Providing social data to underpin catchment planning in the Queensland Murray Darling region

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Executive summary

Introduction

This report presents findings from a survey to 1,000 landholders in the Queensland Murray Darling in 2003. The main aims of this survey were:

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 Natural Heritage Trust 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); and

5. to be used in conjunction with parallel Bureau of Rural Sciences projects to provide a national overview of key trends and Natural Heritage Trust program outcomes.

The Queensland Murray Darling Committee (QMDC), Queensland Department of Primary Industries (QDPI), Brigalow Jimbour Floodplains Group, Western Downs Solutions Group 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 Natural Heritage Trust Extension (NHT).

Assessment of issues

Findings from the survey indicated that social issues such as availability of services, reduced employment opportunities and the decline of small towns were rated amongst the most important issues affecting respondents’ local district. Indeed, three of the top four issues identified related to social conditions.

The identification of weeds and pest animals as a key regional issue in the draft natural resource management plan for the Queensland Murray Darling was confirmed by survey data. Both the cost of managing weeds and pest animals and the impact of these on native plants and animals were rated as important issues affecting the local district by the majority of respondents. However, it is interesting to note that the economic impact of managing weeds and pest animals was rated as an issue by a significantly higher proportion of respondents than the impact on native species.

The majority of respondents also rated the right to harvest or purchase water for agriculture, and depleting groundwater limiting the availability of water as important issues.

Despite being identified as priority issues in the draft natural resource management plan for the Queensland Murray Darling, dryland salinity, native vegetation decline, deteriorating
water quality and lack of Aboriginal community access to culturally significant sites were not rated as important issues by most landholders.

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 remains an important issue, 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.

**Values attached to property**

Findings from the mail survey highlighted that respondents attached a very diverse range of values to their property.

Landholders in the Queensland Murray Darling appeared to have a land stewardship ethic in that achieving a sense of accomplishment from being able to pass the property on in better condition was considered one of the most important values of respondents’ property.

Lifestyle values such as providing the lifestyle they wanted, being a great place to raise a family, being able to work for themselves, being an attractive place to live, and being part of a rural community were also highly rated by respondents with around three quarters of respondents indicating these were important values attached to their property.

Most respondents also said that building/maintaining a viable business, contributing to the environmental health of the district, providing a sound long-term economic investment, and providing most of the household income were important aspects of their property.

While a range of environmental and economic values were attached to respondents’ properties, one of the most highly valued functions 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. 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 is likely to be increased.

**Knowledge**

There was only one natural resource management topic where most respondents said they had sound knowledge. That topic was the benefits of ground cover on grazing and cropping paddocks to maintain and improve soil health.

Respondents reported moderate levels of knowledge about the change in native tree cover in their district, water savings from bore capping/piping and drip irrigation, the benefits of ley pasture and crop rotation, and the effects of unrestricted stock access on waterways and eroded gullies.

Survey findings suggested limited knowledge about the processes leading to herbicide resistance in broad acre cropping, how to interpret results from soil testing, the area of land in the district affected by salinity, training available through the Queensland Department of Primary Industries, and the traditional Aboriginal land management practices in the district.
The relatively low levels of knowledge about some natural resource management issues, including salinity and water quality, are likely to reflect the earlier finding that most landholders did not consider these important issues in their region or on their property. Education and awareness raising 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.

Attitudes towards natural resource management

The most strongly reflected attitude towards natural resource management was that landholders should be paid for environmental services that benefit the wider community. At the same time only a small proportion of respondents agreed that loss in productive capacity could be justified by long-term improvements in the environment.

While acknowledging a wide range of issues, three quarters of respondents were confident that they could achieve social, environmental and economic sustainability.

Preferred funding arrangements for natural resource management

The most preferred option for involving landholders in natural resource management activities was through tax rebates administered by the Australian government. This was the only funding arrangement supported by the majority of respondents.

Over a third of respondents also had a strong interest in the reduction of rates and an annual payment for environmental services.

Less than a third of respondents reported a strong interest in grant schemes administered by QMDC or Landcare, annual lease payments for land managed by others, and contracts with QMDC to undertake work in response to an advertised call.

Despite the earlier finding that the majority of respondents thought landholders should be paid for environmental services, it seems that with the exception of tax rebates, no single mechanism is likely to engage the majority of landholders and that a mix of policy options will be required. The extent to which any paperwork or application process is kept simple and streamlined also appears likely to be an important factor affecting landholder interest in funding arrangements for natural resource management.

Stage of life and long term plans

The average age of landholders in the Queensland Murray Darling was 52 years. Most of rural Australia has an ageing rural population and this trend is often expected to be an important constraint affecting the uptake of new practices. The current perception of a link between younger age and higher adoption of current recommended practices was not supported in this research.

Most property appears likely to be tightly held with over two thirds of respondents reporting that it was likely that they would continue to live on their property, and over half saying that ownership of the property was likely to stay within the family.

Just under one third 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.
Just over one third of respondents said that they were likely to sell or lease all or most of their property in the long-term.

Of those properties that are likely to be sold, the median year that the transfer was likely to occur was 2006. These properties covered approximately 24% of the total land surveyed. The median year of likely transfer for all properties surveyed was 2019 with 35% of properties likely to change hands in the next decade.

**Interest in lease plan to facilitate property transfer**

The Brigalow Jimbour Floodplains Group have developed a proposal intended to assist landholders to fund their retirement, manage family succession or expand to establish viable enterprises by leasing all or part of their property to another landholder or younger family member. Under the proposed arrangement the retiring landholder would receive lease payments that were not means tested against the property (asset or income) and the age pension. The arrangement would also involve a 10-20 year property plan developed by agreement between the landholder, the lessee and the government.

Over half of all respondents said support should be sought to develop a trial area for the lease plan proposed by the Brigalow Jimbour Floodplains Group. These respondents managed over a third of the total survey area.

Of those respondents who expressed some interest in developing this proposal, over a third said that they thought this lease plan provided a useful option for funding their retirement.

**Involvement in planning processes**

Survey findings highlighted limited involvement in a range of planning activities.

Just under half of all respondents were involved in property planning and less than one fifth had a completed or an on-going property plan. Landholders with larger properties were significantly more likely to be involved in property planning.

Despite the finding that most landholders said ownership of their property was likely to stay within the family, most respondents had not begun to plan the transfer of their property to the next generation. Of particular concern was the finding that older respondents were no more likely to be involved in planning the transfer of their property to the next generation. 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.

Just under half of all respondents said they had been involved in local action planning. As was the case with property planning, landholders who managed larger properties were significantly more likely to be involved in local action planning.

Ongoing promotion and greater support to assist landholders to implement plans appear likely to facilitate greater involvement in planning activities. In particular, there appears to be a need for greater attention to promoting and supporting planning activities with managers of smaller properties. Involving the managers of smaller properties in planning activities will be especially important in sub-catchments where these landholders manage a large proportion of the land.
Involvement in government funded programs

Survey data indicated that the vast majority of landholders in the Queensland Murray Darling had not received government funding to undertake work on their property. Less than one quarter of respondents said that work had been undertaken on their property in the last five years that was partially funded by state or federal government programs.

Twenty-one percent of respondents to the survey said that they were currently a member of a Landcare group, four percent of respondents were a member of a Topcrop group and 13% of respondents were a member of another benchmark or best practice group.

Property size and farming as an occupation

The median property size of landholders in the Queensland Murray Darling was 628 ha. Twelve percent of landholders owned/managed a property in excess of 10,000 ha, and these respondents managed 92% of the total area surveyed. Sixty-five percent of respondents said farming was their primary occupation and these respondents managed approximately 99% of the survey area.

Property size is often considered to be an important factor in determining the viability of cropping and grazing enterprises. Findings from this research highlighted a significant relationship between larger property size and returning an on-property profit as well as a higher level of on-property profit.

Levels of income and property equity

Despite the finding that farming was the main occupation for landholders in the Queensland Murray Darling region over half of all respondents to the mail survey said that they did not make return an on-property profit for the 2001/2002 financial year. Furthermore, only 11% of respondents had an on-property income that exceeded the $50,000 profit threshold considered necessary to maintain the natural and capital assets of a property (Rendell et al. 1996).

Almost two thirds of respondents reported an off-property income in 2001/2002, and the combined median total household income was $37,000. Just under a third of respondents had a total household income above the $50,000 mark. The combined total household income for all respondents was just under $14 million, with off-property income accounting for just over $8 million or 56%.

Most respondents had more than 80% equity in their property, although just over a fifth of respondents had less than 60% equity.

Constraints to change

Survey findings highlighted a very broad range of economic, environmental and social constraints that are likely to affect the capacity of landholders in the Queensland Murray Darling to implement changed land management practices. Thirteen of the 18 topics listed in the survey were rated as an important constraint by more than half of all respondents.

The highest rated constraint to changing land management practices was cash flow. Suitability of soils, cost of machinery/equipment, water storage capacity and the extent to which there is support from family or partners were also considered to be important factors by more than two thirds of respondents.
Lack of people undertaking new practices in the district, stage of life, and not seeing returns from the practice in the first year were the lowest rated constraints with less than one third of respondents indicating these were important factors.

**Confidence in current recommended practices (CRP)**

Questions exploring respondents’ confidence in the efficacy of a number of CRP highlight some mixed results. On the one hand, the majority of respondents agreed that fencing was an essential part of the work required to revegetate waterways and eroded gullies, that the time and expense of watering stock off-stream was justified by improvement in bank stability and water quality, and only a very small proportion said that the difficulties and costs associated with stubble retention outweigh any benefits. At the same time, almost half of all respondents acknowledged that fencing waterways and gullies makes it difficult to manage these areas, and were not confident with the scientific advice that 30% of the region needs to be under native vegetation.

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. Individuals who had adopted minimum tillage, fencing waterways and eroded gullies, and only watering stock from a trough or tank were more confident that the benefits of these practices outweighed any disadvantages. The only exception to this trend was the level of confidence in the scientific advice that 30% of the district needs to be under native vegetation, with those who had planted trees and shrubs no more confident in this advice.

**Adoption of CRP**

Results from the mail survey highlighted encouraging levels of adoption for a number of current recommended practices (CRP). Over half of all respondents (with appropriate enterprises/landuses) had adopted the CRP capped and piped bores and bore drains, cropped using minimum tillage practices, only water stock from a trough or tank, made expenditure on controlling pest animals and non-crop weeds, used low pressure overhead or drip irrigation systems, and used time controlled or spell grazing.

Given that almost 90% of respondents had capped and piped all bores and bore drains on their property and 93% of the cropping area surveyed was cropped under minimum tillage the uptake of these practices is particularly encouraging.

Between one third and a half of all respondents (with appropriate enterprises/landuses) adopted the CRP encouraged regrowth of native vegetation; varied crop rotation on the basis of soil test results; fenced waterways and eroded gullies to manage stock access; sowed perennial pasture; planted trees and shrubs and cropped using a rotation with ley pasture.

Less than one third of respondents (with appropriate enterprises/landuses) had adopted the CRP reduced machinery or stock traffic; cropped using reduced chemical use by applying GPS or integrated pest management technologies; and fenced native bush to manage stock access.

Analysis of factors linked to the adoption of CRP highlighted the complex nature of decision making regarding the adoption of these practices. A diverse range of values and attitudes, adoption of other farm management practices, knowledge about the extent and management of issues, and socio-demographic variables were linked to the adoption of CRP. Some of the most common factors linked to adoption of CRP were:
- the perception that building/maintaining a viable business was an important value of the property;
- confidence in the efficacy of practices
- involvement in property planning;
- employment of a consultant;
- involvement in government funded programs;
- on-property profitability;
- Landcare membership; and
- Involvement in local action planning.

The common perceptions that property size, farming as an occupation, age, and low level of equity are important constraints to adoption were not supported by this research.

**Differences across survey sub-regions**

Irrespective of the actions or policies that are contemplated, it is critical to recognise that there are important differences across sub-regions in the Queensland Murray Darling. This research used nine survey sub-regions based around Statistical Local Areas (SLAs) within the region. Differences across these regions included:

- property size;
- occupation;
- on-property profitability;
- off-property profitability;
- perception of issues;
- values attached to property;
- long-term plans for property;
- knowledge about natural resource management;
- factors influencing decisions about implementing changed management practices;
- involvement in government programs; and
- involvement in property planning.

**Opportunities for future research**

This research has provided important baseline information about the views, attitudes, knowledge, long-term plans, and socio-economic characteristics of landholders in the Queensland Murray Darling region. The research also provided a detailed examination of landholder adoption of CRP identified as likely to contribute to improved productivity and
natural resource management outcomes. The establishment of this baseline data provides an important opportunity to be able to track changes over time and contribute to the monitoring and evaluation of natural resource management activities across the region. This potential will only be realised if there is a follow up study in three to five years time.

Findings presented in this report also highlighted a number of issues that appear to warrant further investigation including:

- explanation for limited involvement in property planning and ways of promoting greater participation;
- the relative cost effectiveness and impact of potential funding arrangements for involving landholders in natural resource management activities;
- reasons for limited uptake of cropping with a ley pasture in the rotation for individuals that had employed a consultant to provide advice on property management;
- the impact of implementing CRP on landholders’ lifestyle; and
- exploration of the links between adoption of CRP and the viability of rural communities.
1. Introduction

Research context

This report presents a summary of key findings from a mailed survey to 1000 landholders in the Queensland Murray Darling region in 2003. The survey focussed on gathering 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 Queensland Murray Darling.

It is important to recognise that much of the Queensland Murray Darling has experienced severe drought conditions in 2003 and that these conditions are likely to have affected responses to some of the questions in the mail survey. However, the project partners thought it was important to establish base-line 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 Queensland Murray Darling Committee (QMDC), Queensland Department of Primary Industries (QDPI), Brigalow Jimbour Floodplains Group, Western Downs Solutions Group 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 Natural Heritage Trust Extension (NHT).

Research objectives

1. To provide baseline data for key social and economic conditions/trends at the sub-region 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.
2. Report structure

The next chapter provides some background to the Queensland Murray Darling. 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. assessment of issues;
2. values attached to property;
3. knowledge;
4. attitudes towards natural resource management;
5. Preferred funding arrangements;
6. stage of life and long-term plans;
7. interest in a lease plan to facilitate property transfer;
8. involvement in planning process;
9. involvement in government funded programs;
10. property size and farming as an occupation;
11. levels of income and property equity;
12. land use and enterprise mix;
13. constraints to change;
14. adoption of current recommended practices;
15. confidence in current recommended practices;
16. sub-regional differences; and
17. other background information.

Based on these findings, the concluding chapter highlights key issues and strategies for efforts to improve natural resource management in the Queensland Murray Darling region.
3. Background

The location and character of the Queensland Murray Darling region

The Queensland Murray Darling region is located in southern Queensland and covers an area of approximately 260,000 square kilometres [Figure 1] (QMDC 2003). The Queensland Murray Darling region covers approximately 15% of Queensland and almost 25% of the Murray Darling Basin. The region includes four catchment areas: the Condamine, Border Rivers, Maranoa Balonne and Warrego Paroo. Agriculture and pastoral production are major contributors to the regional economy, and are worth approximately $620 million a year or 15% of the annual gross regional product (QMDC 2003).

Major cities and townships in the region include Stanthorpe, Inglewood, Goondiwindi, Miles, Dirranbandi, St George, Roma, Mitchell, Charleville, Cunnamulla, Quilpie, Dalby, Chinchilla, and Jandowae. The Queensland Murray Darling Regional Natural Resource Management Plan identified dryland salinity, water quality, water allocation, vegetation management, weeds and pest animals, and energy and waste management as major natural resource management issues affecting the area (QMDC 2003).

MAP 1: SURVEY AREA
Survey sub-regions in the Queensland Murray Darling

A key aim of this research was to provide baseline information about the social and economic conditions in the Queensland Murray Darling 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 Queensland Murray Darling region. As highlighted in Map 2, the survey area contained 18 SLAs.

These 18 SLAs were combined on the bases of geographic location and the number of survey respondents in each to form nine survey sub-regions. These survey sub-regions are used throughout this report to explore the variation across different parts of the Queensland Murray Darling region.
MAP 3: SURVEY SUB-REGIONS

Survey sub-regions
1 (Quilpie/Bulloo)
2 (Murweh/Paroo/Booronga/Tambo)
3 (Balonne/Warroo)
4 (Bungil/Bendemere)
5 (Waggamba/Inglewood)
6 (Tara)
7 (Murilla/Chinchilla)
8 (Millmerran/Wambo)
9 (Stanthorpe)
4. Methodology

Background to this research

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

- articulate their vision and objectives (Where do we want to go?);
- describe their catchment 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 catchment 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 catchments;
- drawing on secondary and primary data sources to describe the social structure and change over time in that structure in a catchment;
- employing processes that enable stakeholders to explore the trade-offs inherent in many resource allocation decisions across different issues and parts of a catchment;
- drawing on a range of theoretical and empirical research that would enhance the communication activities of catchment 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 catchment 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 catchments 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 (Vanclay 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 1998).

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). 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

Australians profiling regional communities have usually included attributes that measure some aspect 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 catchment managers who need to understand the behaviour of the private landholders who control most of the land in their catchments. 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 Queensland Murray Darling 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 any additional background information are also provided in the relevant section of the report.

- Assessment of issues affecting property and district.
- 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.
- Response to lease scheme to facilitate property succession.
- Involvement in planning related to family succession, property and business.
- Long-term plans for the property.
- Adoption of 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 Queensland Murray Darling was to explore the impact of factors expected to explain variance in 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:

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

There were 15 CRP included in the survey.

1. Time controlled or spell grazing.
2. Varying crop rotation according to soil test results.
3. Cropping using a rotation with ley pasture.
4. Reducing machinery or stock traffic.
5. Cropping with reduced chemical usage as a result of applying integrated pest management or GPS technology.
6. Only watering stock from troughs or tanks.
7. Using low pressure overhead or drip irrigation systems.
8. Fencing waterways to manage stock access.
9. Fencing native bush to manage stock access.
10. Encouraging regrowth of native vegetation.
11. Cropping using minimum tillage practices.
12. Sowing introduced perennial pasture.
13. Planting trees and shrubs.
14. Time spent to control non-crop weeds and pest animals.
15. Capping and piping bores and bore drains.
The mail survey process

The following points briefly outline the sampling method used in the mail survey to landholders in the Queensland Murray Darling region.

