

# Understanding the social drivers for natural resource management in the Wimmera region

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## Disclaimer

The views expressed in this report are solely the authors', and do not necessarily reflect the views of Charles Sturt University, Wimmera Catchment Management Authority or people consulted during the research project.

## List of acronyms

ABS – Australian Bureau of Statistics  
WCMA – Wimmera CMA  
CMA – Catchment Management Authority  
CRC - Cooperative Research Centre  
CRP – Current Recommended Practices  
GIS – Geographic Information System  
LGA – Local Government Area  
RMU – Resource Management Unit  
NAP – National Action Plan for Salinity & Water Quality  
NHT – Natural Heritage Trust  
NLP – National Landcare Program  
NRM – Natural Resource Management  
QA – Quality Assurance  
RCS – Regional Catchment Strategy  
RMU – Resource Management Unit  
VFF – Victorian Farmers' Federation

# EXECUTIVE SUMMARY

## Introduction

This report presents findings from research commissioned by the Wimmera Catchment Management Authority (WCMA). Data were collected through a survey of rural landholders in the WCMA region during the final months of 2007. A response rate of 56% (503 completed surveys) was achieved.

The 2007 survey followed a similar research process to that employed in the Wimmera region in 2002 (Curtis et al. 2002). Data analysis included comparisons over time to identify trends in the social and farming context, the social drivers of landholder natural resource management (NRM) and progress in the achievement of intermediate NRM outcomes. This is the first time in Australia that a regional NRM organisation has had the capacity to assess progress in the achievement of intermediate NRM objectives. Previous surveys have been undertaken in other Australian catchments and these studies provide readers with some comparative studies (Curtis et al. 2005).

A brief overview of the research findings is followed by a listing of key findings for each of the survey topics.

## An overview

There were significant positive links between adoption of current recommended management practices (CRP) and many of the NRM levers at the disposal of the WCMA. Awareness and concern about NRM issues, knowledge of NRM topics, membership or involvement in landcare, involvement in property and local action planning, involvement in short courses and receipt of funding from government were all linked to higher adoption of CRP. Given the substantial investment in raising awareness and improving knowledge, these findings provide some comfort that NRM investment decisions are soundly based.

Data analysis also suggests that the values landholders attach to their property are a strong predictor of behaviour. Values are generally stable over time and knowledge of values should underpin effective engagement processes. Survey findings suggest there is a strong division between landholders with conservation and production values that are linked to the adoption of related CRP. Appeals that focus on the environmental benefits of CRP are therefore likely to be effective with those with pro-conservation values, including the increasing proportion (33% in 2007, 20% in 2002) of landholders who are not farmers by occupation. Survey data suggests that many farmers are likely to be alienated by such appeals. However, there were some values that transcended the conservation/ production schism. Being able to pass the property on to others in better condition appears to have both widespread appeal and strong links to the adoption of CRP related to biodiversity conservation and sustainable agriculture.

Modelling of turnover in landholders using respondent's age, intentions to sell/ subdivide and Australian Bureau of Statistics life expectancy tables suggest that 45% of the properties in the WCMA will have a different person making management decisions within 10 years. This represents a significant increase from the 36% of properties predicted to change hands using 2002 data. The expected increase in property turnover also suggests there will be a major change from a relatively stable rural landholder population in the Wimmera. Indeed, in 2002, only 6% of respondents had lived in the district for less than 10 years. In 2007, 11% of respondents had lived in the district for less than ten years. Newer and longer-term residents were very different and these differences are linked to differences in land management. WCMA programs will need to accommodate the different values, capacities and information sources of these newer owners.

The 2002 and 2007 surveys included items measuring the achievement of intermediate objectives such as awareness of issues, knowledge of NRM, confidence in current

recommended practices (CRP) and adoption of CRP. These objectives are expected to lead to improved resource condition and are the focus of considerable investment by NRM agencies, including the WCMA. NRM investment is increasingly targeted to specific asset classes, such as a vegetation type. Analyses were therefore undertaken that tested for changes over time for all respondents and for those in locations with specific assets where the WCMA has made targeted investments in recent years.

At the regional scale, there was increased landholder awareness of river health, water quality, dryland salinity and soil erosion issues and increased preparedness to acknowledge the impact of landuse on soils. There was also evidence of significantly increased levels of confidence in fencing to manage stock access as an essential part of work to revegetate waterways and in the efficacy of watering stock off-stream in terms of improvements in bank stability, water quality and stock condition.

However, there were significantly lower levels of self-reported knowledge for almost all topics included in the 2002 and 2007 surveys. This trend remained for analyses focussed on the seven knowledge topics where the WCMA has targeted investments to high priority areas/ assets. There was also a trend to significantly lower landholder implementation of CRP. For example, at a regional scale there were significantly lower proportions of landholders involved in three of the five CRP included in the 2002 and 2007 surveys. Again, this trend remained for analyses focussed on specific areas/ assets, with a trend to lower involvement in four of the five CRP, and a significant decline for two CRP.

The change to drought conditions in recent years and the impact of drought in reducing on-property profitability appears to have constrained the adoption of many CRP. Other factors are also at work, including the trend to smaller properties, a smaller proportion of landholders who identify themselves as farmers and increased proportions of landholders working and living off-property. These trends are important because farmers are more likely than non-farmers to implement sustainable agriculture CRP but less likely to implement conservation related CRP. In this study, each of these factors was linked to lower adoption of CRP, particularly for sustainable agriculture CRP.

## **Assessment of issues**

- Getting the balance between water for consumptive and environmental use and the loss of important services in rural areas were the highest rated issues at the district scale. These findings suggest that most landholders are concerned about a range of social, economic and environmental issues.
- The top five rated issues at the district scale include three water-related items that indicate a high level of concern about both the economic and environmental impacts of competition for limited supplies of surface and ground water.
- Just under half of the respondents rated dryland salinity as having important impacts on water quality and the long-term productive capacity of land at the district scale.
- The impact of changing rainfall patterns and the rising cost of farming inputs on property viability were the highest rated issues at the property level issue.
- Comparison of 2002 and 2007 survey data suggests there has been a general increase in awareness of river health, water quality, dryland salinity and soil erosion issues and an increased preparedness of landholders to acknowledge the impact of their landuse on soils.
- There were significant relationships between the adoption of CRP and 17 of the 21 items exploring issues. These relationships suggest awareness and concern about issues are powerful drivers of landholder behaviour. However, many of the relationships identified were counter-intuitive and reflect the effect of occupation as a mediating variable. That

is, farmers were significantly more likely to adopt practices linked to production. Non-farmers were significantly more likely to give a higher rating to the environmental issues included in the survey. As a result, lower ratings for many issues were associated with higher levels of adoption.

- Most (81%) respondents did not report saline affected areas and the expert maps agreed with their assessments. Saline affected areas reported were mostly small (median 10 ha). The total area of reported salinity was 2,437 ha or 0.61% of the total area surveyed in the WCMA region. These findings are consistent with those from the 2002 survey where 23% said they had saline affected areas with a median affected area of 10 ha and less than one per cent of the area surveyed was affected by salinity.
- Respondents who said they had saline affected areas were significantly more likely to adopt most of the CRP in the survey expected to address dryland salinity.
- Most respondents appear to have a high level of awareness and preparedness to acknowledge current, visible dryland salinity on their property. For example, 92% of the respondents who said they had no areas currently affected by salinity were correct according to the expert maps.
- The expert maps only agreed with 26% of those reporting saline affected areas on their property. A large cluster of these respondents is located in the Northern Footslopes. This topic warrants further exploration.

## **Values attached to property**

- Items related to the lifestyle offered by rural living and being a great place to raise a family were the highest rated values landholders attached to property.
- Economic values related to the sense of accomplishment from improving property infrastructure (fencing, water supply, pasture) and from building/ maintaining a viable business were rated as important by three quarters of respondents.
- There appears to be a strong stewardship ethic amongst most respondents with over three quarters saying it was important to be able to pass the property on to others in better condition. A smaller proportion (45%) said they would accept reduced production in the short-term to gain long-term benefits for the environment.
- Environmental values did not rate in the top 10 items. However, over half of the respondents said it was important that their property contributes to the environmental health of the district and just under half said their property was important because native vegetation on their property provides habitat for native animals.
- Values are stable over time so it was no surprise to find few differences between the data from the 2002 and 2007 surveys.
- There were significant relationships between the adoption of CRP and 16 of the 18 items exploring the values landholders attach to their property. These relationships suggest values are powerful drivers of landholder behaviour. Respondents who attached strong environmental values to their property were more likely to adopt conservation practices. This was also the case for production values and CRP with a production focus. Again, there was an important difference between farmers and non-farmers. There were some values, including being able to pass the property on to others in better condition, with wider appeal because they spanned the conservation/ production divide.

## Knowledge of natural resource management

- Most respondents rated their knowledge below sound (sufficient to act/ explain to others) for 14 of the 17 items in the survey. The exceptions were the role of paddock trees as habitat, grazing strategies to manage ground cover to minimise soil erosion and the impact of clearing of native vegetation on native flora and fauna.
- There were five topics where 10% or fewer respondents said they had sound knowledge, including those related to identifying native understorey species, the extent of pre-European tree coverage, the extent of gully erosion across the region, the area of saline affected vegetation in the district and returns from farm forestry.
- There are significantly lower self-reported levels of knowledge for nine of the 12 topics included in both the 2002 and 2007 surveys. The most dramatic declines were for knowledge about grazing strategies to manage ground cover to minimise soil erosion, how to prepare a whole farm plan, the extent of water savings through the Wimmera/ Mallee pipeline, the extent of pre-European tree coverage, the ability of perennial vegetation to prevent water tables rising and the area of saline affected vegetation in the district.
- There was a significant decline in self-reported knowledge over time for six of the eight topics in areas identified as by WCMA as being locations where the CMA has made a strategic investment.
- There were significant positive relationships between the adoption of CRP and the 17 items exploring landholder knowledge. These relationships suggest knowledge is a powerful driver of landholder behaviour. Importantly, these relationships hold for CRP with both a biodiversity and a sustainable agriculture focus. In most instances, the relationships identified involved plausible causal links between knowledge and adoption.

## Attitudes towards natural resource management

- Almost all respondents (85%) agreed that landholders should manage their properties in the expectation of drought events. This statement implies that drought is a normal part of the Australian environment and landholders must manage their land and finances accordingly.
- Almost all respondents (79%) agreed that landholders should be paid for providing environmental services. The level of agreement with this statement was similar to that obtained in 2002 (84%).
- Most respondents were concerned about right to farm issues. Fifty-six per cent agreed that landholders should have the right to collect rain water that falls on their property even if that action impacts on others; and only 27% agreed that in most cases, the public should have the right to access river/ stream frontages managed by landholders.
- There is some support for a duty of care for biodiversity in that most (57%) respondents agreed that it is fair that the wider community expect landholders to manage their land in ways that will not cause foreseeable harm to the environment. However, only 36% agreed that in future, landholders should expect to be legally responsible for managing their land in ways that will not cause foreseeable harm to the environment.
- Few (25%) landholders supported the view that planting out large areas of the Wimmera to native bush is justified.
- Only a small number of the attitudinal statements in the survey could be expected to affect adoption of CRP in this study. In a few instances, positive attitudes were linked to higher levels of adoption. However, in many instances the results of data analyses were

counter-intuitive in that higher levels of adoption were linked to less positive responses to attitudinal items. The explanation is that farmers were more likely to disagree with statements exploring attitudes about conservation and property rights but farmers were more likely to adopt many CRP.

## **Confidence in recommended practices**

- There was a high level of confidence in fencing to manage stock access as an essential part of work to revegetate waterways (72% agreed). Compared to 2002 this represented a significant improvement in confidence levels.
- Most respondents said they were confident that the benefits of stubble retention outweigh any problems arising.
- Half thought that clearing native vegetation has substantially reduced native flora and fauna in their district.
- Less than half (44%) of the respondents were confident that watering stock off-stream was justified in terms of improvements in bank stability, water quality and stock condition. Compared to 2002 this represented a significant improvement in confidence levels.
- Few respondents were confident that scientists know how to manage dryland salinity in the Wimmera. This finding was identical to the 2007 finding (17% confident in both surveys).
- There were few positive relationships between the items assessing confidence in CRP and adoption of the CRP. The principal exception was the finding of a significant positive relationship between confidence in the benefits of stubble retention and using minimum tillage past five years.
- There were significant differences across the Wimmera Resource Management Units (RMU) for two of the five topics exploring landholder confidence in CRP.

## **Preferred arrangement for involving landholders in NRM**

- Only a reduction in local government rates elicited strong interest from more than half of all respondents. A tax rebate administered by the Commonwealth was the next most popular delivery mechanism offered. There was markedly less interest for a fixed grant incentive scheme or a market-based instrument.
- Taken together, the four mechanisms attracted strong interest from 62% of respondents. Removing the rate reduction, the remaining mechanisms attracted strong interest from 49% of respondents. The addition of the market-based instrument made no difference to the proportion of respondents attracted by the potential mechanisms used to deliver NRM programs in the WCMA region.
- More than a third of respondents expressed strong interest in support that included funds for on-ground work, funds for them to engage contractors to undertake on-ground work and funds to support the work of Landcare or similar groups. About a quarter of respondents expressed strong interest in access to equipment, access to volunteer labour and the CMA organising contractors to undertake work for them.
- Half the respondents said they were willing to undertake environmental work on their property without any external financial support.

- There were significant differences across the Wimmera RMU on six (not including support for MBI) of the 15 items exploring landholder interest in types of support and delivery mechanisms.

## Sources of information about NRM

- Newspapers was the most frequently listed (80%) of the 25 sources included in the survey and was identified as the most useful source by the largest number of respondents (#1 rating). This topic was not included in the 2002 survey.
- Books/ magazines/ journals and mailed brochures/ leaflets/ community newsletters were listed as a source of information by 75% and 69% of respondents respectively, and were both in the top six for most useful sources.
- Radio, Landcare group/ network, friends/ neighbours/ relatives, field days and the WCMA were the only other sources listed by at least half of the respondents. Landcare group/ Network was rated higher (#2) for usefulness than for use (#5).
- Television and radio rated highly (both #4) as useful sources of information.
- The internet and email were identified as a combined source of information by 20% of respondents. This topic was not included in the 2002 survey.

## Stage of life and long term plans

- The 2002 survey established that 94% of respondents had lived in their local district for more than 10 years, with a median length of residence of 46 years. These data suggested the Wimmera region had a stable population. Modelling of the 2002 data suggested 36% of properties would change hands in the next 10 years. Our more recent analysis of property sales data held by the Victorian Valuer General suggests that 22% of rural properties in the Wimmera region changed hands between 1995 and 2005.
- The median age of survey respondents was 54 years, up one year on the median age of 53 years in 2002.
- The median length of residence was 45 years and the median length of property ownership was 25 years. In 2007, 89% of respondents had lived in their district for more than ten years.
- Sixty-nine per cent of respondents said ownership of the property would stay within their family. These respondents managed 75% of the land surveyed
- Most (60%) respondents indicated that they would continue to live on the property.
- Thirty-two per cent of respondents indicated that they had plans to expand their property (buy, lease or share-farm additional land). These respondents managed 47% of the land surveyed. Thirty-eight per cent of respondents indicated that they would dispose of all or a large part of their property either through sale, leasing or share-farming (27% of the land surveyed).
- Respondents who indicated they were going to dispose of all or most of their property were significantly different from those planning to acquire land. It seems that stage of life (younger acquire), farming (farmers acquire) as an occupation and the likelihood of family succession are the key differences between the two groups.
- Those planning to acquire land were significantly more likely to adopt some CRP, including the area sown to perennial pastures, the use of no-till cropping practices and testing of water quality. At the same time, it is important to highlight that there were

identical scores/negligible differences for several CRP, including farm forestry establishment, gully erosion addressed, fencing to manage stock access to waterways, and off-stream watering points established.

- Long-term plans for the property remained very stable over the period 2002 to 2007 with the exception of a significant decrease in the proportion of respondents indicating they planned to acquire additional land (43% in 2002 to 32% in 2007).
- Modelling of the 2007 survey data suggested that 45% of properties would change hands in the next 10 years (not necessarily by sale). This is an increase on the 36% identified through modelling of the 2002 data. The year of predicted property transfer was not significantly different across the Wimmera region RMU.
- Using a 10-year threshold to distinguish between newer and longer-term owners, our analyses established that 15% of respondents were new owners.
- Most (76%) new owners had lived outside the district before purchasing their property and almost half (42%) were absentee owners. Indeed, new owners were significantly more likely than longer-term owners (39% and 18% respectively) to have come from outside the district and to be absentee owners.
- New owners were different from longer-term owners. Longer-term owners were more likely to be older, be farmers, own larger properties, return an on-property profit, work more hours on-property and less off-property, and be members of Landcare and commodity groups.
- Longer-term owners were more focused on production while newer owners appear to be more focused on the environmental values of their property. Newer landholders were more likely to agree with statements that propose limits to landholder property rights, including those involving a duty of care for biodiversity. Newer landholders were more confident in the efficacy of CRP expected to improve the condition of environmental assets. Newer owners self-reported significantly lower levels of knowledge for a number of items. Again, these differences are consistent with the production/ environment split between the two groups.
- Outside a small number of production focused CRP, particularly those linked to cropping, newer and longer-term owners are adopting CRP at similar levels.
- Newer landholders expressed higher levels of interest in most of the potential methods of becoming involved in NRM offered in the survey. They were significantly more interested in a range of training opportunities and advice on how to engage contractors. They were also more willing to undertake work without support.
- New landholders most frequently used mailed brochures/leaflets as their source of information, but rated books/magazines/journals as the most useful. Longer-term owners most frequently used newspapers, and also rated them as the most useful.
- Twenty per cent of respondents indicated they planned to change their enterprise mix to reduce farm workload.
- Interest in conservation covenants was expressed by 10% of respondents, who managed 9% of the land surveyed.
- There were significant differences across the Wimmera RMU on four of the 14 items exploring respondents' long-term plans.

## **Involvement in planning processes**

- Just above half (54%) of all respondents were involved in whole farm planning, with 29% well-advanced or completed/ ongoing. Half (51%) said their plan had provision for drought. Comparing 2002 (49%) and 2007 data suggest there is a trend to higher landholder involvement in whole farm planning.
- Almost all respondents (94%, N=285) said they had a long-term plan or vision for improvements to their property. Twenty-seven per cent said they were advanced or completed/ ongoing.
- Just above half (59%) of all respondents said they had started succession planning. The same proportion said they had a family member interested in taking on their property. Comparison with 2002 survey data (55% started planning) suggests there has been a trend to higher numbers of landholders being engaged in succession planning.
- Only a quarter (23%) of the respondents said they were well advanced or had completed plans for property transfer to the next generation (29% in 2002). Just under half (48%) of the respondents to this question identified a specific age when they would pass their property to another family member. The median age identified was 65 years.
- Just under half (49%) of all respondents said they had been involved in local action planning (e.g. with Landcare, community development or industry associations). Only seven per cent said they were highly involved. This item was not included in the 2002 survey.
- Landholder involvement in planning processes was one of the best predictors of adoption of all the variables in the survey. For example, involvement in local action planning was positively linked to higher adoption for 12 of the 15 items, whole farm planning positively linked to higher adoption of 10 items, having a long-term plan or vision positively linked to nine items, and family agreement to a succession plan positively linked to eight items. Causality can be difficult to unravel. However, these findings provide a compelling case for engaging landholders in these planning processes.

## **Involvement in government programs, Landcare and commodity groups**

- Just over half (56%) of the respondents said that work undertaken to implement at least one of the CRP had been supported by financial and/ or technical resources provided by government, including by the Wimmera CMA, local landcare groups or networks, DPI/ DSE, Greening Australia and Trust for Nature.
- Almost a third (44%) of all respondents said they received financial and/ or technical resources provided by government for tree and shrub planting (including direct seeding) during their management period. As expected, a smaller proportion said they received support for this type of on-ground work over the past five years (32%).
- Amongst those with a livestock enterprise, 32% of respondents said they received support from government for fencing to manage stock access to native bush/ grasslands and 33% had received support for fencing to manage stock access to rivers/ streams/ wetlands. Smaller proportions of respondents said they had received support for these activities over the past five years (20% and 23% respectively).
- Small proportions of respondents said they received support to address gully erosion (16%); establish perennial pasture (10%) and establishing farm forestry (10%).
- There was a significant positive relationship between landholders reporting support from government and adoption of seven of the 10 CRP.

- Thirty-nine per cent of respondents said they were a member or involved with a local Landcare group. In 2002, 47% (N=485) of respondents said they were a member of a Landcare group.
- There was a significant difference in Landcare membership across the Wimmera region.
- Almost three-quarters (74%) of those indicating they were a member or involved in a local Landcare group attended at least one group activity in the past 12 months, for a median of 3.5 activities per respondent. The median number of activities attended per member has increased since the 2002 survey (2 activities).
- Landcare membership or involvement was linked to significantly higher adoption of seven of the 10 CRP, spanning biodiversity conservation and sustainable agriculture.
- Twenty-four per cent of respondents said they were a member of a local commodity group. In 2002 respondents were asked if they were a member of Topcrop, so information from the two surveys is not comparable.
- There was a significant difference in membership of a local commodity group across the Wimmera region.
- Membership of a local commodity group was linked to significantly higher adoption of seven of the 10 CRP, spanning biodiversity conservation and sustainable agriculture.

### **Property size, occupation and on and off-property work**

- The median property size of landholders surveyed was 630 ha (N=493). The median property size for the 2002 study was 900 ha.
- Only 12% of respondents (N=493) owned/ managed properties less than 40 ha.
- There was a significant difference in property size across the Wimmera region.
- There were significant positive links between property size and the adoption of eight of the 10 CRP in the survey. The only CRP where there was not a significant link were establishing farm forestry and addressing gully erosion.
- Farmers were the largest occupational grouping and comprised over half of all respondents (67%). In 2002, farmers comprised 80% of all respondents, indicating that farmers have declined significantly as a proportion of all respondents. Professionals comprised 15% of respondents, up significantly from 7% in 2002.
- There was a significant difference in the proportion of respondents who were farmers across the Wimmera region, varying from 9% in the Grampians RMU to 85% in Wimmera and West Wimmera Plains RMU.
- Respondents worked a median of 45 hours per week on farming/ property related activities in the past 12 months. This figure represented a small decline in property related work since 2002 (median of 50 hours).
- Forty-nine per cent of respondents said that they had paid work off-property in the past twelve months, with a median of 100 days worked off-property.
- On-property work was positively linked to adoption of six CRP and off-property income was negatively linked to adoption of four CRP.

- Identifying as a farmer by occupation was linked to significantly higher adoption of six of the 10 CRP, including biodiversity conservation and sustainable agriculture CRP despite farmers holding attitudes that are less supportive of conservation.
- Only 35% of respondents said they made an on-farm profit in 2006/07 financial year. This finding is in stark contrast to the situation in 2002 when 86% reported a profit.
- For those reporting a profit, the median profit level in 2007 was \$15,000. In 2002 the median profit level was \$45,000.
- Seventy-six per cent of respondents said they or their partner received a net off-property income in 2006/07. In 2002, 66% of respondents said they received a net off-property income. This trend could be attributed to the increased proportion of non-farmers in the 2007 survey and drought conditions in 2006/07 leading farming families to seek off-property income.
- For those reporting an off-property income, the median level of income in 2007 was \$25,000. In 2002 the median level of off-property income was \$15,000.
- Higher level of on-property profitability was linked to significantly higher adoption of a limited range of CRP. Reporting a profit was positively linked to establishing farm forestry and fencing to manage stock access to rivers/ streams/ wetlands. A higher level of profitability was linked to cropping using minimum tillage and no-till techniques, establishing off-stream watering points and sowing perennial pasture and lucerne.

## **Land use and enterprise mix**

- Broadacre cropping (73%) and sheep for meat (67%) or wool (64%) were the most common production enterprises. Beef cattle was nominated as a landuse by 16% of respondents. Minor landuse included: other livestock (goats, deer, horse studs) (8%); irrigated pasture/ cropping (7%); farm forestry (6%); intensive livestock (pigs, poultry, feedlot cattle) (5%); farm-based tourism (2%); and dairy (1%).
- While the overall trend is for limited change in the relative importance of different landuses, there have been some notable changes since 2002. The proportion of landholders engaged in broadacre cropping declined from 84% in 2002, sheep for meat increased from 57% in 2002, and irrigated pasture/ cropping increased from 3% in 2002 (2002 item only referred to cropping).
- Other tree planting, including shade and shelter, habitat, erosion control and recharge control was a landuse listed by 59%. An increased proportion identified this landuse (from 47% in 2002).
- Nine per cent of respondents said they had a conservation covenant over some part of their property in 2007.
- Three per cent of respondents said they had land managed to protect Aboriginal cultural heritage sites in 2007.
- Eighty-nine per cent of respondents said that part of their property was covered by patches of native bush at least a hectare in area. The median area of native bush per property was 20 ha.
- Respondents with patches of native bush were significantly more likely to be undertaking CRP related to the management of native bush.
- Over three quarters (79%) of respondents said their remnant bush was in either excellent or very good health.

- Seventeen per cent said their remnant bush was in poor or very poor condition. Drought (40%), property management (own management or previous owners) (29%), and bush fires (13%) were the main reasons offered by respondents as explanations of bush being in poor health.
- On-property enterprise was linked to higher adoption of CRP.

### **Adoption of current recommended practices**

- Four of the 10 CRP had been adopted by more than half the 2007 survey respondents, including; testing water of the main water source on property in the last five years (58%); cropping using no-till techniques last five years (56%); trees and shrubs planted during your period of management (54%); cropping using minimum tillage last five years (52%).
- It was possible to compare 2002 and 2007 data for five (on six items) of the 10 CRP in the 2007 survey. This analysis revealed that significantly lower proportions of landholders were involved in three of the five CRP, there was significantly higher involvement in one CRP and no clear trend over time for the remaining CRP.
  - There was significantly reduced involvement in trees and shrubs planted; perennial pasture established over the management period; and cropping using minimum tillage.
  - The proportion of respondents with farm forestry had increased significantly from 6% in 2002 to 10% in 2007.
  - There was no clear trend for fencing to manage stock access to native bush/ grassland despite a slight increase over the management period and a slight decrease during the past five years.
- Calculations of median amounts of work completed by respondents of the 2002 and 2007 surveys for the five CRP where comparisons could be made provided additional information for assessing the achievement of onground objectives. There was a significant increase in the median number trees and shrubs planted. For all other CRP the median amount of work declined significantly:
  - fencing of bushland/ grasslands to manage stock access over the management period declined from 20 ha in 2002 to 10 ha in 2007;
  - fencing of bushland/ grasslands over the past three/ five years declined from 5 ha per year in 2002 to 2 ha per year in 2007;
  - sowing perennial pasture and lucerne over the period of management declined from 120 ha in 2002 to 75 ha in 2007;
  - cropping using minimum tillage techniques (maximum area cropped at one time) declined from 400 ha in 2002 (over management period) to 200 ha in 2007 (over past five years); and
  - farm forestry over the management period declined from 12 ha in 2002 to 5 ha in 2007.
- Analyses focussed on specific areas/ assets revealed a trend to lower involvement in four of the five CRP where comparisons could be made between 2002 and 2007. There was a trend to declining proportions of landholders involved for four CRP (fencing to manage stock access to native bush/ grasslands was the exception), with a significant decline for two CRP (trees and shrubs planted; cropping using minimum tillage).

### **Employment of consultants and use of rural financial counsellors**

- Thirty-four per cent of respondents had employed a consultant to provide advice and 17% had used the services of a rural financial counsellor in the past 12 months.

- The use of consultants and financial counsellors were linked to higher adoption of most CRP in the survey. In both cases these links spanned biodiversity conservation and sustainable agriculture CRP.

### **Completion of a short course relevant to property management**

- Just under half of all respondents (47%) said they had completed a relevant short course in the past five years.
- Comparison of 2002 (60%) and 2007 (47%) data shows there has been a significant decline in respondents completing short courses. Farmers are significantly more likely than non-farmers to have completed a short course and it seems that the trend to a smaller proportion of respondents as farmers is part of the explanation of the trend to lower involvement in short courses.
- Participation in a short course related to property management in the past five years was linked to higher adoption of eight of the 10 CRP in the survey. It seems that participation in a short course is a key predictor of landholder behaviour and likely to represent an effective investment of NRM funds in the WCMA region. The only CRP where there was not a significant link with participation in short-courses were addressing gully erosion and establishing off-stream watering points for stock.

# 1 INTRODUCTION

## Research context

This report presents findings from research commissioned by the Wimmera Catchment Management Authority (WCMA) that involved a survey of a random sample of rural landholders in the WCMA region during 2007. A response rate of 56%, with 503 completed surveys returned from the sample of 1,000) was achieved.

This research drew on a widely accepted methodology for catchment-scale social benchmarking (Curtis *et al.* 2005) developed through a series of studies, including the Goulburn Broken Dryland (Curtis *et al.* 2000), the Ovens Catchment (Curtis *et al.* 2002), the Wimmera region (Curtis and Byron 2002), Glenelg Hopkins region (Byron *et al.* 2004) and the Corangamite region (Curtis *et al.* 2006). The 2007 Wimmera survey was the first time that a follow-up survey had been undertaken that would enable comparisons of data over time.

## Research objectives

1. Describe trends in social/ farming structure (property size, property turnover, property subdivision/ amalgamation), including at the Resource Management Unit (RMU) scale.
2. Explain landholder adoption of recommended practices (CRP) identified in the WCMA RCS.
3. Assess progress in the achievement of intermediate NRM objectives consistent with the WCMA Regional Catchment Strategy (RCS) and NHT/ NAP documents by comparing 2002 and 2007 survey data.
4. Assess landholder acceptance of a range of NRM policy instruments.
5. Identify landholders' preferred sources of NRM information.