- QMDC 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 QMDC 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.
- Tables containing rural property information were then entered into a Geographic Information System (ArcView GIS).
- All properties less than 10 ha were excluded from the potential survey sample.
- These names and addresses were forwarded on to BRS, where duplicate names were identified and removed from the 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 QMDC. A draft version of the survey was pre-tested with five focus groups comprised of representatives from a cross section of landholders in the Queensland Murray Darling. 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 the property had been sold (171). This left a final sample of 821, with 490 completed surveys returned. This represents a very high response rate for a randomised survey and provides considerable confidence in the survey findings.
Data Analysis

Findings in this report have been presented so they can be interpreted without understanding the statistical methods used. However, for those who are interested to know how we approached the task of data analysis, a brief explanation of the statistical methods used is given below.

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.

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 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’ motivations.

In this research it was not possible to collect information across time. This is an important limitation given the results of Barr et al. (2000) that identified important temporal trends. The 2003 Queensland Murray Darling survey should be followed by another, say in three to five years time. It would then be possible to identify trends over time.
5. Findings by survey topic

Assessment of issues
Landholders were asked to assess the importance of a range of social, environmental and economic issues in their local district or 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 ‘very important’, ‘important’, ‘of some importance’, ‘minimal importance’ and ‘not important’. To simplify the presentation of this data, these five responses have been collapsed into three categories – ‘important’ (combining very important and important), ‘some’ (of some importance) and ‘unimportant’ (combining not important and minimal importance).

Key findings
- Social issues such as the availability of important services, reduced employment opportunities, and the decline of small towns were rated amongst the most important issues affecting respondents’ local district.
- The cost of managing weeds and pest animals was the highest rated natural resource management issue with three-quarters of respondents reporting this was an important issue in their district.
- The majority of respondents also rated the right to harvest or purchase water for agriculture, depleting groundwater limiting the availability of water, and the impact of introduced plants and animals on native species as important issues.
- Uncertain or low returns limiting investment in the long-term health of property, increased paperwork limiting time available for other management activities and red tape limiting interest in government funding for environmental works were rated as important issues on most respondents’ property.
- Dryland salinity, native vegetation decline, deteriorating water quality and lack of Aboriginal community access to culturally significant sites were not rated as important issues by most landholders.

Issues affecting the local district
Seven of the 18 issues were rated as important issues affecting the local district by more than half of all respondents. The highest rated issue was the availability of important services. The next highest rated issue was the cost of managing weeds and pest animals (including native species) [Figure 1].

Findings from the survey indicated that social issues such as availability of services, reduced employment opportunities and the decline of small towns were rated amongst the most important issues affecting respondent’s local district. Indeed, three of the top four issues identified related to social conditions. There is quite clearly considerable community concern about the viability of many rural communities in the Queensland Murray Darling [Figure 1].
The identification of weeds and pest animals as a key regional issue in the draft natural resource management plan was confirmed by survey data. Both the cost of managing weeds and pest animals and the impact of these on native plants and animals were rated as important issues affecting the local district by the majority of respondents. However, it is interesting to note that the economic impact of managing weeds and pest animals was rated as an issue by a significantly higher proportion of respondents than the impact on native species ($Z=6.637$, $p<0.001$) [Figure 1].

Other issues rated as important by most respondents included the right to harvest or purchase water for agriculture and depleting groundwater limiting the availability of water. These findings are consistent with the identification of water allocation management as a key regional issue in the draft regional natural resource management plan for the Queensland Murray Darling [Figure 1].

In contrast, dryland salinity, decline of native vegetation, deteriorating water quality and lack of Aboriginal community access to culturally significant sites were not rated as important issues affecting the local district by most landholders, despite being identified as priorities issues in the draft regional natural resource management plan [Figure 1]. 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.

It is critical to note that many of the priority issues identified in the draft natural resource management plan for the Queensland Murray Darling 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 remains an important issue, 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 Queensland Murray Darling 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.

There were a number of significant differences in respondents’ assessment of issues affecting their district across the nine survey sub-regions [Appendix 2 & 3].
### Figure 1 – Assessment of Issues Affecting the District

<table>
<thead>
<tr>
<th>Issue</th>
<th>Percentage Distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Availability of important services</td>
<td>85% (Important)</td>
</tr>
<tr>
<td>2. The cost of managing weeds and pest animals (including native species)</td>
<td>76% (Important)</td>
</tr>
<tr>
<td>3. Reduced employment opportunities</td>
<td>74% (Important)</td>
</tr>
<tr>
<td>4. Decline of small towns</td>
<td>68% (Important)</td>
</tr>
<tr>
<td>5. The right to harvest or purchase water for agriculture</td>
<td>58% (Important)</td>
</tr>
<tr>
<td>6. Introduced plants and animals affecting native plants and animals</td>
<td>53% (Important)</td>
</tr>
<tr>
<td>7. Depleting groundwater limiting the availability of water</td>
<td>53% (Important)</td>
</tr>
<tr>
<td>8. Decline in soil health</td>
<td>47% (Important)</td>
</tr>
<tr>
<td>9. Property amalgamation leading to less viable communities</td>
<td>40% (Important)</td>
</tr>
<tr>
<td>10. Altered river or stream flows threatening the health of waterways</td>
<td>40% (Important)</td>
</tr>
<tr>
<td>11. Encroachment of native vegetation on agricultural land</td>
<td>39% (Important)</td>
</tr>
<tr>
<td>12. Inefficient use of water for agriculture</td>
<td>37% (Important)</td>
</tr>
<tr>
<td>13. Nutrient and chemical runoff affecting water quality</td>
<td>34% (Important)</td>
</tr>
<tr>
<td>14. Removal of native vegetation since European settlement</td>
<td>33% (Important)</td>
</tr>
<tr>
<td>15. Dryland salinity undermining the long-term productive capacity of the district</td>
<td>29% (Important)</td>
</tr>
<tr>
<td>16. Property subdivision undermining the viability of agriculture</td>
<td>27% (Important)</td>
</tr>
<tr>
<td>17. Dryland salinity reducing water quality</td>
<td>24% (Important)</td>
</tr>
<tr>
<td>18. Lack of Aboriginal community access to culturally significant sites on private property</td>
<td>4% (Unimportant)</td>
</tr>
</tbody>
</table>

Analysis of survey data highlighted only one link between respondents’ assessment of issues in their district and adoption of the CRP explored in this project. Respondents who said that encroachment of native vegetation on agricultural land was **not** an important issue in their district were significantly more likely to adopt the CRP planted trees and shrubs [refer to adoption of current recommended practices section on page 53].
**Issues affecting respondents’ property**

When asked about a range of issues affecting their property, uncertain or low returns limiting investment in the long-term health of the property was rated as the most important issue. Increased paper work limiting the time available for other management activities and Government “red tape” limiting interest in applying for assistance to undertake work with environmental benefits were also commonly reported issues at the property level. Over half of all respondents said that each of these issues was an important factor affecting their property [Figure 2].

Findings from the mail survey indicated only moderate concern about the availability of technical advice and farm labour. As was the case with issues affecting the district, there was little concern about the long-term impacts of salinity at the property scale [Figure 2].

Assistance for works with environmental benefits appears to be an important approach to facilitate improved natural resource management on private property in the Queensland Murray Darling. At the same time, the success of this approach will depend on the extent it can be implemented without overwhelming paperwork and government red tape. Any application process for assistance must be transparent, equitable, targeted, timely and streamlined.

Respondents’ assessment of the issues affecting their property varied significantly across survey sub-regions [Appendix 2].

**FIGURE 2 – ASSESSMENT OF ISSUES AFFECTING RESPONDENTS’ PROPERTY**

<table>
<thead>
<tr>
<th>Issue</th>
<th>Important</th>
<th>Some</th>
<th>Unimportant</th>
<th>Not applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Uncertain or low returns limiting investment in the long-term health of property</td>
<td>63</td>
<td>11</td>
<td>19</td>
<td>7</td>
</tr>
<tr>
<td>2. Increased paper work limiting the time available for managing other aspects of property</td>
<td>59</td>
<td>10</td>
<td>22</td>
<td>9</td>
</tr>
<tr>
<td>3. Government “red tape” limiting my interest in applying for assistance to undertake work with environmental benefits</td>
<td>58</td>
<td>14</td>
<td>17</td>
<td>11</td>
</tr>
<tr>
<td>4. Reduced technical advice from government to help manage property</td>
<td>30</td>
<td>21</td>
<td>39</td>
<td>10</td>
</tr>
<tr>
<td>5. Access to farm labour limiting management options</td>
<td>26</td>
<td>15</td>
<td>43</td>
<td>16</td>
</tr>
<tr>
<td>6. Dryland salinity undermining the long-term productive capacity of my property</td>
<td>13</td>
<td>7</td>
<td>55</td>
<td>25</td>
</tr>
</tbody>
</table>
Box 2 – Assessment of issues on-property and adoption of CRP

There were no significant links between respondents’ assessment of issues on their property and adoption of CRP.

Respondents’ assessment of the extent 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 estimate the total area of their property where plants were showing some signs of salinity.

Only 16 respondents (4.3% of those surveyed) said there were plants showing the signs of salinity on their property. The median area affected by salinity for these respondents was 18 ha and a total of 3,344 ha, or well under 1% of the total area of properties surveyed.

As highlighted in Map 4 respondents in the west of the region were more likely to report areas on their property where plants were showing signs of salinity, ranging from a high of 25% in survey sub-region 1 to 0% in survey sub-regions 5 and 8.

This finding appears somewhat contradictory in light of the fact that almost all of the recorded salinity sites in the QMD have occurred in the Upper Condamine catchment (QMDC 2004). Part of the explanation for this finding may be that efforts to monitor the extent of salinity have been focused in that part of the catchment as it is considered to be most at risk of salinity.
MAP 4: LANDHOLDER PERCEPTIONS OF SALINITY

Proportion of landholders reporting areas where plants showed signs of salinity

- 0%
- 1 - 3%
- 4 - 6%
- 7 - 12%
- 13 - 25%

Legend:

- 0%
- 1 - 3%
- 4 - 6%
- 7 - 12%
- 13 - 25%
Values attached to property

The mail survey included a range of statements exploring the values landholders in the Queensland Murray Darling 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), ‘some’ (of some importance) and ‘unimportant’ (combining not important and minimal importance).

Key findings

- A very wide range of social, environmental, and economic values were attached to respondents’ property.

- Lifestyle values were highly rated by respondents with around three quarters of respondents indicating that providing the lifestyle they wanted, being a great place to raise a family, being able to work for themselves, being an attractive place to live, and being part of a rural community were important values attached to their property.

- Landholders in the Queensland Murray Darling appear to have a very strong land stewardship ethic in that achieving a sense of accomplishment from being able to pass the property on in better condition was considered the most important value of respondents’ property (82% said this was important to them).

- Most respondents also said that building/maintaining a viable business, providing a sound long-term economic investment, and providing most of the household income were important aspects of their property.

- Contributing to the environmental health of the district, providing habitat for native animals, and keeping them in touch with nature were also values most respondents attached their property.

- Providing a break from their normal occupation, providing the only job they have ever done, and preserving family heritage were not rated as important aspects of their property for most respondents.

Survey findings highlighted a very diverse range of values attached to respondents’ properties. Fifteen of the 21 topics included in the survey were rated as important by more than half of all respondents. One of the single most important values reported was the sense of accomplishment from knowing that the property will be passed on in better condition. Over three quarters of respondents said this was an important value of their property suggesting most respondents had a land stewardship ethic [Figure 3].

Respondents also highlighted a range of important social values associated with their property including providing the lifestyle that they wanted, being a great place to raise a family, the freedom of working for themselves, being an attractive place to live and being part of a rural community. Around three quarters of all respondents indicated that these aspects represented important values of their property [Figure 3].
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 sense of accomplishment from building/maintaining a viable business, providing a sound long-term economic investment, being an asset that will fund retirement and providing the majority of household income were rated as important by the majority of respondents. The property contributing to the environmental health of the district, providing habitat for native plants and animals, and work on the property keeping them in touch with nature were also considered important values by more than half of all respondents [Figure 3].

The lowest rated values were work on the property provides a break from my normal occupation, providing the only job they had ever done and to preserve family heritage [Figure 3].

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, one of the most highly valued functions 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 appeal to landholders in the Queensland Murray Darling 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.

There were a number of significant differences across the nine survey sub-regions in terms of the values respondents attached to their property [Appendix 2 & 3].
FIGURE 3 – VALUES ATTACHED TO PROPERTY

1. Provides the lifestyle that I want
   - Important: 82%
   - Some: 11%
   - Unimportant: 3%

2. Sense of accomplishment knowing that the property will be passed on in better condition
   - Important: 82%
   - Some: 7%
   - Unimportant: 11%

3. It is a great place to raise a family
   - Important: 76%
   - Some: 9%
   - Unimportant: 15%

4. The freedom of working for myself
   - Important: 76%
   - Some: 8%
   - Unimportant: 16%

5. It is an attractive place to live
   - Important: 75%
   - Some: 13%
   - Unimportant: 12%

6. Sense of accomplishment from building/maintaining a viable business
   - Important: 72%
   - Some: 13%
   - Unimportant: 15%

7. Being part of a rural community
   - Important: 71%
   - Some: 18%
   - Unimportant: 11%

8. The condition of the property contributes to the environmental health of the district
   - Important: 71%
   - Some: 17%
   - Unimportant: 12%

9. Provides habitat for native animals
   - Important: 64%
   - Some: 21%
   - Unimportant: 15%

10. Provides a sound long-term economic investment
    - Important: 64%
    - Some: 16%
    - Unimportant: 20%

11. An asset that will fund my retirement
    - Important: 60%
    - Some: 15%
    - Unimportant: 25%

12. Work on the property keeps me in good health
    - Important: 58%
    - Some: 23%
    - Unimportant: 19%

13. Provides most of the household income
    - Important: 58%
    - Some: 13%
    - Unimportant: 29%

14. Sense of accomplishment from producing food or fibre for others
    - Important: 57%
    - Some: 18%
    - Unimportant: 25%

15. Work on the property keeps me in touch with nature
    - Important: 54%
    - Some: 21%
    - Unimportant: 25%

16. A place for recreation
    - Important: 43%
    - Some: 22%
    - Unimportant: 35%

17. Being able to build a business that employs other family members
    - Important: 40%
    - Some: 18%
    - Unimportant: 42%

18. Brings me closer to earlier generations who worked the land
    - Important: 39%
    - Some: 16%
    - Unimportant: 45%

19. Work on the property is a welcome break from normal occupation
    - Important: 39%
    - Some: 10%
    - Unimportant: 51%

20. Work on the property is the only job I’ve ever done
    - Important: 35%
    - Some: 11%
    - Unimportant: 54%

21. To preserve family heritage
    - Important: 32%
    - Some: 13%
    - Unimportant: 55%
Box 3 – Values attached to property and adoption of CRP

There were a number of links between different values attached to property and adoption of CRP.

- Higher adoption of the CRP encouraged regrowth of native vegetation was significantly linked to respondents who said native vegetation providing habitat for native birds and animals was an important value of their property.

- Higher adoption of the CRP planted trees and shrubs was significantly linked to respondents who said that providing a place of recreation was an important value of their property.

- Higher adoption of the CRP sown perennial pasture or lucerne was significantly linked to respondents who said receiving a sense of accomplishment from building/maintaining a viable business was an important value of their property.

- Higher adoption of the CRP only watered stock from a trough or tank was significantly linked to respondents who said receiving a sense of accomplishment from building/maintaining a viable business was an important value of their property.

- Lower adoption of the CRP encourage regrowth of native vegetation was significantly linked to respondents who said receiving a sense of accomplishment from building/maintaining a viable business was an important value of their property.

- Lower adoption of the CRP only watered stock from a trough or tank was significantly linked to respondents who said receiving a sense of accomplishment from building/maintaining a viable business was an important value of their property.

- Lower adoption of the CRP reduced machinery or stock traffic was significantly linked to respondents who said that providing them with the only job they had ever done was an important value of their property.

- Lower adoption of the CRP minimum tillage was significantly linked to respondents who said that providing the lifestyle that they want was an important value of their property.

- Lower adoption of the CRP used low pressure overhead or drip irrigation was significantly linked to respondents who said that keeping them in touch with nature was an important value of their property [refer to adoption of current recommended practices section on page 53].

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 16 topics relating to major natural resource management issues in the Queensland Murray Darling 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 were knowledge about a specific topic was not relevant to respondents (for example where topics related to specific landuses or enterprises).
Key findings

- The only natural resource management topic where most respondents said they had sound knowledge was the benefits of ground cover on grazing and cropping paddocks to maintain and improve soil health (57% said they had sound knowledge).

- Respondents reported moderate levels of knowledge about the change in native tree cover in their district, water savings from bore capping/piping and drip irrigation, the benefits of ley pasture and crop rotation, and the effects of unrestricted stock access on waterways and eroded gullies.

- Between one third and two thirds of respondents said they had little knowledge about assistance available for drought/exceptional circumstances, the processes leading to herbicide resistance in broad acre cropping, how to interpret results from soil testing, the area of land in the district affected by salinity, training available through the QDPI, and the traditional Aboriginal land management practices in the district.

Of the 16 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 ground cover on cropping or grazing paddocks to maintain or improve soil health [Figure 4].

Just under half of all respondents said they had sound knowledge about the change in native tree cover in the district over their lifetime, the extent of water savings from bore capping/piping and drip irrigation, the benefits of ley pasture and crop rotation in maintaining soil health and productivity, the extent of water savings from bore capping/piping and drip irrigation, and the effects of unrestricted stock access on waterways and eroded gullies [Figure 4].

For all other topics including those about salinity, water quality, training, and who to contact for advice about government programs, the vast majority of respondents reported limited knowledge [Figure 4].

The survey highlighted particularly low levels of knowledge about:

- traditional Aboriginal land management practices in the district (62% little or no knowledge);
- training available though the Queensland Department of Primary Industries (48% little or no knowledge);
- the area of land affected by salinity in the district (47% little or no knowledge);
- the process leading to herbicide resistance in broad acre cropping (43% little or no knowledge);
- and how to interpret results from soil testing (36% little or no knowledge) [Figure 4].

The relatively low levels of knowledge across some natural resource management issues, including salinity and water quality, 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.

Analyses of survey data highlighted significant differences in respondents’ knowledge of natural resource management across the nine survey sub-regions [Appendix 2 & 3].

FIGURE 4 – KNOWLEDGE ABOUT NATURAL RESOURCE MANAGEMENT

1. The benefits of ground cover on grazing or cropping paddocks to maintain or improve soil health
   - Sound knowledge: 57%
   - Some knowledge: 31%
   - Little knowledge: 10%
   - Not applicable: 2%

2. The change in native tree cover in your district over your lifetime
   - Sound knowledge: 47%
   - Some knowledge: 30%
   - Little knowledge: 21%
   - Not applicable: 2%

3. The extent of water savings from bore capping/piping and drip irrigation
   - Sound knowledge: 44%
   - Some knowledge: 37%
   - Little knowledge: 12%
   - Not applicable: 7%

4. The benefits of ley pastures and crop rotation in maintaining soil health and productivity
   - Sound knowledge: 42%
   - Some knowledge: 32%
   - Little knowledge: 18%
   - Not applicable: 8%

5. The effects of unrestricted stock access on waterways and eroded gullies
   - Sound knowledge: 40%
   - Some knowledge: 39%
   - Little knowledge: 18%
   - Not applicable: 3%

6. The ability of vegetation in waterways and gullies to improve water quality
   - Sound knowledge: 34%
   - Some knowledge: 44%
   - Little knowledge: 20%
   - Not applicable: 2%

7. The ability of perennial vegetation and standing stubble to improve water quality
   - Sound knowledge: 32%
   - Some knowledge: 38%
   - Little knowledge: 27%
   - Not applicable: 3%

8. How to prepare a property plan that allocates land use according to different land classes
   - Sound knowledge: 31%
   - Some knowledge: 32%
   - Little knowledge: 34%
   - Not applicable: 3%

9. How to recognise the signs of salinity
   - Sound knowledge: 27%
   - Some knowledge: 53%
   - Little knowledge: 18%
   - Not applicable: 2%

10. Who to contact about government programs supporting better natural resource management
    - Sound knowledge: 27%
    - Some knowledge: 44%
    - Little knowledge: 27%
    - Not applicable: 2%

11. Assistance available for drought/exceptional circumstances
    - Sound knowledge: 27%
    - Some knowledge: 36%
    - Little knowledge: 34%
    - Not applicable: 3%

12. The processes leading to herbicide resistance in broad acre cropping situations
    - Sound knowledge: 19%
    - Some knowledge: 25%
    - Little knowledge: 43%
    - Not applicable: 13%

13. How to interpret results from soil testing
    - Sound knowledge: 17%
    - Some knowledge: 45%
    - Little knowledge: 36%
    - Not applicable: 3%

14. The area of land where plants are affected by salinity in your district.
    - Sound knowledge: 17%
    - Some knowledge: 20%
    - Little knowledge: 47%
    - Not applicable: 16%

15. Training available through the Queensland Department of Primary Industries
    - Sound knowledge: 11%
    - Some knowledge: 38%
    - Little knowledge: 48%
    - Not applicable: 3%

16. Traditional Aboriginal land management practices in your district
    - Sound knowledge: 7%
    - Some knowledge: 20%
    - Little knowledge: 62%
    - Not applicable: 11%
Box 4 – Knowledge and adoption of CRP

Analysis highlighted some links between knowledge and adoption of CRP.

- Higher adoption of the CRP minimum tillage was significantly linked to respondents who said they had knowledge about the processes leading to herbicide resistance in broadacre cropping situations.

- Higher adoption of the CRP cropping rotation varied according to soil test results was significantly linked to respondents who said they had knowledge about how to interpret results from soil testing [refer to adoption of current recommended practices section on page 53].

Attitudes towards natural resource management

A series of nine statements explored landholders’ attitudes to the management of natural resources in the Queensland Murray Darling 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 5.

Key findings

- The most strongly reflected attitude towards natural resource management was that landholders should be paid for environmental services that benefit the wider community (76% of respondents agreed).

- While acknowledging a wide range of issues, three quarters of respondents were confident that they could achieve social, environmental and economic sustainability.

- The majority of respondents also agreed that it made more sense to protect areas of high quality remnant vegetation than revegetating cleared landscapes and that water diversion and on-property storage could have impacts on other landholders and the environment.

- Only a small proportion of respondents agreed that loss in productive capacity could be justified where there were long-term environmental benefits, clearing had substantially reduced the existence and diversity of native plants and animals, there was a substantial area of marginal cropping country that should be returned to grazing, and Aboriginal communities should have the right to access culturally significant sites on private property.

The most strongly reflected attitude was that landholders should be paid for environmental services that benefit the wider community with over three quarters of respondents agreeing with this statement. At the same time, only one third of respondents thought a short-term loss in productive capacity could be justified by long-term benefits to natural resources [Figure 5]. Respondents who returned an on-property profit ($\chi^2=3.193$, df=4, p=0.526) or had a higher level of on-property profit ($r_s=0.057$, p=0.455) were no more or less likely to indicate that reduced productive capacity could be justified by improved resource conditions. While earlier findings indicated that most landholders had a land stewardship ethic in that being able to
pass the property on in better condition was important to them, the need to maintain short-
term productivity appears likely to represent a barrier for some respondents.

Overall, respondents appeared confident about sustaining a triple bottom line. Despite
previous sections of this report highlighting a broad range of issues, the vast majority of
respondents said they thought it was possible for landholders in their district to achieve
economic, environmental and social sustainability [Figure 5]. That is, while landholders
acknowledged a range of economic, environmental and social issues they appeared confident
that these issues can be addressed.

Responses to the survey also indicated an understanding of the need for strategic investments
and the potential for off-site or down stream impacts from actions on an individual property.
Over half of all respondents agreed that it makes more sense to protect areas of high quality
remnant vegetation as opposed to revegetating cleared landscapes and that water diversion
and on-property storage could lead to problems for other landholders and the environment
[Figure 5]. The issues section of this report highlighted that over half of all landholders were
concerned about the right to harvest or purchase water for agriculture. Nevertheless, it also
appears there is an understanding of potential impacts of water diversion and storage.

In contrast, only a small proportion of respondents thought that clearing had substantially
reduced the existence and diversity of native plants and animals and over half of all
respondents disagreed. It is interesting to note that in earlier sections of this report almost half
of all respondents said they had sound knowledge about the change in native tree cover, yet
removal of native vegetation was not perceived as a priority issue by most landholders [Figure
5]. These finding suggest that while there is relatively good knowledge about the change in
native vegetation over time there is less certainty amongst landholders about the impacts of
this change.

Only a small proportion of respondents felt that Aboriginal communities should have the right
to access culturally significant sites on private property [Figure 5]. These perceptions appear
likely to be largely linked to ongoing concerns about native title and property rights. Any
attempts to either identify or provide access to culturally significant sites on private property
would need to clearly outline the implications of these issues.

There were a number of significant differences across the survey sub-regions in terms of
landholders’ attitudes towards natural resource management [Appendix 2].
FIGURE 5 – ATTITUDES TOWARDS NATURAL RESOURCE MANAGEMENT

1. Landholders should be paid for environmental services that benefit the wider community
2. Landholders in this district can achieve economic, environmental and social sustainability
3. It makes more sense to protect high quality remnant vegetation than to revegetate cleared landscapes
4. Water diversion and on-property storage could lead to problems for other landholders and the environment
5. Loss in productive capacity can be justified where there are long-term benefits to natural resources
6. It is difficult to obtain reliable expert advice or assistance for natural resource management
7. Clearing has substantially reduced the existence and diversity of native plants and animals in this district
8. There is a substantial area of marginal cropping country that should be returned to grazing
9. Aboriginal communities should have the right to access culturally significant sites on private property

Box 5 – Attitudes to natural resource management and adoption of CRP

Survey data highlighted two links between respondents’ attitudes towards natural resource management and adoption of CRP.

- Higher adoption of the CRP reduced machinery and stock traffic was significantly linked to respondents who said loss of productive capacity can be justified where there are long-term benefits to natural resources [refer to adoption of current recommended practices section on page 53].

Preferred funding arrangements for natural resource management

Through its regional natural resource management plan, the QMDC 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 6].

Key findings

- Tax rebates and reduction in rates were the funding arrangements that survey respondents reported the strongest interest in. Tax rebates was the only funding arrangement that the majority of respondents had a strong interest in.

- 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 QMDC or Landcare (26%), annual lease payments for land managed by others (18%), and contracts with QMDC to undertake work in response to an advertised call (14%).

The most preferred option for involving landholders in natural resource management activities was through tax rebates administered by the Australian Government. This was the only funding arrangement that the majority of respondents (50%) reported a strong interest in [Figure 6].

Just under half of all respondents (45%) were also strongly interested in reductions to rates levied by local government and over a third for annual payments for environmental services [Figure 6].

Survey findings highlighted more limited levels of interest in grant schemes administered by the QMDC or Landcare [Figure 6].

Less than 20% of respondents reported strong interest in annual lease payments for land managed by others or a contract with QMDC in response to an advertised call [Figure 6].

Despite the earlier finding that the majority of respondents thought landholders should be paid for environmental services, it seems that with the exception of tax rebates no single mechanism is likely to engage the majority of 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.

Survey data highlighted two significant differences in respondents’ interest in incentives for natural resource management across the nine survey sub-regions [Appendix 2].
FIGURE 6 – INTEREST IN FUNDING ARRANGEMENTS FOR NATURAL RESOURCE MANAGEMENT

| 1. Tax rebate administered by the Australian Government |
|-------------|-------------|----------------|
| Strong interest | Moderate interest | Limited interest |
| 2. Reduction in rates levied by local government |
| 3. Annual payment for environmental services (eg. carbon credits) |
| 4. Grant scheme administered by QMDC or Landcare |
| 5. Annual lease payments for land managed by others |
| 6. Contract with QMDC to undertake work in response to an advertised call |

Box 6 – Interest in funding arrangements for NRM and adoption of CRP

There were no significant links between respondents preferred funding arrangements for natural resource management activities and adoption of any CRP included in the mail survey.

Stage of life and long term plans

Respondents to the mail survey were asked to indicate their age at the time of the survey. In addition, twelve statements explored the likelihood that each respondent’s long-term plans would involve a range of options [Figure 7].

This data was expected to contribute to a better understanding of the potential for change in the management and ownership of land in the Queensland Murray Darling region.

The response options for these statements were ‘highly likely’, ‘likely’, ‘not sure’, ‘unlikely’, and ‘highly unlikely’. These choices were not considered as being mutually exclusive, that is, any single respondent could indicate that more than one option was likely to occur. For presentation purposes, in Figure 7 these response options have been collapsed into three groups – ‘likely’ (combining highly likely and likely), ‘not sure’, and ‘unlikely’ (combining highly unlikely and unlikely).
Key findings

- The average age of landholders in the Queensland Murray Darling Basin was 52 years.
- Most property appears likely to be tightly held with over two thirds of respondents reporting that it was likely that they would continue to live on their property and over half said that ownership of the property was likely to stay within the family.
- Just under one third 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.
- Just over a third of respondents said that they were likely to sell or lease all or most of their property in the long-term.
- Of those properties that are likely to be sold, the median year that the transfer was likely to occur was 2006.
- The median year of likely transfer for all properties surveyed was 2019, with 35% likely to change hands in the next decade.

Age

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 mean age of property owners surveyed in the Queensland Murray Darling was 52 years. Seventeen percent of respondents were under the age of 40, while 13% were over the age of 65. The over 65 years of age group managed just over 3% of all land surveyed.

Box 7 – Age and adoption of CRP

Data analysis indicated no significant links between age and adoption of the CRP included in the mail survey. The common perception that age represents an important barrier to the adoption of CRP was not supported by survey findings in the Queensland Murray Darling.

Continue to live on property

Responses to the survey question exploring landholders’ long-term plans indicated that most land in the Queensland Murray Darling 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 7]. This group of respondents managed 89% of land surveyed.

Ownership of the property will stay within the family

Fifty-nine percent of respondents also indicated that it was highly likely/likely that ownership of their property would stay within the family [Figure 7]. These respondents managed 73% of land surveyed. One 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.
Plans for expansion

Just under one third of respondents said it was likely that their long term plans would involve increasing the land they managed by purchasing, leasing or share farming additional land [Figure 7]. This small group of respondents managed 63% 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 1,391 ha compared to 506 ha for other respondents ($\chi^2=10.532, \text{df}=1, p=0.001$). One possible explanation for this finding is that larger property owners are more likely to have the equipment needed to operate a large scale enterprise. These larger landholders are also more likely to have the capital resources needed to purchase additional land or equipment. There was a significant difference in the proportion of respondents who planned to expand their land holding across the survey sub-regions ranging from 50% in survey sub-region 1 to only 18% in survey sub-region 9 [Appendix 2 & 3].

Plans to sell or lease all or most of the property

When analysing data from across the Queensland Murray Darling it appears that the proportion of respondents likely to expand will be closely matched by the properties likely to become available for lease or sale. Twenty-five 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 4% though they were likely to subdivided and sell a large part of their property [Figure 7]. Combining these groups, just over one third of respondents reported that they were likely to sell or lease all or most of their property in the long-term. These respondents owned approximately 23% of the land surveyed or just over 1.7 million ha. When comparing the percentage of respondents who indicated they planned to expand by acquiring additional land and those likely to sell all or most of their property, the demand for land appears likely to roughly match that likely to become available. However, it was not possible to determine if the land likely to become available will be in the same location or the same size desired by those respondents who plan to expand.

The proportion of respondents who said they were likely to sell their property varied significantly across the survey sub-regions with 40% saying this was likely in survey sub-region 6 compared to 14% in survey sub-region 4 [Appendix 2 & 3].
Box 8 – Long-term plans and adoption of CRP

The adoption of two CRP was significantly linked to respondents’ long-term plans for their property.

- Higher adoption of the CRP planted trees and shrubs was significantly linked to respondents who said their long-term plans were likely to involve seeking additional off-property work.

- Higher adoption of the CRP varied cropping rotation according to soil test results was significantly linked to respondents who said their long-term plans were likely to involve increasing the area of land they managed [refer to adoption of current recommended practices section on page 53].
Method and timing of property transfer

Respondents were allocated to one of three long-term options if they selected highly likely/likely for any of the options in Figure 7. Those who did not place highly likely/likely on any option (n=24) were removed from the sample for this analysis.

- Sell all or a large part of the property.
- Retain property in the family.
- Other plans, including continue to live on the property.

Where respondents indicated that it was highly likely or likely that their property would be sold or subdivided and a large part sold, they were asked to indicate the year they thought this sale might occur.

Those indicating highly likely/likely for only one long-term option were allocated to that option. Other respondents were allocated to one of the three options on the following basis and in the order shown:

- if they had a succession plan, then they were allocated to retain property in the family;
- if they nominated a date when they expected to sell the property, they were assumed to be likely to sell;
- if they planned to transfer the property in the family but did not have a succession plan they were still allocated to retain in the family as long as they had not indicated they were likely to sell; and
- those indicating highly likely/likely for both selling the property and retaining it in the family, had no succession plan and did not nominate a date to sell were assumed to be likely to sell.

The date of property transfer was assumed to occur in the year nominated on the survey. Where respondents had not nominated a date, it was assumed that transfer would occur on retirement at age 65 years for those under 65 years, and at death for those over 65 years. For the latter set, the ABS Life Tables (ABS 2001) were used to calculate the remaining life expectancy and provide the expected date of property transfer.

All other respondents were assumed to be planning to continue living on and retaining ownership of their properties until death required the transfer of their properties. Obviously, transfer could then be within the family or to others. Again the ABS Life Tables (ABS 2001) were used to calculate remaining life expectancy and provide the expected date of property transfer.

The mean age (52 years) was assigned to those respondents (n = 2) who hadn’t provided their age.

Adopting the approach outlined above:

- 55% of respondents appear likely to pass their property on to someone else in the family;
- 28% appear likely to sell their property; and
- 17% had other plans, mostly to stay on the property in the long term [Figure 8].
Respondents who were classed as likely to sell using the method outlined above owned approximately 1.8 million ha or 24% of the total land surveyed. The median year of sale for those likely to sell was 2006. However, only approximately 5% of the area surveyed is likely to change hands over this period. Seventy-six percent of properties likely to be sold, representing approximately 6% of the total area surveyed, will change hands by 2013. The remaining 13% of the total area surveyed that is likely to be sold (or more than half of the area likely to be sold) will not be sold for at least 10 years. These findings indicate that while a significant number of properties are likely to be sold over the next decade, many of the larger properties that are thought likely to be available will not be sold within this time.

The median year of transfer for all properties including those likely to be sold, passed on to other family members or those with other long-term plans was 2019 (transfer is assumed to occur in the year nominated, at retirement age or upon death). Thirty-five percent of all properties, representing 65% of the total area surveyed, are likely to change hands over the next decade.

**FIGURE 8 – PROPERTY TRANSFER**

<table>
<thead>
<tr>
<th>% of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Likely to sell the property</td>
</tr>
<tr>
<td>Likely to pass the property on to family</td>
</tr>
<tr>
<td>Other plans</td>
</tr>
</tbody>
</table>

**Interest in lease plan to facilitate property transfer**

Landholders in the Queensland Murray Darling continue to face difficult economic conditions and many families are finding it difficult to fund retirement, manage family succession or expand to establish viable enterprises. In response to these issues, the Brigalow Jimbour Floodplains Group developed a proposal that would allow landholders considering retirement to lease all or part of their property to another landholder or younger family member. The retiring landholder may continue to live in the district. A property management plan is developed by agreement between the landholder, the lessee and the government. This 10-20 year plan is intended to provide an opportunity for the next generation of landholders and to enhance conservation and production. The retiring landholder would receive lease payments that were not means tested against the property (asset or income) and the age pension. The survey asked respondents if they thought government support should be sought to develop this proposal for a trial area.

Findings highlighted considerable support for the proposed plan with 51% of respondents indicating that government support should be sought for a trial area. A further 33% said
possibly and only 16% said no. Those respondents who said that government support should
be sought managed approximately 34% of the area surveyed.