## Report structure

The next chapter provides some background to the Wimmera region. The subsequent methodology chapter includes a brief summary of the literature the research team drew upon to identify the variables included in the survey, brief descriptions of the mail out process and the approach to data analysis. Research findings are presented in the next chapter and are arranged around major topics explored in the mail survey, namely:

- assessment of issues affecting property and district;
- comparison of landholder identified salinity sites and discharge maps;
- values attached to property;
- knowledge of natural resource management (NRM) topics;
- attitudes about the roles and responsibilities of key NRM actors;
- level of confidence in current recommended practices (CRP);
- preferred arrangements for involving landholders in NRM programs;
- source of information about NRM;
- stage of life, long-term plans and predicted property turnover;
- involvement in planning process;
- involvement in government funded programs, Landcare and commodity groups;
- property size and farming as an occupation;
- levels of income and property equity;
- land use and enterprise mix; and
- adoption of current recommended practices (CRP), including measures of work accomplished.

The concluding chapter discusses the implications of key findings for WCMA engagement with private landholders in the WCMA region.

As far as possible all topics and items from the 2002 survey were included in the 2007 survey. The exceptions were that:

- the 2007 survey did not include a topic seeking respondents' views about factors affecting their decision making about new enterprises; and
- the 2007 survey included new topics about preferred arrangements for NRM involvement and preferred sources of information.

## 2 BACKGROUND

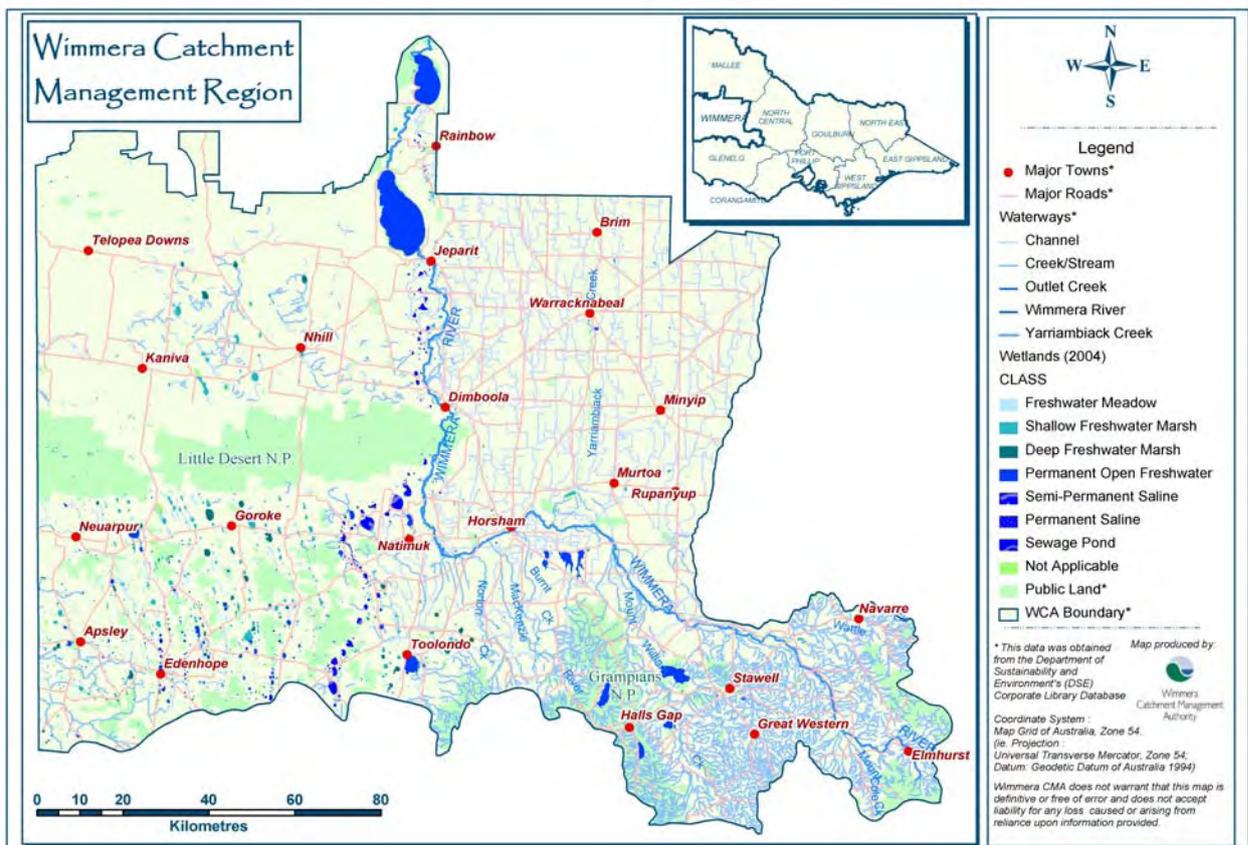
### The location and character of the Wimmera region

The Wimmera Catchment Management Region (WCMA region) is located in Western Victoria and covers an area of approximately 30,000 square kilometres [Figure 1]. The Wimmera region includes the Wimmera River Catchment and part of the Millicent Coast Basin. The Wimmera River is the largest Victorian river that does not flow to the sea and the region includes a series of terminal lakes, the largest of which are Lake Hindmarsh and Lake Albacutya.

Agriculture is the predominant landuse and approximately 85% of the region has been cleared of native vegetation. Much of the remaining native vegetation exists within public reserves including the Grampians and Little Desert National Parks. Cropping (cereal, oil seed and grain legume) is the principal agricultural activity, followed by meat, wool and milk. Tourism is also an important industry in the region.

The Wimmera regional population is around 50,000 with almost a third of these people living on farms on in small townships. Horsham is the largest centre, with Edenhope, Nhill, Stawell and Warracknabeal other larger centres.

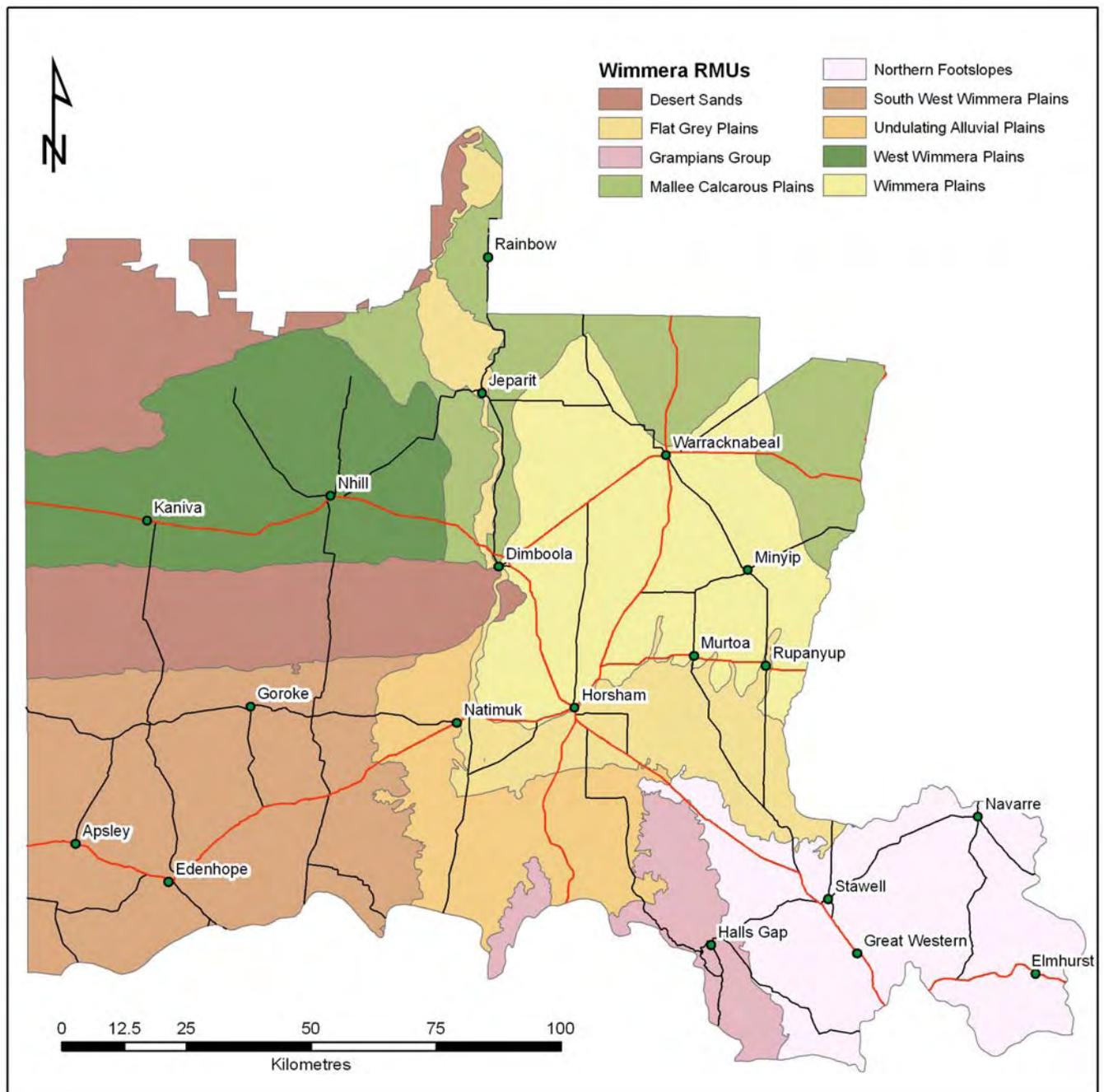
Figure 1 The Wimmera CMA area



## Resource Management Units

The WCMA region has been divided into nine RMU. These RMU reflect areas within the region that share similar landform, soils and vegetation [Figure 2]. Given the importance of RMU to the management of NRM in the WCMA region, our analysis of survey data included the identification of statistically significant differences across the RMU. We have also used survey data to prepare RMU profiles and these have been presented as Appendix 1.

**Figure 2 Wimmera RMU**



## **Desert Sands**

*Landform:* Chains of windblown white dunes mainly in the north west.

*Soils:* Soils are mainly uniform fine to medium sands and sandy yellow duplex types.

*Native Vegetation:* Woodland to open heathland of Brown Stringy-bark and Mallee species. (About 3% of the original vegetation remains).

*Landuse:* Grazing, cropping and National Parks. *Annual rainfall:* 325-375mm.

## **Flat Grey Plains**

*Landform:* Natural Floodplain of the Wimmera River and Yarriambiack Creek.

*Soils:* Varies from grey self-mulching and cracking clays to red and yellow duplex.

*Native Vegetation:* Open forest of Buloke, Yellow Gum, Grey Box, Red Gum and Black Box. (About 5% of the original vegetation remains).

*Landuse:* Cropping, grazing and irrigation.

*Annual rainfall:* 325-550mm.

## **Grampians Group**

*Landform:* Grampians National Park, Black Range State Park and State Forest and Mt Arapiles unit of the Mt Arapiles-Tooan State Park.

*Native Vegetation:* Brown Stringy-bark, Long Leaved Box and Messmate, woodlands of Red Gum, Yellow Box, Manna Gum as well as heath and woodlands of Apple Box and Brown Stringy-bark on yellow duplex soils.

*Landuse:* Flora and fauna, recreation and water harvesting.

*Annual Rainfall:* 400-1000mm.

## **Wimmera Plains**

*Landform:* Gently undulating to flat plains.

*Soils:* Uniform grey self mulching and brown cracking clays and some red duplex.

*Native Vegetation:* Open forest with Black Box, Buloke, Yellow Gum and Grey Box (About 2% of the original vegetation remains).

*Landuse:* Cropping and grazing.

*Annual Rainfall:* 375-500mm.

## **Mallee Calcarous Plains**

*Landform:* Undulating plains with sand dunes running mostly east west.

*Soils:* Sand to sandy loam and light clays on the flats.

*Native Vegetation:* Mallee eucalypts, Black Box, Yellow Gum, Buloke, Callitris and Casuarina (About 1% of the original vegetation remains).

*Landuse:* Grazing and cropping.

*Annual rainfall:* 325-450mm.

## **Northern Footslopes**

This RMU contains an amalgam of smaller land management units. (About 5% of the original vegetation remains across the Northern Footslopes).

### 5a) Tertiary Rises

*Landform:* Gently undulating plateau.

*Soils:* Mottled yellow duplex soils with coarse structure.

*Native Vegetation:* Long Leaved Box, Grey Box, Yellow Gum.

*Landuse:* Grazing and gravel extraction.

*Annual rainfall:* 450-650mm.

### 5b) Granites

*Landform:* Hills with boulders and undulating plains.

*Soils:* Mottled duplex soils with ironstone.

*Native Vegetation:* Long Leaved Box, Yellow Box, Manna Gum and Messmate.

*Landuse:* Grazing, timber and recreation.

*Annual rainfall:* 500-750mm.

### 5c) Volcanic Plain

*Landform:* Gently undulating plain.

*Soils:* Medium to heavy clay soils.

*Native Vegetation:* Open Red Gum woodland.

*Landuse:* Grazing and cropping.

*Annual rainfall:* 500-850mm.

### 5d) Sedimentary Rises

*Landform:* Low hills and undulating rises.

*Soils:* Duplex with some thin stony soils.

*Native Vegetation:* Grey Box, Long Leaved Box and Yellow Box.

*Landuse:* Grazing and cropping.

*Annual rainfall:* 450-750mm.

### **Northern Footslopes *cont...***

5e) Upland and Grampians Alluvial Plains  
*Landform:* Highland valleys of the Upper Wimmera.

*Soils:* Predominantly red and yellow duplex.

*Native Vegetation:* Red and Yellow Gum, Grey and Yellow Box, with Manna Gum towards the Grampians.

*Landuse:* Grazing and cropping.

*Annual rainfall:* 500-1000mm.

5f) Steep Hills

*Landform:* Rolling to steep hills.

*Soils:* Rocky ridges have generally stony soils, whilst the lower slopes have red duplex soils.

*Native vegetation:* Yellow Box, Red Box, Red Gum and Yellow Gum.

*Landuse:* Grazing and forestry.

*Annual rainfall:* 450-750mm.

### **South West Wimmera Plains**

*Landform:* Flat to undulating plain with significant wetland system.

*Soils:* Yellow duplex soils and some uniform grey and brown self mulching clays.

*Native vegetation:* Shrubby woodland of Brown and Red Stringy-bark, Messmates, Red Gum, Yellow Gum, Grey Box and Buloke. (About 15-20% of the original vegetation remains).

*Landuse:* Grazing and cropping, with large tracts of vegetated public land.

*Annual rainfall:* 400-550mm.

### **Undulating Alluvial Plains**

*Landform:* Flat to undulating plains.

*Soils:* Sandy rises to red, and red and yellow duplex and uniform grey self-mulching clays.

*Native Vegetation:* Open forest of Grey Box, Yellow Gum and Red Gum, closed forest of Brown String-bark and Messmates and wetlands of Samphire and Beaded Glasswort. (About 2% of the original vegetation remains).

*Landuse:* Cropping and Grazing.

*Annual rainfall:* 400-850mm.

### **West Wimmera Plains**

*Landforms:* Low irregular undulating plain with pronounced ridges and occasional dunes.

*Soils:* Wimmera self-mulching grey cracking clay, red duplex and sandy loam duplexes.

*Native Vegetation:* Open woodland forest of Stringy-bark, Yellow Gum, Buloke and Black Box. (About 2% of the original vegetation remains).

*Landuse:* Cropping and grazing.

*Annual rainfall:* 350-450mm.

### 3 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 (Commonwealth of Australia 2007; Paton *et al.* 2004). 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 assets and the threatening processes likely to affect their condition (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?).

Private landholders manage large parts of most Victorian catchments (Commonwealth of Australia 2002). Affecting behavioural change in private landholders is a complex task. In a widely cited synthesis paper, Pannell *et al.* (2006) concluded that landholders readily adopt conservation practices that are consistent with them achieving their goals/objectives. Drawing on their backgrounds in economics, psychology and sociology and extensive research experience, these authors proposed a framework for exploring adoption that has four broad sets of factors. This framework and examples of specific factors is provided below:

1. Nature of the practice; including its trialability, observability, complexity and extent of re-skilling, extent it fits with existing farming systems and lifestyle, cost and time for returns to accrue, and whether it is a substantial improvement on what already exists.
2. Personal characteristics of landholder and their immediate family; including their occupation (farmer/non-farmer), education levels, knowledge, skills, length of experience in area/as a farmer; extent they are risk takers, whether they are introverts/extroverts, level of income, stage of life, if there is to be farm family succession, and extent of their personal network.
3. Wider social context of the landholder including prevailing norms, information flows through networks, the existence and activities of local organisations, and the level of trust in extension agents.
4. Nature of any intervention/learning process such as a regulation, market-based instrument, grant program, and group processes.

Drawing on this framework, our experience with the 2002 survey, and given the constraints of a mailed survey, we identified a limited number of topics likely to explain differences in the level of adoption of CRP to be included in the survey. Topics included in the survey explored landholder values and long-term plans and some factors from each of the four sets of topics in the Pannell *et al.* (2006) model [refer the section below for a more complete listing]. In our previous studies we developed a methodology for predicting property turnover (Curtis & Byron 2002; Curtis *et al.* 2006; Mendham & Curtis in press). An important outcome of this research was the finding that a large and substantially increased proportion of rural properties were likely to change hands in the next decade and that many of these new owners were from outside the local district and often absentee owners (Mendham and Curtis in press). We also included questions in the 2007 survey exploring these topics.

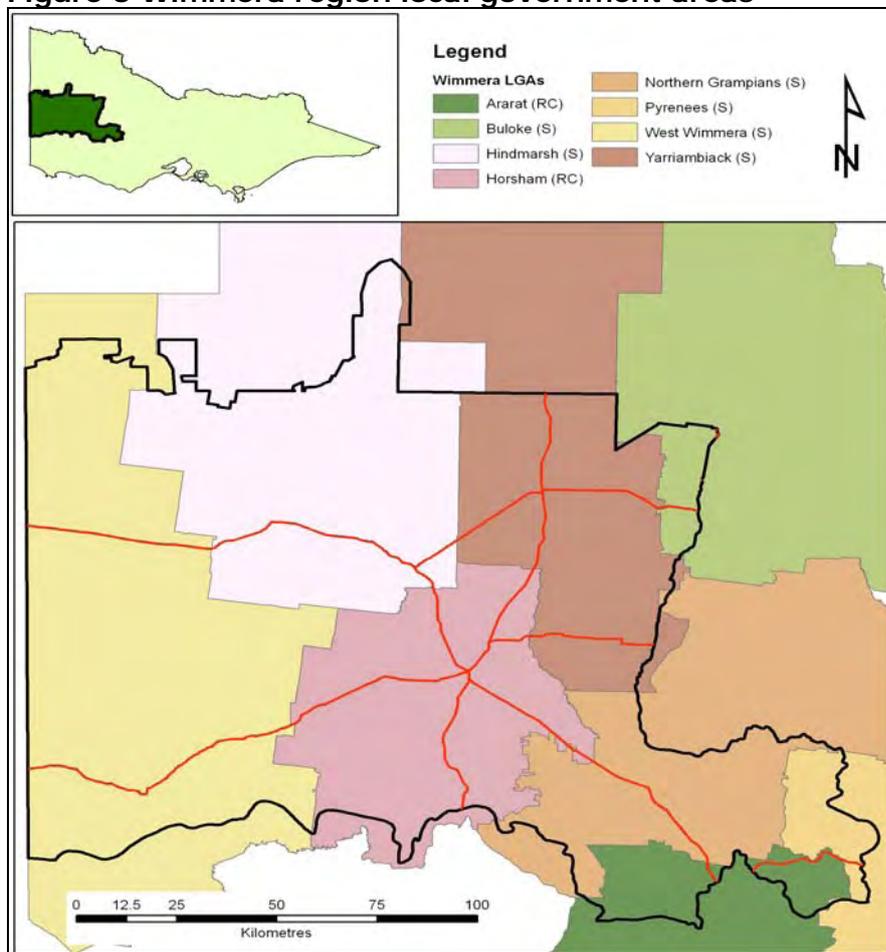
Given their responsibilities, it is essential for catchment groups to have access to information about the social and farming context in which they operate (Curtis *et al.* 2005). Social benchmarking surveys provide a useful and cost effective way of providing these data (Curtis *et al.* 2003; Curtis *et al.* 2005).

Australians profiling regional communities have usually included attributes that measure some aspect of the four capitals: human capital (e.g. skills and education), produced economic capital (e.g. financial resources and infrastructure), social capital (e.g. networks and links), and natural capital (e.g. landforms, plants and animals) (Cavaye 2003; Webb and Curtis 2002).

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 catchments 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. Barr *et al.* (2005) has more recently used census data to identify local government areas of Victoria where rural landholders are mostly lifestyle, mostly agricultural or in transition.

The analysis of data collected through farm and household censuses can provide useful information, but as Schultz *et al.* (1998) and Curtis *et al.* (2001) demonstrated, these data are unlikely to satisfy catchment managers who need to monitor outcomes from investments they make in NRM, understand landholder adoption of CRP, and make judgements about the likely efficacy of available policy instruments. In the first instance, national data collection processes are unlikely to address most of the topics for which data are needed (Curtis *et al.* 2005). Secondly, data are only available to the public in aggregated form, the smallest scale being census collector districts that combine data for about 200 households. In most cases, analysis is at the local government scale. This level of aggregation reduces the usefulness of data, particularly when sub-regional contexts are so different, as for the Wimmera region.

**Figure 3 Wimmera region local government areas**



## Topics and questions included in the mail survey

Drawing on the above literature and given the constraints of a mail survey (mainly space and the type of questions that can be effectively posed) the authors, in collaboration with the WCMA, identified the topics listed below for inclusion in the survey. As explained earlier the intention was, as far as practicable, to ensure that the 2007 survey replicated topics in the 2002 survey. An explanation of specific questions, including the response options employed, are provided in the relevant section of this report. The principal survey topics were:

- assessment of issues affecting property and district
- self-assessment of knowledge for different NRM topics
- awareness of on-property dryland salinity
- values attached to property
- views about the roles and responsibilities of key NRM actors
- level of confidence in current recommended practices (CRP)
- preferred arrangement for involving landholders in NRM programs
- sources of information about NRM
- involvement in planning related to family succession and property planning
- long-term plans for the property
- land use/ enterprise mix
- management practices on-property
- background socio-economic and property data, including: property size; age; gender; education; occupation; on and off-property work; on and off-property income; involvement in voluntary organisations; Landcare membership; membership of commodity groups; support from other sources for on-ground work; use of financial counsellors and consultants; involvement in short-courses; time lived in district; time owned or managed property; place of residence (absentee); and level of equity in property.

## Current recommended practices – CRP

An important research objective was to explore the key factors linked to adoption of CRP identified in the WCMA RCS. There were 15 items in the survey exploring the adoption of CRP. Some of items were cropping or grazing specific, others applied to all/ most landholders. Some items referred to the total time of property management by the respondent and/ or actions in the last five years. The 15 items included in the 2007 survey related to 10 CRP:

- Use of minimum tillage for cropping \*\*\*
- The use of no-till cropping
- Area of gully erosion addressed
- Establishing perennial pasture and lucerne \*\*\*
- Off-stream watering points established
- Fencing native bush/ grasslands to manage stock access \*\*\*
- Fencing to manage stock access to waterways
- Farm forestry \*\*\*
- Planting trees and shrubs, including through direct seeding \*\*\*
- Testing the quality of the main water source for stock/ irrigation.

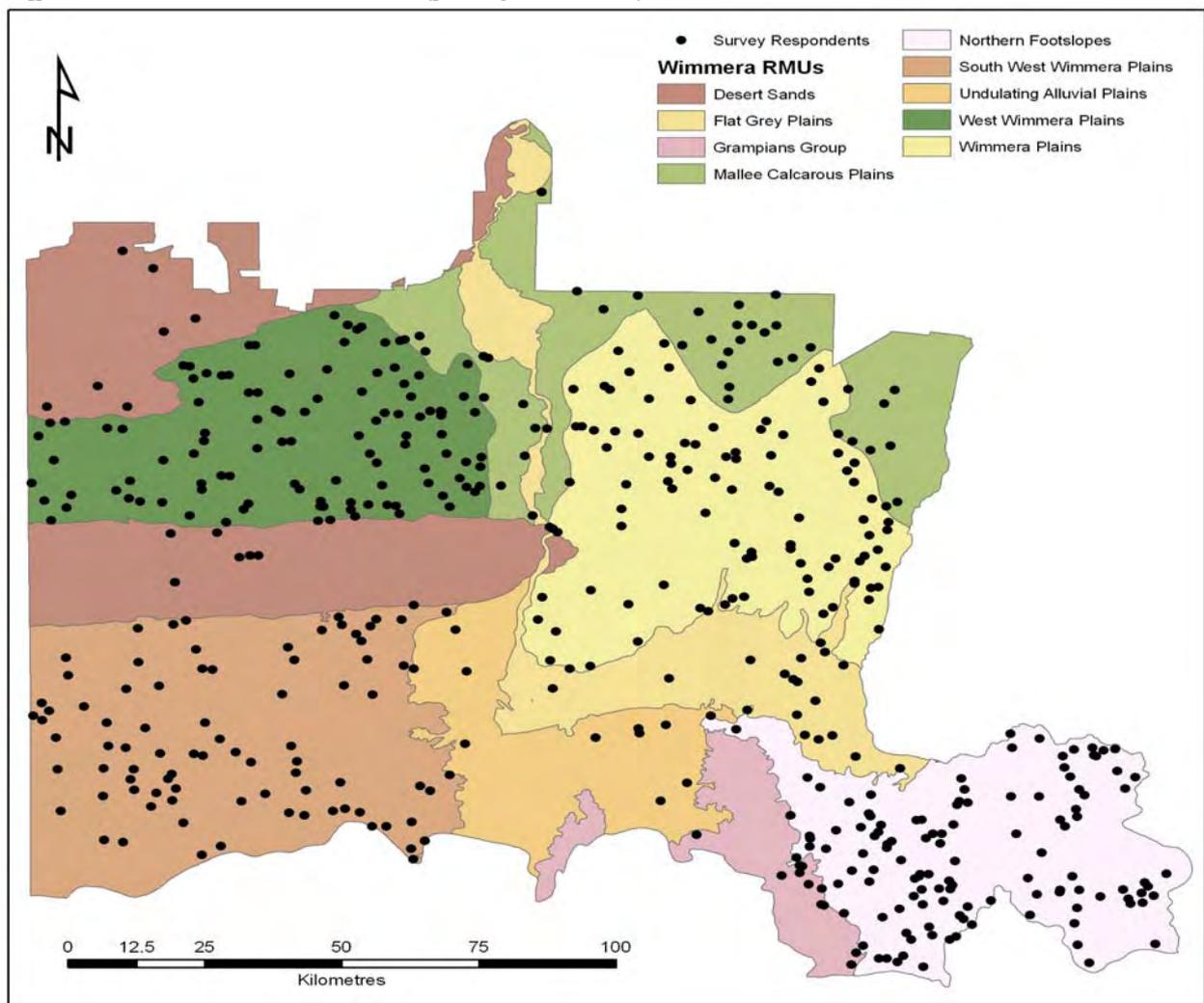
Items in the list above that are asterixed were also included in the 2002 survey. Some other topics were addressed in both surveys but with slightly different questions there is not the opportunity for a direct comparison. For example, the 2002 survey asked for information about the number of paddocks where stock is usually watered from a trough while the 2007 survey asked for the number of off-stream watering points established. The 2002 survey asked for information about the total time of management by the respondent and /or activity in the past three years. Comparisons between data from the 2002 and 2007 for items where a three or five-year time-frame was set have been made on a per annum basis.

## The mail survey process

The following points outline the sampling method used in the mail survey to rural landholders in the Wimmera region.

1. WCMA approached the eight municipalities (Ararat, Buloke, Hindmarsh, Horsham, Northern Grampian, Pyrenees, West Wimmera and Yarriambiack) in the region to provide their local government rural property lists [Figure 3]. With the exception of Buloke, all Shires provided their mailing lists. Buloke LGA represents a very small proportion of the WCMA region and was not sampled [Figure 4].
2. Local government staff excluded all properties less than 10 ha from the potential survey sample (this threshold was also employed when analysing data from the Victorian Value General).
3. The remaining property details were forwarded to the WCMA and WCMA staff then identified a random sample of 1,200 properties from across the region.
4. The WCMA provided the list of random properties to CSU, where duplicate names were identified and removed. A final sample of 1,000 properties was obtained.
5. Tables containing rural property information were then entered into a Geographic Information System (ArcViewGIS) and each property was assigned to one of the nine WCMA region RMU [Figure 2].
6. Using this approach, there were three RMU where the number in the sample was less than 30 [Table 1]. Some caution needs to be exercised when interpreting the profiles of these RMU.

Figure 4 Distribution of survey respondents, 2007



Adopting a randomised approach using LGA boundaries resulted in a small sample being identified in one RMU: Undulating Alluvial Plains [Table 1].

**Table 1 Survey response rates by RMU, 2007**

RMU	N population*	n sample	n returned	% returned	Unusable	Usable (used for analysis)
Desert Sands	267	29	16	55%	1	15
Flat Grey Plains	1193	54	29	54%	2	27
Grampians Group	117	21	12	57%	1	11
Mallee Calcarous Plains	1119	67	43	64%	3	40
Northern Footslopes	2068	248	123	50%	4	119
South West Wimmera Plains	1619	160	84	53%	1	83
Undulating Alluvial Plains	1002	24	11	46%	0	11
West Wimmera Plains	1545	197	113	57%	6	107
Wimmera Plains	2365	200	92	46%	5	87
Unknown			3			3
Totals	11295	1000	526	56%	23	503

The survey design and mail out processes employed a modified Dillman (1979) process that has been refined through the experience of successive catchment surveys (a detailed explanation is provided in Curtis *et al.* 2005). A draft survey instrument was refined by the project steering committee.

Dillman's *Total Design Method* provides specific advice about survey design and involves a series of survey mail outs and reminder cards over a period of three months to achieve response rates above those often accepted by researchers. In the Wimmera study, the first mail out of surveys was followed by a reminder card sent out one week later, with a second and third reminder cards mailed out each consecutive week. Eight 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 two reminder cards a week apart.

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.

After a period of approximately 12 weeks a final survey response rate of 56% was achieved [Table 1]. Of the 1,000 surveys sent out to landholders, 526 were completed and returned. Of these, 23 were unusable. The final N value was therefore 503 [Table 1]. Figure 4 shows the geographical spread of survey respondents across the region.

## Data analysis

Statistical analysis included in this report consists of: descriptive statistics (including mean, median, sum and total data); Pearson's Chi-Square Test for count data; multiple linear regression modelling; Kruskal-Wallis Rank Sum Test; and Spearman rank order correlations. A brief explanation of the statistical methods is given below.

Pearson's Chi-square test was used compare categorical variables against each other, such as whether or not respondents tested water quality on their property and whether or not respondents had a net profit.

The Kruskal-Wallis Rank Sum test was used to determine the significant difference of a continuous variable based on a second grouping variable. For example, the Kruskal-Wallis Rank Sum 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 Kruskal-Wallis chi-square statistic (or  $X^2$ ) indicates the strength of the difference between groups on a given variable, with a higher value indicating a larger difference. However, the  $X^2$  value does not indicate the direction of the relationship.

Multiple linear regression modelling was used to look for relationships between all continuous variables. For example, linear regression was used to test for a relationship between property size and adoption of CRP.

Spearman rank order correlations were used as an exploratory tool to search for relationships between variables, as well as to look for natural groupings (for example, natural groupings of reasons why the property is important to respondents).

In all analyses the p statistic represents the significance level where a value below 0.05 is considered to be statistically significant. The p value statistic was used for significant relationship or difference. A p value below 0.05 means that it is unlikely (probability of less than 5%) that the observed relationship or difference has occurred purely by chance. All statistical analyses were performed using the SPLUS software package and Microsoft Excel.

Analyses exploring factors affecting adoption were undertaken for each CRP based on a classification of CRP as either cropping or grazing specific or generic/ non-specific. Only respondents engaged in those landuses were included in the analyses for each CRP.

## 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 or decision-making processes.

## 4 FINDINGS BY RESEARCH TOPIC

### 4.1 Assessment of issues at the property and district levels

Respondents were asked to assess the importance of a range of social, environmental and economic issues in their local district or on their property [Figures 5, 6 respectively]. The 21 items covered in the survey were identified through discussions with the project steering committee and included 13 items from the 2002 survey (these are asterixed in Figures 5 and 6). There were significant trends over time on these items so we have only presented regional-scale comparisons between 2002 and 2007.

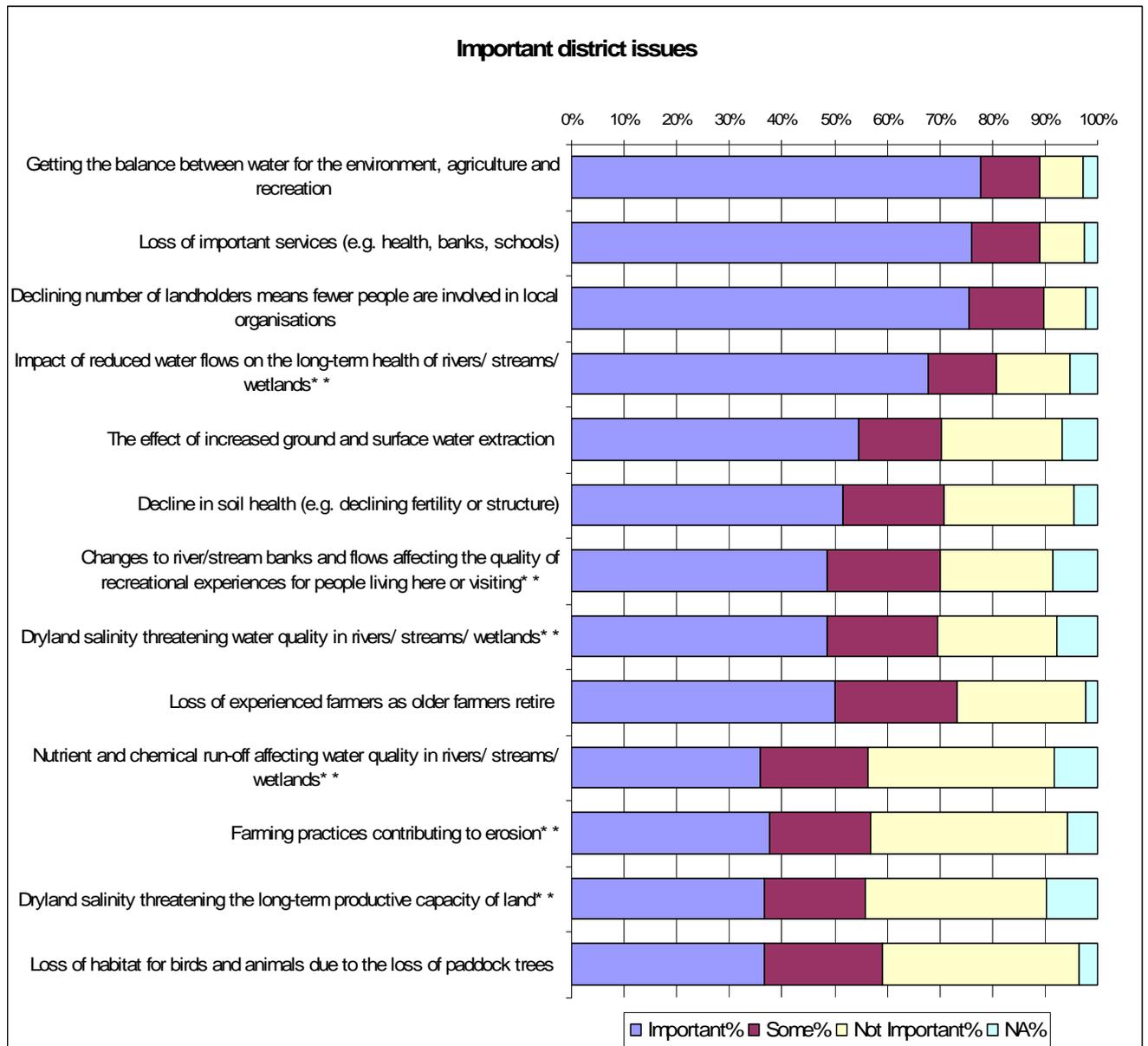
Respondents were asked to rate the importance of each issue listed in the survey as either "very important", "important", "of some importance", "minimal importance" and "not important". Respondents could also choose "don't know/ not applicable". To simplify the presentation of these data, the response options have been collapsed into three categories – "important" (combining very important and important), "some" (of some importance) and "unimportant" (combining not important and minimal importance), plus "not applicable" [Figures 5, 6].

#### Key findings

- Getting the balance between water for consumptive and environmental use and the loss of important services in rural areas were the highest rated issues at the district scale. These findings suggest that most landholders are concerned about a range of social, economic and environmental issues.
- The top five rated issues at the district scale include three water-related items that indicate a high level of concern about both the economic and environmental impacts of competition for limited supplies of surface and ground water.
- The impact of changing rainfall patterns and the rising cost of farming inputs on property viability were the highest rating issues at the property level issue.
- Just under half of the respondents rated dryland salinity as having important impacts on water quality and the long-term productive capacity at the district scale.
- Comparison of 2002 and 2007 survey data suggests there has been a general increase in awareness of river health, water quality, dryland salinity and soil erosion issues and an increased preparedness of landholders to acknowledge the impact of their landuse on soils.
- There were significant relationships between the adoption of CRP and 17 of the 21 issues explored in the survey. These relationships suggest awareness and concern about issues are powerful drivers of landholder behaviour. However, many of the relationships identified were counter-intuitive and reflect the effect of occupation as a mediating variable.
- There were significant differences at the RMU scale for 12 of the 21 items exploring respondents' views of issues.

## Issues affecting the local district

Figure 5 District issues, 2007



Repeated questions from 2002 are asterixed.

Nine of the 13 issues included in the survey were rated as important issues affecting the local district by close to half of the respondents (49% or more). This group includes a range of social and environmental issues. The highest rated issues at the district scale were getting the balance between water for environment, agriculture and recreation and the loss of important services (eg health, banks, schools) [Figure 5]. Findings from the survey highlighted considerable concern about the viability of rural communities with two of the top three issues related to this topic.

Six items were included in both the 2002 and 2007 surveys for importance of issues affecting your local district. For each item there were an increased proportion of respondents who rated it as an important issue. Indeed, there were statistically significant increases in the level of concern for all six items, including those related to water quality (nutrient and chemical run-off and dryland salinity [Table 2]) and soil erosion caused by farming practices [Table 3]. These longitudinal trends suggest there has been a general increase in awareness of river health, water quality, dryland salinity and soil erosion issues and an increased preparedness of landholders to acknowledge the impact of their landuse on soils.

The RMU profiles included as an Appendix provide details of the three highest rated issues at both the district and property scale [Appendix 1].

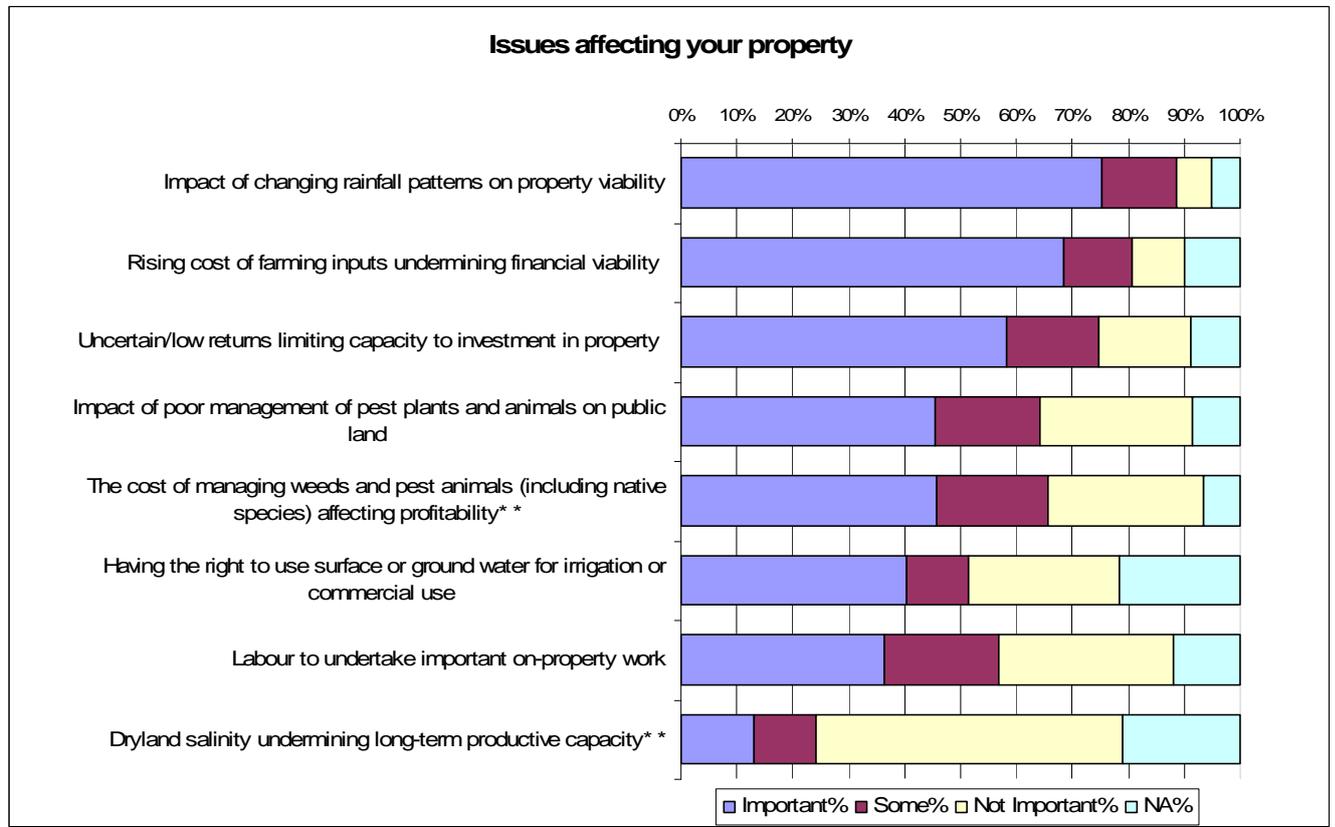
**Table 2 District issues, 2007 and 2002**

<b>Importance of issues affecting your local district</b> <i>(ranked in order of importance by means)</i>	<b>n</b>	<b>Important %</b>	<b>Some %</b>	<b>Not Important %</b>	<b>NA %</b>	<b>Mean</b>
Getting the balance between water for the environment, agriculture and recreation	477	78	11	8	3	4.10
Loss of important services (e.g. health, banks, schools)	483	76	13	8	2	4.10
Declining number of landholders means fewer people are involved in local organisations	483	76	14	8	2	4.05
Impact of reduced water flows on the long-term health of rivers/ streams/ wetlands	480	68 58	13	14	5	3.93 3.58
The effect of increased ground and surface water extraction	482	55	16	23	7	3.57
Decline in soil health (e.g. declining fertility or structure)	479	52	19	25	5	3.46
Changes to river/stream banks and flows affecting the quality of recreational experiences for people living here or visiting	478	49 45	22	21	9	3.45 3.21
Dryland salinity threatening water quality in rivers/ streams/ wetlands	482	49 22	21	23	8	3.44 2.52
Loss of experienced farmers as older farmers retire	480	50	23	24	2	3.39
Nutrient and chemical run-off affecting water quality in rivers/ streams/ wetlands	481	36 17	20	35	8	3.10 2.33
Farming practices contributing to erosion	480	38 12	19	38	6	3.09 2.33
Dryland salinity threatening the long-term productive capacity of land	479	37 22	19	34	10	3.07 2.61
Loss of habitat for birds and animals due to the loss of paddock trees	479	37	22	37	4	3.02

*Repeated questions and means from 2002 are highlighted. All repeated questions' means differences are statistically significant.*

## Issues affecting respondents' properties

Figure 6 Property issues ranked by importance, 2007



Repeated questions from 2002 are asterixed.

The impact of changing rainfall patterns on property viability and the rising cost of farming inputs undermining financial viability were the highest rating issues at the property level. Substantial proportions (>40%) of respondents were concerned about the economic impacts on their viability of the cost of managing pest plant and animals, including as a result of poor management of these pests on public lands. While there was considerable concern about dryland salinity at the district scale, this was the lowest rated issue at the property scale in the survey [Figure 6].

Two items were included in both the 2002 and 2007 surveys [refer to Table 3]. There was a statistically significant increase in the level of concern for dryland salinity undermining long-term productive capacity on the property.

**Table 3 Important property issues, 2007 and 2002**

<b>Importance of issues affecting your property</b> <i>(ranked in order of importance by means)</i>	<b>n</b>	<b>Important %</b>	<b>Some %</b>	<b>Not Important %</b>	<b>NA %</b>	<b>Mean</b>
Impact of changing rainfall patterns on property viability	480	75%	13%	6%	5%	4.15
Rising cost of farming inputs undermining financial viability	484	68%	12%	9%	10%	4.04
Uncertain/low returns limiting capacity to investment in property	484	58%	17%	16%	9%	3.66
Impact of poor management of pest plants and animals on public land	480	45%	19%	27%	9%	3.33
The cost of managing weeds and pest animals (including native species) affecting profitability	484	46% 43%	20%	28%	7%	3.32 3.19
Having the right to use surface or ground water for irrigation or commercial use	480	40%	11%	27%	22%	3.24
Labour to undertake important on-property work	480	36%	20%	31%	12%	3.06
Dryland salinity undermining long-term productive capacity	481	13% 11%	11%	55%	21%	2.21 1.99

*Repeated questions and means from 2002 are highlighted. The differences between "Dryland salinity undermining long-term productive capacity" means are statistically significant, p value = 0.0029.*

There were significant links between the adoption of CRP and 17 of the 21 items included in the survey exploring respondents' assessments of issues on their property and in the local district. These findings suggest that awareness and concern about issues are powerful drivers of landholder behaviour. For example, a higher rating for the loss of habitat for birds and animals due to loss of paddock trees in the local district was linked to significantly higher levels of establishing farm forestry in the past five years. A higher rating for the impact of dryland salinity on the long-term productive capacity of the property was linked to significantly higher levels of fencing in the past five years to manage stock access to rivers/ streams/ wetlands and planting trees and shrubs (including direct seeding) during the period of management.

However, many of the relationships identified were counter-intuitive and reflect the effect of occupation as a mediating variable. Farmers were significantly more likely to adopt a range of CRP, particularly those linked to production. Non-farmers were significantly more likely to give a higher rating to the environmental issues included in the survey. As a result, lower ratings for many issues were associated with higher levels of adoption of many CRP, particularly those with a production focus. For example, a lower rating for the issue farming practices contributing to erosion in the district was linked with higher establishment of perennial pasture and lucerne in the past five years and cropping using minimum tillage in the past five years, but lower levels of establishment of farm forestry during the management period.

## 4.2 Landholder identified saline affected areas

### Key findings

- Most (81%) respondents did not report saline affected areas and the expert maps agreed with their assessments.
- Saline affected areas reported were mostly small (median 10 ha). The total area of reported salinity was 2,437 ha or 0.61% of the total area surveyed in the WCMA region. These findings are consistent with those from the 2002 survey where 23% said they had saline affected areas with a median affected area of 10 ha and less than one per cent of the area surveyed was affected by salinity.
- The proportion of respondents saying they had saline affected areas and the median area affected were consistent with the findings from the 2002 survey (23% said Yes and median of 10 ha).
- Respondents who said they had saline affected areas on their property were significantly more likely to adopt most of the CRP in the survey that are expected to address dryland salinity.
- Most respondents appear to have a high level of awareness and preparedness to acknowledge current, visible dryland salinity on their property. For example, 92% of the respondents who said they had no areas currently affected by salinity were correct according to the expert maps.
- The expert maps only agreed with 26% of those reporting saline affected areas on their property. A large cluster of these respondents are located in the Northern Footslopes. It seems unlikely that landholders would deliberately over-state the extent of salinity on their property and given current climatic conditions, it is unlikely that landholders would misinterpret water logged areas as saline affected. This topic warrants further exploration.
- Comparison of 2002 and 2007 survey data indicates little change in the proportion of respondents that the expert maps suggest have correctly reported no saline affected areas on their property. At the same time, the capacity of expert maps to predict landholder identified saline affected areas has declined (from 36% to 26%). However, the distribution of those areas where there are discrepancies appears to be very similar.

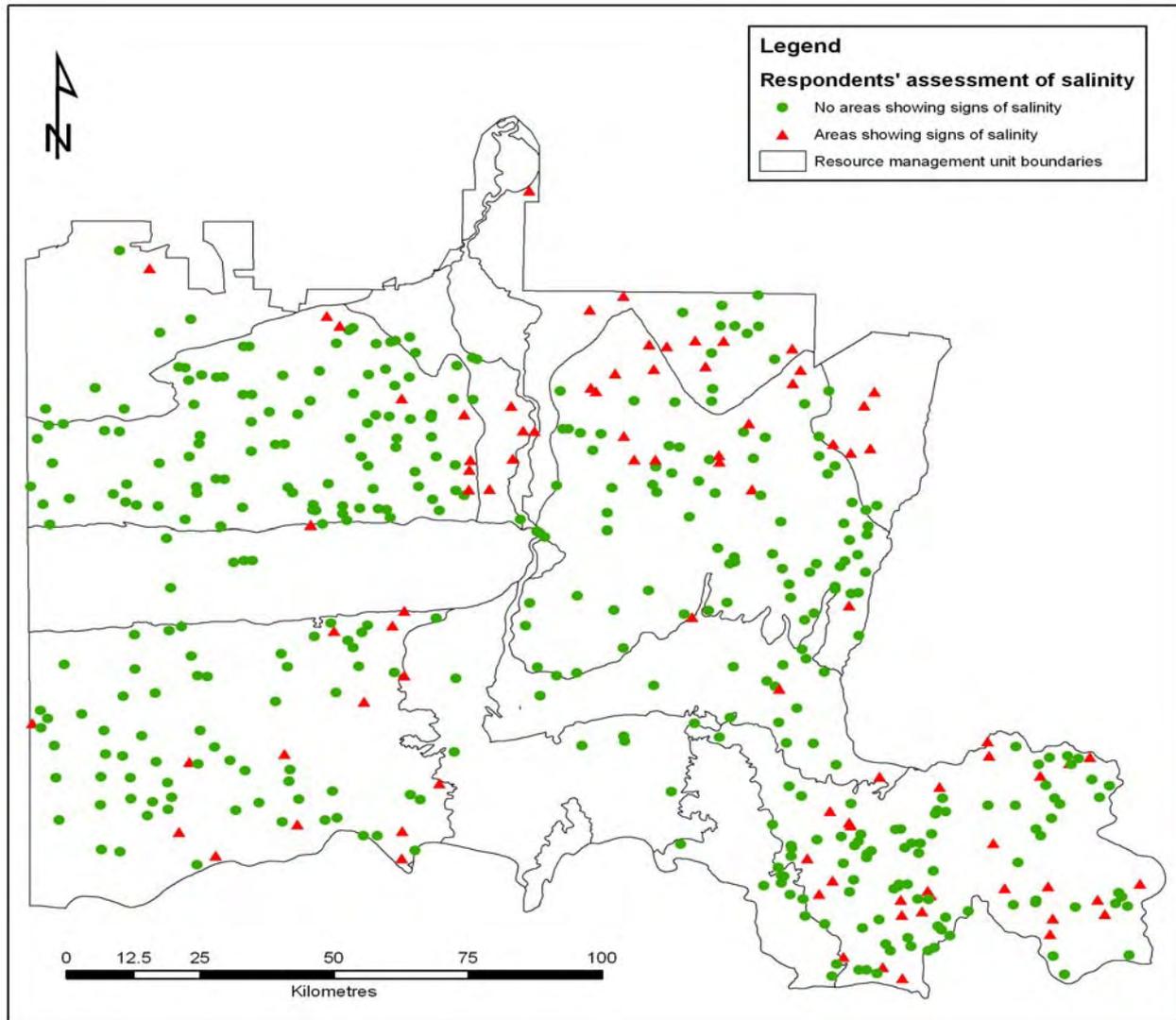
### ***Extent of dryland salinity reported by landholders***

The mail survey asked respondents if they had any areas on their property showing signs of salinity, and if so what was the area involved.

Nineteen per cent of respondents (n=88, N=472) recognised they had areas on their property showing signs of salinity [Figure 7]. The median area affected by salinity was 10 ha. The total area of reported salinity was 2,437 ha or 0.61% of the total area surveyed in the WCMA region. These findings are consistent with those from the 2002 survey where 23% said they had saline affected areas with a median affected area of 10 ha and less than one per cent of the area surveyed was affected by salinity.

There was a significant difference in the distribution of respondents across the Wimmera region who identified saline affected areas on their property.

**Figure 7 Landholders self-assessment of salinity, 2007**



Respondents who said there were areas on their property affected by salinity were significantly more likely to adopt most of the CRP in the survey expected to address dryland salinity, including:

- sowing perennial pasture and lucerne (period of management and past five years);
- planting trees and shrubs (including direct seeding) (period of management and past five years); and
- addressing gully erosion areas.

### ***Landholder awareness of dryland salinity compared to expert maps***

Information on respondents' assessment of salinity affected areas on their property was entered into a GIS where it was overlaid and compared with salinity discharge sites identified by the WCMA [Figure 8]. A one km buffer was used around the discharge sites to provide some margin of error when comparing the location of these sites with landholder identified salinity sites.

GIS analyses using salinity mapping data from the WCMA (using tested areas and a one km buffer, map agrees/disagrees) suggested that most respondents had a high level of awareness and preparedness to acknowledge current, visible dryland salinity impacts on vegetation. For example, only 8% (N=381, n=31) of those who reported no areas with

vegetation that showed the effects of salinity were within one kilometre of a discharge site as identified by the expert maps [Figure 8]. In other words, 92% (90% in 2002) of the respondents who said they had no areas currently affected by salinity were correct according to the expert maps. It therefore seems that landholders have a high level of awareness of the areas currently affected by salinity.

The lack of awareness (assuming the expert maps are correct) displayed by a small number of the respondents (n=31) may be explained by a number of possibilities, including that these landholders:

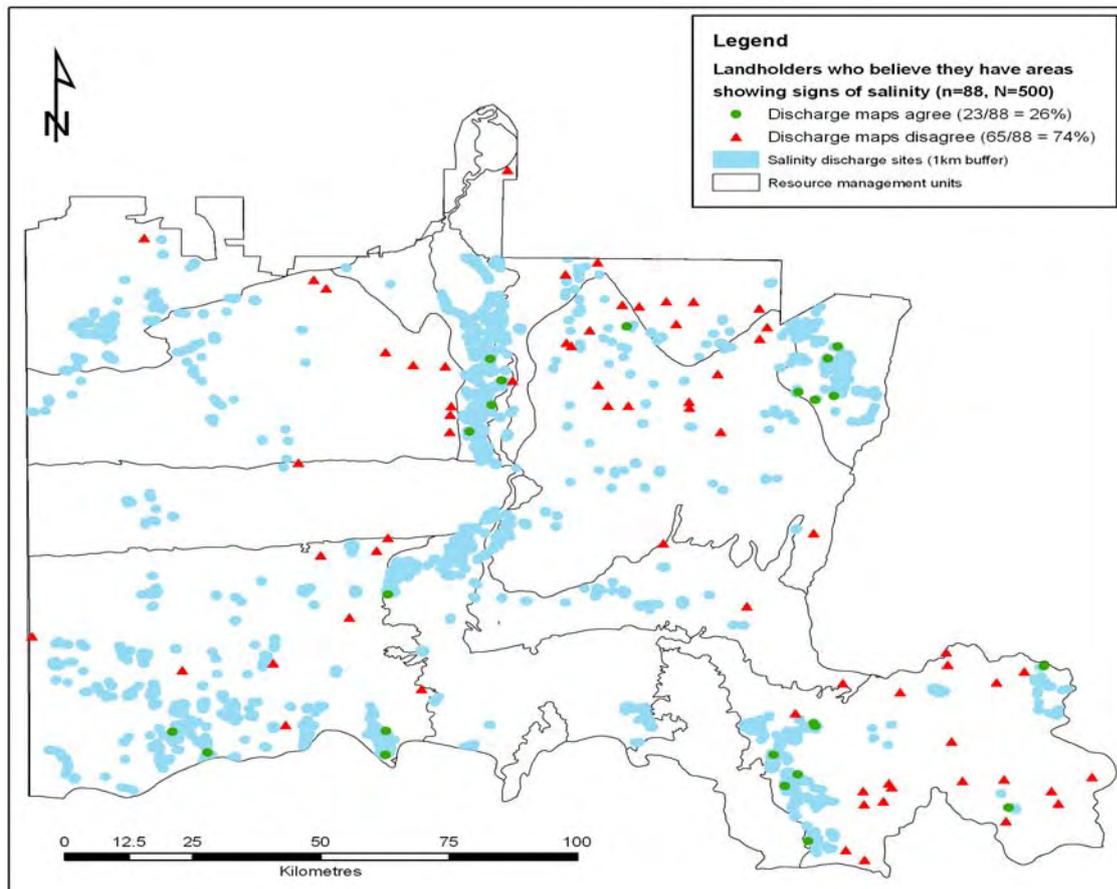
- are not able to identify saline affected vegetation; or
- do not want to acknowledge that they have saline affected areas.

Eighteen of the 31 respondents are located in two RMU: Northern Footslopes and South West Wimmera Plains.

It was also possible to examine the efficacy of the expert maps by assessing their capacity to predict areas affected by salinity as identified by landholders [Figure 8]. The expert maps only predicted salinity affected areas for 26% (N=88, n=23) of those reporting saline affected areas on their property. A large cluster of these respondents is located in the Northern Footslopes. It seems unlikely that landholders would deliberately over-state the extent of salinity on their property and given current climatic conditions, it is unlikely that landholders would misinterpret water logged areas as saline affected. Potential explanations of this trend include the possibility that there has been less investment of effort to map saline affected areas in the Northern Footslopes and some other RMU.

Comparison of 2002 and 2007 survey data suggests that the capacity of expert maps to predict landholder identified saline affected areas has declined (from 36% to 26%). However, the distribution of those areas where there are discrepancies appears to be very similar.