Those respondents who said either yes or possibly in regards to seeking government support
to develop the proposal for a trial area were then asked if they considered the proposal a
useful option for their retirement. Of those 84% of all respondents who said yes or possibly,
37% said they would consider such a proposal as a useful option for their retirement (33%
said possibly and only 30% said no).

Given that there was very limited space in the mail survey it was not possible to provide a
detailed explanation of the proposal. This lack of detail is likely to explain the high proportion
of people who said they would possibly be interested. If a more detailed proposal had been
provided there may have been a higher level of support for the proposal.

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.

Key findings
· Just under half of all respondents were involved in property planning and 14% had a
completed or on-going property plan.
· Despite the finding that most landholders said ownership of their property was likely to
stay within the family, most respondents (59%) had not begun to plan the transfer of their
property to the next generation.
· Just under half of all respondents (49%) said they had been involved in 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’.

Forty-three percent of all respondents were either currently preparing or had completed a
property plan. About one third of those involved in property planning had a completed or well
advanced plan [Figure 9]. Just under 2 million ha or approximately 26% of the area surveyed
was currently covered by completed property plan. Landholders with larger properties were
significantly more likely to be involved in property planning ($\chi^2 = 46.678$, df = 4, $p < 0.001$). The
median property size for those respondents who had completed a property plan was 5,125
ha compared to 294 ha for those who were not involved in property planning.

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 managers of smaller properties. Involving the managers of smaller properties in property planning will be especially important in sub-catchments where these landholders manage a large proportion of the land [Appendix 2].

**FIGURE 9 – INVOLVEMENT IN PROPERTY PLANNING**

![Bar chart showing involvement in property planning]

**Box 9 – Property planning and adoption of CRP**

Involvement in property planning was significantly linked to:

- higher adoption of the CRP cropping rotation varied according to soil test results; and
- higher adoption of the CRP native bush fenced to manage stock access [refer to adoption of current recommended practices section on page 53].

**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 (61%) had 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 (58%) had not begun to plan for this process. Less than 10% of respondents had agreed on a family succession plan and less than 10% had well advanced plans [Figure 10]. Furthermore, analysis suggested that older respondents were no more likely to be further advanced in succession planning ($\chi^2 = 2.913$, df = 4, p = 0.572).

Respondents who had used the services of a rural financial counsellor (6%) were significantly more likely to have started planning for the transfer of their property to the next generation ($\chi^2 = 30.947$, df = 4, p < 0.001). Only 29% percent of respondents who had used the services of a
rural financial counsellor had not started a succession plan compared to 60% of all other respondents. 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. The limited involvement in succession planning also highlights the need for other approaches to manage property transfer such as the proposed lease plan outlined earlier in this report.

There was a significant difference in respondents’ involvement in succession planning across the survey region ranging from a high of 67% in survey sub-region 1 to only 31% in survey sub-region 9 [Appendix 2].

**FIGURE 10 – INVOLVEMENT IN SUCCESSION PLANNING**

<table>
<thead>
<tr>
<th>Completion Level</th>
<th>% of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Completed/ongoing</td>
<td>20%</td>
</tr>
<tr>
<td>Well advanced</td>
<td>15%</td>
</tr>
<tr>
<td>Halfway</td>
<td>10%</td>
</tr>
<tr>
<td>Early stages</td>
<td>20%</td>
</tr>
<tr>
<td>Not started</td>
<td>35%</td>
</tr>
</tbody>
</table>

**Box 10 – Succession planning and adoption of CRP**

There was only one CRP significantly linked to involvement in succession planning. Higher adoption of the CRP encouraged regrowth of native vegetation was significantly linked to respondents who said they had completed or were further advanced in family succession planning [refer to adoption of current recommended practices section on page 53].

**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 planing. Only 7% of respondents were highly involved in local action planning [Figure 11]. As was the case with property planning, landholders that managed larger properties were significantly more
likely to be involved in local action planning ($\chi^2 = 55.599$, df = 3, p < 0.001). The median property size for respondents who were not involved in local action planning was 202 ha compare to 1,019 ha for those with a little involvement right through to 2,630 ha for those who were highly involved. Survey data suggests that the activities of many local action planning groups have a stronger appeal to larger property owners. Again in sub-catchments where there are a large proportion of smaller property owners, local action planning groups may need to carefully target the interests of these landholders [Appendix 2].

**FIGURE 11 – INVOLVEMENT IN LOCAL ACTION PLANNING**

**Box 11 – Involvement in local action planning and adoption of CRP**

Involvement in local action planning was significantly linked to:

- higher adoption of the CRP expenditure on pest animal and weed control; and
- cropped with reduced chemical use as a result of applying GPS or integrated pest management strategies. [refer to adoption of current recommended practices section on page 53].

**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 four 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.
Key findings

- Sixteen percent of respondents said that they had work undertaken on their property that was at least partially funded by government programs in the past five years.
- Twenty-one percent of respondents said they were currently a member of a Landcare group.
- Four percent of respondents were a member of a Topcrop group.
- Thirteen percent of respondents were a member of 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 Queensland Murray Darling had not received government funding to undertake work on their property. Only 16% 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. Having government funded work undertaken on their property was significantly linked to respondents who:

- had completed or were further advanced in property planning (Wald=5.552, p=0.018, Exp(B)=1.1279);
  - 46% of respondents who had work funded on their property by government had completed a property plan compared to 11% for all other respondents.
- were involved or more highly involved in local action planning (Wald=32.820, p<0.001, Exp(B)=2.658); and
  - 53% of those who had worked funded on their property by government were highly involved in local action planning compared to 5% of all other respondents.
- had lived on their property for longer (Wald=3.907, p=0.048, Exp(B)=1.017).
  - The median time lived on the property for respondents who had work funded on their property by government was 26 years compared to 14 years for all other respondents.

These three factors accounted for approximately 32% of the variation between those who had work funded by government programs on their property and those who had not (Nagelkerke pseudo $R^2=0.320$).

There were also significant differences in the proportion of landholders who had government funded work undertaken on their property across survey sub-regions ranging from 29% in survey sub-region 2 to 3% in survey sub-region 6 [Appendix 3].

Box 12 – Work funded by government on property and adoption of CRP

Having work funded by government on property was significantly linked to:

- higher adoption of the CRP reduced machinery or stock traffic;
- higher adoption of the CRP fenced to manage stock access to waterways and eroded gullies [refer to adoption of current recommended practices section on page 53].
Landcare membership

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

Membership of a Landcare group was significantly associated with respondents who:

- had completed or were further advanced in property planning (Wald=6.060, p<0.001, Exp(B)=1.790);
  - 49% of Landcare members had completed a property plan compared to 15% of all other respondents.
- were involved or more highly involved in local action planning (Wald=19.755, p<0.001, Exp(B)=6.165); and
  - 75% of Landcare members were highly involved in local action planning compared to 3% of all other respondents.
- said their property supported a higher number of family members (Wald=12.519, p<0.001, Exp(B)=1.550).
  - Landcare members said their property supported a median of four people compared to two people for non-members.

These variables accounted for just over 68% of the variation between Landcare members and non-members (Nagelkerke pseudo $R^2=0.684$).

Involvement in Landcare varied significantly across the regions from a high of 44% in survey sub-region 4 to only 2% in survey sub-region 6 [Appendix 3].

### Box 13 – Landcare membership and adoption of CRP

<table>
<thead>
<tr>
<th>Landcare membership was significantly linked to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• higher adoption of the CRP sown perennial pasture or lucerne; and</td>
</tr>
<tr>
<td>• higher adoption of the CRP only watered stock from a trough or tank [refer to adoption of current recommended practices section on page 47].</td>
</tr>
</tbody>
</table>

Topcrop membership

Four percent of respondents said they were a member of a Topcrop group.

Membership of a Topcrop was significantly associated with respondents who:

- had employed a consultant to provide advice on managing their property in the past 12 months (Wald=10.259, p<0.001, Exp(B)=7.081);
  - 67% of Topcrop members had employed a consultant in the last 12 months compared to 21% of non-members.
- said their property employed a higher number of people over the past 12 months (Wald=4.701, p=0.030, Exp(B)=1.085); and
  - 75% of Topcrop members had employed at least one person over the past 12 months compared to 35% of all other respondents.
These three variables explained almost 20% of the variation between Topcrop members and non-members (Nagelkerke pseudo $R^2=0.197$).

**Box 14 – Topcrop membership and adoption of CRP**

Membership of a Topcrop group was linked to higher adoption of the CRP reduced machinery and stock traffic [refer to adoption of current recommended practices section on page 47].

**Membership of benchmark or best practice groups**

Thirteen percent of respondents said they were a member of any other benchmark or best practice group.

Membership of a benchmark or best practice group was significantly linked to respondents who:

- had completed a short course in property management ($Wald=19.331, p<0.001$, $\text{Exp}(B)=4.887$);
  - 85% of members in a benchmark or best practice group had completed a short course in property management compared to 48% of all other respondents.
- said their main occupation was farming ($Wald=7.788, p=0.005$, $\text{Exp}(B)=4.004$).
  - 92% of members in a benchmark or best practice group were farmers compared to 61% of all other respondents.

These two factors explained approximately 19% of the variation between members of benchmark or best practice groups and non-members (Nagelkerke pseudo $R^2=0.192$).

Membership of a benchmark or best practice group varied significantly across the QMD region ranging from 33% in survey sub-region 3 to 3% in survey sub-region 6.

**Box 15 – Membership of a benchmark or best practice group and adoption of CRP**

There were no significant links between membership of a benchmark or best practice group and adoption of CRP in this study.
Property size and farming as an occupation

This section of the report focuses on a number of topics related to property size and occupation, including:

- property size;
- occupational grouping that best describes main area of paid/unpaid work; and
- level of on and off property work.

Key findings

- The median property size of landholders in the Queensland Murray Darling was 628 ha.
- The 12% of respondents that owned/managed a property in excess of 10,000 ha managed 92% of the total area surveyed.
- Sixty-five percent of respondents said that farming was their primary occupation. The 25% of landholders that said farming was not their primary occupation managed approximately 1% of the total area surveyed.

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 right up to properties in excess of 1,000,000 ha.

The median property size for respondents to the survey was 628 ha [Table 1]. Survey data suggested that a small number of large property owners manage the vast majority of land in the Queensland Murray Darling. Only 12% of respondent reported that they owned or managed a property in excess of 10,000 ha. However, these respondents managed 92% 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 ($\chi^2 = 55.531, df = 1, p < 0.001$) and a higher level of on-property profit ($\chi^2 = 28.894, df = 7, p < 0.001$). The median size of properties that reported an on-property profit was 1,960 ha compared to 118 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. One third of respondents said that the leased, share farmed or agisted land from other people ranging from an area of one ha up to 40,000 ha. The median area leased, share farmed or agisted from others was 266 ha.

Box 16 – Property size and adoption of CRP

There were no significant links between property size and adoption of CRP in this study.
Table 1
Proportion of respondents by property size for each sub-catchment

<table>
<thead>
<tr>
<th>Sub-catchment</th>
<th>n</th>
<th>10 – 200</th>
<th>201 - 500</th>
<th>501 - 700</th>
<th>701 - 1000</th>
<th>1001 - 5000</th>
<th>&gt; 5000</th>
<th>Median (ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>9</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>100%</td>
<td>70,416</td>
</tr>
<tr>
<td>2</td>
<td>40</td>
<td>5%</td>
<td>0%</td>
<td>3%</td>
<td>0%</td>
<td>7%</td>
<td>85%</td>
<td>16,125</td>
</tr>
<tr>
<td>3</td>
<td>42</td>
<td>5%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>31%</td>
<td>64%</td>
<td>7,956</td>
</tr>
<tr>
<td>4</td>
<td>55</td>
<td>13%</td>
<td>5%</td>
<td>5%</td>
<td>11%</td>
<td>52%</td>
<td>14%</td>
<td>1,335</td>
</tr>
<tr>
<td>5</td>
<td>44</td>
<td>11%</td>
<td>9%</td>
<td>9%</td>
<td>5%</td>
<td>41%</td>
<td>25%</td>
<td>2,103</td>
</tr>
<tr>
<td>6</td>
<td>61</td>
<td>63%</td>
<td>0%</td>
<td>3%</td>
<td>8%</td>
<td>24%</td>
<td>2%</td>
<td>17</td>
</tr>
<tr>
<td>7</td>
<td>66</td>
<td>30%</td>
<td>27%</td>
<td>11%</td>
<td>6%</td>
<td>21%</td>
<td>5%</td>
<td>388</td>
</tr>
<tr>
<td>8</td>
<td>44</td>
<td>48%</td>
<td>21%</td>
<td>9%</td>
<td>9%</td>
<td>9%</td>
<td>4%</td>
<td>251</td>
</tr>
<tr>
<td>9</td>
<td>88</td>
<td>80%</td>
<td>7%</td>
<td>3%</td>
<td>2%</td>
<td>7%</td>
<td>1%</td>
<td>33</td>
</tr>
<tr>
<td>Total*</td>
<td>449</td>
<td>37%</td>
<td>9%</td>
<td>6%</td>
<td>4%</td>
<td>23%</td>
<td>21%</td>
<td>628</td>
</tr>
</tbody>
</table>

* 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: MEDIAN 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 the majority of all respondents (65%). One quarter of all respondents were not farmers and these respondents managed only 1% of all land surveyed [Table 2].

On average, respondents to the mail survey said they spent 60 hours per week on on-property work and had 70 days of off-property work over the past 12 months.

<table>
<thead>
<tr>
<th>Sub-catchment</th>
<th>n</th>
<th>Farmer</th>
<th>Professional</th>
<th>Trades</th>
<th>Retired</th>
<th>Other: clerical, admin, retail, home duties</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>9</td>
<td>100%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>2</td>
<td>41</td>
<td>95%</td>
<td>0%</td>
<td>0%</td>
<td>2%</td>
<td>3%</td>
</tr>
<tr>
<td>3</td>
<td>44</td>
<td>96%</td>
<td>4%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>4</td>
<td>55</td>
<td>78%</td>
<td>4%</td>
<td>11%</td>
<td>2%</td>
<td>5%</td>
</tr>
<tr>
<td>5</td>
<td>45</td>
<td>73%</td>
<td>11%</td>
<td>5%</td>
<td>9%</td>
<td>2%</td>
</tr>
<tr>
<td>6</td>
<td>58</td>
<td>36%</td>
<td>9%</td>
<td>14%</td>
<td>26%</td>
<td>15%</td>
</tr>
<tr>
<td>7</td>
<td>66</td>
<td>70%</td>
<td>11%</td>
<td>3%</td>
<td>7%</td>
<td>9%</td>
</tr>
<tr>
<td>8</td>
<td>40</td>
<td>68%</td>
<td>13%</td>
<td>7%</td>
<td>12%</td>
<td>0%</td>
</tr>
<tr>
<td>9</td>
<td>85</td>
<td>33%</td>
<td>20%</td>
<td>7%</td>
<td>20%</td>
<td>20%</td>
</tr>
<tr>
<td>Total*</td>
<td>443</td>
<td>65%</td>
<td>10%</td>
<td>6%</td>
<td>11%</td>
<td>8%</td>
</tr>
</tbody>
</table>

*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.

**Box 17 – Occupation and adoption of CRP**

There were no significant links between occupation and adoption of CRP in this study.
Levels of income and property equity

The survey included five questions exploring levels of income and levels of equity in the property. A profit was defined as a situation where the amount of income from the property exceeded all expenses before tax. Respondents who indicated a profit were then asked to select the amount of profit from one of eight ranges. For the purpose of data analysis, each respondent was allocated the mid-point of the chosen dollar interval. These questions were completed by between 78% – 91% of respondents to the survey.

Key findings

- Over half of all respondents did not return an on-property profit for the 2001/2002 financial year and the average on-property income was $16,000.
- Almost two-thirds of respondents reported an off-property profit for the 2001/2002 financial year with an average off-property income of $21,000.
- The average total household income for all respondents was $37,000 and only 32% of landholders reported a combined income in excess of $50,000.
- Off-property income accounted for 56% of total household income for landholders in the Queensland Murray Darling in the 2001/2002 financial year.
- Most respondents (52%) had more than 80% equity in their property. At the same time, just over a fifth of respondents had less than 60% equity.
On-property income

Survey data indicated that over half of all respondents (57%) did not make a profit for the 2001/2002 financial year. The average on-property profit for all respondents was just under $16,000. Only 11% 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.

It is important to note that in many cases on-property incomes for the year 2001/2002 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 Queensland Murray Darling.

There was a significant difference in the proportion of respondents who reported returning an on-property profit across survey sub-regions ranging from 70% in survey sub-region 4 to 15% in survey sub-region 6 [Appendix 3].

**Box 18 – On-property profit and adoption of CRP**

Returning an on-property profit in 2001/02 was significantly linked to:

- higher adoption of the CRP expenditure on pest animal and weed control; and
- higher adoption of the CRP only watered stock from a trough or tank [refer to adoption of current recommended practices section on page 53].

Off-property income

Almost two thirds of respondents (64%) reported an off-property profit for the 2001/2002 financial year. The average off-property profit for all respondents for this period was approximately $21,000.

The proportion of respondents who reported an off-property income ranged from 84% in survey sub-region 9 to 48% in sub-region 6 [Appendix 3].

**Box 19 – Off property income and adoption of CRP**

While the earlier finding of a link between on-property profitability and adoption of CRP suggests that profitability is linked to adoption, there was no link between off-property profitability and adoption. These findings indicate that there may be some reluctance for landholders to invest off-property income into changing management practices on their property.

Total household income

The average total household income for all respondents (calculated by combining on-property and off-property income) was slightly over $37,000. 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 $14 million. Of this, on-property income accounted for just over $6 million or 44% of all income. The combined off-property income was just over $8 million or 56% of the total income for the 2001/2002
financial year. 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 earlier 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 landholders in the Queensland Murray Darling.

**Box 20 – Household income and adoption of CRP**

There were no significant links between household income and adoption of CRP in this study.

**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 (52%) indicating 81%-100% equity. However, just over a fifth of respondents (21%) had less than 60% equity in their property [Figure 12].

Respondents with lower levels of equity owned significantly smaller properties, particularly in the 0-20% and 21-40% brackets where the median property size was 27 ha and 63 ha respectively ($\chi^2 = 39.714, df = 4, p < 0.001$). Those respondents with less than 60% equity in their property managed approximately 356,000 ha or five percent of the total area surveyed.