**Figure 8 Landholders assessment compared to expert map, 2007**



### 4.3 Values attached to property

Values are widely accepted as underpinning behaviour of private landholders (Pannell *et al.* 2006). Social researchers (and psychologists) distinguish between the guiding principles or held values that guide our behaviour (Braithwaite and Scott 1991) and those that we attach to particular things, physical goods, activities and services (Lockwood 1999). Survey topics explored aspects of survey recipients held and attached values. In the past, the authors have employed a multi-item land ethic or land stewardship scale that attempted to measure the extent respondents placed the long-term health of the land ahead of short-term economic gain (Vanclay 1992; Curtis and De Lacy 1998). This scale has had mixed success in discriminating between respondents and stewardship has generally not been associated with higher adoption of CRP (Curtis and De Lacy 1998). Nevertheless, we included a single item from that scale in the 2007 survey: *Reduced production in the short-term is justified where there are long-term benefits to the environment.*

The mail survey included 18 statements exploring the range of social, economic and environmental values landholders might attach to their property and one item that explored respondents' stewardship ethic [Figure 9]. Twelve items were included in both the 2002 and 2007 surveys [Table 4]. The response options were "very important", "important", "of some importance", "minimal importance" and "not important". A "not applicable" option was also provided. As in the previous section these options have been collapsed into three categories plus "not applicable" to simplify presentation – "important" (combining "very important" and "important"), "some" (of "some importance") and "unimportant" (combining "not important" and "minimal importance") [Figure 9].

#### Key findings

- Social values related to the lifestyle offered by rural living and being a great place to raise a family were the highest rated values.
- Economic values related to the sense of accomplishment from improving property infrastructure (fencing, water supply, pasture) and from building/ maintaining a viable business were rated as important by three quarters of respondents.
- There appears to be a strong stewardship ethic amongst most respondents with over three quarters of respondents saying it was important to be able to pass the property on to others in better condition. As might be expected, a smaller proportion (45%) said they would accept reduced production in the short-term to gain long-term benefits to the environment.
- Although there was not one specific environmental value in the top 10 values, over half of all respondents said it was important that their property contributes to the environmental health of the district and just under half said their property was important because native vegetation on their property provides habitat for native animals.
- Values are stable over time so it was no surprise to find few differences between the data from the 2002 and 2007 surveys. The principal differences are the reduced ranking and mean score for the property provides most of the household income, increased mean score (but lower ranking) for work on my property is a welcome break from my normal occupation, and reduced ranking and mean score for the property is a place for recreation. Changes in these items these items are consistent with the trend to lower proportions of respondents as farmers and drought conditions affecting recreation opportunities.
- There were significant relationships between the adoption of CRP and 16 of the 18 items in the survey exploring the values landholders attach to their property. These relationships suggest values are powerful drivers of landholder behaviour. Respondents who attached strong environmental values to their property were more likely to adopt

conservation practices. This was also the case for production values and CRP with a production focus. Again, there was an important difference between farmers and non-farmers. There were some values, including being able to pass the property on to others in better condition with wide appeal across the conservation/ production divide.

- More positive responses to the item measuring a landholder stewardship ethic were linked to significantly higher levels of adoption of farm forestry, both in the past five years and over the period of management. However, lower stewardship scores were also linked with higher adoption of six CRP, including a mix of biodiversity conservation and sustainable agriculture practices. It seems that stewardship is not a useful predictor of behaviour.
- There were significant differences in respondents' scores for 12 of the 18 items exploring the values landholders attach to property (including the item exploring value orientation) across the Wimmera RMU.

**Table 4 Values attached to property, 2007 and 2002**

Why your property is important to you	Mean score 07	Mean score 02	2007 rank	2002 rank
Provides the lifestyle that I want	4.27	Not asked	1	
A great place to raise a family	4.19	4.11	2	5
Sense of accomplishment from improving property infrastructure (fencing, sheds, water supply, pasture)	4.19	Not asked	3	
The freedom of working for myself	4.18	4.33	4	3
Being able to pass the property on to others in better condition *	4.13	4.37*	5	1
Sense of accomplishment from building/maintaining a viable business	4.10	4.29	6	4
An attractive place to live	4.08	4.04	7	6
Provides most of the household income	4.07	4.36	8	2
Being part of a rural community	4.00	4.03	9	7
Rural land represents a sound long-term investment	3.88	Not asked	10	
Sense of accomplishment from knowing that my property is contributing to improved environmental health in the district	3.80	Not asked	11	
Sense of accomplishment from producing food or fibre for others	3.66	3.82	12	8
An asset that will fund my retirement	3.63	3.80	13	9
Opportunity to learn new things	3.60	Not asked	14	
To preserve tradition as the property has been in my family for a long time	3.40	Not asked	15	
Native vegetation on my property provides habitat for native animals	3.38	3.45	16	12
A place for recreation	3.32	3.57	17	10
Reduced production in the short-term is justified where there are long-term benefits to the environment **	3.30	Not asked	18	
Work on the property is a welcome break from my normal occupation	3.14	2.37	19	16

*Yellow=Social values, White=Economic, Green=Environmental*

*\*changed from an "Economic" value in 2002 to an "Environmental" in 2007 based on correlations with other statements.*

*\*\* landholder stewardship ethic (2<sup>nd</sup> from bottom)*

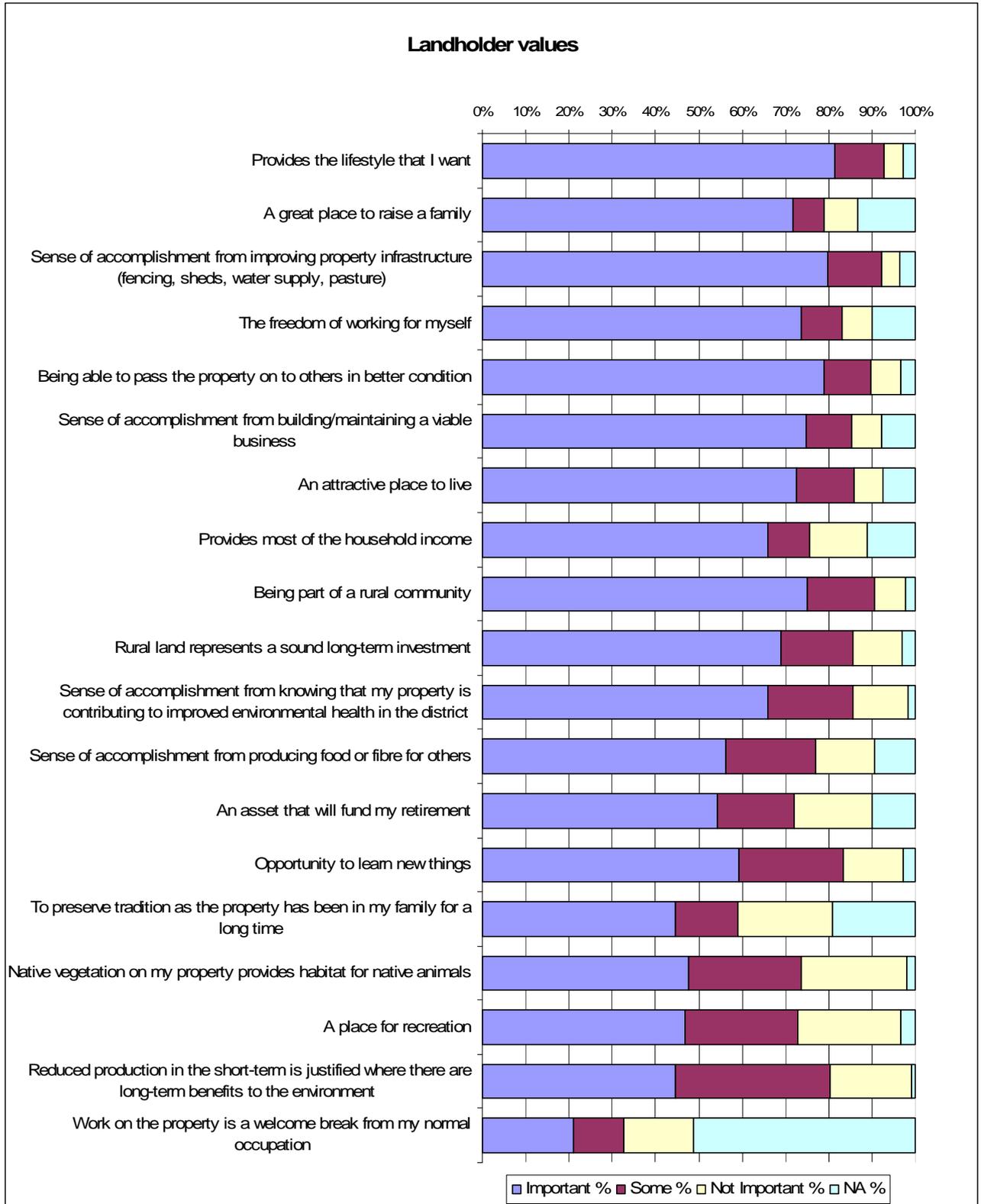
*There is no significant difference between the means of 2002/07 (Kruskal-Wallis Test)*

More positive responses to the item measuring a landholder stewardship ethic were linked to significantly higher levels of adoption of farm forestry, both in the past five years and over the period of management. Lower stewardship scores were also linked with higher adoption of six CRP, including a mix of biodiversity conservation and sustainable agriculture practices. It seems that stewardship is not a strong predictor of behaviour.

There were significant relationships between the adoption of CRP and 16 of the 18 items in the survey exploring the values landholders attach to their property. These relationships suggest values are powerful drivers of landholder behaviour. Respondents who attached strong environmental values to their property were more likely to adopt conservation practices. This was also the case for production values and CRP with a production focus. Again, there was an important difference between farmers and non-farmers. There were some values, including being able to pass the property on to others in better condition that cut across the conservation/ production For example:

- Those who gave a higher rating to native vegetation on my property provides habitat for native animals were significantly more likely to: plant trees and shrubs (including direct seeding); fence native bush/ grasslands to manage stock access during their management; fence native bush/ grasslands to manage stock access during the last five years; establish farm forestry in past five years; and fence to manage stock access to rivers/ streams/ wetlands during their management.
- Those who gave a higher rating to the value property provides most of the household income were significantly more likely in the past five years to: sow perennial pasture and lucerne; sow crops using minimum tillage techniques; sow crops using no-till techniques; and test the quality of the main water source for stock or irrigation purposes on their property.
- As expected, those who gave a higher rating to work on the property is a welcome break from my normal occupation were significantly less likely to undertake the suite of production focused CRP. On the other hand, those who gave a higher rating to sense of accomplishment from building/ maintaining a viable business were significantly more likely to undertake the production focussed CRP but less likely to have established farm forestry during their management.
- Those who gave a higher rating to: being able to pass the property on in better condition were significantly more likely to; fence native bush/ grasslands to manage stock access during their management; fence to manage stock access to rivers/ streams/ wetlands during their management; plant trees and shrubs (including direct seeding) during their management; plant trees and shrubs (including direct seeding) during past five years; sow perennial pasture and lucerne during their management; sow crops using minimum tillage techniques during past five years; sow crops using no-till techniques during past five years; and test the quality of the main water source for stock or irrigation purposes on their property.

**Figure 9 Landholder values ranked in importance, 2007**



## 4.4 Knowledge of natural resource management topics

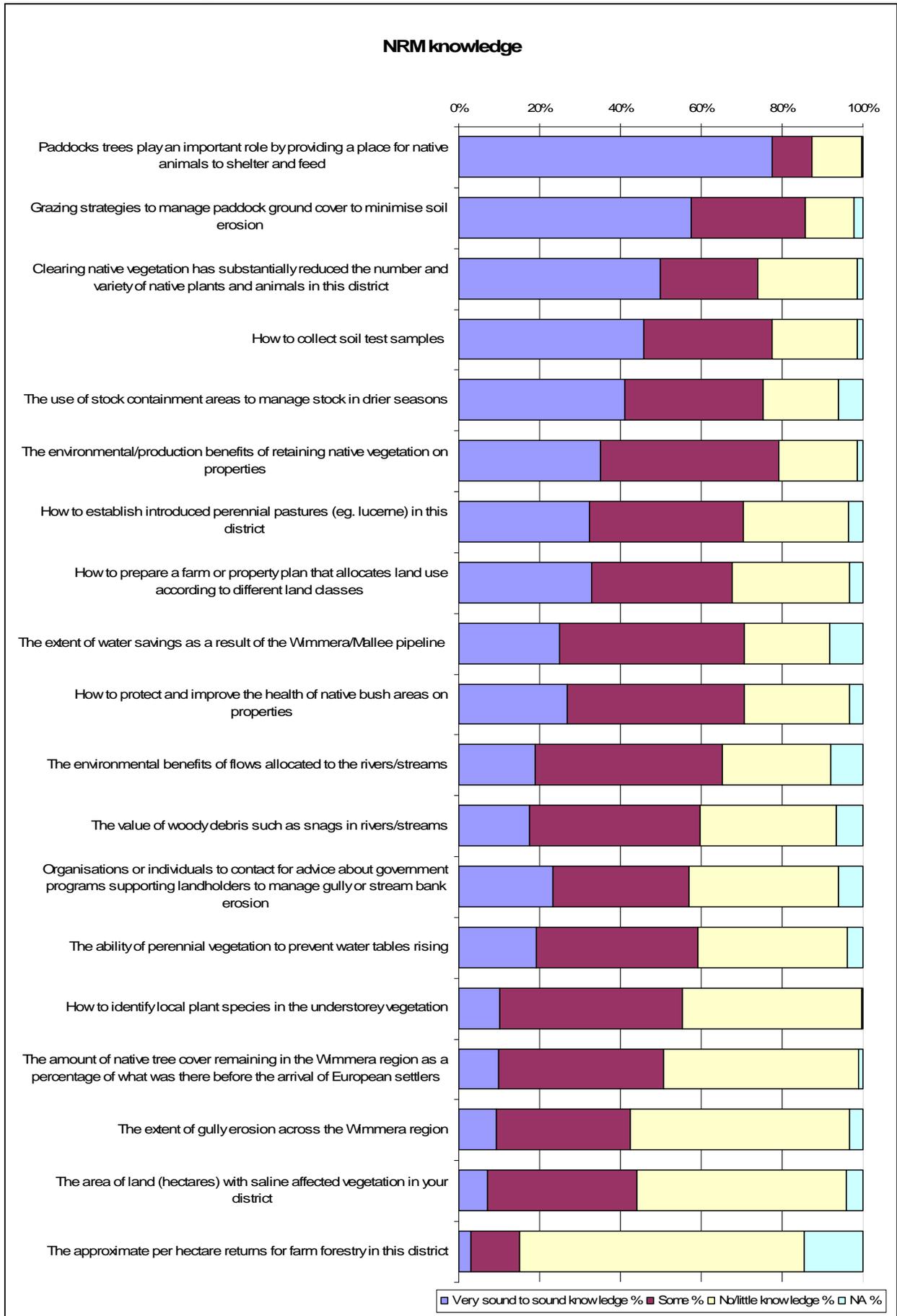
Self-assessment is a widely accepted approach to gathering information about people's knowledge of NRM (Shindler and Wright 2000; Curtis *et al.* 2001). In this study, respondents were asked to rate their knowledge for 19 items relating to NRM in the WCMA region [Figure 10]. Twelve items were included in both the 2002 and 2007 surveys [Table 5]. NRM investment is increasingly targeted to specific asset classes, such as a vegetation type or a specific wetland. These investments often include a focus on important knowledge gaps. Analyses were undertaken that tested for changes in knowledge over time for all respondents [Table 5a] and for those in locations with specific assets [Table 5b]. We discuss findings from the regional-scale analysis first.

Respondents were able to select the best response option from "very sound knowledge", "some knowledge" and "limited knowledge" (combining "no knowledge" and "very little knowledge"), plus "not applicable" [Figure 10].

### Key findings

- The majority of respondents rated their knowledge below sound (sufficient to act/explain to others) for all but three of the 19 items. The exceptions were the role of paddock trees as habitat, grazing strategies to manage ground cover and the impact of clearing of native vegetation on native flora and fauna.
- There were five topics where 10% or fewer respondents said they had sound knowledge, including those related to identifying native understorey species, the extent of pre-European tree coverage, the extent of gully erosion across the region, the area of saline affected vegetation and returns for farm forestry.
- There are significantly lower self-reported levels of knowledge for nine of the 12 topics included in both the 2002 and 2007 surveys [Table 5a]. The most dramatic declines were for knowledge about grazing strategies to manage ground cover to minimise erosion, how to prepare a farm plan, the extent of water savings through Wimmera/Mallee pipeline, the extent of pre-European tree coverage, the ability of perennial vegetation to prevent water tables rising and the areas of saline affected land in the district.
- There was a significant decline in self-reported knowledge over time for six of the eight topics in areas identified by the WCMA as locations where the CMA had made a strategic investment [Table 5b]. There was a significant increase over time for the topic "The value of woody debris such as snags in rivers/streams".
- There were significant positive relationships between the adoption of CRP and the 19 items exploring landholder knowledge. These relationships suggest knowledge is a powerful driver of landholder behaviour. Importantly, these relationships hold for CRP with both a biodiversity and a sustainable agriculture focus. In most instances, the relationships identified involved plausible causal links between knowledge and adoption.
- There were significant differences across the Wimmera RMU on 11 of the 19 items exploring landholder self-reported knowledge.

Figure 10 Knowledge of NRM, 2007



**Table 5a Knowledge of NRM: all topics and all respondents, 2007 and 2002**

Topics	n	Very sound to sound knowledge %	Some %	No/little knowledge %	NA %	Mean score
Paddocks trees play an important role by providing a place for native animals to shelter and feed	483	78%	10%	12%	0%	3.83
<b>Grazing strategies to manage paddock ground cover to minimise soil erosion</b>	489	57% 76%	28%	12%	2%	3.53 3.84
Clearing native vegetation has substantially reduced the number and variety of native plants and animals in this district	479	50%	24%	25%	1%	3.36
<b>How to collect soil test samples</b>	487	46% 55%	32%	21%	1%	3.27 3.41
The use of stock containment areas to manage stock in drier seasons	490	41%	34%	19%	6%	3.25
The environmental/production benefits of retaining native vegetation on properties	486	35%	44%	19%	1%	3.17
How to establish introduced perennial pastures (eg. lucerne) in this district	489	32% 40%	38%	26%	4%	3.06 3.01
<b>How to prepare a farm or property plan that allocates land use according to different land classes</b>	488	33% 47%	35%	29%	3%	3.00 3.25
<b>The extent of water savings as a result of the Wimmera/Mallee pipeline</b>	490	25% 56%	46%	21%	8%	2.99 3.50
How to protect and improve the health of native bush areas on properties	486	27%	44%	26%	3%	2.98
The environmental benefits of flows allocated to the rivers/streams	484	19%	46%	27%	8%	2.84
The value of woody debris such as snags in rivers/streams	487	17% 23%	42%	34%	7%	2.75 2.69
Organisations or individuals to contact for advice about government programs supporting landholders to manage gully or stream bank erosion	487	23% 26%	34%	37%	6%	2.74 2.82
<b>The ability of perennial vegetation to prevent water tables rising</b>	488	19% 31%	40%	37%	4%	2.70 2.93
How to identify local plant species in the understorey vegetation	489	10%	45%	44%	0%	2.54
<b>The amount of native tree cover remaining in the Wimmera region as a percentage of what was there before the arrival of European settlers</b>	491	10% 24%	41%	48%	1%	2.46 2.87
<b>The extent of gully erosion across the Wimmera region</b>	489	9% 5%	33%	54%	3%	2.37 2.04
<b>The area of land (hectares) with saline affected vegetation in your district</b>	487	7% 16%	37%	52%	4%	2.32 2.60
<b>The approximate per hectare returns for farm forestry in this district</b>	487	3% 5%	12%	70%	15%	1.74 1.85

*Repeated knowledge topics and means from 2002 are highlighted.*

*Knowledge topics in **bold** type have significantly declined from 2002 to 2007*

**Table 5b Knowledge of NRM: focus topics and investment areas, 2007 and 2002**

Knowledge topic	Investment asset/ area	2002 Mean/ median	2007 Mean/ median	P value*
How to collect soil test samples	NE Wimmera	4 n=156	4 n=111	0.4894
How to establish introduced perennial pastures (eg. lucerne) in this district	3 priority ground flow systems	4 n=36	3 n=14	0.0145
How to prepare a farm or property plan that allocates land use according to different land classes	NE Wimmera	3.2 n=152	2.8 n=107	0.008
The value of woody debris such as snags in rivers/streams	19 Waterway Management Units** Mt Cole Creek	3 n=20	4 n=20	0.0046
Organisations or individuals to contact for advice about government programs supporting landholders to manage gully or stream bank erosion	19 Waterway Management Units Mt Cole Creek** Yarriambiack	4.2, n=22 3, n=125	3.15, n=20 2, n=73	0.0065 0.0023
The ability of perennial vegetation to prevent water tables rising	3 priority ground flow systems	3.3 n=30	2.5 n=50	0.0016
The area of land (hectares) with saline affected vegetation in your district	Hindmarsh Shire	3 n=116	2 n=107	0.0339
The approximate per hectare returns for farm forestry in this district	3 priority ground flow systems	2 n=28	1 n=48	0.0164

*Knowledge topics where there has been a significant decline from 2002 to 2007 are highlighted grey*

*Knowledge topic where there has been a significant increase from 2002 to 2007 is highlighted green*

*\*Kruskal-Wallis test for significance at 0.05 level*

*\*\*A significant change over time only for the Waterway Units listed*

There were significant positive relationships between the adoption of CRP and each of the 17 items exploring landholder knowledge. These relationships suggest knowledge is a powerful driver of landholder behaviour. Importantly, these relationships hold for CRP with both a biodiversity and a sustainable agriculture focus. The only caveat here is that variables may be correlated without a causal relationship existing. Higher self-assessed knowledge of whole farm planning was significantly linked with higher adoption of 12 of the 15 CRP measures. Knowledge of whole farm planning may lead to planning and in turn, the adoption of CRP. It is also possible that those landholders with a professional approach to management are better planners and better land managers. In most instances, the relationships identified involved plausible causal links between knowledge and adoption. For example:

- Higher self-assessed knowledge about how to collect soil samples was linked to higher adoption of: sowing perennial pasture and lucerne past five years; sowing perennial pasture and lucerne during period of management; cropping using minimum tillage past five years; and cropping using no-till techniques past five years;
- Higher self-assessed knowledge of the ability of: perennial vegetation to prevent water tables rising was linked to higher adoption of sowing perennial pasture and lucerne (past five years; period of management); fencing to manage stock access to native bush/ grasslands past five years; planting trees and shrubs (past five years; management period);
- Higher self-assessed knowledge of the returns from farm forestry was linked to higher adoption of farm forestry past five years;
- Higher self-assessed knowledge of how to: protect and improve the health of native bush areas was linked to higher adoption of planting trees and shrubs (past five years; management period); establishing farm forestry during management period; fencing to manage stock access to native bush and grasslands (past five years; management period); fencing to manage stock access to rivers/ streams/ wetlands during management period;
- Higher self-assessed knowledge about how to establish introduced perennial pastures was linked to higher adoption of sowing perennial pasture and lucerne (past five years; management period); cropping using minimum tillage past five years; and cropping using no-till techniques past five years.

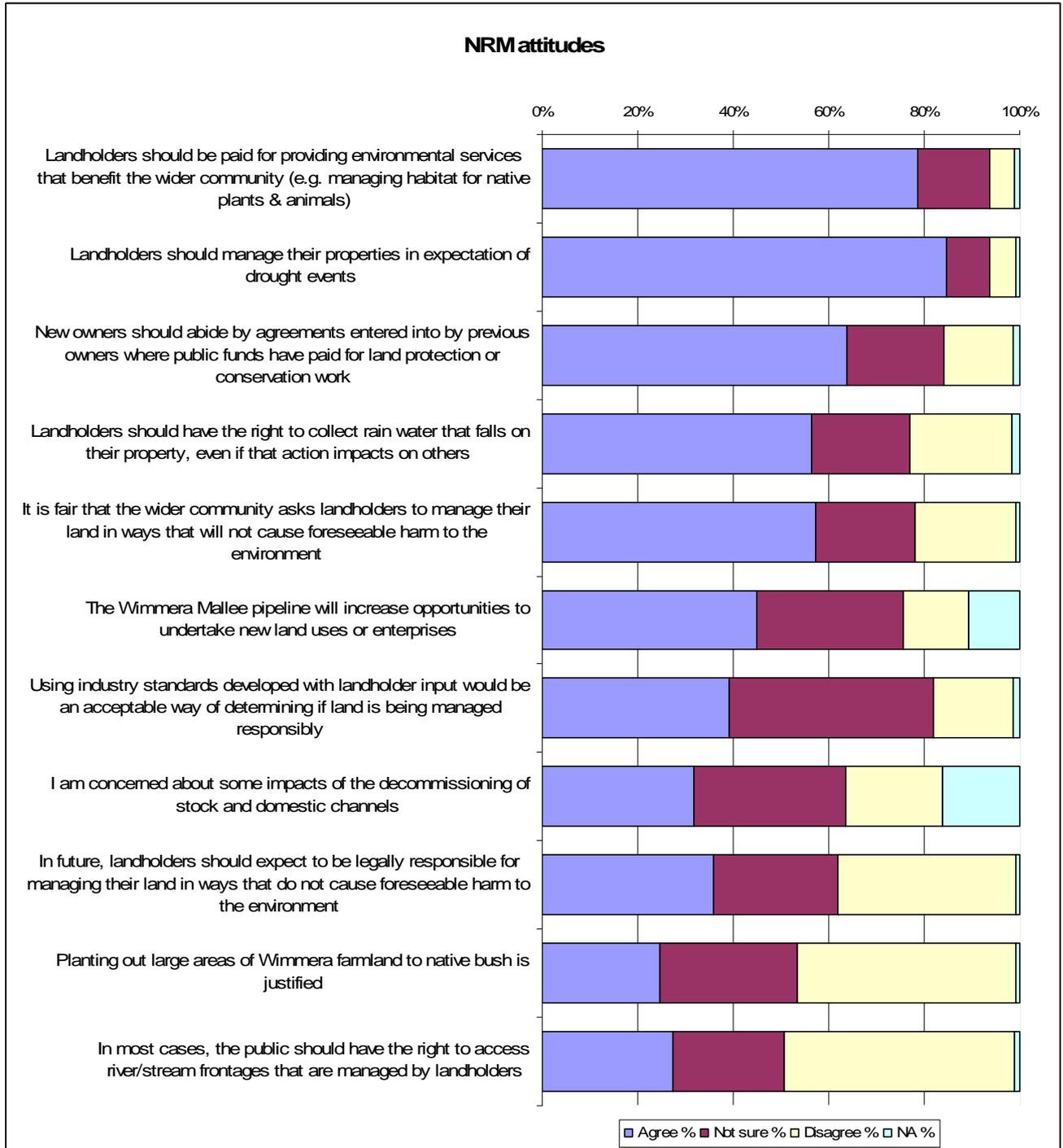
## 4.5 Attitudes towards natural resource management

A series of 11 statements sought each respondent's views about the roles and responsibilities of different NRM actors [Figure 11]. Only one of these items was included in the 2002 survey: landholders should be paid for the environmental services they provide. For each statement respondents were asked to choose a response option from "strongly agree", "agree", "not sure", "disagree" and "strongly disagree". A "not applicable" option was also included. These response options have been collapsed into three groups plus "not applicable" [Figure 11]. While examining Figure 11 you should note that some topics are expressed in the negative and others in the positive.

### Key findings

- Almost all respondents (85%) agreed that landholders should manage their properties in the expectation of drought events. This statement implies that drought is a normal part of the Australian environment and landholders must manage their land and finances accordingly.
- Almost all respondents (79%) agreed that landholders should be paid for providing environmental services. The level of agreement with this statement was similar to that obtained in the 2002 survey (84%).
- Most respondents were concerned about right to farm issues. Fifty-six per cent agreed that landholders should have the right to collect rain water that falls on their property even if that action impacts on others and only 27% agreed that in most cases, the public should have the right to access river/ stream frontages managed by landholders.
- There is some support for a duty of care for biodiversity in that most (57%) respondents agreed that it is fair that the wider community expect landholders to manage their land in ways that will not cause foreseeable harm to the environment. However, only 36% agreed that in future, landholders should expect to be legally responsible for managing their land in ways that will not cause foreseeable harm to the environment.
- Few (25%) landholders supported the view that planting out large areas of the Wimmera to native bush is justified.
- Only a small number of the attitudinal statements in the survey could be expected to affect adoption of CRP in this study. In a few instances, positive attitudes were linked to higher levels of adoption. However, in many instances the results of analyses were counter-intuitive in that higher levels of adoption were linked to less positive responses to attitudinal items. The explanation is that farmers were more likely to disagree with statements exploring attitudes about conservation and property rights but farmers were more likely to adopt many CRP.
- There were significant differences across the Wimmera RMU on three of the 11 items exploring landholder attitudes.

**Figure 11 Regional attitudes towards issues, 2007**



Only a small number of the attitudinal statements in the survey could be expected to affect adoption of the CRP in this study. In a few instances, positive attitudes were linked to higher levels of adoption. For example, more positive responses to the statement planting out large areas of Wimmera farmland to native bush is justified was linked to higher levels of adoption for establishing farm forestry (past five years; during the management period); and fencing erected to manage stock access to rivers/ streams/ wetlands.

However, in many instances the results of the analyses were counter-intuitive in that higher levels of adoption were linked to negative attitudes. For example, a more positive response to planting out large areas of Wimmera farmland to native bush is justified was linked to lower levels of adoption for five CRP. Four of these items were linked to sustainable agriculture, including sowing perennial pasture and lucerne (past five years; management period) and both minimum tillage and no-till cropping past five years. It seems that the explanation for these negative relationships is that farmers had generally negative attitudes to the attitudinal statement and farmers were more likely to adopt CRP, particularly those related to sustainable agriculture.