**Box 21 – Equity and adoption of CRP**

There were no significant links between equity and adoption of CRP in this study.

**FIGURE 12 – LEVEL OF EQUITY**

![Bar chart showing the percentage of respondents in different equity brackets]
Land use 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.

Key findings

- Beef cattle (63%) and dryland pasture (61%) were the most predominant enterprises/land uses and the only ones to be reported by the majority of respondents.

- The only other enterprises/land uses to be reported by more than 20% of respondents were other trees for shade and shelter, habitat, erosion control or recharge control (43%) and broadacre cropping (32%).

Beef cattle and dryland pasture were the most common enterprises/land uses with over 60% of respondents reporting these enterprises on their property. Dryland pasture accounted for 32% of the total area surveyed while 16% was used for beef cattle. Other trees for shade and shelter, habitat, erosion control or recharge control (43%) and broadacre cropping (32%) were the only other two enterprises/land uses reported by more than 20% of respondents. Other trees accounted for 19% of the area surveyed and broadacre cropping approximately 2%. A small proportion of respondents were involved in alternative enterprises including farm forestry (7%), grapes and stone fruit (6%), other horticulture (5%), other livestock (5%), melon growing (1%) and eco-tourism (1%) [Figure 13]. When considered collectively, just over 20% of all respondents reported at least one of these alternative enterprises on their property covering a total of just over 1.2 million ha or approximately 17% of the area surveyed.
Constraints to change

There were two parts to this section. In the first, the survey explored the importance of 18 factors that our previous research and industry partners thought were likely to influence landholder decision making about taking on new practices. Practices suggested in the preamble 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’, ‘some importance’, ‘minimal
importance’ and ‘not important’. These response options have been collapsed into three categories – ‘important’ (very important and important), ‘some’ (some importance) and ‘unimportant’ (minimal importance and not important).

In the second part of this question respondents were asked to indicate what would be the three most important topics or constraints if they were asked to include or increase farm forestry in their enterprise mix.

**Key findings**

- Over three quarters of respondents said that cash flow, suitability of soils, cost of machinery and water storage capacity were or would be important constraints to changing management practices on their property.

- Commitment and support from family or partner(s), fitting in with existing enterprises, access to on-going professional advice and fitting in with their current lifestyle were also among a number of other factors consider important by the majority of respondents.

- There not being many people undertaking a practice in the district, stage of life and not seeing returns from the practice in the first year were rated as the least important constraints with less than one third of respondents indicating these were or would be important aspects in their decision making.

- When asked to indicate the most important constraints to including or increasing farm forestry 53% said cash flow was one of the top three factors followed by needing a large investment of additional funds (35%), and suitability of soils (29%).

Survey findings highlighted a very broad range of economic, environmental and social constraints that are likely to affect the capacity of landholders in the Queensland Murray Darling to implement changed land management practices. Thirteen of the 18 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 14].

The highest rated constraint to changing land management practices was cash flow with 81% of respondents indicating this was or would be an important factor. Suitability of soils was also rated very highly as a constraint (79%), reflecting the fact that the success of many current recommended practices is unknown or unpredictable depending on the resource base. Cost of machinery/equipment, water storage capacity and the extent there is support from family or partners were also considered to be important factors by more than two thirds of respondents [Figure 14].

Lack of people undertaking new practices in the district, stage of life, and not seeing returns from the practice in the first year were the lowest rated constraints with less than one third of respondents indicating these were important factors [Figure 14]. At the same time, older respondents were significantly more likely to indicate that stage of life was an important constraint ($r_s=0.229$, $p<0.001$). When considering only those respondents over the age of 65 years, 48% said that stage of life was an important factor affecting their decision making about changing management practices. To the extent that the average age of the rural population in the Queensland Murray Darling continues to increase, stage of life may become a much more important constraint to implementing changed management practices. Recent research undertaken in the Condamine region of southern Queensland suggested the average
age of farmers in the beef industry (the most common enterprise reported in the Queensland Murray Darling) was likely to continue to increase (Cary et al. 2003).

Survey data suggesting that cash flow and cost of machinery/equipment were important constraints to the adoption of changed management practices, in combination with the earlier finding that landholders thought they should be paid for environmental services that benefit the wider community indicate the potential for stronger cost sharing arrangements to contribute to greater 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 Queensland Murray Darling had not received any government funding to undertake works on their property over the last five years.

When asked about including or increasing farm forestry in their enterprise mix, the key factors affecting decision making appear to be very similar. The highest rated factor in decision making about farm forestry was cash flow with 53% of respondents indicating this would be one of the top three factors. The next highest rated factors were the extent any change would need a large investment of additional funds and the suitability of soils with 35% and 29% of respondents respectively indicating these would be one of the top three factors in their decision making about farm forestry.

There were a number of significant differences in survey respondents’ assessment of the major factors affecting their capacity to change across survey sub-regions [Appendix 2 & 3].
FIGURE 14 – CONSTRAINTS TO ADOPTING NEW LAND MANAGEMENT PRACTICES

<table>
<thead>
<tr>
<th>Constraint</th>
<th>Important</th>
<th>Some</th>
<th>Unimportant</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Cash flow</td>
<td>81%</td>
<td>6%</td>
<td>13%</td>
</tr>
<tr>
<td>2. Suitability of soils</td>
<td>79%</td>
<td>9%</td>
<td>12%</td>
</tr>
<tr>
<td>3. Cost of machinery/equipment</td>
<td>77%</td>
<td>8%</td>
<td>15%</td>
</tr>
<tr>
<td>4. Water storage capacity</td>
<td>76%</td>
<td>9%</td>
<td>15%</td>
</tr>
<tr>
<td>5. Extent there is commitment or support from family or partner(s)</td>
<td>69%</td>
<td>11%</td>
<td>20%</td>
</tr>
<tr>
<td>6. Extent practice fits with work requirements of existing enterprises</td>
<td>65%</td>
<td>16%</td>
<td>19%</td>
</tr>
<tr>
<td>7. Access to ongoing professional advice</td>
<td>65%</td>
<td>13%</td>
<td>22%</td>
</tr>
<tr>
<td>8. Needs a large investment of additional funds</td>
<td>64%</td>
<td>16%</td>
<td>20%</td>
</tr>
<tr>
<td>9. Uncertainty about existence of long-term markets</td>
<td>60%</td>
<td>22%</td>
<td>18%</td>
</tr>
<tr>
<td>10. Extent practice fits with lifestyle</td>
<td>59%</td>
<td>18%</td>
<td>23%</td>
</tr>
<tr>
<td>11. Need to invest time and effort to acquire skills or knowledge</td>
<td>50%</td>
<td>19%</td>
<td>31%</td>
</tr>
<tr>
<td>12. Need to reorganise physical layout of property</td>
<td>50%</td>
<td>17%</td>
<td>33%</td>
</tr>
<tr>
<td>13. Availability of labour</td>
<td>50%</td>
<td>12%</td>
<td>38%</td>
</tr>
<tr>
<td>14. Better returns available from off-property investment</td>
<td>49%</td>
<td>22%</td>
<td>29%</td>
</tr>
<tr>
<td>15. Uncertain that the practice would address environmental issues</td>
<td>47%</td>
<td>33%</td>
<td>20%</td>
</tr>
<tr>
<td>16. Will not see returns from the practice this year</td>
<td>31%</td>
<td>29%</td>
<td>40%</td>
</tr>
<tr>
<td>17. Stage of life</td>
<td>28%</td>
<td>20%</td>
<td>52%</td>
</tr>
<tr>
<td>18. Not many people undertaking this practice in district</td>
<td>20%</td>
<td>34%</td>
<td>46%</td>
</tr>
</tbody>
</table>

Box 22 – Constraints to change and adoption of CRP

There were some significant links between the perceived constraints to change and adoption of CRP.
• Higher adoption of the CRP expenditure on pest animal and weed control was significantly linked to respondents who said that there not being many other people undertaking a practice in their district was an important constraint to changing management practices on their property.

• Higher adoption of the CRP fenced native bush to manage stock access was significantly linked to respondents who said that the cost of machinery/equipment was not an important constraint to changing management practices on their property.

• Higher adoption of the CRP minimum tillage was significantly linked to respondents who said not seeing return from a new practice in the first year was an important constraint to changing management practices on their property [refer to adoption of current recommended practices section on page 53].

**Adoption of current recommended practices (CRP)**

The mail survey included questions relating to the uptake of 15 current recommended practices (CRP) identified as likely to contribute to improved productivity and natural resource management outcomes in the Queensland Murray Darling region. Survey respondents were asked to indicate the area of their property under each practice. As some CRP relate to specific enterprises only individuals who reported those enterprises on their property were included in calculations. 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 15 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. Reduced machinery or stock traffic.
   d. Sown perennial pasture or lucerne.
   e. Conducted work to control pest animal and non-crop weeds.

2. Cropping CRP (including only those respondents who reported cropping enterprises on their property).
   a. Cropped using reduced chemical use as a result of applying integrated pest management or GPS technology.
   b. Cropped using a rotation that was varied based on soil test results.
   c. Cropped using a rotation with ley pasture.
   d. Cropped using minimum tillage practices.

3. Stock CRP (including only those respondents who reported stock on their property).
   a. Fenced to manage stock access to waterways and eroded gullies.
b. Used time controlled or spell grazing.

c. Only watered stock from a trough or tank.

4. Irrigation CRP (including only respondents with irrigated enterprises on their property).

   a. Used low pressure overhead or drip irrigation systems.

5. Native vegetation CRP (including only those respondents with areas of native vegetation on their property and stock).

   a. Native bush fenced to manage stock access.

6. Bore water CRP (including only those respondents with bores or bore drains on their property).

   a. Capped and piped bores and bore drains.

---

**Key findings**

- Survey data highlighted high levels of adoption of some CRP including bore capping and piping (87% with bores adopted practice), using minimum tillage (73% who cropped adopted practice), only watering stock from a trough or tank (69% with stock adopted practice), and undertaking pest animal and non-crop weed control (66% adopted).

- Only two other CRP, used low pressure overhead or drip irrigation (58% of irrigators adopted practice) and used time controlled or spell grazing (52% with stock adopted practice) were adopted by the majority of respondents.

- Findings demonstrated moderate uptake of encouraging regrowth of native vegetation, cropping with a rotation based on soil test results, fencing to manage stock access to waterways and eroded gullies, sown perennial pasture or lucerne, planted trees or shrubs, and cropped using a rotation with a ley pasture.

- Less than one third of respondents had cropped using reduced chemical usage by applying GPS or integrated pest management technologies, fenced native bush to manage stock access, and reduced machinery or stock traffic.

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**Guide to interpreting results from binary logistic regression**

Example of results:

*Using binary logistic regression, adoption of the CRP expenditure on pest plant and animal control 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 expenditure on pest animal and plant control 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**

Survey data highlighted moderate levels of adoption for most non-specific CRP. The only CRP to be adopted by the majority of respondents (66%) was work to control pest animals and non-crop weeds. Respondents reported a median expenditure on pest plant and animal control of $2,000 over the past year (including labour calculated at $20 per hour) [Table 3]. The combined expenditure for all respondents on pest plant and animal control was just over $3 million. Using binary logistic regression, adoption of the CRP expenditure on pest plant and animal control 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, \( p=0.006 \), \( \text{Exp}(B)=1.597 \));
  - 75% of respondents who said other people not undertaking a practice was an important constraint had made expenditure on pest control compared to 67% of respondents who said this was unimportant.
• reported an on-property profit (Wald=3.893, p=0.048, Exp(B)=1.943); and
  o 72% of respondents who reported an on-property profit had made expenditure on pest control compared to 59% of all other respondents.

• were involved or more highly involved in local action planning (Wald=9.734, p=0.002, Exp(B)=1.778).
  o 89% of respondents who were highly involved in local action planning had made expenditure on pest control compared to 55% of those not involved.

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

Forty-seven percent of respondents said that they had encouraged regrowth of native vegetation on their property, with a median area of 40 ha [Table 3]. The combined area where regrowth had been encouraged was 431,339 ha, or approximately 6% of the area surveyed. Using binary logistic regression, adoption of the CRP encouraged regrowth of native vegetation was significantly linked to respondents who:

• said providing habitat for native birds and animals was an important value of their property (Wald=13.476, p<0.001, Exp(B)=1.512);
  o 54% of respondents who said providing habitat was an important value of their property had encouraged regrowth compared to 32% who said this was unimportant.

• said receiving a sense of accomplishment from building/maintaining a viable business was not an important value of their property (Wald=6.538, p=0.011, Exp(B)=0.757); and
  o 42% of respondents who said building/maintaining a viable business was an important value of their property had encouraged regrowth compared to 64% of respondents who said this was not important.

• had completed or were further advanced in family succession planning (Wald=5.549, p=0.018, Exp(B)=1.250).
  o 64% of respondents who had completed a family succession plan had encouraged regrowth compared to 48% of respondents who had not started a family succession plan.

These three variables accounted for just over 12% of the variation in adoption of the CRP encouraged regrowth of native vegetation (Nagelkerke pseudo $R^2=0.121$).

Thirty-five percent of respondents said that they had sown perennial pasture or lucerne on their property [Table 3]. The median area sown was 160 ha and the combined area across all properties surveyed was 93,236 ha or just over one percent of the total area. Using binary logistic regression, adoption of the CRP sown perennial pasture or lucerne was significantly linked to respondents who:

• said receiving a sense of accomplishment from building/maintaining a viable business was an important value of their property (Wald=8.212, p=0.004, Exp(B)=1.614);
  o 42% of respondents who said that building/maintaining a viable business was an important value of their property had sown perennial pasture compared to 7% of respondents who this was unimportant.
were a member or involved with a local Landcare group (Wald=15.938, p<0.001, Exp(B)=3.863); and
  * 63% of Landcare members had sown perennial pasture compared to 27% of non-members.

• had lived on their current property for a longer period of time (Wald=4.406, p=0.045, Exp(B)=1.016).
  * Respondents who had sown perennial pasture had lived on their property for a median of 23 years compared to 15 years for non-adopters.

These three factors accounted for just over 23% of the variation in adoption of the CRP sown perennial pasture or lucerne (Nagelkerke pseudo $R^2=0.234$).

Tree and shrub planting was reported by 33% of respondents, slightly less than the proportion that had encouraged the regrowth of native vegetation. The median area planted by these respondents was 100 ha [Table 3]. While the median area of plantings was greater than the median area where regrowth was encouraged, the combined area planted across all properties surveyed was 94,223 ha or just over one percent of the total area. When considering both tree planting and regrowth, about seven percent of the area surveyed was being or had been revegetated. Using binary logistic regression, adoption of the CRP planted trees and shrubs was significantly linked to respondents who:

• reported that encroachment of native vegetation on agricultural land was not an important issue in their district (Wald=4.710, p=0.030, Exp(B)=0.829);
  * 24% of respondents who said that encroachment was an important issue in their district had planted trees and shrubs compared to 38% who said this was unimportant.

• said providing a place for recreation was an important value of their property (Wald=12.807, p<0.001, Exp(B)=1.403);
  * 42% of respondents who said providing a place for recreation was an important value of their property had planted trees and shrubs compared to 25% who said this was unimportant.

• said their long-term plans were likely to involve seeking additional off-property work (Wald=6.501, p=0.011, Exp(B)=1.224); and
  * 46% of respondents who said that they were likely to seek additional off-property work had planted trees and shrubs compared to 29% who said they were unlikely to seek addition off-property work.

• thought that fencing waterways and eroded gullies did not make it more difficult to manage those areas (Wald=4.598, p=0.032, Exp(B)=0.789).
  * 23% of respondents who agreed that fencing waterways and eroded gullies makes it more difficult to manage these areas had planted trees and shrubs compared to 39% for those who disagreed.

These four variables accounted for approximately 13% of the variation in adoption of the CRP planted trees and shrubs (Nagelkerke pseudo $R^2=0.130$).

Just under one third of survey respondents said they had reduced machinery or stock traffic on some part of their property (median of 35 Ha) [Table 3]. Using binary logistic regression, adoption of the CRP reduced machinery or stock traffic was significantly linked to respondents who:
• said providing them with the only job they have ever done was not an important value of their property (Wald=8.795, p=0.003, Exp(B)=0.758);
  o 20% of respondents who said providing the only job they have ever done was an important value of their property had reduced machinery or stock traffic compared to 37% of respondents who said this was unimportant.
• thought that fencing to manage stock access was an essential part of the work required to revegetate waterways (Wald=7.922, p=0.005, Exp(B)=1.439);
  o 40% of respondents who agreed that fencing was an essential part of the work required to revegetate waterways had reduced machinery or stock traffic compared to 16% of respondents who disagreed.
• were a member of a local TopCrop group (Wald=9.073, p=0.003, Exp(B)=6.624);
  o 47% of Topcrop members had reduced machinery or stock traffic compared to 30% of non-members.
• reported that there had been work on their property at least partially funded by government in the past five years (Wald=4.547, p=0.033, Exp(B)=2.020); and
  o 45% of Topcrop members had reduced machinery or stock traffic compared to 28% of non-members.
• said that short-term loss in productive capacity could be justified where there are long-term benefits to natural resources (Wald=3.923, p=0.048, Exp(B)=1.322); and
  o 37% of Topcrop members had reduced machinery or stock traffic compared to 21% of non-members.

These variables accounted for almost 18% of the variation in the adoption of the CRP reduced machinery or stock traffic (Nagelkerke pseudo $R^2=0.177$).

Cropping CRP

Analysis of survey data highlighted high adoption of minimum tillage for respondents involved in cropping enterprises. Almost three quarters of respondents who cropped said that they had cropped using minimum tillage practices on some part of their property (median of 500 ha) [Table 3]. Of the total area cropped by survey respondents, 110,777 ha or just over 93% was cropped using minimum tillage. Using binary logistic regression, adoption of minimum tillage was significantly linked to respondents who:

• said the lifestyle that they want was not an important value of their property (Wald=6.922, p=0.009, Exp(B)=0.348);
  o 67% of respondents who said the lifestyle that they wanted was an important value of their property compared to 78% of those who said this was unimportant.
• had greater knowledge about the processes leading to herbicide resistance in broadacre cropping situations (Wald=10.044, p=0.002, Exp(B)=2.109);
  o 87% of respondents who said they had sound knowledge about the processes leading to herbicide resistance had used minimum tillage compared to 50% of those who reported limited knowledge.
• said not seeing returns from a new practice in the first year was an important constraint to adopting new practices (Wald=8.165, p=0.004, Exp(B)=2.420); and
o 81% of respondents who said not seeing a return in the first year was an important constraint had used minimum tillage compared to 64% of those who said this was unimportant.