The statement exploring views about landholder duty of care for the environment is another example illustrating this explanation. Respondents who were more likely to agree that in future landholders should expect to be legally responsible for managing their land in ways that do not cause foreseeable harm to the environment were more likely to adopt CRP related to farm forestry establishment (past five years; management period). At the same time, those more likely to disagree with this statement were more likely to adopt CRP including sowing perennial pasture and lucerne (past five years; management period) and both minimum tillage and no-till cropping past five years.

## 4.6 Confidence in recommended practices

Five survey topics explored aspects of landholder confidence in CRP, including fencing to manage stock access to waterways and wetlands, the impact of clearing native vegetation, scientific knowledge about managing dryland salinity, the benefits of stubble retention in cropping systems and watering stock off-stream [Figure 12]. Three of these topics were included in both the 2002 and 2007 surveys [Table 6]. There were significant trends over time in landholder confidence so we have not included asset-specific analyses for this topic.

For each statement respondents were asked to choose a response option from “strongly agree”, “agree”, “not sure”, “disagree” and “strongly disagree”. A “not applicable” option was also included. These response options have been collapsed into three groups plus “not applicable” [Figure 12].

- There was a high level of confidence in fencing to manage stock access as an essential part of work to revegetate waterways (72% agreed). Compared to 2002 this represented a significant improvement in confidence levels.
- Most respondents said they were confident that the benefits of stubble retention outweigh any problems arising.
- Half thought that clearing native vegetation has substantially reduced native flora and fauna in their district.
- Less than half (44%) of the respondents were confident that watering stock off-stream was justified in terms of improvements in bank stability, water quality and stock condition. Compared to 2002 this represented a significant improvement in confidence levels.
- Few respondents were confident that scientists know how to manage dryland salinity in the Wimmera. This finding was almost identical to the 2007 finding (17% confident in both surveys).
- Multi-variate analysis established few positive relationships between the items assessing confidence in CRP and adoption of the CRP. The principal exception was the finding of a significant positive relationship between confidence in the benefits of stubble retention and using minimum tillage past five years.
- There were significant differences across the Wimmera RMU for two of the five topics exploring landholder confidence in CRP.

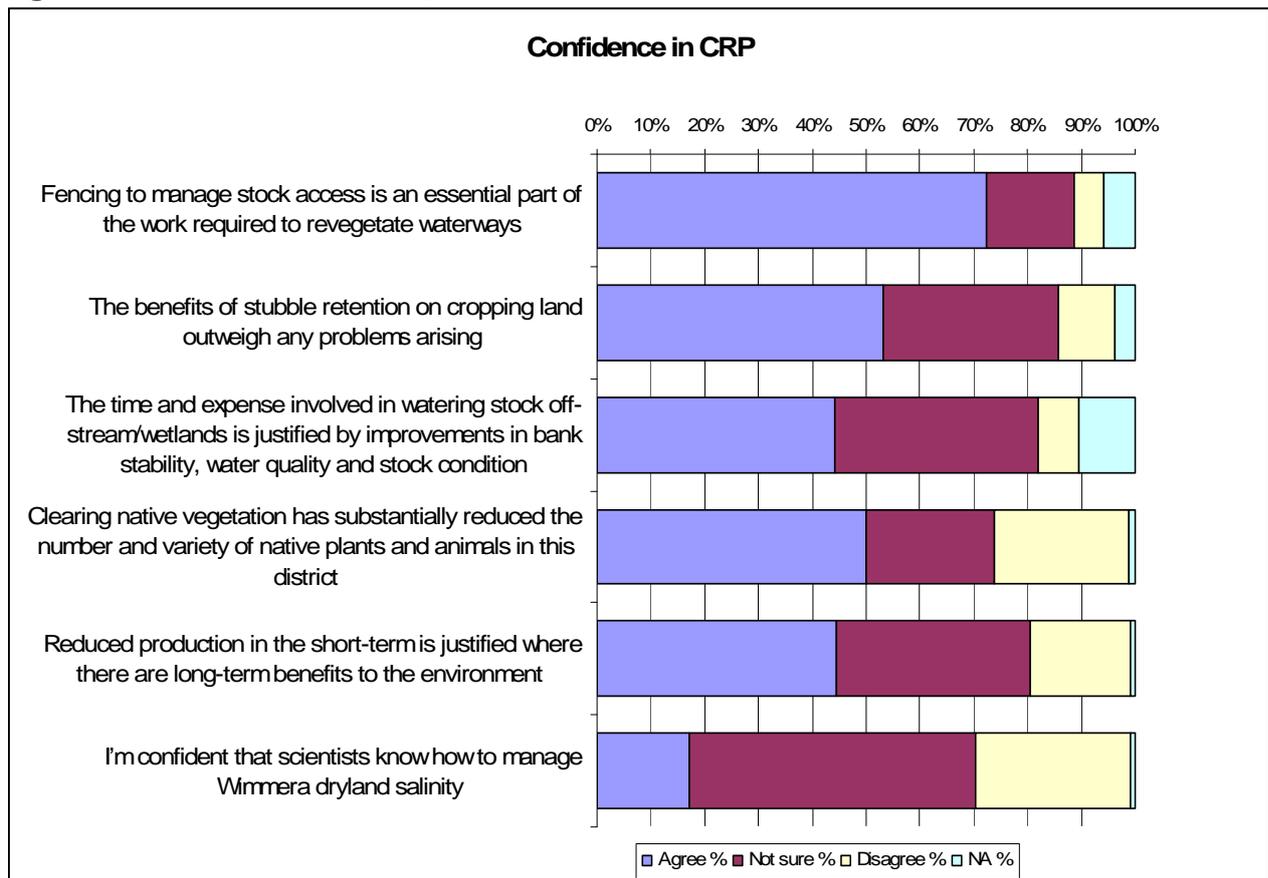
Data analysis established few positive relationships between items assessing confidence in CRP and adoption. The principal exception was the finding of a significant positive relationship between confidence in the benefits of stubble retention and adoption of cropping using minimum tillage past five years.

Interestingly, lower confidence that scientists know how to manage dryland salinity in the Wimmera was linked to significantly higher adoption of sowing perennial pasture and lucerne (past five years; management period) and planting trees and shrubs (including direct seeding) (past five years).

**Table 6 Confidence in CRP, 2007 and 2002**

Statements	n	Agree %	Not Sure %	Disagree %	NA %	mean score
Fencing to manage stock access is an essential part of the work required to revegetate waterways	483	72% 70%	16% 18%	6% 12%	6%	3.92 3.76
The benefits of stubble retention on cropping land outweigh any problems arising	480	53%	33%	11%	4%	3.55
The time and expense involved in watering stock off-stream/wetlands is justified by improvements in bank stability, water quality and stock condition	479	44% 35%	38% 52%	8% 13%	10%	3.54 3.24
* Clearing native vegetation has substantially reduced the number and variety of native plants and animals in this district	479	50%	24%	25%	1%	3.36
I'm confident that scientists know how to manage Wimmera dryland salinity	482	17% 17%	53% 52%	29% 31%	1%	2.80 2.78

**Figure 12 Confidence in CRP, 2007**



## 4.7 Preferred arrangement for involving landholders in NRM

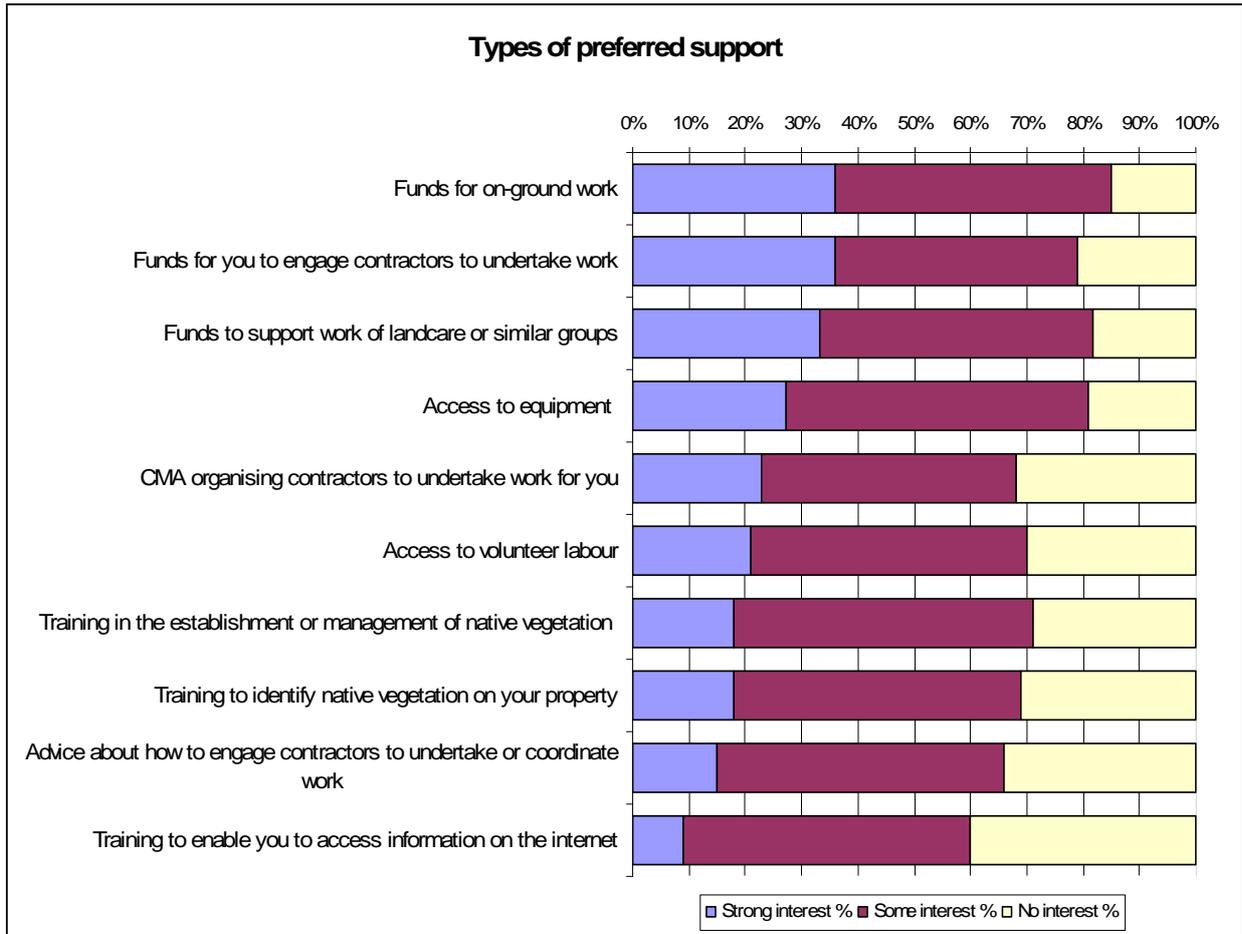
Through its RCS, the WCMA is responsible for investing around \$10 million per year for NRM in the Wimmera region. Survey respondents were asked to indicate their interest in different types of support and arrangements that could be used to deliver that support [Figure 13]. The survey included 15 items (four delivery mechanisms and ten types of support) plus a question asking if respondents were willing to undertake environmental works on their property without any external support.

For the first 14 items, respondents were offered a five point response option scale: “definitely interested”, “strong interest”, “interested”, “some interest” and “not interested”. To simplify presentation these options were grouped into three categories “strong interest” (combining strong interest and definitely interested), “moderate interest” (interested), and “limited interest” (combining not interested and some interest). A “don’t know/ not aware” option was also provided in the survey and has been included in Figure 13. For the final item, respondents simply selected yes or no.

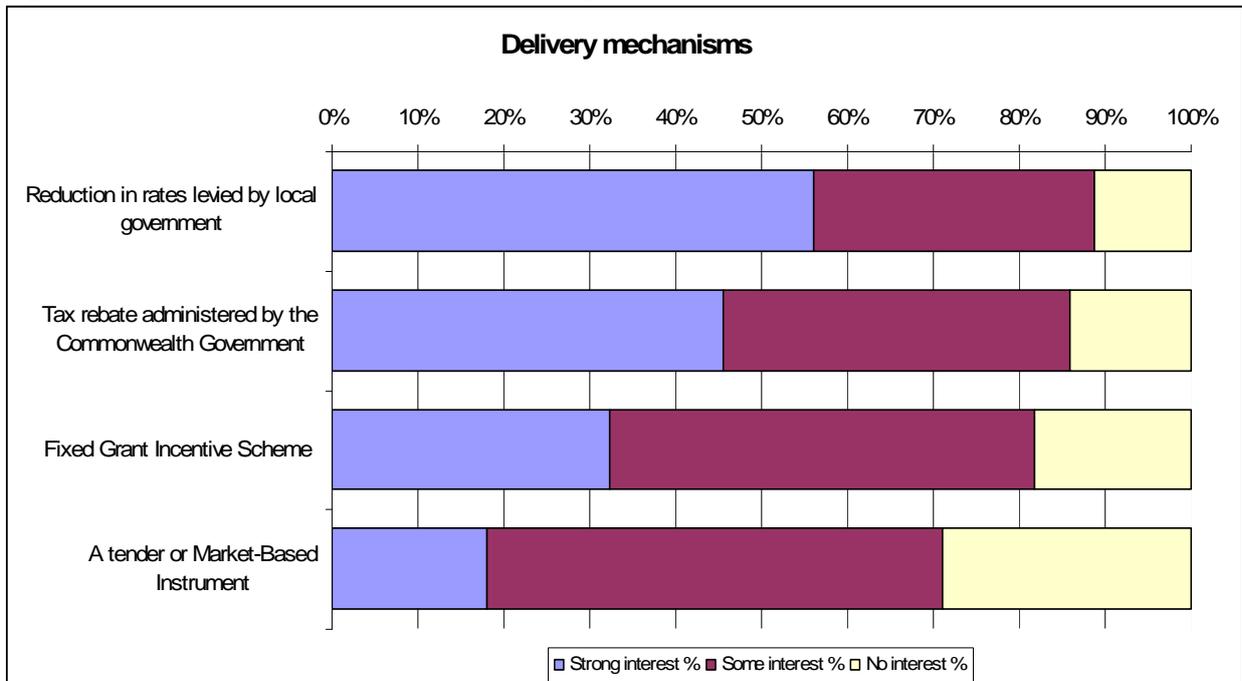
### Key findings

- Only a reduction in local government rates elicited strong interest from more than half (55%) of respondents. A tax rebate administered by the Commonwealth (45%) was the next most popular delivery mechanism offered.
- There was markedly less interest for a fixed grant incentive scheme (32%) or a market-based instrument (18%).
- Taken together, the four mechanisms attracted strong interest from 62% of respondents. Removing the rate reduction, the remaining mechanisms attracted strong interest from 49% of respondents. The addition of the market-based instrument made no difference to the proportion of respondents indicating they had a strong interest in possible mechanisms to deliver NRM programs in the WCMA region.
- More than a third of respondents expressed strong interest in support that included funds for on-ground work, funds for them to engage contractors to undertake on-ground work and funds to support the work of Landcare or similar groups. About a quarter of respondents expressed strong interest in access to equipment, access to volunteer labour and the CMA organising contractors to undertake work for them.
- Half the respondents said they were willing to undertake environmental work on their property without any external financial support.
- There were significant differences across the Wimmera RMU on six (not including MBI) of the 15 items exploring landholder interest in types of support and delivery mechanisms.

**Figure 13a Interest in types of support, 2007**



**Figure 13b Interest in different delivery mechanisms, 2007**

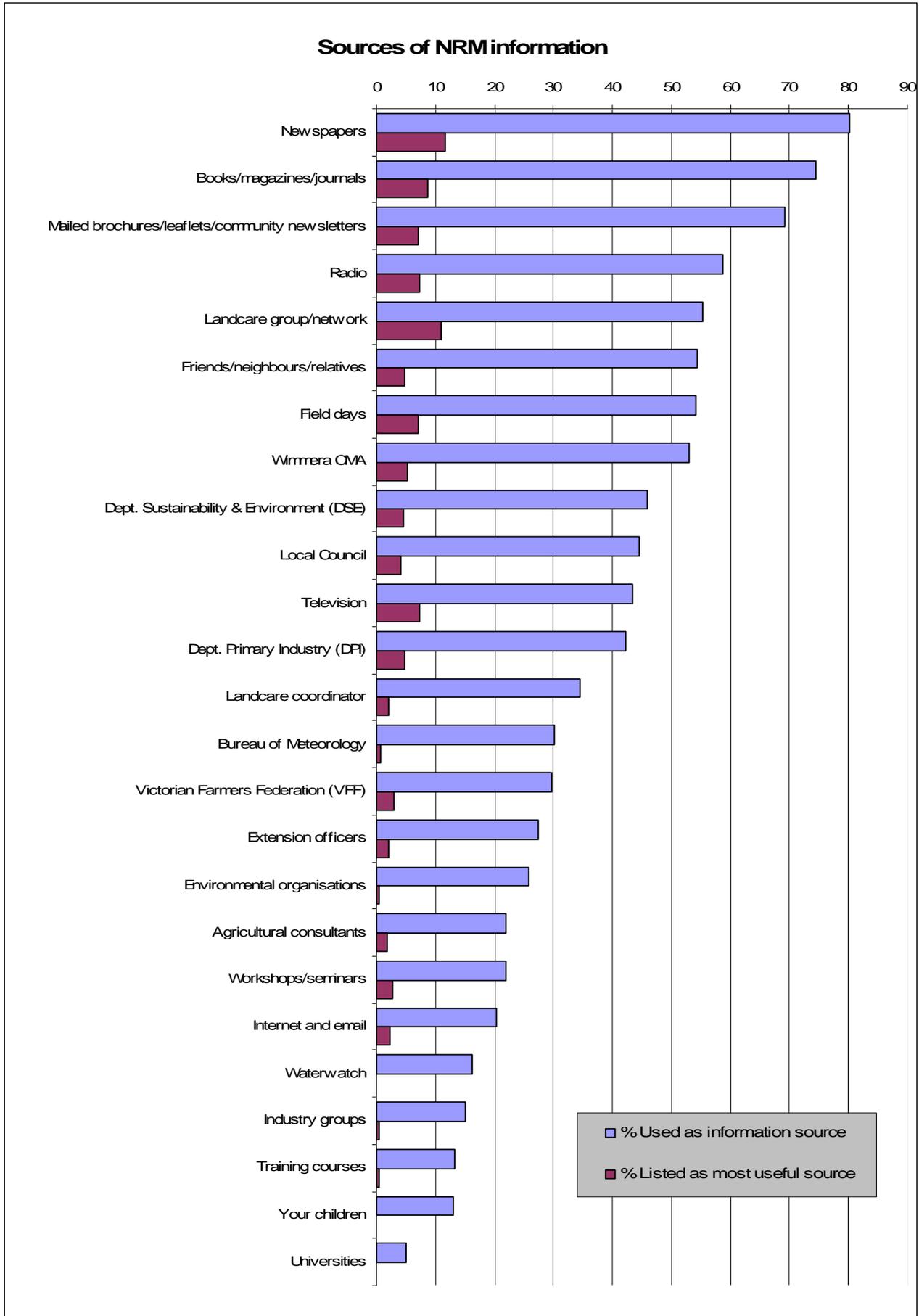


## 4.8 Sources of information about natural resource management

Respondents were asked to indicate their sources of information about NRM for the WCMA region during the past 12 months using a list of 25 possible sources [Figure 14]. Respondents were then asked to nominate the three most useful information sources they had used. For data presentation we have simply provided the total number of times a source of information was listed as 1, 2 or 3 [Figure 14].

- Newspapers was the most frequently listed (80%) of the 25 sources included in the survey and was identified as the most useful source by the largest number of respondents (#1 rating).
- Books/ magazines/ journals and mailed brochures/ leaflets/ community newsletters were listed as a source of information by 75% and 69% of respondents respectively, and were both in the top six for the sources identified as most useful.
- Radio, Landcare group/ network, friends/ neighbours/ relatives, field days and the WCMA were the only other sources listed by at least half of the respondents. Landcare group/ Network was rated higher (#2) for usefulness than for use (#5).
- Television and radio rated highly (both #4) as useful sources of information.
- The internet and email were identified as a combined source of information by 20% of respondents.
- There were significant differences across the Wimmera RMU on 10 of the 25 items exploring landholder sources of information about NRM.

Figure 14 Sources of information, 2007



## 4.9 Stage of life and long term plans

This topic provides useful contextual information for NRM planners. For example, the 2002 Wimmera survey established that 90% of respondents had lived in their local district for more than 10 years, with a median length of residence of 46 years. These data suggested the Wimmera had a stable population. At the same time, modelling suggested 36% of properties would change hands in the next 10 years, suggesting an increased and substantial rate of property turnover. With additional questions in the 2007 survey, we have undertaken further analyses including extensive comparisons of newer and longer-term owners. Our view is that these findings will assist NRM staff attempting to engage the newer landholder cohort.

Survey respondents were asked to indicate their age at the time of the survey. They were also asked to indicate the number of years they had resided in their local district, the number of years they had owned/managed their property and whether the property was their principal place of residence.

Respondents were also asked to indicate whether the long term plans for their property included family succession; disposal of land through sale, leasing or share-farming; or acquisition of more land through purchase, leasing or share-farming [Figure 15].

Respondents were asked to indicate the likelihood that they would take up each of the 14 long-term choices offered in the survey. If respondents indicated that their long-term plans involved selling all or a large part of their property they were asked to indicate when this might occur. These data were then used to explore the extent of future change in owners/managers and the implications of these changes for the adoption of CRP.

### Key findings

The 2002 survey established that 94% of respondents had lived in their local district for more than 10 years, with a median length of residence of 46 years. These data suggested the Wimmera had a stable population. At the same time, modelling of the 2002 data suggested 36% of properties would change hands in the next 10 years. Our more recent analysis of property sales data held by the Victorian Valuer General suggests that 22% of rural properties in the Wimmera region changed hands between 1995 and 2005.

- The median age of survey respondents was 54 years, up one year on the median age of 53 years in 2002.
- The median length of residence was 45 years and the median length of property ownership was 25 years. In 2007, 89% of respondents had lived in their district for more than ten years.
- Sixty-nine per cent of respondents said ownership of the property would stay within their family. These respondents managed 75% of the land surveyed
- Most (60%) respondents indicated that they would continue to live on the property.
- Thirty-two per cent of respondents indicated that they had plans to expand their property (buy, lease or share-farm additional land). These respondents managed 47% of the land surveyed. Thirty-eight per cent of respondents indicated that they would dispose of all or a large part of their property either through sale, leasing or share-farming (27% of the land surveyed).
- Respondents who indicated they were going to dispose of all or most of their property were significantly different from those planning to acquire land. It seems that stage of life (younger acquire), farming (farmers acquire) as an occupation and the likelihood of family succession are the key differences between the two groups. Those planning to

acquire land were also more likely to be involved in a commodity group, be involved in prime lamb production and have family members interested in taking on the property.

- Those planning to acquire land were significantly more likely to adopt some CRP, including: for the area sown to perennial pastures; the use of no-till cropping practices; and testing of water quality. At the same time, it is important to highlight that there were identical scores/negligible differences for several CRP, including farm forestry establishment, gully erosion addressed, fencing to manage stock access to waterways, and off-stream watering points established.
- Long-term plans for the property remained very stable over the period 2002 to 2007 with the exception of a significant decrease in the proportion of respondents indicating they planned to acquire additional land (43% in 2002 to 32% in 2007). This trend is not surprising given the change to drought conditions.
- Modelling of the 2007 survey data suggested that 45% of properties would change hands in the next 10 years (not necessarily by sale). This is an increase on the 36% identified through modelling of the 2002 data. The year of predicted property transfer was not significantly different across the Wimmera region RMU.
- Using a 10-year threshold to distinguish between newer and longer-term owners, our analyses established that 11% of respondents were new owners. Given the prediction that 45% of properties will be under different management in 10 years, we have examined new/ longer-term landholders in some depth.
- Most (76%) new owners had lived outside the district before purchasing their property and almost half (42%) were absentee owners. Indeed, new owners were significantly more likely than longer-term owners (39% and 18% respectively) to have come from outside the district and to be absentee owners.
- New owners were different from longer-term owners. Longer-term owners were more likely to be older, be farmers, own larger properties, return an on-property profit, work more hours on-property and less off-property, and be members of Landcare and commodity groups.
- Longer-term owners were more focused on production while newer owners appear to be more focused on the environmental values of their property. Newer landholders were more likely to agree with statements that propose limits to landholder property rights, including those involving a duty of care for biodiversity. Newer landholders were more confident in the efficacy of CRP expected to improve the condition of environmental assets. Newer owners self-reported significantly lower levels of knowledge for a number of items. Again, these differences are consistent with the production/ environment split between the two groups.
- Outside a small number of production focused CRP, particularly those linked to cropping, newer and longer-term owners are adopting CRP at similar levels.
- Newer landholders expressed higher levels of interest in most of the potential methods of becoming involved in NRM offered in the survey. They were significantly more interested in a range of training opportunities and advice on how to engage contractors. They were also more willing to undertake work without support.
- New landholders most frequently used mailed brochures/leaflets as their source of information, but rated books/magazines/journals as the most useful. Longer-term owners most frequently used newspapers, and also rated them as the most useful.
- Twenty per cent of respondents indicated they planned to change their enterprise mix to reduce farm workload.

- Interest in conservation covenants was expressed by 10% of respondents, who managed 9% of the land surveyed.
- There were significant differences across the Wimmera RMU on four of the 14 items exploring respondents' long-term plans.

## Age

The median age of respondents in the Wimmera region was 54 years in 2007 (53 years in 2002). Twenty per cent of land (81,672 ha) in the surveyed area was owned by people 65 years of age and above. There were no statistically significant relationships between age and the adoption of CRP.

## Long-term plans

The 2007 survey included 14 statements that explored respondents' long-term plans for their property, including: family succession; disposal of land through sale, leasing or share-farming; and acquisition of land through purchase, leasing or share farming. Eight of these items were repeated from the 2002 survey. The response options for these items were "highly likely", "likely", "not sure", "unlikely", "highly unlikely" and "not applicable". These response options have been collapsed into four groups – "likely" (combining "highly likely" and "likely"), "not sure", "unlikely" ("unlikely" and "highly unlikely") and "not applicable" [Figure 15].

### ***Ownership of the property will stay in the family***

Most (69%) respondents said they expected ownership of their property would stay within the family (71% in 2002). These respondents managed 297,708 ha or 75% of land surveyed. Only 23% of those who said management would stay within the family had a well advanced or completed family succession plan.

### ***I will live on the property***

Most (60%) respondents said they planned to continue to live on their property in the long-term (55% in 2002). This group managed 62% or 248,497 ha of the land surveyed. The median age for this cohort was the same as that for survey respondents (53 years).

### ***Additional land will be purchased, leased or share-farmed***

Thirty-two per cent of respondents said it was likely that their long-term plans involved increasing the amount of land they owned/managed by purchasing, leasing or share-farming (43% in 2002) [Figure 16]. These respondents managed 186,542 ha or 47% of the land surveyed.

### ***Property sales***

Nineteen per cent of respondents said that in the long-term they were likely to sell their entire property (18% in 2002). Four per cent thought they were likely to subdivide and sell a large part of their property. Combining these groups, 21% of respondents planned to sell all or most of their property (n=100, N=476). This group managed 13% of the land surveyed (50,891 ha).

### ***All or most of the property will be leased or share-farmed***

Fifteen per cent of respondents said that they were likely to lease all or most of their property to someone else and nine per cent said it was likely all or most of the property would be share-farmed. Combining these groups suggested that 21% planned to lease or share-farm most of their property (23% in 2002) and 71,800 ha of the land surveyed would be added to the stock of land leased or share-farmed.