- had employed a consultant to provide advice on property management in the past 12 months (Wald=6.794, p=0.009, Exp(B)=4.211).

- 90% of respondents who had employed a consultant had used minimum tillage compared to 58% of respondents who had not.

These variables explained approximately 40% of the variation between respondents (involved in cropping) who had and had not adopted minimum tillage practices (Nagelkerke pseudo $R^2=0.403$).

Forty-three percent of respondent involved in cropping said that they had cropped using a rotation that was varied as a result of soil test results. The median area cropped under this practice was 460 ha with a total area of 60,252 ha or about half (51%) of all cropping land surveyed [Table 3]. Results from binary logistic regression indicated that the adoption of a cropping rotation varied according to soil test results was significantly linked to respondents who:

- said that their long-term plans were likely to involve increasing the area of land they managed (Wald=3.975, p=0.046, Exp(B)=1.265); and

- 58% of respondents who said they were likely to increase the land they managed had varied their crop rotation according to soil test results compared to 26% of those who said this was unlikely.

- had higher knowledge about how to interpret results from soil testing (Wald=5.160, p=0.023, Exp(B)=1.675); and

- 73% of respondents who said they had sound knowledge about how to interpret soil test results had varied their crop rotation according to soil test results compared to 19% of those with limited knowledge.

- were involved or further advanced in property planning (Wald=10.392, p=0.001, Exp(B)=1.441).

- 63% of respondents who had completed a property plan had varied their crop rotation according to soil test results compared to 31% of those that had not started a property plan.

These three factors explained approximately 19% of the variation in the adoption of the CRP cropped using a rotation varied according to soil test results (Nagelkerke pseudo $R^2=0.185$).

Using a rotation with a ley pasture was adopted by 33% of respondents (involved in cropping). For those who adopted this CRP, the median area cropped under this practice was 175 ha [Table 3]. The combined area cropped using a rotation with a ley pasture was 38,840 ha or approximately 33% of the entire survey area used for cropping. Data analysis using binary logistic regression showed that adoption of the CRP cropped using a rotation with ley pasture was significantly linked to respondents who:

- had not employed a consultant to provide advice on property management in the past 12 months (Wald=8.205, p=0.004, Exp(B)=0.362).

- 25% of respondents who had employed a consultant had used a rotation with ley pasture compared to 41% of those who had not.
This variable accounted for just under 7% of the variation in the adoption of the practice cropped using a rotation with a ley pasture (Nagelkerke pseudo $R^2=0.068$).

Cropping with reduced chemical use as a result of applying GPS or integrated pest management technologies was the least commonly adopted cropping CRP with 22% of respondents (involved in cropping) adopting this practice. The median area cropped under this CRP was 1,000 ha with a total of 49,294 ha or 42% of all cropping land surveyed [Table 3]. Results from binary logistic regression indicated that the adoption of a cropping with reduced chemical use as a result of applying GPS or integrated pest management was significantly linked to respondents who:

- had employed a consultant to provide advice on property management in the past 12 months (Wald=6.445, $p=0.011$, Exp(B)=4.626);
  - 35% of respondents who had employed a consultant had reduced chemical use through GPS or integrated pest management compared to 11% of those who had not.
- were involved or more highly involved in local action planning (Wald=5.296, $p=0.021$, Exp(B)=1.866).
  - 36% of respondents who were highly involved in local action planning had reduced chemical use through GPS or integrated pest management compared to 10% of those who had not started property planning.

These two factors explained approximately 19% of the variation in the adoption of the CRP cropped using a rotation varied according to soil test results (Nagelkerke pseudo $R^2=0.189$).

**Stock CRP**

Findings highlighted encouraging levels of adoption for stock related CRP with over half of all respondents (involved in stock related enterprises) adopting two of the three CRP explored in the survey.

Over two thirds (69%) of respondents (involved in stock related enterprises) reported that they had paddocks on their property where they only watered stock from a trough or tank. The median proportion of paddocks where stock were only watered by a trough or tank was 60% [Table 3]. Using binary logistic regression adoption of the CRP stock only watered from a trough or tank was significantly linked to respondents who:

- said their property was important as it provided a sense of accomplishment from building/maintaining a viable business (Wald=7.130, $p=0.008$, Exp(B)=1.590);
  - 74% of respondents who said that building/maintaining a viable business was an important value of their property only watered stock from a trough or tank compared to 61% of respondents who said this was unimportant.
- thought the time and expense of watering stock off-stream or off-wetlands was justified by improvements in bank stability and water quality (Wald=9.686, $p=0.002$, Exp(B)=1.742);
  - 76% of respondents who agreed that the time and expense in watering stock off-stream was justified by improvement in bank stability and water quality only watered stock from a trough or tank compared to 57% of respondents who disagreed.
- said their property retuned a pre-tax profit in the last financial year (Wald=4.893, $p=0.027$, Exp(B)=2.291); and
76% of respondents who reported an on-property profit only watered stock from a trough or tank compared to 64% of those who did not.

- were a member or involved with a local Landcare group (Wald=6.012, p=0.014, Exp(B)=3.177).

- 86% of respondents who were highly involved in local action planning only watered stock from a trough or tank compared to 64% of those who were not involved.

These factors explained approximately 21% of the variation between those who had and had not adopted the CRP only watered stock from a trough or tank (Nagelkerke pseudo R²=0.211).

Just over half of respondents with stock reported that they had adopted the CRP time controlled or spell grazing on their property. The median area under this practice for these respondents was 500 ha with a total of almost 1.1 million ha [Table 3]. Binary logistic regression showed that adoption of the CRP used time controlled or spell grazing was significantly linked to respondents who:

- reported that there had been work on their property at least partially funded by government in the past five years (Wald=5.437, p=0.020, Exp(B)=2.099); and

- 66% of respondents who had work on their property funded by government used spell or time controlled grazing compared to 48% of those who had not.

This variables accounted for just over 3% of variation in the adoption of the CRP used time controlled or spell grazing (Nagelkerke pseudo R²=0.031).

The only stock related CRP that was adopted by less than half (39%) of all respondents involved in stock related enterprises was erected fencing to manage stock access to waterways and eroded gullies. The median length of fencing erected by these respondents was three kilometres [Table 3]. Using binary logistic regression, adoption of the CRP fenced to manage stock access to waterways or eroded gullies was significantly linked to respondents who:

- thought fencing to manage stock access was an essential part of the work required to revegetate waterways (Wald=10.585, p=0.001, Exp(B)=1.636); and

- 51% of respondents who agreed that fencing to manage stock access was an essential part of the work required to revegetate waterways had fenced to manage stock access compared to 25% of those who disagreed.

- had work undertaken on their property that was at least partially funded by government programs (Wald=8.795, p=0.001, Exp(B)=3.184).

- 68% of respondents who had government funded work undertaken on their property had fenced to manage stock access to waterways and eroded gullies compared to 30% of those who had not.

These variables accounted for approximately 17% of the variation in adoption of the CRP fenced to manage stock access the waterways or eroded gullies (Nagelkerke pseudo R²=0.167).
Irrigation CRP

Over half of all respondents who reported irrigated enterprises on their property said that they had adopted low pressure overhead or drip irrigation systems. The median area irrigated under these practices was 9 ha [Table 3]. Using binary logistic regression, adoption of the CRP used low pressure overhead or drip irrigation was significantly linked to respondents who:

- said their property was not important as on-property work kept them in touch with nature (Wald=8.563, p=0.003, Exp(B)=0.386).
  - 45% of respondents who said their property was important as on-property work kept them in touch with nature used low pressure or drip irrigation systems compared to 91% of those who said this was unimportant.

This variable explained almost 23% of variation amongst those had and had not adopted the CRP used low pressure overhead or drip irrigation practices (Nagelkerke pseudo $R^2$=0.229).

Bore water CRP

Survey findings highlighted very high levels of adoption of the CRP capped and piped bores and bore drains with 87% of respondents (with a bore or bore drain) indicating they had adopted this CRP. Almost all of these respondents reported that they had capped and piped all bores and bore drains on their property [Table 3]. There were no significant links between any of the variables included in the survey and adoption of the CRP capped and piped bores and bore drains.

Native bush CRP

Survey data highlighted limited adoption of the CRP fenced native bush to manage stock access. Under one third of respondent (30%) who had both stock and areas of native vegetation on their property said that they had fenced to manage stock access to these areas. The median area of native bush that had been fenced was 80 ha or a total area of 158,908 ha [Table 3]. Using binary logistic regression, adoption of the CRP native bush fenced to manage stock access was significantly linked to respondents who:

- said fencing to manage stock access was an essential part of the work required to revegetate waterways (Wald=8.313, p=0.004, Exp(B)=1.708);
  - 43% of respondents who agreed that fencing was an essential part of the work required to revegetate waterways had fenced native bush to manage stock access compared to 12% of respondents who disagreed.

- said that the cost of machinery/equipment was not an important factor constraining their ability to change management practices (Wald=5.895, p=0.015, Exp(B)=0.608); and
  - 29% of respondents who agreed that the cost of machinery/equipment was an important constraint to changing management practices had fenced native bush to manage stock access compared to 59% of respondents who disagreed.

- had completed or were further advanced in property planning (Wald=4.596, p=0.026, Exp(B)=1.318).
  - 30% of respondents who had completed a property plan had fenced native bush to manage stock access compared to 21% of respondents who were not involved in property planning.
These factors explained approximately 19% of the variation in adoption of the CRP fenced to manage stock access to native bush (Nagelkerke pseudo $R^2=0.191$).

**Differences across survey sub-regions**

There were significant differences in respondents’ adoption across survey sub-regions for four of the CRP included in the mail survey [Table 4].
### Table 3
Adoption of current recommended practices

<table>
<thead>
<tr>
<th>Current Recommended Practice</th>
<th>% adopting practice</th>
<th>Median uptake of practice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planted trees and shrubs.</td>
<td>33%</td>
<td>100 ha</td>
</tr>
<tr>
<td>Encouraged regrowth of native vegetation.</td>
<td>47%</td>
<td>40 ha</td>
</tr>
<tr>
<td>Reduced machinery or stock traffic.</td>
<td>31%</td>
<td>35 ha</td>
</tr>
<tr>
<td>Sown perennial pasture or lucerne.</td>
<td>35%</td>
<td>160 ha</td>
</tr>
<tr>
<td>Control of pest animal and non-crop weeds</td>
<td>66%</td>
<td>$2,000</td>
</tr>
<tr>
<td>Cropped using reduced chemical use as a result of applying integrated pest management or GPS technology.</td>
<td>22%</td>
<td>1,000 ha</td>
</tr>
<tr>
<td>Cropped using a rotation that was varied based on soil test results.</td>
<td>43%</td>
<td>460 ha</td>
</tr>
<tr>
<td>Cropped using a rotation with ley pasture.</td>
<td>33%</td>
<td>175 ha</td>
</tr>
<tr>
<td>Cropped using minimum tillage practices</td>
<td>73%</td>
<td>500 ha</td>
</tr>
<tr>
<td>Fenced to manage stock access to waterways an eroded gullies</td>
<td>39%</td>
<td>3 km</td>
</tr>
<tr>
<td>Used time controlled or spell grazing.</td>
<td>52%</td>
<td>500 ha</td>
</tr>
<tr>
<td>Only watered stock from a trough or tank</td>
<td>69%</td>
<td>60% of paddocks</td>
</tr>
<tr>
<td>Used low pressure overhead or drip irrigation systems</td>
<td>58%</td>
<td>9 ha</td>
</tr>
<tr>
<td>Native bush fenced to manage stock access</td>
<td>30%</td>
<td>80 ha</td>
</tr>
<tr>
<td>Capped and piped bores and bore drains</td>
<td>87%</td>
<td>100% of bores/bore drains</td>
</tr>
</tbody>
</table>
Table 4
Differences in adoption of CRP across survey sub-regions

<table>
<thead>
<tr>
<th>CRP</th>
<th>Survey sub-region (% of respondents adopting practice)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Planted trees and shrubs ((\chi^2), p&lt;0.001)</td>
<td>0%</td>
</tr>
<tr>
<td>Encouraged regrowth of native vegetation ((\chi^2), p&lt;0.001)</td>
<td>86%</td>
</tr>
<tr>
<td>Sown perennial pasture or lucerne ((\chi^2), p&lt;0.001)</td>
<td>0%</td>
</tr>
<tr>
<td>Only water stock from a trough or tank ((\chi^2), p&lt;0.001)</td>
<td>83%</td>
</tr>
</tbody>
</table>

Discussion of major factors influencing adoption of CRP

Overall, findings from the analysis of factors linked to the adoption of CRP highlighted the complex nature of decisions and the need to balance a wide range of issues.

The extent to which respondents considered their property was important in providing a sense of accomplishment from building or maintaining a viable business was one of the factors most commonly linked to the adoption of CRP included in the mail survey. Respondents who reported that their property was important to them in providing a sense of accomplishment from building or maintaining a viable business were significantly more likely to adopt the CRP established perennial pasture and only watered stock from a trough or tank. In contrast, those respondents who said that building or maintaining a viable business was not an important value of their property were significantly more likely to adopt the CRP encouraged regrowth of native vegetation.

These findings suggest that if a practice is considered to provide a viable business option the chances of that practice being adopted are increased. This is particularly relevant for practices aimed at sustainable agricultural production. Demonstration sites and trial areas are likely to provide an important tool 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. On the other hand, a strong focus on maintaining a viable business is likely to be a barrier to adoption of some practices if they are considered to impede production and viability. 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 in this report many respondents appear reluctant to forego productive capacity to achieve improved natural resource outcomes.
The importance of respondents’ values in understanding adoption were further highlighted by links between adoption or non-adoption and a range of other values attached to property including providing habitat for native animals, a place for recreation, the only job they have ever done, and their desired lifestyle.

Involvement in planning activities were also linked to the adoption of a number of CRP. Involvement in property planning was linked to higher adoption of the CRP cropped with a rotation based on soil test results and used time controlled or spell grazing. Involvement in local action planning was also linked to higher adoption of the CRP expenditure on pest animal and plant control and reducing chemical use as a result of applying GPS or integrated pest management technologies. Landcare membership was linked to higher adoption of the CRP sowed perennial pasture and only watered stock from a trough or tank. In light of the earlier findings of limited involvement in these activities, on-going promotion and support for landholders to undertake various planning activities appears to be an important element in facilitating the adoption of CRP.

Analysis of survey data also highlighted that the level of confidence regarding the efficacy or need for a practice was an important factor linked to adoption. Respondents who said that fencing was an essential part of the work required to revegetate waterways and eroded gullies were significantly more likely to have reduced stock or machinery traffic, fenced waterways to manage stock access, and fenced native bush to manage stock access. Similarly respondents who said that the time and expense in watering stock off-stream was justified by improvement in water quality and bank stability were more likely to have only watered stock from a trough or a tank. Again these finding 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.

There were some links between on-farm profitability and adoption of CRP. Respondents who returned an on-property profit in the last financial year were significantly more likely to have adopted the CRP expenditure on pest animal and plant control and watered stock only from a trough or a tank. Respondents who said that the cost of machinery and equipment was an important factor in their decision making about new practices were also less likely to have adopted the CRP fenced native bush to manage stock access. Low on-property profitability appears likely to represent an important barrier to adoption of practices particularly for practices that require a substantial investment of funds. These findings correspond with respondents rating cash flow the most important factor in their decision making about taking on new practices, and uncertain or low returns limiting investment in the long-term health as the most important issue affecting their property. While off-property income exceeded on-property income there was no link between adoption of CRP and off-property profitability. This finding is consistent with our previous research and appears to indicate some reluctance for landholders to invest off-property income back into the property.

It is important to note that respondents who had received government funding for environmental works were significantly more likely to have fenced waterways to manage stock access, used time controlled or spell grazing and reduced machinery or stock traffic. Indeed, over three quarters 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 and 58% of respondents said government “red tape” limited their interest in applying for government funding. 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 a 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 tax rebates (50% interested) and rate reductions (45% interested).

Respondents who had employed a consultant to provide advice on property management over the 12 months were more likely to have adopted the cropping CRP varied crop rotation on the basis of soil tests results and used minimum tillage. Providing a register or list of consultants across the region and areas they can provide advice on may help landholders access these services and in turn improve the adoption of CRP. At the same time, respondents who had employed a consultant were less likely to have used a rotation with ley pasture. One possible explanation is that consultants have some concerns about the efficacy of this practice. Involving local consultants in discussions about improving the uptake of CRP and techniques to improve the efficacy of these practices under local conditions (particularly those related to cropping) is likely to help promote greater adoption.

The common perceptions that property size, farming as an occupation, age, and low levels of equity were important constraints to adoption were not supported by this research.

Confidence in current recommended practices

Respondents were asked to provide information about their level of confidence in fencing waterways and eroded gullies, watering stock off-stream, the need for 30% cover of native vegetation to conserve biodiversity and cropping using stubble retention. This information was gathered using five 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).

Key findings

- The majority of survey respondents agreed that fencing waterways and eroded gullies was an important part of the work required to revegetate these areas. At the same time, just under half of all respondents also acknowledged that fencing makes these areas more difficult to manage.

- Most respondents also indicated that the time and expense of watering stock off-stream was justified by improvements in bank stability and water quality.

- Only 12% of respondents thought that the difficulties and costs associated with stubble retention outweighed the benefits of this practice.

- In contrast, almost half of all respondents said they were not confident in the scientific advice that 30% of the district needs to be under native vegetation to improve the environment.

The draft regional natural resource management plan identified a target of a 30% minimum native remnant vegetation cover at the sub-catchment scale by 2020. This target was largely informed by ecological research suggesting that 30% retention of remnant vegetation is required to prevent species extinction and land degradation (Boulter et al. 2000). The mail survey asked respondents to indicate how confident they were with the scientific advice that
30% of their local district needed to be under native vegetation to improve the environment. Responses to this statement highlighted a lack of confidence in this advice, with 44% of respondents disagreeing with this statement and a further 25% not sure [Figure 15].