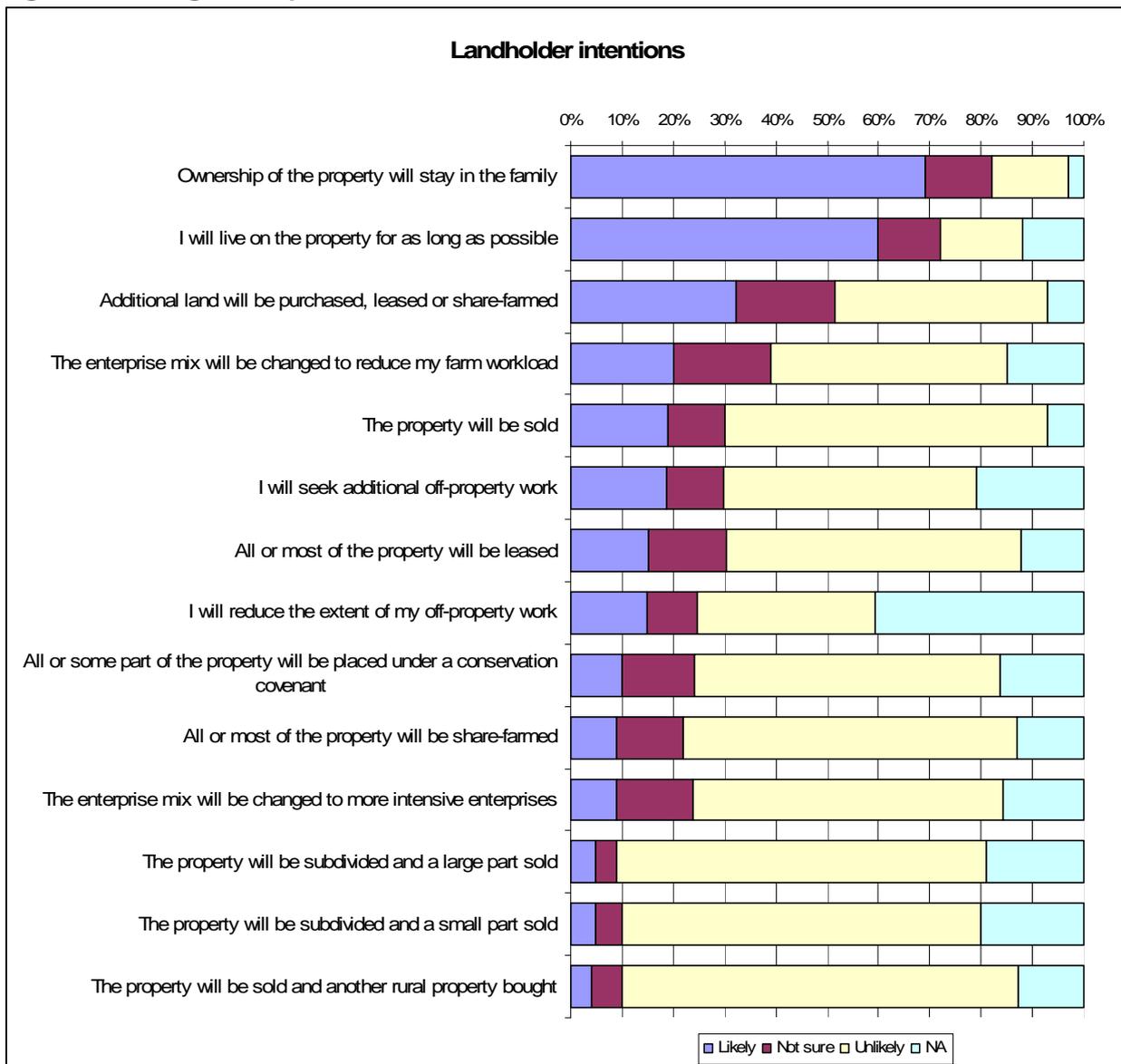
***The enterprise mix will be changed to reduce my farm workload***

Twenty per cent of respondents indicated they would change their enterprise mix to reduce their workload. This cohort managed 20% or 78,240 ha of the land surveyed.

***I will seek additional off-property work***

Nineteen per cent of respondents said they would seek additional off-property work. At the same time 15% said they would reduce the extent of their off-property work. These findings suggest that there are two contrasting trends where some landholders are looking to off-property work to supplement their on-property income while others are approaching retirement and looking to scale back their off-property work.

**Figure 15 Long-term plans (N=503), 2007**



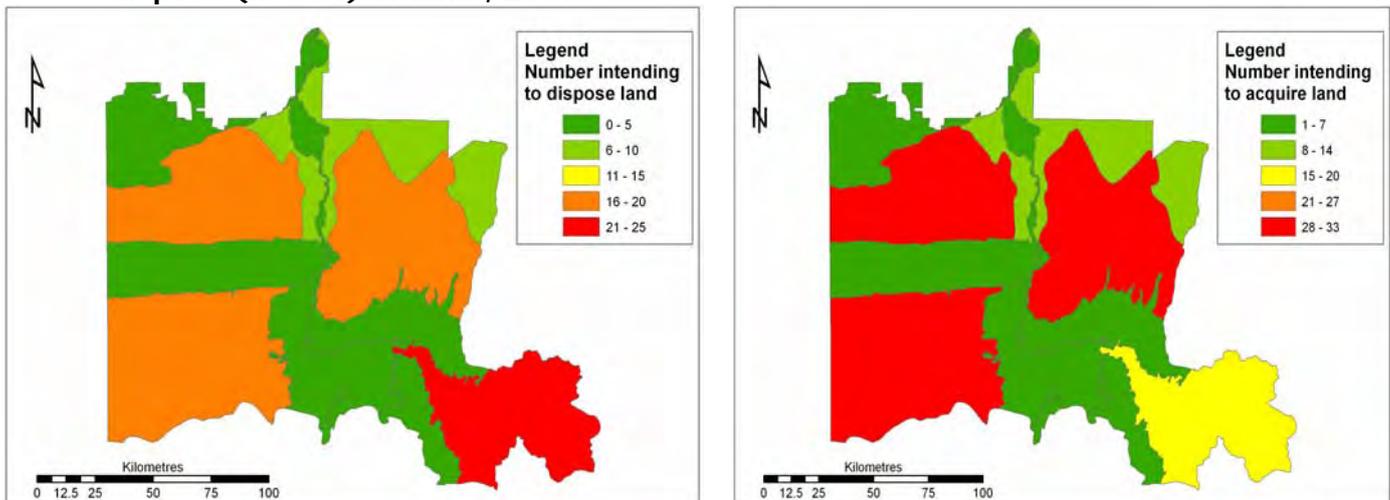
**Social and farming attributes of those planning to acquire and dispose of land**

Combining those who planned to sell all or a large part of their property with those intending to lease or share-farm the majority of their property suggested that 38% of respondents planned to end or substantially reduce their input into the management of their property. These respondents owned 27% of the land surveyed. As explained above, 32%

intended to increase the amount of land they owned/managed by purchasing, leasing or share-farming. These respondents managed 47% of the land surveyed.

The distributions of landholders indicating they will either dispose or acquire land have been mapped by RMU [Figure 16]. There is an obvious pattern in the two maps in that the three RMU with the highest proportions of landholders acquiring land (West Wimmera Plains, Wimmera Plains, South West Wimmera Plains) are also in the group of four RMU with the highest proportions of landholders disposing of land [Figure 16].

**Figure 16 Number of respondents in each RMU planning to acquire (n=152) and dispose (n=184) of land , 2007**



Respondents who indicated they were going to dispose of all or most of their property were significantly different from those planning to acquire land on a range of social and farming characteristics. Those planning to acquire more land operated larger farms, were more likely to be farmers, were younger, more likely to be involved in a commodity group, more likely to be involved in prime lamb production and more likely to have family members interested in taking on the property [see Table 7]. It seems that occupation, stage of life and the likelihood of family succession are the key differences between the two groups.

Analysis of the values attached to properties confirms these differences between the two groups in that those planning to dispose of land valued their properties more highly as an asset to fund their retirement whereas those planning to acquire land rated their properties more highly for: providing most of the household income; freedom of working for myself; providing a sense of accomplishment from building a viable business; providing a sense of accomplishment from improving farm infrastructure; and being able to pass the property on in better condition.

Consistent with a farmer/non-farmer dichotomy, those intending to dispose of their property scored higher on the item measuring a stewardship ethic: putting long-term health of the environment ahead of short-term economic benefit. They were also significantly more likely to agree that clearing native vegetation has substantially reduced the number and variety of native plants and animals in this district, and that paddock trees play an important role by providing a place for native animals to shelter and feed. On the other hand, those planning to acquire land gave higher self-assessments of their knowledge for: the grazing strategies to manage paddock cover to minimise soil erosion; how to establish perennial pastures; and the use of stock containment areas in drier seasons. However, there were no differences between the two groups for self-assessed knowledge for several items with an environmental focus, including: how to protect and improve the health of native bush areas on properties; the environmental/production benefits of retaining vegetation on properties; and the environmental benefits of flows allocated to the rivers/streams.

Overall, there was a trend for those planning to acquire land to adopt CRP at higher levels than for those planning to dispose of land [Table 8]. There were significant differences in a number of instances including for the area sown to perennial pastures; the use of no-till cropping practices; and testing of water quality. At the same time, it is important to highlight that there were identical scores/negligible differences for several CRP, including farm forestry establishment, gully erosion addressed, fencing to manage stock access to waterways, and off-stream watering points established [Table 8].

**Table 7 Comparing those planning to dispose (n=149-165) and those planning to acquire land (n=122-133): social and farming variables, 2007**

Social and farming variables	Intending to dispose	Intending to acquire	P
Median property size	475 ha	1140 ha	<0.001
Farmer by occupation	58%	88%	<0.001
Median years of property ownership	25 yrs	24 yrs	0.277
Principal place of residence	71%	89%	<0.001
Median age	57 yrs	48 yrs	<0.001
Median hours worked on property/week	30 hrs/wk	50 hrs/wk	<0.001
Median days worked off-property/year	10 days/yr	0 days/yr	0.001
Median length of residence in local district	47 yrs	45 yrs	0.091
Have a vision for the property	71%	95%	<0.001
Intend to pass property on in family	33%	90%	<0.001
Completed a short course	39%	70%	<0.001
Member of Landcare	35%	41%	0.355
Member of a commodity group	18%	39%	<0.001
Employed a consultant	23%	55%	<0.001
Returned a net property profit	43%	31%	0.044
Received off-property income	78%	83%	0.396
Involved in prime lamb production	63%	79%	0.005

**Table 8 Comparing those planning to dispose (n=130-164) and those planning to acquire land (n=115-134): adoption of CRP, 2007**

CRP	Intending to dispose	Intending to acquire	P
<b>Practices undertaken during your management</b>			
Trees and shrubs planted/direct seeded	49%	60%	0.094
Fencing native bush/grasslands to manage stock access	36%	41%	0.478
Sown perennial pasture and lucerne	29%	45%	0.009
Fencing erected to manage stock access to rivers/streams/wetlands	24%	28%	0.600
Off-stream watering points established	22%	23%	0.948
Farm forestry established	10%	11%	0.870
Gully erosion addressed	8%	8%	0.919
<b>Practices undertaken in last 5 years</b>			
Crop sown using minimum-tillage techniques	54%	62%	0.200
Testing water quality of main water source for stock and irrigation purposes	48%	77%	<0.001
Farm forestry established	4%	4%	0.940
Crop sown using no-till techniques	39%	59%	0.001
Trees and shrubs planted/direct seeded	33%	40%	0.232
Sown perennial pasture and lucerne	25%	40%	0.005
Fencing native bush/grasslands to manage stock access	25%	22%	0.743
Fencing to manage stock access to rivers/streams/wetlands	16%	22%	0.254

## Extent and timing of property owner/manager change

Drawing on survey data the research team employed our previously published methodology (Curtis *et al.* 2005) to predict the extent and timing of future changes in property ownership/management in the Wimmera region. The approach involved the following steps taken in this order:

### **1. If the property was to be sold or subdivided and a large part sold (n=135)**

Respondents selecting these options were also asked to indicate the year they thought the sale might occur. It was then assumed that this was when the property would be sold (n=117). If respondents said they were likely to sell but did not nominate a year for the sale (n=18) the median year of sale for people of the same age was allocated to them.

### **2. Ownership will stay in the family (n=142)**

Most farmers in Victoria retire before they reach 65 years of age. The evidence supporting this assumption is that only 13.9% of people employed in agriculture, fishing and forestry in Victoria are over 65 years of age (ABS 2006a).

When survey respondents indicated they had a family succession plan, property transfer was assumed to occur on retirement. For those under 65 years (n=38), retirement was assumed to be at 65 years of age. For those over 65 years (n=16), it was assumed that they had decided to 'die with their boots on' in that the property would be transferred at the time of their death, which was then calculated using ABS Life-Expectancy Tables (ABS 2006b). For those who indicated that they planned to pass the property on in the family but

did not have a well advanced or completed succession plan (n=88), transfer was assumed to occur on death (age calculated using ABS Life-Expectancy Tables).

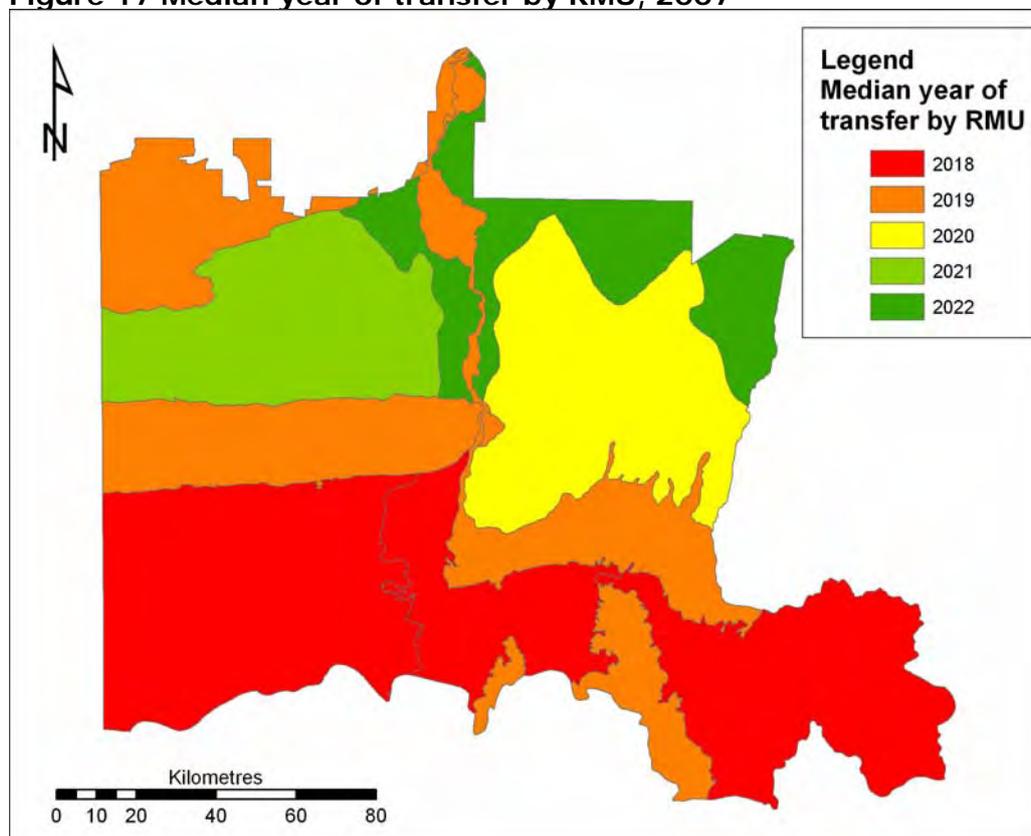
**3. For all others, including those who will continue on the property long-term (n=227)**

For those respondents who indicated they did not plan to sell their property or pass it on in the family, it was assumed that property transfer would occur on retirement at age 65 years for those under 65 years (n=164) and at death for those over 65 years. For the latter set (n=63), ABS Life-Expectancy Tables (ABS 2006b) were used to calculate the remaining life expectancy and provide the expected date of property transfer. In the Wimmera survey, the median age of 54 years was assigned to the 15 respondents who hadn't provided their age. It was assumed that these properties would be transferred on retirement at age 65 years.

The median year of transfer for all properties was 2020 [Figure 17], with 50% of the surveyed land to change hands by 2020 (198,502 ha), and 45% of properties in the next decade. The year of predicted property transfer was not significantly different across RMU. However, there is a general trend towards higher levels of property turnover towards the southern part of the region which is closer to Melbourne and has a more comfortable climate as well as areas along sections of the Murray River in the north west of the region [see Figure 17].

Our analysis of property sales data held by the Victorian Valuer General that are tagged to Local Government Area (LGA) suggests that less than one quarter (22%, n=4894) of rural properties greater than 10 ha in the Wimmera region changed hands in the decade between 1995 and 2005. In the 2007 survey, the median length of residence across the Wimmera region was 45 years, also suggesting a very stable population in the past. Given the finding that 45% of properties will change hands in the next ten years, it seems that the rate of change in property ownership is increasing substantially.

**Figure 17 Median year of transfer by RMU, 2007**



## Comparing newer and longer-term property owners

The change in ownership/management of 50% of rural properties and 50% of the land area surveyed over the next 12 years is likely to have important implications for NRM in the Wimmera region (Mendham and Curtis 2008). Survey data allowed us to test the extent that newer and longer-term landholders were different (e.g. occupation, age, long-term plans) and the extent that they adopted CRP at different levels. Given the extent of predicted property turnover and our knowledge of the difficulties that regional NRM groups experience engaging new landholders, we have allocated a substantial section of the report to this topic. These comparisons were not undertaken for the 2002 survey.

Researchers have distinguished between new and long-term residents using different criteria. Some authors have used five and seven-year periods of residency as thresholds between new and long-term residents (Ford 1999; Smith and Krannich 2000). However, most studies have adopted 10 years as the threshold (Burnley and Murphy 2004; Fortmann and Kusel 1990; Rudzitis 1999). Another approach has been to distinguish between those who lived in an area before and after a major migration wave (Hunter *et al.* 2005; Jones *et al.* 2003). This can be a sensible approach where there has been a major social upheaval, such as the post-Second World War migration from Europe to the New World. For this study we adopted a 10 year period as the threshold because there was not an obvious migration wave; the 10 year threshold would enable comparison with most international studies; we already had property sales data for a 10 year period; and this division provided a larger sample of survey respondents.

Survey questions sought information about both the length of residence in the local district, the length of property ownership in the district and whether their rural property was the principal place of residence. It was therefore possible to explore differences between either new and longer-term residents or new and longer-term owners. We settled on length of property ownership, as this enabled distinctions between new and longer-term owners; and between new owners who had previously been residents of the region, those who had previously resided elsewhere, and those who continued to live outside the district (absentee owners).

Employing the 10-year threshold, our analysis of survey data established that 15% of respondents were new owners and 85% were longer-term owners. Most longer-term owners had lived in the district before purchasing their property and most identified their property as their principal place of residence. Although most new owners listed the property as their principal place of residence, the proportion that did so was significantly lower than for longer-term residents. Most new owners indicated they had lived elsewhere before purchasing their property [Table 9]. Given the trend for increased levels of property turnover, these findings have important implications for agencies seeking to engage rural landholders in NRM.

Newer property owners were spatially concentrated across the Wimmera region. As might be expected, newer owners were a higher proportion of respondents in more attractive areas that are closer to Melbourne, such as the RMU near the Grampians and Horsham [Figure 18].

New owners were significantly different from longer-term owners on a range of social and farming variables. Longer-term owners were more likely to be farmers by occupation, own larger properties, return an on-property profit, work more hours on-property and less off-property, and be members of Landcare and commodity groups. New owners were younger, more likely to have lived in another district prior to purchasing their property and less likely to live on the property (i.e. more likely to be absentee owners) [Table 9].

**Table 9 Comparing newer (n=54-73) and longer-term landholders (n=346-404): social and farming variables, 2007**

Social and farming variables	Newer owners	Longer-term owners	P
Median property size	145 ha	722 ha	<0.001
Median age	48 yrs	55 yrs	<0.001
Farmer by occupation	35%	73%	<0.001
Median hours worked on property/week	20 hrs/wk	50 hrs/wk	<0.001
Median days worked off-property/year	50 days/yr	0 days/yr	0.006
Principal place of residence	58%	82%	<0.001
Lived elsewhere before purchasing property	76%	39%	<0.001
Male	72%	91%	<0.001
Completed a short course	37%	50%	0.073
Member of Landcare	17%	43%	<0.001
Member of a commodity group	8%	27%	0.004
Employed a consultant	31%	35%	0.615
Returned a net on-property profit	17%	38%	0.002
Received off-property income	79%	75%	0.598
Have a vision for the property	88%	81%	0.223
Intend to pass the property on in the family	49%	61%	0.097

Longer-term owners who are more likely to be farmers than newer owners and were also more focused on production while newer owners appear to be more focused on the environmental values of their property. For example, longer-term owners valued their properties more highly for providing most of the household income [Table 10] and were more concerned about low returns limiting capacity for on-farm investment [Table 11]. On the other hand, newer landholders were more likely to value their properties for: improving the environmental health of the district; providing habitat and agree that reduced production in the short-term is justified where there are long-term benefits to the environment [Table 10]; be more concerned about getting the balance between water for agriculture, the environment and recreation; the impact of reduced flows on the health of waterways; the effect of increased ground and surface water extraction; and nutrient and chemical run-off affecting water quality in rivers/streams/wetlands [Table 11]. Interestingly, newer landholders were significantly more concerned about dryland salinity, including its potential impact on both productive capacity and water quality [Table 11].

Newer landholders were more likely to agree with statements that propose limits to landholder property rights, including those involving a duty of care for biodiversity. For example, new owners were more likely to agree that in future landholders should expect to be legally responsible for managing land in ways that do not cause foreseeable harm to the environment and using industry standards with landholder input would be an acceptable way of determining if land is being managed responsibly [Table 12].

Newer and longer-term owners self-reported significantly different levels of knowledge (using a mean of rank scores) for a number of items [Table 13]. Again, these differences are consistent with the production/environment split between the two groups. For example, newer owners reported higher knowledge for the amount of native tree cover remaining in the Wimmera region as a percentage of what was there before the arrival of European settlers; while longer-term owners reported higher knowledge for how to prepare a farm or property plan; grazing strategies to manage paddock ground cover to minimise soil erosion; and how to collect soil samples. Overall, the trend was for most respondents from both groups to report they didn't have sound (sufficient to act) or very sound (could give a detailed explanation) knowledge on each topic [Table 13].

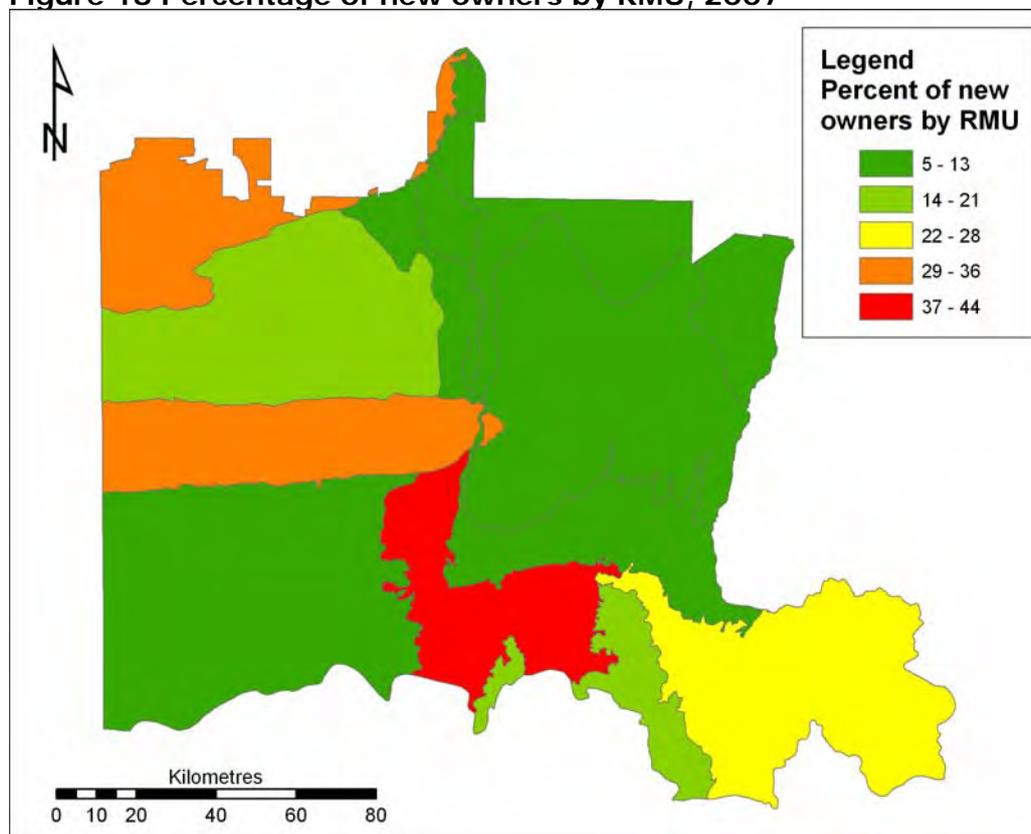
Newer landholders were more confident in the efficacy of CRP expected to improve the condition of environmental assets, including fencing to manage stock access to revegetate waterways; and planting out large areas of the Wimmera to native bush [Table 12].

Although most respondents were involved in dryland farming, longer-term owners were significantly more likely than newer owners to be involved in broad-acre cropping and sheep for meat and wool enterprises. On the other hand, newer landholders were more likely to have some part of their property placed under a covenant and be involved in alternative forms of livestock enterprises.

Newer landholders expressed higher levels of interest in most of the potential methods of becoming involved in NRM that were listed in the survey [Table 14]. New owners were significantly more interested in a range of training opportunities, advice on how to engage contractors, and were more willing to undertake work without support [see Table 14].

More newer property owners reported that they had sourced information about NRM from mailed brochures and leaflets while more longer-term owners said they obtained information from newspapers. There were few significant differences in the frequency that potential sources were listed by either group. Significant differences were observed in the frequency in use of newspapers (65% newer, 83% longer-term,  $p=0.002$ ); Landcare group/network (newer 40%, longer-term 57%,  $p=0.013$ ); VFF (newer 11%, longer-term 33%,  $p=0.001$ ); and Waterwatch (newer 5%, longer-term 18%,  $p=0.016$ ). Respondents were also asked to list the three sources they found most useful. Books/magazines/journals (11%), Landcare group (9%), newspapers (9%), field days (8%) and friends/neighbours/relatives (8%) were the top five sources most frequently cited as helpful by newer property owners. The most frequently cited as helpful by longer-term owners were newspapers (12%), Landcare (11%), books/magazines/journals (8%), TV (7%) and radio (7%).

**Figure 18 Percentage of new owners by RMU, 2007**



**Table 10 Comparison of newer (n=48-68) and longer-term landholders (n=356-388): values attached to property and value orientation, 2007**

Value topics	Newer owners		Longer-term owners		P
	Important rating	Mean	Important rating	Mean	
Provides the lifestyle that I want	83%	4.29	12%	4.26	0.349
Sense of accomplishment from improving property infrastructure	80%	4.20	83%	4.18	0.476
An attractive place to live	79%	4.24	78%	4.05	0.036
Sense of accomplishment from knowing that my property is contributing to improved environmental health in the district	78%	4.06	66%	3.76	0.022
Sense of accomplishment from building/maintaining a viable business	72%	3.95	82%	4.12	0.352
A great place to raise a family	71%	4.02	84%	4.20	0.834
Being able to pass on the property on to others in better condition	70%	3.79	84%	4.19	0.057
Being part of a rural community	69%	3.84	78%	4.02	0.255
Opportunity to learn new things	68%	3.87	61%	3.56	0.011
The freedom of working for myself	67%	3.81	84%	4.23	0.072
A place for recreation	64%	3.77	45%	3.23	0.001
An asset that will fund my retirement	61%	3.58	60%	3.63	0.935
Native vegetation on my property provides habitat for native animals	60%	3.69	47%	3.32	0.013
Rural land represents a sound long-term investment	59%	3.65	74%	3.93	0.098
To preserve tradition as the property has been in my family for a long time	47%	3.25	56%	3.40	0.715
Sense of accomplishment from producing food/fibre for others	47%	3.37	65%	3.70	0.136
Provides most of the household income	44%	3.10	78%	4.21	<0.001
Reduced production in the short-term is justified where there are long-term benefits to the environment***	61%	3.71	42%	3.23	<0.001

\*\*\*Item measuring Landholder value orientation

**Table 11 Comparing newer (n=52-64) and longer-term landholders (n=310-388): assessment of issues affecting their property and district, 2007**

Issues	Newer owners		Longer-term owners		P
	Important rating	Mean	Important rating	Mean	
<b>Importance of issues affecting property</b>					
Impact of changing rainfall patterns on property viability	84%	4.32	78%	4.12	0.101
Rising cost of farming inputs undermining financial viability	66%	3.79	77%	4.08	0.506
Having the right to use surface or ground water for irrigation or commercial use	62%	3.60	49%	3.17	0.049
The cost of managing weeds and pest animals (including native species)	59%	3.49	47%	3.29	0.186
Uncertain/low returns limiting capacity to invest on-property	51%	3.28	66%	3.72	0.022
Labour to undertake important on-property work	51%	3.19	40%	3.04	0.331
Impact of poor management of pest plants and animals on public land	50%	3.44	50%	3.32	0.552
Dryland salinity undermining long-term productive capacity	31%	2.71	15%	2.14	0.003
<b>Importance of issues affecting district</b>					
Getting the balance between water for the environment, agriculture and recreation	90%	4.39	78%	4.05	0.013
Impact of reduced water flows on the long-term health of rivers/streams/wetlands	83%	4.30	70%	3.89	0.009
Dryland salinity threatening water quality in rivers/streams/wetlands	76%	4.05	49%	3.35	<0.001
Decline in soil health (e.g. declining fertility or structure)	76%	4.05	50%	3.37	<0.001
Loss of important services (e.g. health, banks, schools)	75%	4.11	79%	4.10	0.859
The effect of increased ground and surface water extraction	73%	4.05	57%	3.49	0.001
Farming practices contributing to erosion	73%	3.78	36%	2.98	<0.001
Declining number of landholders means fewer people are involved in local organisations	63%	3.79	13%	4.10	0.072
Nutrient and chemical run-off affecting water quality in rivers/streams/wetlands	58%	3.74	36%	2.99	<0.001
Dryland salinity threatening the long-term productive capacity of land	57%	3.50	39%	3.03	0.008
Loss of habitat for birds and animals due to the loss of paddock trees	54%	3.60	36%	2.95	<0.001
Changes to river/stream banks and flows affecting the quality of recreational experiences for people living here or visiting	52%	3.51	53%	3.44	0.652
Loss of experienced farmers as older farmers retire	44%	3.34	52%	3.38	0.732