The majority of survey respondents acknowledged that fencing was an important part of the work required to revegetate waterways and eroded gullies (56% agreed). At the same time, there was some concern about the efficacy of fencing waterways with 42% of respondents reporting that fencing these areas makes them more difficult to manage [Figure 15].

Just over half of all respondents (51%) also thought that the time and expense of watering stock off-stream was justified by improvements in bank stability and water quality. Only 17% of respondents indicated that the benefits of watering stock off-stream did not out weigh the time and expense involved [Figure 15].

There was considerably more uncertainty regarding the efficacy of stubble retention with the majority of respondents (59%) indicating that they were not sure if the benefits of stubble retention outweighed the costs and difficulties associated with this practice. This finding is likely to reflect the fact that about 60% of respondents were not involved in cropping enterprises. Keeping this in mind, survey data suggested some confidence in this practice with only 12% of respondents indicating the difficulties and costs associated with stubble retention outweighed the benefits of this practice [Figure 15].

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 requirement for 30% remnant vegetation, these analyses confirmed that individuals who had adopted CRP were more confident that the benefits of these practices outweighed any costs.

- Respondents who had fenced waterways or eroded gullies to manage stock access were significantly less likely to indicate that fencing made it difficult to manage these areas (36% of those who adopted compared to 44% of non-adopters ($\chi^2=12.874$, df=4, $p=0.012$)).
- Respondents who only watered stock from a trough or tank were significantly more likely to report that benefits in terms of improved water quality and bank stability outweighed the time and expenses involved (56% of those who adopted compared to 44% of non-adopters ($\chi^2=16.266$, df=4, $p=0.003$)).
- Respondents who had adopted minimum tillage practices were significantly more likely to indicate that the difficulties and costs did not outweigh the benefits of stubble retention (52% of those who adopted compared to 19% of non-adopters ($\chi^2=58.521$, df=4, $p<0.001$)).
- There was no significant difference between those who had planted trees and shrubs and those who had not in terms of respondents’ confidence in the scientific advice that 30% of the local district needed to be under native vegetation (34% of those who adopted compared to 28% of non-adopters ($\chi^2=7.411$, df=4, $p=0.116$)).
FIGURE 15 – CONFIDENCE IN CURRENT RECOMMENDED PRACTICES

1. Fencing is an essential part of work required to revegetate waterways and eroded gullies

2. Time and expense of watering stock off-stream is justified by improvements in bank stability and water quality

3. Fencing waterways makes it more difficult to manage these areas

4. I am confident in the scientific advice that 30% of the local district needs to be under native vegetation

5. The difficulties and cost associated with stubble retention outweigh the benefits*

*Note statement presented in the negative

Box 23 – Confidence and adoption of CRP

There were a number of links between confidence and adoption of CRP.

- Lower adoption of the CRP planted trees and shrubs was significantly linked to respondents who said that fencing out waterways makes it more difficult to manage these areas.

- Higher adoption of the CRP only watered stock from a trough or tank was significantly linked to respondents who said the time and expense of watering stock off-stream was justified by improvements in bank stability and water quality.

- Higher adoption of the CRP reduced machinery or stock traffic was significantly linked to respondents who said fencing to manage stock access was an essential part of the work required to revegetate waterways and eroded gullies.

- Higher adoption of the CRP fenced native bush to manage stock access was significantly linked to respondents who said fencing to manage stock access was an essential part of the work required to revegetate waterways and eroded gullies.

- Higher adoption of the CRP fenced to manage stock access to waterways and eroded gullies was significantly linked to respondents who said that this was an important part of the work required to revegetate these areas [refer to adoption of current recommended practices section on page 53].
Other social and demographic variables

Gender

Women play an important role in decision-making in farming families but their voice is often not heard (Curtis et al. 1997). According to estimates by Elix and Lambert (2000) about 30% of Australia’s farm work force is female and slightly less than 20% of agricultural decision-makers are women. The mailing list for this survey was compiled from lists of rural property owners provided by local councils [see earlier section on methodology]. No attempt was made to target women property owners or managers.

Of the 559 respondents who indicated their gender, 83 or just under 15% were women. This value is slightly lower than the 20% reported by Elix and Lambert (2000).

<table>
<thead>
<tr>
<th>Box 24 – Gender and adoption of CRP</th>
</tr>
</thead>
<tbody>
<tr>
<td>There were no significant links between the adoption of CRP covered in this research and respondents’ gender.</td>
</tr>
</tbody>
</table>

Time lived in the local district

Most respondents to the mail survey had lived in their local district for the majority of their life with a median of 32 years. Approximately 20% of respondents had lived in the area for less than 10 years. Furthermore, findings outlined earlier in this report suggested that the majority of land in the Queensland Murray Darling is likely to continue to be tightly held. The long period of residence in the district for landholders may partly explain the strong attachment to their community and concerns about community decline.

<table>
<thead>
<tr>
<th>Box 25 – Time lived in the local district and adoption of CRP</th>
</tr>
</thead>
<tbody>
<tr>
<td>There were no significant links between the adoption of CRP covered in this research and the time respondents had lived in their local district.</td>
</tr>
</tbody>
</table>

Time lived on current property

Respondents to the mail survey also indicated that they had lived for a median of 18 years on their current property.

<table>
<thead>
<tr>
<th>Box 26 – Time lived on current property and adoption of CRP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respondents who had lived on their property for a longer period of time were significantly more likely to adopt the CRP sown perennial pasture [refer to adoption of current recommended practices section on page 53].</td>
</tr>
</tbody>
</table>

Employment of a consultant to provide advice on property management

Twenty-seven percent of respondents said that they had employed a consultant to provide advice on some aspect of property management in the past 12 months.
Box 27 – Employment of a consultant and adoption of CRP

Employment of a consultant to provide advice on management of their property was significantly linked to:

- higher adoption of the CRP minimum tillage;
- higher adoption of the CRP cropped using reduced chemical use as a result of applying GPS or integrated pest management technology;
- lower adoption of the CRP cropped using a rotation with ley pasture [refer to adoption of current recommended practices section on page 53].

Use of rural counselling services

A small minority (6%) of respondents had used the services of a rural counsellor in the past 12 months.

Box 28 – Use of rural counsellors and adoption of CRP

There were no significant links between the adoption of CRP covered in this research and use of rural counsellors.

Number of family members supported by property

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

Box 29 – Family supported by property and adoption of CRP

There were no significant links between the adoption of CRP covered in this research and the number of family members supported by respondents’ property.

Number of individuals employed on property

Thirty-seven 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 461 persons.

Box 30 – Persons employed to work on property and adoption of CRP

There were no significant links between the adoption of CRP covered in this research and the number of people employed to work on property.
6. 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 Queensland Murray Darling region. The information contained within this report also provides critical baseline information and presents an opportunity to track changes over time and contribute to the monitoring and evaluation of 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 Queensland Murray Darling are not considered amongst the most pressing issues facing rural communities. Three of the top four issues identified by landholders related to social issues including the availability of important services, reduced employment opportunities and the decline of small towns. While some production and environmental issues such the impact of pest plants and animals (both on productivity and native species) and the availability of water for agriculture were considered important by most respondents, others such as dryland salinity, native vegetation decline, deteriorating water quality and lack of Aboriginal community access to culturally significant sites were not rated as important issues by most landholders.

Despite many natural resource management issues not being highly rated, most landholders in the Queensland Murray Darling Basin 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’ property and most landholders also said that contributing to the environmental health of the district and providing habitat for native animals were 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.

Analyses exploring the adoption of CRP highlighted that the values respondents attach to their property can be an important factor linked to adoption. One of the most common factors linked to adoption of CRP included in the mail survey was the extent respondents valued their property in providing a sense of accomplishment from building or maintaining a viable business. This attribute was particularly important for practices that focused on sustainable agricultural production such as watering stock off-stream and establishing perennial pasture. Where productivity benefits of practices can be demonstrated 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 raft of issues affecting land managers. To the extent that natural resource management activities can draw links and 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.
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 maintaining ground cover in improving soil health, the change in native tree cover in the district, the benefits of ley pasture and crop rotation and the extent of water savings from capping and piping bores and bore drains. In contrast, respondents reported limited knowledge across topics including those about salinity, water quality and traditional Aboriginal land management practices. The relatively low level of knowledge about 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 tried 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.

Sixty-five percent of respondents to the mail survey said that farming was their primary occupation. The 35% of respondents who said that farming was not their primary occupation managed only one percent of the total area surveyed. Survey findings highlighted that a small proportion of large landholders manage the vast majority of land in the Queensland Murray Darling. Only 12% of respondents managed a property larger than 10,000 ha yet these respondents managed over 92% of the area surveyed. There were no links between property size and farming as an occupation and adoption of CRP.

Despite farming being the primary occupation, over half of all survey respondents said they did not return a pre-tax on-property profit for the 2001/2002 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. Survey finding suggested that low on-property profitability represented an important barrier to the adoption of some CRP particularly for those practices that require a substantial investment of additional funds. On-property profitability was linked to the adoption of the CRP related to expenditure on pest animal and plant control and only watering stock from a trough or a tank. Respondents who said that the cost of machinery and equipment was an important factor in their decision making about new practices were also less likely to have adopted the CRP fenced native bush to manage stock access.

Off-property income appeared to be an important strategy to overcome low on-property profitability for many respondents. Almost two thirds of respondents reported an off-property profit and total off-property income exceeded total on-property income for 2001/2002. However, there were no significant links between off-property income and adoption of CRP. It appears that landholders may be reluctant to invest off-property income back into the property to adopt new practices where returns may be uncertain.

Furthermore, landholders are becoming increasingly aware that they are being asked to implement on-property works that have wider community benefits. Over three quarters of respondents said they thought landholders should be paid for providing environmental services that have wider community benefits. Indeed, there were a number of links between
adoption of CRP and respondents who said that they had work undertaken on their property that was at least partially funded by government programs.

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. Less than one quarter of respondents said that they had received government funding for work on their property and over half said that government “red tape” limited their interest in applying for funding. 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 tax rebates and rate reductions. 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 Queensland Murray Darling Basin was 52 years. The common perception that older age represents an important barrier to the adoption of CRP was not supported in this research. Analyses identified no significant links between age and adoption of any CRP included in the mail survey.

Findings from the survey suggested that there is likely to be substantial turnover in property managers in the future with 55% of properties likely to be passed on to another family member and 24% likely to be sold. Analyses suggested that half of all properties surveyed are likely to change hands by 2019.

Survey findings highlighted encouraging levels of involvement in property planning with just under half of all respondents either currently involved or with a completed property plan. Nevertheless, over half of all respondents had no involvement in property planning. Smaller landholders were significantly less likely to be involved in property planning. Respondents who were involved in property planning were significantly more likely to adopt a number of CRP. There were also links between adoption of CRP and involvement in local action planning, Landcare, family succession planning, and Topcrop. Ongoing promotion and greater support for landholders to implement plans appears to be an important factor in facilitating increased property planning particularly amongst smaller landholders.
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 $\chi^2$ indicates the strength of the difference between groups on a given variable with a higher value indicating a larger difference. However, the $\chi^2$ 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 $\text{Exp}(B)$ 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 across survey sub-regions

Table A1: Perception of issues affecting the district across sub-regions

<table>
<thead>
<tr>
<th>Variable</th>
<th>Survey sub-regions (% reporting very important/important)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decline of small towns ($\chi^2=41.57$, $p=0.014$)</td>
<td>60% 80% 76% 80% 63% 75% 69% 58% 55%</td>
</tr>
<tr>
<td>Property amalgamation leading to less viable communities ($\chi^2=47.51$, $p=0.003$)</td>
<td>20% 46% 36% 42% 47% 52% 46% 44% 25%</td>
</tr>
<tr>
<td>Dryland salinity undermining long-term productive capacity of district ($\chi^2=49.30$, $p=0.002$)</td>
<td>20% 10% 27% 13% 30% 51% 30% 30% 33%</td>
</tr>
<tr>
<td>Removal of native vegetation since European settlement ($\chi^2=49.77$, $p=0.002$)</td>
<td>20% 37% 26% 22% 23% 48% 28% 29% 42%</td>
</tr>
<tr>
<td>Depleting groundwater limiting the availability of water ($\chi^2=43.37$, $p=0.009$)</td>
<td>20% 39% 38% 44% 55% 49% 54% 68% 69%</td>
</tr>
<tr>
<td>Altered river or stream flows threatening health of waterways ($\chi^2=43.75$, $p=0.008$)</td>
<td>40% 13% 38% 26% 40% 44% 52% 50% 46%</td>
</tr>
<tr>
<td>Encroachment of native vegetation on agricultural land ($\chi^2=51.65$, $p=0.001$)</td>
<td>60% 51% 57% 42% 46% 35% 32% 29% 27%</td>
</tr>
<tr>
<td>Decline in soil health ($\chi^2=42.85$, $p=0.010$)</td>
<td>40% 26% 29% 42% 48% 60% 51% 53% 52%</td>
</tr>
<tr>
<td>Nutrient and chemical runoff affecting water quality ($\chi^2=84.99$, $p&lt;0.001$)</td>
<td>20% 8% 29% 20% 35% 44% 44% 48% 37%</td>
</tr>
<tr>
<td>Inefficient use of water for agriculture ($\chi^2=66.04$, $p&lt;0.001$)</td>
<td>20% 16% 31% 18% 46% 49% 39% 48% 45%</td>
</tr>
<tr>
<td>Lack of Aboriginal community access to culturally significant sites ($\chi^2=39.15$, $p=0.026$)</td>
<td>0% 0% 2% 4% 5% 14% 3% 3% 2%</td>
</tr>
<tr>
<td>The right to harvest or purchase water for agriculture ($\chi^2=58.16$, $p&lt;0.001$)</td>
<td>0% 49% 46% 46% 79% 52% 55% 58% 77%</td>
</tr>
</tbody>
</table>

Table A2: Perception of issues affecting property across sub-regions

<table>
<thead>
<tr>
<th>Variable</th>
<th>Survey sub-regions (% reporting very important/important)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dryland salinity undermining long-term productive capacity of property ($\chi^2=47.61$, $p=0.003$)</td>
<td>20% 8% 10% 7% 10% 32% 9% 13% 13%</td>
</tr>
<tr>
<td>Access to farm labour limiting management options ($\chi^2=70.59$, $p=0.001$)</td>
<td>60% 36% 49% 20% 40% 30% 15% 28% 12%</td>
</tr>
<tr>
<td>Increased paperwork limiting the time available to manage other aspect of my property ($\chi^2=61.53$, $p&lt;0.001$)</td>
<td>80% 69% 79% 69% 75% 37% 62% 67% 38%</td>
</tr>
<tr>
<td>Government “red tape” limiting interest in assistance to undertake work with environmental benefits ($\chi^2=41.55$, $p=0.014$)</td>
<td>80% 82% 64% 64% 63% 48% 63% 61% 39%</td>
</tr>
</tbody>
</table>
Table A3: Values attached to property across sub-regions

<table>
<thead>
<tr>
<th>Variable</th>
<th>Survey sub-regions (% reporting very important/important)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Provides most of the household income</td>
<td>100%</td>
</tr>
<tr>
<td>Sense of accomplishment knowing that the property will be passed on in better condition</td>
<td>100%</td>
</tr>
<tr>
<td>A place for recreation</td>
<td>60%</td>
</tr>
<tr>
<td>Sense of accomplishment from building/maintaining a viable business</td>
<td>80%</td>
</tr>
<tr>
<td>Provides the lifestyle I want</td>
<td>80%</td>
</tr>
<tr>
<td>Work on the property is a welcome break from my normal occupation</td>
<td>33%</td>
</tr>
<tr>
<td>To preserve family heritage</td>
<td>80%</td>
</tr>
<tr>
<td>An asset that will fund my retirement</td>
<td>80%</td>
</tr>
<tr>
<td>Being able to build a business that can employ other family members</td>
<td>40%</td>
</tr>
<tr>
<td>Work on the property keeps me in good health</td>
<td>60%</td>
</tr>
<tr>
<td>Provides a sound long-term economic investment</td>
<td>60%</td>
</tr>
<tr>
<td>It’s a great place to raise a family</td>
<td>100%</td>
</tr>
<tr>
<td>It is an attractive place to live</td>
<td>80%</td>
</tr>
<tr>
<td>The freedom of working for myself</td>
<td>80%</td>
</tr>
<tr>
<td>Variable</td>
<td>Survey sub-regions (% reporting very sound/sound knowledge)</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
<td>------------------------------------------------------------</td>
</tr>
<tr>
<td>Traditional Aboriginal land management practices in your district</td>
<td>13% 17% 9% 11% 12% 3% 1% 6% 2%</td>
</tr>
<tr>
<td>How to recognise signs of salinity</td>
<td>11% 44% 38% 36% 38% 13% 20% 41% 14%</td>
</tr>
<tr>
<td>Water savings for bore capping/piping and drip irrigation</td>
<td>78% 69% 56% 46% 60% 23% 19% 49% 46%</td>
</tr>
<tr>
<td>The change in native tree cover in your district over your life time</td>
<td>78% 76% 60% 56% 54% 28% 44% 43% 28%</td>
</tr>
<tr>
<td>The area of land where plants are affected by salinity in your district</td>
<td>25% 36% 30% 25% 13% 2% 7% 22% 12%</td>
</tr>
<tr>
<td>Who to contact about government programs supporting better natural</td>
<td>50% 45% 36% 26% 34% 15% 17% 39% 18%</td>
</tr>
<tr>
<td>The benefits of ground cover on grazing and cropping paddocks to</td>
<td>63% 67% 71% 63% 62% 41% 56% 70% 44%</td>
</tr>
<tr>
<td>maintain or improve soil health</td>
<td>50% 65% 71% 63% 62% 41% 56% 70% 44%</td>
</tr>
<tr>
<td>Assistance available for drought / exceptional circumstances</td>
<td>50% 45% 47% 26% 35% 17% 27% 30% 10%</td>
</tr>
<tr>
<td>The ability of vegetation in waterways and gullies to improve water</td>
<td>50% 35% 56% 37% 48% 22% 30% 43% 20%</td>
</tr>
<tr>
<td>quality</td>
<td>50% 21% 46% 44% 43% 25% 30% 42% 16%</td>
</tr>
<tr>
<td>The ability of perennial vegetation and standing stubble to improve</td>
<td>14% 27% 53% 49% 56% 29% 40% 57% 35%</td>
</tr>
<tr>
<td>water quality</td>
<td>56% 41% 51% 34% 32% 22% 30% 42% 14%</td>
</tr>
<tr>
<td>The benefits of ley pastures and crop rotation in maintaining soil</td>
<td>75% 50% 53% 46% 52% 24% 36% 42% 27%</td>
</tr>
<tr>
<td>health and productivity</td>
<td>50% 65% 71% 63% 62% 41% 56% 70% 44%</td>
</tr>
<tr>
<td>The effects of unrestricted stock access on waterways and eroded gullies</td>
<td>50% 65% 71% 63% 62% 41% 56% 70% 44%</td>
</tr>
</tbody>
</table>
Table A5: Interest in incentives across sub-regions