**Table 12 Comparing newer (n=61-70) and longer-term landholders (n=349-393): attitudes and confidence in CRP, 2007**

Attitude Topics	Newer owners		Longer-term owners		P
	Important rating	Mean	Important rating	Mean	
Landholders should manage their properties in expectation of drought events	93%	4.22	84%	3.97	0.006
It is fair that the wider community asks landholder to manage their land in ways that do not cause foreseeable harm to the environment	76%	3.97	55%	3.33	<0.001
Landholders should be paid for providing environmental services that benefit the wider community (e.g. managing habitat for native species)	75%	4.01	80%	4.10	0.624
New owners should abide by agreements entered into by previous owners where public funds have been paid for land protection or conservation work	65%	3.74	65%	3.59	0.320
Using industry standards developed with landholder input would be an acceptable way of determining if land is being managed responsibly	58%	3.53	37%	3.18	0.002
Landholders should have the right to collect rain water that falls on their properties, even if that action impacts on others	57%	3.51	57%	3.56	0.684
In future, landholders should expect to be legally responsible for managing their land in ways that do not cause foreseeable harm to the environment	54%	3.46	34%	2.84	<0.001
The Wimmera-Mallee pipeline will increase opportunities to undertake new land uses or enterprises	41%	3.36	51%	3.43	0.425
In most cases, the public should have the right to access river/stream frontages that are managed by landholders	25%	2.59	28%	2.69	0.420
<b>Confidence in CRP</b>					
Fencing to manage stock access is an essential part of the work required to revegetate waterways	86%	4.25	75%	3.87	<0.001
The time and expense in watering stock off-stream/wetlands is justified by improvements in bank stability, water quality and stock condition	56%	3.74	48%	3.50	0.059
The benefits of stubble retention on cropping land outweigh any problems arising	56%	3.62	55%	3.54	0.684
Planting out large areas of the Wimmera farmland to native bush is justified	44%	3.26	21%	2.59	<0.001

**Table 13 Comparing newer (n=64-70) and longer-term landholders (n=358-398): self assessed knowledge, 2007**

Knowledge topics	Newer owners		Longer-term owners		P
	Sound knowledge	Mean	Sound knowledge	Mean	
Paddock trees play an important role by providing a place for native animals to shelter and feed	87%	4.16	76%	3.77	0.001
Clearing native vegetation has substantially reduced the number and variety of native plants and animals in this district	56%	3.71	50%	3.31	0.009
Grazing strategies to manage paddock ground cover to minimise soil erosion	50%	3.21	61%	3.59	0.019
The use of stock containment areas to manage stock in drier seasons	39%	3.03	44%	3.28	0.164
The environmental/production benefits of retaining native vegetation on properties	39%	3.19	36%	3.17	0.788
How to collect soil test samples	33%	2.94	33%	3.32	0.009
How to prepare a farm or property plan that allocated land use according to different land classes	30%	2.71	35%	3.06	0.032
How to establish introduced perennial pastures (e.g. lucerne in this district)	29%	2.82	41%	3.10	0.072
How to protect and improve the health of native bush areas on properties	27%	2.91	28%	2.99	0.526
Organisations or individuals to contact for advice about government programs supporting landholders to manage gully or stream bank erosion	25%	2.85	25%	2.72	0.448
The environmental benefits of flows allocated to rivers/streams	24%	2.85	20%	2.83	0.954
The value of woody debris such as snags in rivers/streams	22%	2.88	18%	2.71	0.220
The extent of water savings as a result of the Wimmera-Mallee pipeline	19%	2.61	29%	3.05	0.001
The ability of perennial vegetation to prevent water tables rising	17%	2.54	21%	2.74	0.095
How to identify local plant species in the understorey vegetation	13%	2.51	10%	2.54	0.765
The amount of native tree cover remaining in the Wimmera region as a percentage of what as there before the arrival of European settlers	10%	2.26	10%	2.49	0.036
The extent of gully erosion across the Wimmera region	9%	2.27	10%	2.38	0.245
The area of land (ha) with saline affected vegetation in your district	4%	2.20	8%	2.33	0.345

**Table 14 Comparing newer (n=34-67) and longer-term landholders (n=204-376): preferred method of engagement in NRM, 2007**

Methods of engagement	Newer % interested	Longer-term % interested	P
Are you willing to undertake environmental works on your property without any external financial support?	64%	48%	0.020
Reduction in rates levied by local Government	55%	55%	0.377
Tax rebate administered by the Commonwealth Government	50%	44%	0.515
Funds to support work of Landcare or similar groups	45%	47%	0.800
Funds for on-ground work	42%	35%	0.459
Fixed grant incentive scheme	40%	30%	0.569
Funds for you to engage contractors to undertake work	39%	35%	0.176
Training to identify native vegetation on your property	35%	14%	<0.001
Access to equipment	33%	26%	0.222
Training in the establishment or management of native vegetation	28%	17%	<0.001
Access to volunteer labour	26%	20%	0.312
Market-based instrument	24%	17%	0.087
CMA organising contractors to undertake work for you	23%	23%	0.851
Training to enable you to access information on the internet	20%	7%	<0.001
Advice about how to engage contractors to undertake or coordinate work	18%	14%	0.051

**Table 15 Comparison of newer (n=53-71) and longer-term landholders (n=324-399): adoption of CRP, 2007**

CRP	New	Longer-term	P
<b>Practices undertaken during your management</b>			
Trees and shrubs planted/direct seeded	49%	56%	0.343
Fencing erected to manage stock access to rivers/streams/wetlands	26%	27%	0.968
Native bush/grasslands fenced to managed stock access	26%	39%	0.103
Off-stream watering points established	25%	23%	0.885
Sown perennial pasture and lucerne	24%	38%	0.030
Gully erosion addressed	11%	11%	0.911
Farm forestry established	7%	11%	0.485
<b>Practices undertaken in last 5 years</b>			
Tested water quality of main water source for stock or irrigation purposes	46%	60%	0.061
Trees and shrubs planted/direct seeded	41%	37%	0.582
Crop sown using minimum-tillage techniques	40%	56%	0.023
Crop sown using no-till techniques	29%	44%	0.041
Native bush/grasslands fenced to manage stock access	28%	24%	0.572
Fencing erected to manage stock access to rivers/streams/wetlands	25%	20%	0.596
Sown perennial pasture and lucerne	24%	32%	0.225
Farm forestry established	6%	4%	0.760

Overall, the trend was for longer-term owners to undertake CRP at higher levels than new owners [Table 15]. However, there were some exceptions including planting trees and shrubs in the past five years, established farm forestry past five years, fencing erected to manage stock access rivers/streams/wetlands last five years, and fencing erected to manage stock access to native bush/grasslands last five years, and the establishment of off-stream watering points during the period of management. Newer and longer-term owners were just as likely to report addressing gully erosion during their period of management. Indeed, there were few significant differences between the adoption of CRP by the two groups, with longer-term owners more likely to have established perennial pasture, used no-till and minimum-tillage techniques [Table 15]. These findings suggest that outside a small number of production focused CRP, particularly those linked to cropping, newer and longer-term owners are adopting CRP at similar levels.

## 4.10 Involvement in planning processes

Respondents were asked to indicate the extent of their involvement in a number of planning processes. These included property management or whole farm planning, having a long-term plan or vision for improvements to the property, succession planning and local action planning. For the first four items, respondents were asked to select from five response options: "completed/ ongoing", "well advanced", "halfway", "early stages", and "not started". For the local action planning item, respondents were offered four response options: "no involvement", "little involvement", "some involvement", and "highly involved".

### Key findings

- Just above half (54%) of all respondents were involved in whole farm planning, with 29% (N=419) either well advanced or completed/ ongoing. Half (51%) said their plan had provision for drought. Comparing 2002 (49%) and 2007 data suggest there is a trend to higher landholder involvement in whole farm planning.
- Almost all respondents (94%, N=285) said they had a long-term plan or vision for improvements for their property. Twenty-seven per cent said they were advanced or completed/ ongoing.
- Just above half (59%, N=285) of all respondents said they had started succession planning. The same proportion said they had a family member interested in taking on their property. Comparison with 2002 survey data (55% started planning) suggests there has been a trend to higher landholder involvement in succession planning.
- Only a quarter (23%) of the respondents said they were well advanced or had completed plans for property transfer to the next generation (29% in 2002). Just under half (48%, n=138) of the respondents to this question identified a specific age when they would pass their property to another family member. The median age identified was 65 years, providing further evidence to support our assumption of retirement at 65 years in the property-turnover calculations [Section 4.8].
- Just under half (49%, N=437) of all respondents said they had been involved in local action planning (e.g. with Landcare, community development or industry associations). Only seven per cent said they were highly involved. This item was not included in the 2002 survey.
- Landholder involvement in planning processes was one of the best predictors of adoption of all the variables in the survey. For example, involvement in local action planning was positively linked to higher adoption for 12 of the 15 items, whole farm planning was positively linked to higher adoption of 10 items, having a long-term plan or vision was positively linked to nine items, and family agreement to a succession plan was positively linked to eight items. As explained earlier, causality can be difficult to unravel. However, these findings provide a compelling case for engaging landholders in these planning processes.
- There was no significant difference across the Wimmera RMU in the proportion of respondents involved in whole farm planning, having a long-term plan or vision for their property or the family having agreed to a succession plan. However, there was a significant difference across the RMU for involvement in local action planning.

Involvement in whole farm planning was linked to significantly higher adoption of CRP for: planting trees and shrubs (including direct drilling) (past five years; period of management); establishing farm forestry (past five years); fencing to manage stock access to rivers/ streams/ wetlands past five years; establishing perennial pasture and lucerne (past five years; period of management); fencing to manage stock access to native bush and grasslands (past five years; period of management); establishing off-stream watering points for stock for the period of management; and testing for water quality of the main water source for stock or irrigation purposes on property (past five years).

Having a long-term plan or vision was linked to significantly higher adoption of CRP for: fencing to manage stock access to rivers/ streams/ wetlands (past five years); establishing perennial pasture and lucerne (past five years; period of management); fencing to manage stock access to native bush and grasslands (past five years; period of management); cropping using minimum tillage techniques (past five years); cropping using no-till techniques (past five years); and planting trees and shrubs (including direct drilling) (past five years; period of management).

Family agreement to a succession plan for managing the transfer of the property to the next generation was linked to significantly higher adoption of CRP for establishing farm forestry past five years; cropping using minimum tillage techniques past five years; cropping using no-till techniques past five years; addressing gully erosion during management period; establishing off-stream watering points for stock period of management; and testing for water quality of the main water source for stock or irrigation purposes on property past five years.

Involvement in local action planning was linked to significantly higher adoption of CRP for fencing to manage stock access to native bush and grasslands (past five years; period of management); establishing farm forestry past five years; fencing to manage stock access to rivers/ streams/ wetlands (past five years; period of management); sowing perennial pasture and lucerne (past five years; period of management); cropping using minimum tillage techniques past five years; cropping using no-till techniques past five years; and planting trees and shrubs (including direct drilling) (past five years; period of management).

## 4.11 Involvement in government programs, Landcare and commodity groups

The survey topic exploring landholder adoption of CRP also asked respondents to indicate whether any work listed had been supported by financial and/ or technical support provided by government [Table 16]. The 2002 survey question asked if in the past five years there had been work on respondents' property at least partially funded by federal or state government programs. The 2002 and 2007 data is therefore not directly comparable. However, for 2007 it was possible to identify landholders who acknowledged receiving support and those that didn't.

Data presented in Table 16 was compared with findings employing thresholds of 0.25 ha for revegetation and 0.5 km for fencing erected. These thresholds were nominated by WCMA staff. These additional analyses were undertaken because it was assumed that landholders implementing onground work on a larger scale would be more likely to receive government funding. Applying these thresholds made no difference to any of the statistics in Table 16 for four of the six items exploring adoption of CRP and only a very minor difference to some statistics for the remaining two items.

As part of the background information requested, respondents were asked to indicate if they were a member or involved with a local Landcare group and if they were, to provide an estimate of the number of group activities attended in the past 12 months. They were also asked if they were a member or involved with a local commodity group. Similar items were included in the 2002 survey.

### Key findings

#### *Government support*

- Just over half (56%, n=185, N=333) of the respondents said that work undertaken to implement at least one of the CRP had been supported by financial and/ or technical resources provided by government, including by the Wimmera CMA, local landcare groups or networks, DPI/ DSE, Greening Australia and Trust for Nature.
- 
- Almost a third (44%) of all respondents said they received financial and/ or technical resources provided by government for tree and shrub planting (including direct seeding) during their management period. As expected, a smaller proportion said they received support for this type of onground work over the past five years (32%) [Table 17].
- Amongst those with a livestock enterprise, 32% of respondents said they received support from government for fencing to manage stock access to native bush/ grasslands; 33% support for fencing to manage stock access to rivers/ streams/ wetlands. Smaller proportions of respondents said they had received support for these activities over the past five years (20 and 23 respectively) [Table 17].
- Small proportions of respondents said they received support to address gully erosion (16%); establish perennial pasture (10%); and establishing farm forestry (10%) [Table 17].
- There was a significant difference in government support for onground work across the Wimmera region [Appendix 1].

**Table 16: CRP adoption and government support, 2007**

<b>group</b>	<b>Practices undertaken during your management</b>	<b>n</b>	<b>% adopt</b>	<b>Work done median</b>	<b>% receiving support from govt</b>
nonSpecific	Area of trees and shrubs planted (including direct seeding) [ha]	487	54%	5 ha	44%
nonSpecific	Area sown to perennial pasture and lucerne [ha]	490	36%	75 ha	10%
nonSpecific	Area of gully erosion addressed [ha]	487	11%	5 ha	16%
nonSpecific	Area of farm forestry established [ha]	489	10%	5 ha	10%
stockers	Area of native bush/grasslands fenced to manage stock access [ha]	393	37%	10 ha	32%
stockers	Length of fencing erected to manage stock access to rivers/ streams/ wetlands [km]	392	27%	4 km	33%
stockers	Number of off-stream watering points established [number]	393	23%	5.5	6%
<b>group</b>	<b>Practices undertaken in last 5 years</b>	<b>n</b>	<b>% adopt</b>	<b>Work done median</b>	<b>% receiving support from govt</b>
nonSpecific	Have you tested the water quality of the main water source for stock or irrigation purposes on your property in the last 5 years?	428	58%	N/A	N/A
nonSpecific	Area of trees and shrubs planted (including direct seeding) [ha]	491	37%	4 ha	32%
nonSpecific	Area sown to perennial pasture and lucerne [ha]	489	30%	60 ha	12%
nonSpecific	Area of farm forestry established [ha]	491	4%	5 ha	N/A
stockers	Length of fencing erected to manage stock access to rivers/ streams/ wetlands [km]	395	21%	3 km	23%
stockers	Area of native bush/grasslands fenced to manage stock access [ha]	490	20%	10 ha	20%
croppers	Maximum area of crop sown in any year using no-til techniques [ha]	32	56%	200 ha	N/A
croppers	Max area of crop sown in any year using minimum tillage techniques [ha]	33	52%	200 ha	N/A

Govt support was linked to significantly higher adoption of seven of the 10 CRP in the survey, with the exception of testing for water quality of the main water source for stock or irrigation purposes on the property in past five years; cropping using minimum tillage techniques past five years; and farm forestry established over the management period (but was significant for past five years).

### ***Landcare membership/ participation***

- Thirty-nine per cent of respondents said they were a member or involved with a local Landcare group. In 2002, 47% (N=485) of respondents said they were a member of a Landcare group. There has been a trend to reduced participation in landcare but this is not a significant decline.

- There was a significant difference in Landcare membership across the Wimmera region [Appendix 2].
- Almost three-quarters (74%) of those indicating they were a member or involved in a local Landcare group attended at least one group activity in the past 12 months, for a median of 3.5 activities per respondent. The median number of activities attended per member has increased since the 2002 survey (two activities).
- There was a significant difference across the Wimmera RMU in the proportion of respondents who were members or involved in landcare.

Landcare membership or involvement was linked to significantly higher adoption of seven of the 10 CRP with the exceptions of testing for water quality where there was a negative relationship between testing and membership, establishing farm forestry and off-stream watering for stock. Significant positive relationships existed for: planting trees and shrubs (past five years; period of management); fencing to manage stock access to rivers/ streams/ wetlands (past five years; period of management); fencing to manage stock access to native bush/ grasslands (past five years; period of management); establishing perennial pasture and lucerne (past five years; period of management); addressing gully erosion during period of management; cropping using minimum tillage techniques (past five years); and cropping using no-till techniques (past five years).

Interestingly, the number of activities attended in the past 12 months was only linked to one CRP: a positive relationship between the number of activities attended and testing for water quality of the main water source for stock or irrigation purposes on your property in past five years.

### ***Membership of commodity groups***

- Twenty-four per cent of respondents said they were a member of a local commodity group. In 2002 respondents were asked if they were a member of Topcrop, so information from the two surveys is not comparable.
- There was a significant difference in membership of a local commodity group across the Wimmera region [Appendix 2].

Membership of a local commodity group was linked to significantly higher adoption of seven of the 10 CRP with the exceptions of establishing off-stream water points, addressing gully erosion, and fencing to manage stock access to rivers/ streams/ wetlands. Significant positive relationships existed for: planting trees and shrubs (past five years; period of management); fencing to manage stock access to native bush/ grasslands during period of management; establishing perennial pasture and lucerne (past five years; period of management); cropping using minimum tillage techniques (past five years); and cropping using no-till techniques (past five years); testing for water quality of the main water source for stock or irrigation purposes on your property (past five years); and establishing farm forestry (past five years).

## 4.12 Property size, farming as an occupation and on and off-property work

Respondents were asked to indicate 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 survey included farmer, teacher, investor or retiree. Responses to this open-ended question were grouped into four occupational categories: farmer, professional, retirees and trades. Two additional items sought information about the number of hours per week worked on farming/ property related activities over the past 12 months and the number of days involved in paid off-property work in the past 12 months. Similar items were included in the 2002 survey.

Survey respondents were also asked to indicate the total area of land that was owned or managed by them or their immediate family in their local district. Similar items were included in the 2002 survey.

Three items explored levels of on and off-property income. The first item asked if their property returned a net profit which was defined as a situation where the amount of income from the property exceeded all expenses before tax. This item was completed by most respondents (N=461). 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. Respondents were also asked if they or their partner received a net off-property income after expenses and before tax (N=454). Respondents who indicated a net off-property income were then asked to select the amount of income from one of eight ranges. Again, each respondent was allocated the mid-point of the chosen dollar interval. These items were included in the 2002 survey.

### Key findings

#### *Property size*

- The median property size of landholders surveyed was 630 ha (N=493). The median property size for the 2002 study was 900 ha.
- Only 12% of respondents (N=493) owned/ managed properties less than 40 ha.
- There was a significant difference in property size across the Wimmera region [Appendix 2].

Data analysis established significant positive links between property size and the adoption of eight of the 10 CRP in the survey. The only CRP where there was not a significant link were establishing farm forestry and addressing gully erosion. Many smaller property owners could be expected to have limited capacity/ willingness to be involved in cropping and cropping related CRP. However, many other CRP are not dependent on property size. Larger property owners are more likely to be farmers and spend more time in on-property work. These landholders are also more likely to undertake most CRP. Declining property size and the associated trends to fewer farmers and more landholders working off-property are likely to increase the challenges for NRM organisations working with landholders.

## **Occupation**

- Farmers were the largest occupational grouping and comprised over half of all respondents (67%, N=484). In 2002, farmers (N=606) comprised 80% of all respondents, indicating that farmers had declined significantly ( $X^2$  225.4585,  $df = 1$ ,  $p$ -value <0.001) as a proportion of all respondents [Figure 19]. This trend is consistent with other survey data, including the decline in median property size.
- Professionals comprised 15% of respondents, up significantly from 7% in 2002.
- There were significant differences in the proportion of respondents who were farmers across the Wimmera region, varying from 9% in the Grampians RMU to 85% in Wimmera and West Wimmera Plains RMU [Appendix 2].
- Farmers and non-farmers were significantly different in terms of their concerns about issues (14 of 21 items); values attached to property (14 of 18 items); knowledge of NRM ((11 of 18 items); attitudes about NRM roles and responsibilities (8 of 11 items); and confidence in CRP (3 of 5 items).
- Respondents worked a median of 45 hours per week (N=466) on farming/ property related activities in the past 12 months. This figure represented a small decline in property related work since 2002 (median of 50 hours).
- Forty-nine per cent of respondents said that they had paid work off-property (N=425) in the past twelve months, with a median of 100 days worked off-property.
- There was a significant difference across the Wimmera RMU in the proportion of respondents who were farmers by occupation.

Identifying as a farmer by occupation was linked to significantly higher adoption of six of the 10 CRP, including: planting trees and shrubs during period of management; fencing to manage stock access to native bush/ grasslands during period of management; establishing perennial pasture and lucerne (past five years; period of management); cropping using minimum tillage techniques (past five years); cropping using no-till techniques (past five years); and testing for water quality of the main water source for stock or irrigation purposes on your property (past five years). Farming was therefore linked with significantly higher levels of adoption of biodiversity conservation and sustainable agriculture CRP despite farmers holding attitudes that are less supportive of conservation.

**Figure 19 Landholders occupation, 2007 and 2002**



Note that the 2002 Trade column includes "Other"

### ***On and off-property income***

- Only 35% (N=461) of respondents said they made an on-farm profit in 2006/07 financial year. This finding is in stark contrast to the situation in 2002 when 86% reported a profit.
- For those reporting a profit, the median profit level in 2007 was \$15,000. In 2002 the median profit level was \$45,000. Drought conditions in 2006/07 account for much of the difference in profitability reported in the two surveys.
- Seventy-six per cent (N=454) of respondents said they or their partner received a net off-property income in 2006/07. In 2002, 66% of respondents said they received a net off-property income. This trend could be attributed to the increased proportion of non-farmers in the 2007 survey and drought conditions in 2006/07 leading farming families to seek off-property income.
- For those reporting an off-property income, the median level of income in 2007 was \$25,000. In 2002 the median level of off-property income was \$15,000.
- There were significant differences across the Wimmera RMU in the proportion of respondents who reported a profit and in the level of off-property income. At the same time, there was not a significant difference in the level of on-property income or the proportion reporting off-property income.

Higher levels of on-property profitability and off-property household income were linked to significantly higher adoption of a limited range of CRP. Reporting a profit was positively linked to establishing farm forestry during the management period and fencing to manage stock access to rivers/ streams/ wetland during the management period. A higher level of profitability was positively linked to: cropping using minimum tillage techniques past five years; cropping using no-till techniques past five years; establishing off-stream watering points for stock during the management period; and sowing perennial pasture and lucerne during the management period.

Data analysis established a sharp contrast between on-property work and off-property work in that on-property work was positively linked to adoption of CRP and off-property income was negatively linked to adoption. On-property work was positively linked to adoption of six CRP in the survey: sowing perennial pasture and lucerne (past five years; management period); cropping using minimum tillage techniques past five years; cropping using no-till techniques past five years; establishing off-stream watering points for stock during the management period; testing for water quality of the main water source for stock or irrigation purposes on your property past five years; and planting trees and shrubs during period of management. Off property work was linked to: lower adoption of sowing perennial pasture and lucerne (past five years; management period); cropping using minimum tillage techniques past five years; cropping using no-till techniques past five years; and testing for water quality of the main water source for stock or irrigation purposes on your property past five years.

## 4.13 Land use and enterprise mix

Survey respondents were asked to indicate their current land uses/ enterprise mix by selecting their current land use mix from a list of 12 possible items. Two additional items explored the extent of conservation covenanting and whether land was being managed to protect Aboriginal cultural heritage sites [Table 17]. Respondents were simply asked to indicate whether they undertook each enterprise. Similar items were included in the 2002 survey.

Another item sought information about the occurrence of patches of native bush that covered at least a hectare of grasslands, swamps or trees and had not been cleared or regenerated (regrowth). Respondents were asked to estimate the area of native bush, rate the health of that bush and if they rated the bush as in poor health, to provide an explanation of why they think that is the case. Respondents were able to choose from "very poor", "poor", "very good", "excellent" and "unsure" when rating the health of their patches of bush. These items had not been included in the 2002 survey.

### Key findings

#### *Current land use*

- Broadacre cropping (73%, N=48) and sheep for meat (67%, N=486) or wool (64%, N=487) were the most common production enterprises. Beef cattle was nominated as a landuse by 16% (N=480) of respondents.
- Minor landuse included, Other livestock (goats, deer, horse studs) (8%, N=478); irrigated pasture/ cropping (7%, 478); farm forestry (6%, N=478); intensive livestock (pigs, poultry, feedlot cattle) (5%, N=478); farm-based tourism (2%, N=478); and dairy (1%, N=478).
- While the overall trend is for limited change in the relative importance of different landuses, there have been some notable changes since 2002. For example, the proportion of landholders engaged in broadacre cropping declined from 84% in 2002 to 73% in 2007; sheep for meat increased from 57% to 67%; and irrigated pasture/ cropping increased from 3% to 7% (2002 item only referred to cropping).
- Other tree planting, including shade and shelter, habitat, erosion control and recharge control was a landuse listed by 59% (N=479). There had been an increase in the proportion of respondents identifying this landuse between 2002 and 2007 (from 47% in 2002).
- Nine per cent of respondents said they had a conservation covenant over some part of their property in 2007.
- Three per cent of respondents said they had land managed to protect Aboriginal cultural heritage sites in 2007.
- There were significant differences across the Wimmera RMU in the proportion of respondents involved in 9 of the 14 landuses/ enterprises listed in the survey, including broadacre cropping, beef cattle, sheep for both wool and meat.

**Table 17 Current landuses/ enterprises, 2007**

Land uses / enterprises on your property	n	Yes %	No %
Dryland pasture	482	79	21
Irrigated pasture/cropping	478	7	93
Broadacre cropping	488	73	27
Sheep for wool	487	64	36
Sheep for meat	486	67	33
Beef cattle	480	16	84
Dairying	478	1	99
Intensive livestock (e.g. pigs, poultry, feedlot cattle)	478	5	95
Other livestock (e.g. goats, deer, horse studs)	478	8	92
Farm-based tourism (e.g. farm stays)	478	2	98
Farm forestry	478	6	94
Other tree planting, including for shade and shelter, habitat, erosion control, recharge control	479	59	41
Land managed to protect Aboriginal cultural heritage sites	475	3	97
Part of the property is under a conservation covenant	477	9	91

There were a number of significant positive relationships between the principal on-property enterprises and adoption of CRP in the survey. Beef cattle producers were more likely to report undertaking six of the eight CRP that were grazing specific/ generic, including fencing to manage stock access to rivers/ streams/ wetlands (past five years; management period); establishing off-stream watering points for stock during the period of management; addressing gully erosion during the period of management; fencing to manage stock access to native bush/ grasslands during the past five years; sowing perennial pasture and lucerne (past five years; period of management); and planting trees and shrubs (including direct seeding) past five years. The two CRP where there was not a significant relationship with cattle grazing were testing of water quality and establishing farm forestry.

Broadacre cropping was linked to significantly higher levels of adoption for cropping specific CRP such as cropping using minimum tillage techniques past five years; cropping using no-till techniques past five years; establishing off-stream watering points for stock during the management period; testing for water quality of the main water source for stock or irrigation purposes on your property in past five years; and sowing perennial pasture and lucerne during the management period. However, broadacre cropping was not linked to adoption of non-specific CRP with a biodiversity conservation focus.

Sheep for wool was linked to significantly higher levels of fencing to manage stock access to rivers/ streams/ wetlands (past five years; management period); sowing perennial pasture and lucerne (past five years; management period); planting trees and shrubs (including direct seeding) past five years; and testing for water quality of the main water source for stock or irrigation purposes on your property in past five years.

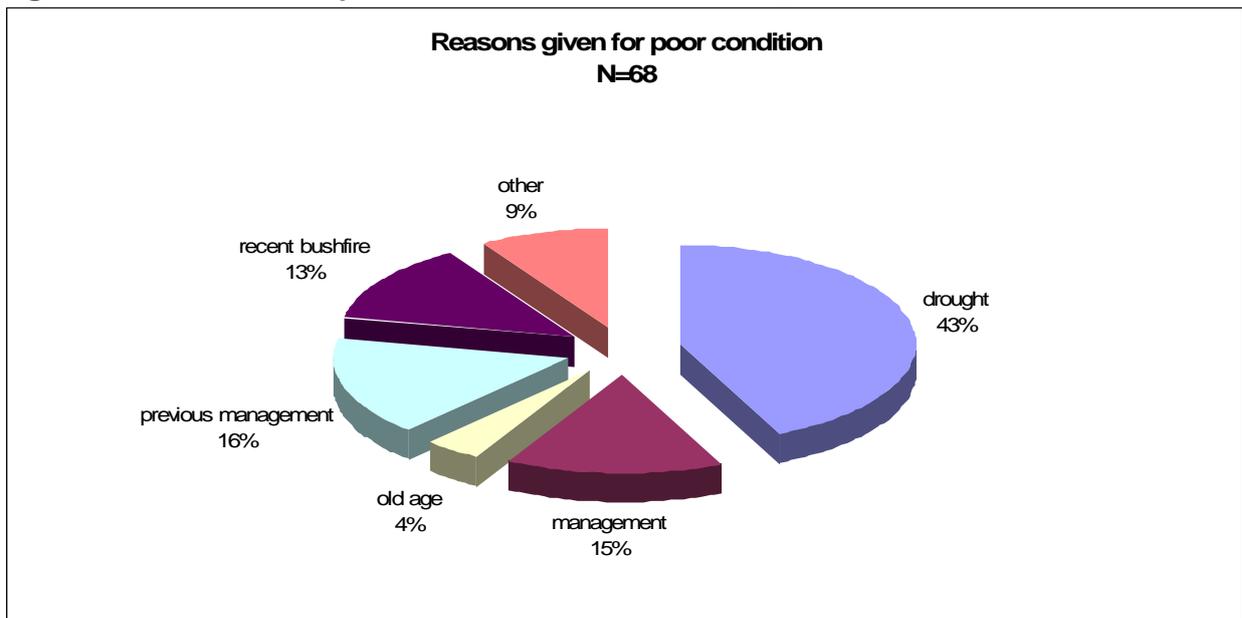
Sheep meat production was linked to significantly higher levels of fencing to manage stock access to native bush/ grasslands during the period of management; fencing to manage stock access to rivers/ streams/ wetlands during period of management; sowing perennial pasture and lucerne (past five years; management period); planting trees and shrubs (including direct seeding) (past five years; management period); and testing for water quality of the main water source for stock or irrigation purposes on your property in past five years.