<table>
<thead>
<tr>
<th>Variable</th>
<th>Survey sub-regions (% reporting definite/strong interest)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Tax rebates ($\chi^2=35.52, p=0.003$)</td>
<td>88%</td>
</tr>
<tr>
<td>Contract with QMDC to undertake work in response to an advertised call ($\chi^2=39.18, p=0.001$)</td>
<td>29%</td>
</tr>
</tbody>
</table>

Table A6: Attitudes towards natural resource management across sub-regions

<table>
<thead>
<tr>
<th>Variable</th>
<th>Survey sub-regions (% reporting strongly agree/agree)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>It is difficult to obtain reliable expert advice or assistance for natural resource management ($\chi^2=45.41, p&lt;0.001$)</td>
<td>22%</td>
</tr>
<tr>
<td>Landholders should be paid for environmental service that benefit the wider community ($\chi^2=34.25, p=0.005$)</td>
<td>56%</td>
</tr>
<tr>
<td>Water diversion and on-property storage could lead to problems for other landholders and the environment ($\chi^2=36.81, p=0.002$)</td>
<td>75%</td>
</tr>
<tr>
<td>Loss in productive capacity can be justified where there are long-term benefits the natural resources ($\chi^2=39.13, p=0.001$)</td>
<td>38%</td>
</tr>
<tr>
<td>Clearing has substantially reduced the existence and diversity of native plants and animals in this district ($\chi^2=43.51, p&lt;0.001$)</td>
<td>22%</td>
</tr>
</tbody>
</table>

Table A7: Long-term plans for property across sub-regions

<table>
<thead>
<tr>
<th>Variable</th>
<th>Survey sub-regions (% reporting highly likely/likely)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>The property will be sold ($\chi^2=29.62, p=0.020$)</td>
<td>25%</td>
</tr>
<tr>
<td>I will increase the land I manage by purchasing, leasing or share farming additional land ($\chi^2=59.08, p&lt;0.001$)</td>
<td>50%</td>
</tr>
</tbody>
</table>
Table A8: Involvement in planning activities across survey sub-regions

<table>
<thead>
<tr>
<th>Variable</th>
<th>Survey sub-regions (% reporting some involvement)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Property planning ( (\chi^2=72.74, \ p&lt;0.001) )</td>
<td>67%</td>
</tr>
<tr>
<td>Family succession planning ( (\chi^2=46.99, \ p=0.042) )</td>
<td>67%</td>
</tr>
<tr>
<td>Local action planning ( (\chi^2=62.81, \ p&lt;0.001) )</td>
<td>50%</td>
</tr>
</tbody>
</table>

Table A9: Constraints to the adoption of CRP across sub-regions

<table>
<thead>
<tr>
<th>Variable</th>
<th>Survey sub-regions (% reporting very important/important)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Cash flow ( (\chi^2=43.54, \ p&lt;0.001) )</td>
<td>100%</td>
</tr>
<tr>
<td>Availability of labour ( (\chi^2=38.07, \ p=0.001) )</td>
<td>100%</td>
</tr>
<tr>
<td>Uncertainty about the existence of long-term markets ( (\chi^2=31.18, \ p=0.013) )</td>
<td>60%</td>
</tr>
</tbody>
</table>
Appendix 3 – Survey sub-region profiles
Quilpie/Bulloo (1)

CHARACTERISTICS OF PROPERTIES

 Median property size: 70,416 ha

 3 most common land uses or enterprises:
    Beef cattle-100%
    Sheep for wool-86%
    Dryland pasture-71%

 Proportion of respondents who reported areas showing signs of salinity: 25%

 Proportion likely to sell property: 25%

 Proportion likely to increase the land they manage: 50%

 Most commonly adopted CRP:
    Work to control non-crop weeds and pests-86%
    Encouraged regrowth of native vegetation-86%
    Only watered stock from trough/tank/dam-83%

 On-property profit (2001/2002): 50%

 Average on-property income (2001/2002): $50,000


 Average off-property income (2001/2002): $29,000
CHARACTERISTICS OF RESPONDENTS

Median age: 58 years

Farmer by occupation: 100%

Landcare membership: 44%

Membership of best practice group: 4%

Proportion with government funded work on their property in the past 5 years: 22%

Top 3 issues:
  Availability of important services-100%
  Cost of managing weeds and pests-100%
  Reduced employment opportunities-80%

Top 3 values attached to property:
  Providing most of the household income-100%
  Being a great place to raise a family-100%
  Able to pass property on in better condition-100%

NRM topics where respondents reported the highest knowledge (% with sound knowledge):
  Water savings from bore/capping and drip irrigation-78%
  Change in native tree cover-78%
  Effects of unrestricted stock on waterways-75%

Top 3 factors when considering changing land management practices:
  Availability of labour-100%
  Cash flow-100%
  Suitability of soils-88%
CHARACTERISTICS OF PROPERTIES

Median property size: 16,125 ha

3 most common land uses or enterprises:
  - Beef cattle-79%
  - Sheep for wool-60%
  - Dryland pasture-51%

Proportion of respondents who reported areas showing signs of salinity: 12%

Proportion likely to sell property: 30%

Proportion likely to increase the land they manage: 21%

Most commonly adopted CRP:
  - Work to control non-crop weeds and pests-63%
  - Used low pressure overhead or drip irrigation-100%
  - Only watered stock from trough/tank/dam-88%

On-property profit (2001/2002): 59%

Average on-property income (2001/2002): $19,000

Off-property profit (2001/2002): 58%

Average off-property income (2001/2002): $15,000
CHARACTERISTICS OF RESPONDENTS

Median age: 50 years

Farmer by occupation: 95%

Landcare membership: 36%

Membership of best practice group: 20%

Proportion with government funded work on their property in the past 5 years: 29%

Top 3 issues:
   Availability of important services-87%
   Reduced employment opportunities-85%
   Decline of small towns-80%

Top 3 values attached to property:
   Being able to build/maintain a viable business-93%
   Providing the lifestyle I want-100%
   Able to pass property on in better condition-85%

NRM topics where respondents reported the highest knowledge (% with sound knowledge):
   Change in native tree cover-76%
   Water savings from bore/capping and drip irrigation-69%
   The benefits of ground cover on grazing and cropping paddocks-67%

Top 3 factors when considering changing land management practices:
   Cash flow-93%
   Cost of machinery or equipment-80%
   Suitability of soils-75%
Balonne/Warroo (3)

CHARACTERISTICS OF PROPERTIES

Median property size: 7,598 ha

3 most common land uses or enterprises:
  Beef cattle-78%
  Dryland pasture-62%
  Broadacre cropping-48%

Proportion of respondents who reported areas showing signs of salinity: 4%

Proportion likely to sell property: 31%

Proportion likely to increase the land they manage: 33%

Most commonly adopted CRP:
  Used minimum tillage-88%
  Work to control non-crop weeds and pests-68%
  Only watered stock from trough/tank/dam-68%

On-property profit (2001/2002): 50%

Average on-property income (2001/2002): $16,000

Off-property profit (2001/2002): 54%

Average off-property income (2001/2002): $18,000
CHARACTERISTICS OF RESPONDENTS

Median age: 52 years

Farmer by occupation: 96%

Landcare membership: 22%

Membership of best practice group: 33%

Proportion with government funded work on their property in the past 5 years: 18%

Top 3 issues:
  Availability of important services-95%
  Reduced employment opportunities-85%
  Cost of managing weeds and pest animals-81%

Top 3 values attached to property:
  Being able to build/maintain a viable business-91%
  Providing most of the household income-86%
  Able to pass property on in better condition-86%

NRM topics where respondents reported the highest knowledge (% with sound knowledge):
  The benefits of ground cover on grazing and cropping paddocks-71%
  Change in native tree cover-60%
  Water savings from bore/capping and drip irrigation-56%

Top 3 factors when considering changing land management practices:
  Cash flow-93%
  Cost of machinery or equipment-85%
  Suitability of soils-93%
Bungil/Bendemere (4)

CHARACTERISTICS OF PROPERTIES

Median property size: 1,335 ha

3 most common land uses or enterprises:
  Beef cattle-80%
  Dryland pasture-71%
  Other trees-44%

Proportion of respondents who reported areas showing signs of salinity: 2%

Proportion likely to sell property: 23%

Proportion likely to increase the land they manage: 40%

Most commonly adopted CRP:
  Work to control non-crop weeds and pests-74%
  Only watered stock from trough/tank/dam-71%
  Used low pressure overhead or drip irrigation-50%

On-property profit (2001/2002): 70%

Average on-property income (2001/2002): $20,000

Off-property profit (2001/2002): 64%

Average off-property income (2001/2002): $24,000
CHARACTERISTICS OF RESPONDENTS

Median age: 55 years
Farmer by occupation: 78%
Landcare membership: 32%
Membership of best practice group: 12%
Proportion with government funded work on their property in the past 5 years: 21%

Top 3 issues:
  Availability of important services-82%
  Decline of small towns-80%
  Cost of managing weeds and pest animals-80%

Top 3 values attached to property:
  Able to pass property on in better condition-93%
  Providing the lifestyle I want-91%
  Being able to build/maintain a viable business-88%

NRM topics where respondents reported the highest knowledge (% with sound knowledge):
  The benefits of ground cover on grazing and cropping paddocks-63%
  Change in native tree cover-56%
  The benefits of ley pastures and crop rotation-49%

Top 3 factors when considering changing land management practices:
  Cash flow-88%
  Cost of machinery or equipment-84%
  Suitability of soils-84%
Waggamba/Inglewood (5)

CHARACTERISTICS OF PROPERTIES

Median property size: 2,103 ha

3 most common land uses or enterprises:
   Beef cattle-67%
   Dryland pasture-62%
   Sheep for wool-58%

Proportion of respondents who reported areas showing signs of salinity: 0%

Proportion likely to sell property: 14%

Proportion likely to increase the land they manage: 46%

Most commonly adopted CRP:
   Used minimum tillage-78%
   Only watered stock from trough/tank/dam-71%
   Cropped using a rotation based on soil tests-52%

On-property profit (2001/2002): 60%

Average on-property income (2001/2002): $34,000

Off-property profit (2001/2002): 64%

Average off-property income (2001/2002): $20,000
CHARACTERISTICS OF RESPONDENTS

Median age: 46 years

Farmer by occupation: 73%

Landcare membership: 28%

Membership of best practice group: 24%

Proportion with government funded work on their property in the past 5 years: 20%

Top 3 issues:
- Availability of important services-88%
- Cost of managing weeds and pest animals-80%
- Right to harvest or purchase water for agriculture-79%

Top 3 values attached to property:
- Able to pass property on in better condition-92%
- Being a great place to raise a family -90%
- Providing a sound long-term economic investment-87%

NRM topics where respondents reported the highest knowledge (% with sound knowledge):
- The benefits of ground cover on grazing and cropping paddocks-62%
- Water saving from bore capping/drip irrigation-60%
- The benefits of ley pastures and crop rotation-56%

Top 3 factors when considering changing land management practices:
- Cash flow-88%
- Suitability of soils-85%
- Cost of machinery or equipment-83%
CHARACTERISTICS OF PROPERTIES

Median property size: 17 ha

3 most common land uses or enterprises:
  - Dryland pasture-71%
  - Beef cattle-67%
  - Broadacre cropping-43%

Proportion of respondents who reported areas showing signs of salinity: 6%

Proportion likely to sell property: 40%

Proportion likely to increase the land they manage: 25%

Most commonly adopted CRP:
  - Encouraged regrowth-60%
  - Used low pressure overhead or drip irrigation-100%
  - Only watered stock from a trough/tank/dam-62%

On-property profit (2001/2002): 15%

Average on-property income (2001/2002): 
$10,000


Average off-property income (2001/2002): 
$17,000
CHARACTERISTICS OF RESPONDENTS

Median age: 54 years

Farmer by occupation: 36%

Landcare membership: 2%

Membership of best practice group: 3%

Proportion with government funded work on their property in the past 5 years: 3%

Top 3 issues:
   Availability of important services-83%
   Cost of managing weeds and pest animals-83%
   Decline of small towns-75%

Top 3 values attached to property:
   Able to pass property on in better condition-74%
   Provides habitat for native animals-66%
   Provides the lifestyle I want-70%

NRM topics where respondents reported the highest knowledge (% with sound knowledge):
   The benefits of ground cover on grazing and cropping paddocks-41%
   The benefits of ley pastures and crop rotation-29%
   Change in native tree cover-28%

Top 3 factors when considering changing land management practices:
   Water storage capacity-73%
   Cost of machinery or equipment-73%
   Suitability of soils-68%
CHARACTERISTICS OF PROPERTIES

Median property size: 388 ha

3 most common land uses or enterprises:
- Dryland pasture-73%
- Beef cattle-73%
- Other trees-48%

Proportion of respondents who reported areas showing signs of salinity: 3%

Proportion likely to sell property: 22%

Proportion likely to increase the land they manage: 25%

Most commonly adopted CRP:
- Only watered stock from a trough/tank/dam-83%
- Work to control non-crop weeds and pests-69%
- Used time controlled or spell grazing-63%

On-property profit (2001/2002): 42%

Average on-property income (2001/2002): $13,000

Off-property profit (2001/2002): 69%

Average off-property income (2001/2002): $19,000
CHARACTERISTICS OF RESPONDENTS

**Median age:** 56 years

**Farmer by occupation:** 70%

**Landcare membership:** 27%

**Membership of best practice group:** 7%

**Proportion with government funded work on their property in the past 5 years:** 27%

**Top 3 issues:**
- Availability of important services-76%
- Cost of managing weeds and pest animals-76%
- Reduced employment opportunities-70%

**Top 3 values attached to property:**
- Provides the lifestyle I want-86%
- Able to pass property on in better condition-81%
- Building/maintaining a viable business-79%

**NRM topics where respondents reported the highest knowledge (% with sound knowledge):**
- The benefits of ground cover on grazing and cropping paddocks-56%
- Change in native tree cover-44%
- The benefits of ley pastures and crop rotation-40%

**Top 3 factors when considering changing land management practices:**
- Cash flow-79%
- Support and commitment from family-75%
- Suitability of soils-68%
Millmerran/Wambo (8)

CHARACTERISTICS OF PROPERTIES

Median property size: 251 ha

3 most common land uses or enterprises:
  - Dryland pasture-58%
  - Broadacre cropping-55%
  - Beef cattle-39%

Proportion of respondents who reported areas showing signs of salinity: 0%

Proportion likely to sell property: 24%

Proportion likely to increase the land they manage: 41%

Most commonly adopted CRP:
  - Only watered stock from a trough/tank/dam-75%
  - Work to control non-crop weeds and pests-73%
  - Used minimum tillage-80%

On-property profit (2001/2002): 49%

Average on-property income (2001/2002): $21,000

Off-property profit (2001/2002): 54%

Average off-property income (2001/2002): $16,000
CHARACTERISTICS OF RESPONDENTS

Median age: 50 years

Farmer by occupation: 68%

Landcare membership: 19%

Membership of best practice group: 14%

Proportion with government funded work on their property in the past 5 years: 14%

Top 3 issues:
  - Availability of important services-93%
  - Reduced employment opportunities-70%
  - Depleting groundwater limiting availability of water-68%

Top 3 values attached to property:
  - Being a great place to raise a family-93%
  - Being an attractive place to live-85%
  - The freedom of being self employed-85%

NRM topics where respondents reported the highest knowledge (% with sound knowledge):
  - The benefits of ground cover on grazing and cropping paddocks-70%
  - The benefits of ley pastures and crop rotation-57%
  - Water savings from bore capping/drip irrigation-49%

Top 3 factors when considering changing land management practices:
  - Cash flow-84%
  - Cost of machinery/equipment-77%
  - Support and commitment from family-72%
Stanthorpe (9)

CHARACTERISTICS OF PROPERTIES

Median property size: 33 ha

3 most common land uses or enterprises:
- Dryland pasture-47%
- Broadacre cropping-34%
- Other trees-52%

Proportion of respondents who reported areas showing signs of salinity: 5%

Proportion likely to sell property: 27%

Proportion likely to increase the land they manage: 18%

Most commonly adopted CRP:
- Used low pressure overhead or drip irrigation-68%
- Work to control non-crop weeds and pests-64%
- Used minimum tillage-60%

On-property profit (2001/2002): 22%

Average on-property income (2001/2002): $6,000

Off-property profit (2001/2002): 84%

Average off-property income (2001/2002): $29,000
CHARACTERISTICS OF RESPONDENTS

Median age: 53 years

Farmer by occupation: 33%

Landcare membership: 9%

Membership of best practice group: 5%

Proportion with government funded work on their property in the past 5 years: 5%

Top 3 issues:
- Availability of important services-83%
- Right to harvest or purchase water for agriculture-77%
- Reduced employment opportunities-76%

Top 3 values attached to property:
- Being an attractive place to live-85%
- Provides the lifestyle that I want-82%
- Provides habitat for native animals-77%

NRM topics where respondents reported the highest knowledge (% with sound knowledge):
- Water savings from bore capping/drip irrigation-46%
- The benefits of ground cover on grazing and cropping paddocks-44%
- The benefits of ley pastures and crop rotation-35%

Top 3 factors when considering changing land management practices:
- Water storage capacity-88%
- Suitability of soils -76%
- Cash flow-69%
References


Vanclay, F. 1997. The social basis of environmental management in agriculture: a background for