Irrigated pasture/ cropping was linked to significantly higher levels of sowing perennial pasture and lucerne (past five years; management period); planting trees and shrubs (including direct seeding) past five years; and fencing to manage stock access to rivers/ streams/ wetlands past five years. Dairying was significantly linked to establishing farm forestry past five years.

### **Patches of native bush**

- Eighty-nine per cent of respondents (N=425) said that part of their property was covered by patches of native bush at least a hectare in area.
- The median area of native bush per property was 20 ha.
- Most respondents provided an assessment of the health of their remnant bush. Over three quarters (80%) respondents said their remnant bush was in either excellent or very good health.
- Sixteen per cent (n=68) of respondents said their remnant bush was in poor or very poor condition [Figure 20]. Three per cent were unsure of the condition.
- Drought (40%, N=72), property management (29%) (own management or previous owners), and bush fires (13%) were the main reasons offered by respondents as explanations of bush being in poor health.
- There were significant differences across the RMU in the proportion of properties with patches of remnant bush and in landholder assessment of the health of those patches.

**Figure 20 Reasons for poor condition of native bush, 2007**



Data analysis established that respondents with patches of native bush were significantly more likely to be undertaking CRP related to the management of native bush, including fencing native bush/ grasslands to manage stock access (past five years; management period); fencing to manage stock access to rivers/ streams/ wetlands during the management period; and planting trees and shrubs (including direct seeding) during the management period.

## 4.14 Adoption of current recommended practices

### Adoption of CRP

Drawing on relevant literature we identified variables thought to influence the adoption of CRP for sustainable farming and biodiversity conservation. There are obvious limitations to the type and number of questions that can be included in a mail survey, so only a selection of the possible factors was included in the survey.

The survey sought information about the adoption of 10 CRP that spanned sustainable agriculture and biodiversity conservation [Table 18]. Fifteen survey items explored adoption of CRP over the length of the respondent's management and in the past five years.

Five of the 2007 CRP were also included in the 2002 survey and provide the basis for comparisons over time [Table 18]. In 2002, respondents were asked for information about adoption of CRP over the length of their management and for the past three years. NRM investment is increasingly targeted to specific asset classes, such as a vegetation type or a specific wetland. Analyses were therefore undertaken that tested for changes over time for all respondents and for those in locations with specific assets [Table 18b]. In the key findings section we present findings from the regional-scale analysis first.

In our data analysis we were also conscious that some CRP are relevant to all/ most landholders (ie, non-specific), while others are more relevant to particular landholders (ie, specific). For this research we identified CRP specific to either cropping or livestock grazing. All respondents were included in calculations for the per cent of respondents implementing the non-specific CRP but only those involved in cropping or livestock enterprises were included in calculations for the proportion implementing CRP specific to those enterprises.

### Key findings

- Four of the 10 CRP had been adopted by more than half the 2007 survey respondents, including; testing water of the main water source on property in the last five years (58%); cropping using no-till techniques last five years (56%); trees and shrubs planted during your period of management (54%); cropping using minimum tillage last five years (52%).
- It was possible to compare 2002 and 2007 data for five (on six items) of the 10 CRP in the 2007 survey. Our regional-scale analysis revealed that significantly lower proportions of landholders were involved in three of the five CRP, there was significantly higher involvement in one CRP and no clear trend over time for the remaining CRP.
  - There was significantly reduced involvement in trees and shrubs planted (60% to 37% despite the 2002 survey referring to a three year period and 2007 to a five year period); perennial pasture established over the management period (47% to 36%); and cropping using minimum tillage (67% to 52%).
  - The proportion of respondents with farm forestry had increased significantly from 6% in 2002 to 10% in 2007.
  - There was no clear trend for fencing to manage stock access to native bush/ grassland despite a slight increase over the management period (32% in 2002 to 37% in 2007) and a slight decrease during the past five years (from 28% to 20% in 2007) [Table 18].
- Calculations of median amounts of work completed by respondents to the 2002 and 2007 surveys for the five CRP where comparisons could be made provided additional information for assessing the achievement of onground objectives [Table 18]. There was a significant increase in the median number trees and shrubs planted (83 trees/ shrubs

in 2002; 200 trees/ shrubs in 2007). For all other CRP the median amount of work declined significantly:

- fencing of bushland/ grasslands to manage stock access over the management period declined from 20 ha in 2002 to 10 ha in 2007;
  - fencing of bushland/ grasslands over the past three/ five years declined from 5 ha per year in 2002 to 2 ha per year in 2007;
  - sowing perennial pasture and lucerne over the period of management declined from 120 ha in 2002 to 75 ha in 2007;
  - cropping using minimum tillage techniques (maximum area cropped at one time) declined from 400 ha in 2002 (over management period) to 200 ha in 2007 (over past five years); and
  - farm forestry over the management period declined from 12 ha in 2002 to 5 ha in 2007.
- Analyses focussed on specific areas/ assets revealed a trend to lower involvement in four of the five CRP where comparisons could be made between 2002 and 2007. There was a trend to declining proportions of landholders involved for four CRP (fencing to manage stock access to native bush/ grasslands was the exception), with a significant decline for two CRP (trees and shrubs planted; cropping using minimum tillage). Interestingly, while there had been a significant increase in the proportion of landholders involved in farm forestry across the region, this trend did not hold for the three Ground Flow Systems, areas the WCMA has targeted for farm forestry.

**Table 18a Adoption of CRP, 2007 and 2002 (shaded)**

<b>group</b>	<b>Practices undertaken during your management</b>	<b>n=</b>	<b>% adopt</b>	<b>Work done median</b>
nonSpecific	Area of trees and shrubs planted (including direct seeding) [ha]	487	54%	5ha
nonSpecific	Area sown to perennial pasture and lucerne [ha]	490 619	36% 47%	75ha 120ha
nonSpecific	Area of gully erosion addressed [ha]	487	11%	5ha
nonSpecific	Area of farm forestry established [ha]	489 586	10% 6%	5ha 12ha
stockers	Area of native bush/grasslands fenced to manage stock access [ha]	393 619	37% 32%	10ha 20ha
stockers	Length of fencing erected to manage stock access to rivers/ streams/ wetlands [km]	392	27%	4km
stockers	Number of off-stream watering points established [number]	393	23%	5.5
<b>group</b>	<b>Practices undertaken during the past 5 years (2007) or past 3 years (2002)</b>	<b>n</b>	<b>% adopt</b>	<b>Work done median</b>
nonSpecific	Have you tested the water quality of the main water source for stock or irrigation purposes on your property in the last 5 years?	428	58%	N/A
nonSpecific	Area of trees and shrubs planted (including direct seeding) [planted annually]*	491 619	37% 60%	200 83
nonSpecific	Area sown to perennial pasture and lucerne [ha]	489	30%	60ha
nonSpecific	Area of farm forestry established [ha]	491	4%	5ha
stockers	Length of fencing erected to manage stock access to rivers/ streams/ wetlands [km]	395	21%	3km
stockers	Area of native bush/grasslands fenced to manage stock access [ha enclosed annually]	490 619	20% 28%	2ha 5ha
croppers	Maximum area of crop sown in any year using no-til techniques [ha]	32	56%	200
croppers	Max area of crop sown in any year using minimum tillage techniques [ha]	33 619	52% 67%	200ha 400ha

\*Area recalculated as number of trees per year

**Table 18b: Adoption of CRP by strategic investment areas, 2007 and 2002**

CRP	Investment asset/ area	% involved 2002	% involved 2007	P value*
Area of trees and shrubs planted (including direct seeding) last 5 years	3 priority ground flow systems; Yarriambiack & Hindmarsh	48%, n=33	43%, n=51	0.7976
		56%, n=282	32%, n=220	0.0000**
Area sown to perennial pasture and lucerne	3 priority ground flow systems	64% n=33	45% n=51	0.1405
Max area of crop sown in any year using minimum tillage techniques	Wimmera cropping areas	77% n=471	66% n=351	0.002**
Area of farm forestry established	3 priority ground flow systems	15% n=33	4% n=50	0.1659
Area of native bush/grasslands fenced to manage stock access [ha]	Wimmera region	31% n=589	42% n=490	0.3918

\*Tests for significance were undertaken using the proportions test.

\*\* Significant at 0.05 level.

## Factors affecting adoption of CRP

The survey included 15 items to explore adoption of 10 CRP. The overlapping items sought information for the period of the landholder's management of the property and the last five years. A large number of variables linked to higher adoption. In this section we provide a summary of the factors affecting the adoption of each CRP. A discussion of the implications of these findings for engaging landholders in NRM is provided in the Conclusions section of the report.

### 1. Established trees and shrubs planted (including direct seeding)

- A higher rating for the impact of dryland salinity on the long-term productive capacity of the property
- Said there were areas on their property affected by salinity
- A higher rating to native vegetation on my property provides habitat for native animals
- A higher rating to being able to pass the property on in better condition
- Higher self-assessed knowledge of the ability of perennial vegetation to prevent water tables rising
- Higher self-assessed knowledge of how to protect and improve the health of native bush areas
- Involvement in whole farm planning
- Having a long-term plan or vision
- Landcare membership or involvement
- Membership of a local commodity group
- Larger property size
- Identifying as a farmer by occupation
- Support from government
- More on-property work
- Beef cattle producers
- Sheep for wool producers
- Sheep meat producers
- Irrigated pasture/ cropping
- Have patches of native bush

## **2. Fencing native bush/ grasslands to manage stock access**

- A higher rating to native vegetation on my property provides habitat for native animals
- A higher rating to being able to pass the property on in better condition
- Higher self-assessed knowledge of the ability of perennial vegetation to prevent water tables rising
- Higher self-assessed knowledge of how to protect and improve the health of native bush areas
- Involvement in whole farm planning
- Having a long-term plan or vision
- Landcare membership or involvement
- Membership of a local commodity group
- Larger property size
- Identifying as a farmer by occupation
- Support from government
- Beef cattle producers
- Sheep meat producers
- Have patches of native bush

## **3. Fencing rivers/ streams/ wetlands to manage stock access**

- A higher rating for the impact of dryland salinity on the long-term productive capacity of the property
- A higher rating to native vegetation on my property provides habitat for native animals
- Higher self-assessed knowledge of how to protect and improve the health of native bush areas
- A higher rating to being able to pass the property on in better condition
- Agreed planting out large areas of Wimmera farmland to native bush is justified
- Involvement in whole farm planning
- Having a long-term plan or vision
- Landcare membership or involvement
- Larger property size
- Reporting an on-property profit
- Support from government
- Beef cattle producers
- Sheep for wool producers
- Sheep meat producers
- Irrigated pasture/ cropping
- Have patches of native bush

## **4. Established farm forestry**

- Higher self-assessed knowledge of the returns from farm forestry
- Higher self-assessed knowledge of how to protect and improve the health of native bush areas
- Agreed that planting out large areas of Wimmera farmland to native bush is justified
- Involvement in whole farm planning
- Family agreement to a succession plan
- Membership of a local commodity group
- Reporting an on-property profit
- Support from government

## **5. Addressed gully erosion during your management**

- Said there were areas on their property affected by salinity
- Family agreement to a succession plan
- Landcare membership or involvement

- Support from government
- Beef cattle producers

#### **6. Establishing off-stream watering points during your management**

- Involvement in whole farm planning
- Family agreement to a succession plan
- Larger property size
- A higher level of on-property profitability
- More on-property work
- Support from government
- Beef cattle producers

#### **7. Testing quality of the main water source for stock or irrigation purposes on your property past five years**

- A higher rating to the value the property provides most of the household income
- A higher rating to being able to pass the property on in better condition
- Planning to acquire land
- Involvement in whole farm planning
- Family agreement to a succession plan
- Membership of a local commodity group
- Larger property size
- Identifying as a farmer by occupation
- More on-property work
- Broadacre cropping
- Sheep for wool producers
- Sheep meat producers

#### **8. Sowing perennial pasture and lucerne**

- Said there were areas on their property affected by salinity
- A higher rating to the value the property provides most of the household income
- A higher rating to being able to pass the property on in better condition
- Higher self-assessed knowledge about how to collect soil samples
- Higher self-assessed knowledge of the ability of perennial vegetation to prevent water tables rising
- Higher self-assessed knowledge about how to establish introduced perennial pastures
- Planning to acquire land
- Longer-term owners
- Involvement in whole farm planning
- Having a long-term plan or vision
- Landcare membership or involvement
- Membership of a local commodity group
- Larger property size
- Identifying as a farmer by occupation
- A higher level of on-property profitability
- More on-property work
- Support from government
- Beef cattle producers
- Broadacre cropping
- Sheep for wool producers
- Sheep meat producers
- Irrigated pasture/ cropping

## **9. Cropping in past five years using no-til techniques**

- A higher rating to the value the property provides most of the household income
- A higher rating to being able to pass the property on in better condition
- Higher self-assessed knowledge about how to collect soil samples
- Higher self-assessed knowledge about how to establish introduced perennial pastures.
- Planning to acquire land
- Longer-term owners
- Having a long-term plan or vision
- Family agreement to a succession plan
- Landcare membership or involvement
- Membership of a local commodity group
- Larger property size
- Identifying as a farmer by occupation
- A higher level of on-property profitability
- More on-property work
- Support from government
- Broadacre cropping

## **10. Cropping in past five years using minimum tillage techniques**

- A higher rating to the value provides most of the household income
- A higher rating to being able to pass the property on in better condition
- Higher self-assessed knowledge about how to collect soil samples
- Higher self-assessed knowledge about how to establish introduced perennial pastures
- Higher levels of confidence in the benefits of stubble retention
- Longer-term owners
- Having a long-term plan or vision
- Family agreement to a succession plan
- Landcare membership or involvement
- Membership of a local commodity group
- Larger property size
- Identifying as a farmer by occupation
- A higher level of on property profitability
- More on-property work
- Broadacre cropping

## 4.15 Other social and demographic variables

### Gender

Women play an important role in decision-making in farming families but their voice often is not heard (Curtis *et al.* 1997). Estimates by Elix and Lambert (2000) are that about 30% of Australia's farm work force is female and that just under 20% of agricultural decision-makers are women. Since the mailing list for this survey was compiled by randomly selecting landholders 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 482 respondents who indicated their gender, 12% (n=59) were women.

Male respondents were significantly more likely to undertake five of the 10 CRP in the survey, including sowing perennial pasture and lucerne (past five years; period of management); cropping using minimum tillage techniques past five years; cropping using no-till techniques past five years; testing for water quality of the main water source for stock or irrigation purposes on your property in past five years; and planting trees and shrubs (including direct seeding) during the management period. These CRP are principally related to sustainable agriculture.

### Time lived in district

Most respondents to the survey had lived in their local district for the majority of their life with a median of 45 years. Only 11% of respondents had lived in their local district for less than 10 years. These data suggest the Wimmera has had a very stable rural landholder population. A comparison of 2002 and 2007 survey data suggests a trend towards increased population mobility in the Wimmera region (median 46 years; 94% >10 years residency in 2002).

There was a significant difference across the Wimmera RMU in the median years lived in the local district [Appendix 2].

In our analyses exploring factors affecting the adoption of CRP we focussed on newer and longer-term property owners rather than the length of residence in the district. A detailed discussion of this analysis is presented in section 4.8.

Length of residence was significantly linked with three CRP in the survey. As might be expected, longer length of residence was more likely to be positively linked with sustainable agriculture CRP such as sowing perennial pastures and lucerne (past five years; period of management) and cropping using no-till techniques; and linked to fencing of native bush/grasslands to manage stock access past five years.

### Absentee property ownership

Just under a quarter (22%) of respondents (N=498) said their property was not their principal place of residence. This item was not included in 2002 survey. Those indicating they were absentee owners were then asked if they planned to live permanently on the property in future years, and if so, to indicate a year when this might occur. Our view is that information provided on these items is unreliable. No analysis of these data has been included in the report.

Respondents who identified their property as their principal place of residence were asked if they had lived elsewhere, other than for education or travel, prior to becoming the manager

of the property. Those who had lived elsewhere were then asked to indicate if they had previously lived in “a large regional centre or major city”, “rural township”, “rural property outside the Wimmera” or “rural property in the Wimmera”. These items were included in the survey to help the research team explore the extent of “tree change” migration in the Wimmera. Findings from this analysis will be reported to the WCMA in a separate paper.

Forty-three per cent of the respondents (N=431) said they had lived elsewhere before becoming the manager of the property. Thirty-two per cent of these respondents (N=195) said they had previously lived in a rural township; 28% in a large regional centre or major city; 28% on a rural property in the Wimmera; and 13% on a rural property outside the Wimmera.

There was a significant difference across the Wimmera RMU in the median years lived in the local district

Property residency was positively linked to six of the 10 CRP in the survey and appears a key factor affecting adoption of biodiversity conservation and sustainable agriculture CRP. Respondents living on their property were significantly more likely to be planting trees and shrubs (including direct seeding) during the management period; fencing to manage stock access to native bush/ grasslands during the management period; sowing perennial pasture and lucerne (past five years; period of management); cropping using minimum tillage techniques past five years; cropping using no-till techniques past five years; and testing for water quality of the main water source for stock or irrigation purposes on your property in past five years.

### **Level of property equity**

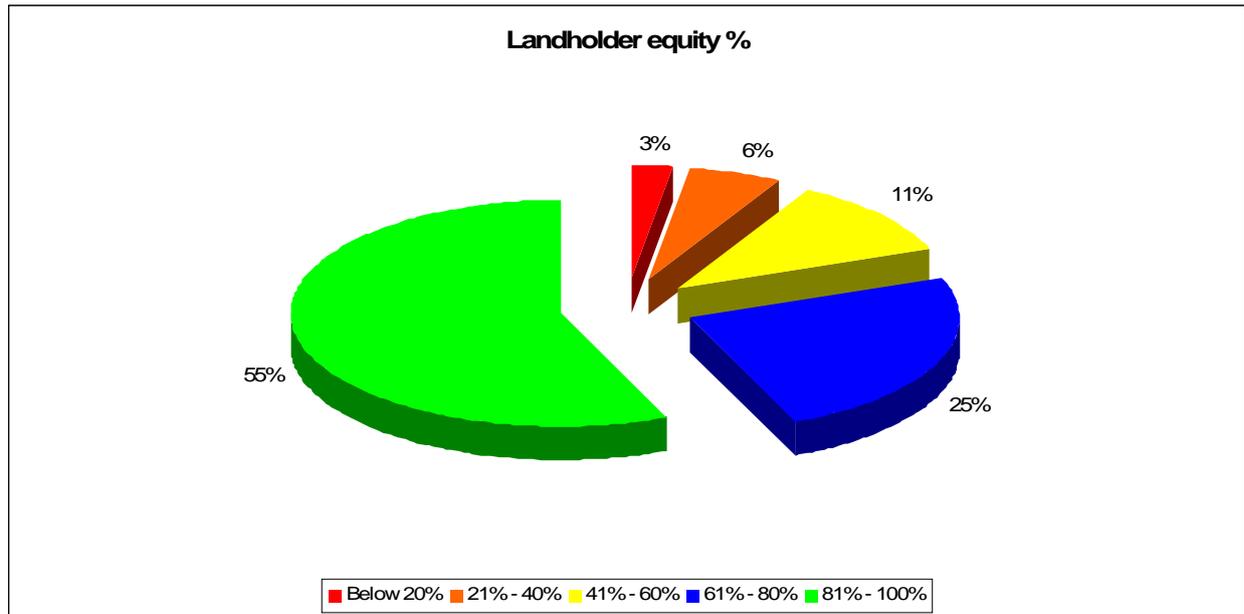
Respondents were asked to indicate the level of equity in their property (including land, machinery, buildings and livestock) and were able to select from five options, each covering a 20% range. The same item was included in the 2002 survey.

Most respondents had high levels of property equity with over half (56%) indicating 81%-100% equity. One fifth of respondents (20%) had less than 60% equity in their property [Figure 21].

As might be expected during a period of drought conditions and significantly reduced on-property profitability, there has been a trend to lower levels of property equity between 2002 and 2007. For example, in 2002 64% of respondents had more than 80% equity in their property and only 15% had 60% or less equity.

There was no significant difference across the Wimmera RMU in the level of property equity.

**Figure 21: Level of property equity, 2007**



Property equity was negatively linked to lower adoption of cropping using minimum tillage techniques and cropping using no-till techniques. In other words, those with higher debt levels were more likely to implement these cutting-edge cropping practices.

### **Employment of consultants and use of rural financial counsellors**

Separate survey items asked if respondents had employed a consultant to provide advice on any aspect of on-property management and if the services of a rural financial counsellor had been used in the past 12 months. These items were not included in the 2002 survey.

- Thirty-four per cent of respondents (N=478) said they had employed a consultant to provide advice and 17% (N=480) said they had used the services of a rural financial counsellor in the past 12 months.
- There were significant differences across the Wimmera RMU in respondents' accessing a consultant or financial counsellors.

The use of consultants and financial counsellors were linked to adoption of most CRP in the survey. There positive relationships between the use of a consultant and fencing to manage stock access to native bush/ grasslands during the management period; fencing to manage stock access to rivers/ streams/ wetlands (past five years; management period); sowing perennial pasture and lucerne (past five years; period of management); cropping using minimum tillage techniques past five years; cropping using no-till techniques past five years; and planting trees and shrubs (including direct seeding) (past five years; period of management). It is possible that more successful managers who are more likely to undertake CRP also engage consultants. Again, the weight of evidence suggests that consultants have an impact on adoption, particularly of complicated technologies such as minimum and no-till cropping and establishing pastures.

One explanation for the links between the use of rural financial counsellors and adoption is that in tough drought conditions experienced recently, more competent managers have the confidence and initiative to engage these services. We doubt that financial counsellors have a significant impact on adoption of CRP.

## Completion of a short course relevant to property management

As in 2002, survey respondents were asked if they had completed a short-course relevant to property management in the past five years. Examples of topics and specific courses such as financial planning, pest management, grain marketing, whole farm planning, chemical handling and *Prograze* were provided.

- Just under half of all respondents (47%, N=475) said they had completed a relevant short course in the past five years. In 2002 60% (n=364) of respondents said they had completed a short course.
- Comparison of 2002 and 2007 data shows there has been a statistically significant (X-square = 17.6308, df = 1, p-value = 0) decline in the proportion of respondents completing short courses. It seems that at least part of the explanation for this trend is the significant increase in the proportion of respondents who are non-farmers by occupation. Farmers are significantly more likely than non-farmers to have completed a short course. For example, in 2007, 62% of farmers (n= 312) had completed a short course but only 10% of non-farmers (n=159) (X-square = 70.775, df = 1, p-value = 0).
- There was a significant difference across the Wimmera RMU in the proportion of respondents who had completed a short course related to property management.

Data analysis established significant positive links between participation in a short course related to property management in the past five years and eight of the 10 CRP in the survey. It seems that participation in a short course is a key predictor of landholder behaviour and likely to represent an effective investment of NRM funds in the WCMA region. The only CRP where there was not a significant link with participation in short-courses were addressing gully erosion and establishing off-stream watering points for stock.

## Involvement in any voluntary groups

Ninety per cent of respondents (n=454, N=503) completed this item with a median of two hours per week per given to voluntary groups by each respondent during the previous 12 months. This item was not included in the 2002 survey.

## 4.16 Differences across the RMU

The Wimmera region has been divided into 9 RMU. This study highlighted a range of differences in the social and farming context at the RMU scale. The summary table [Appendix 2] and the individual RMU profiles [Appendix 1] include summary data about topics where there were significant differences across the RMU. Indeed, there were differences on 106 specific survey items.

Some of the principal differences in the social and farming contexts across the WCMA RMU include:

- Property size
- Values attached to property
- Stewardship ethic
- Knowledge of NRM
- Attitudes about roles and responsibilities
- Confidence in recommended practices
- Occupation (proportion of farmers)
- Involvement in short courses
- Landcare membership and involvement
- Membership of a commodity group
- Proportion reporting an on-property profit and level of profit
- Amount of off-property income
- Involvement in local action planning
- Proportion of absentee owners
- Years owned/ managed property
- Employed a consultant
- Accessed a rural financial counsellor.

## 5 Conclusions

### Introduction

The key aims of this research were to:

1. Describe trends in social/ farming structure (property size, property turnover, property subdivision/ amalgamation), including at the Resource Management Unit (RMU) scale.
2. Explain landholder adoption of recommended practices (CRP) identified in the CMA Regional Catchment Strategy (RCS).
3. Assess progress in the achievement of intermediate NRM objectives consistent with the CMA RCS and NHT/ NAP documents by comparing 2002 and 2007 survey data.
4. Assess landholder acceptance of a range of NRM policy instruments.
5. Identify landholders' preferred sources of NRM information.

The Executive summary, Findings and Appendix sections of the report provide detailed information that addresses each of these aims. In this section we provide a summary of findings about progress in the achievement of intermediate NRM objectives and a discussion of the implications for the WCMA of key findings across the remaining research topics.

### Progress in achievement of NRM objectives

There is considerable theory and empirical evidence, including this study, linking improvements in awareness, knowledge and confidence in CRP to the adoption of CRP. In turn, it is assumed that adoption of CRP will lead to improved resource condition. These intermediate NRM objectives are the focus of considerable investment by NRM agencies, including the WCMA. The 2007 survey gathered data for each of these objectives. Some items were included in both the 2002 and 2007 surveys and these items enabled a comparison of trends over time in the achievement of intermediate NRM objectives. NRM investment is increasingly targeted to specific asset classes, such as a vegetation type or a specific wetland. Analyses were therefore undertaken to test for changes over time in intermediate objectives for all respondents and for those in locations with specific assets. We discuss findings from the regional-scale analysis first.

Comparison of 2002 and 2007 survey data suggests that at the regional scale there had been a general increase in awareness of river health, water quality, dryland salinity and soil erosion issues and an increased preparedness of landholders to acknowledge the impact of their landuse on soils. Two topics exploring landholder confidence in CRP were included in both the 2002 and 2007 surveys. There was also evidence of significantly increased levels of confidence in fencing to manage stock access as an essential part of work to revegetate waterways and in the efficacy of watering stock off-stream in terms of improvements in bank stability, water quality and stock condition.

There were significantly lower self-reported levels of knowledge for nine of the 12 topics included in both the 2002 and 2007 surveys. The most dramatic declines were for knowledge about grazing strategies to manage ground cover to minimise soil erosion, how to prepare a whole farm plan, the extent of water savings through the Wimmera/ Mallee pipeline, the extent of pre-European tree coverage, the ability of perennial vegetation to prevent water tables rising and the areas of saline affected vegetation in the district. This trend remained for analyses focussed on the eight knowledge topics where the WCMA has targeted investments to specific areas/ assets. Indeed, there had been a significant decline for six of the eight topics. Potential explanations for this trend include that there has been reduced involvement in short course and a loss of local and farming knowledge as older farmers retire and are replaced by new owners.

It was possible to compare 2002 and 2007 data for five (on six items) of the 10 CRP in the 2007 survey. Significantly reduced proportions of landholders were involved in three CRP (trees and shrubs planted; perennial pasture established; cropping using minimum tillage),

significantly increased proportions involved in one CRP (farm forestry) and there was no clear trend for the remaining CRP (fencing to manage stock access to native bush/ grasslands). Again, this trend remained for analyses focussed on specific areas/ assets, with a trend to lower involvement in four of the five CRP (all except fencing to manage stock access to native bush/ grasslands), with a significant decline for two CRP (trees and shrubs planted; cropping using minimum tillage). Calculations of median amounts of work completed by respondents of the 2002 and 2007 surveys for the five CRP where comparisons could be made provided additional information for assessing the achievement of onground objectives. There was a significant increase in the median number trees and shrubs planted. For all other CRP the median amount of work declined significantly.

The change to drought conditions in recent years and the impact of drought in reducing on-property profitability appears to have constrained the adoption of many CRP. Other factors are also at work, including the trend to smaller properties, a smaller proportion of landholders who identify themselves as farmers and increased proportions of landholders working and living off-property. In this study, each of these factors was linked to lower adoption of CRP, particularly for sustainable agriculture CRP.

Given these circumstances, it is not surprising that there was a significant positive relationship between undertaking almost all CRP and landholders receiving financial and/or technical resources provided by government. In this study, just over half of the respondents said they had received support provided by government to undertake work during the past five years and/ or their period of management.

## **Landholder engagement**

Many items in the 2007 Wimmera survey were included because previous research suggested they were important influences on adoption and were likely to be amenable to WCMA interventions. Other items were included because they would provide information expected to enhance the capacity of the WCMA to effectively engage landholders.

There were significant positive links between adoption and many of the NRM levers at the disposal of the WCMA. Awareness and concern about NRM issues, knowledge of NRM topics, membership or involvement in landcare, involvement in property and local action planning, involvement in short courses and access to government funding were all linked to higher adoption of CRP.

Given the substantial investment in raising awareness and improving knowledge, these findings provide some comfort that NRM investment decisions are soundly based. For example, those reporting areas affected by dryland salinity were more likely to have adopted a range of practices expected to address salinity. Higher landholder self-assessments about how to collect soil test samples was linked to adoption of sowing perennial pasture and lucerne. Higher confidence in the benefits of stubble retention was linked to the cropping using minimum and no-till technologies.

Consistent with other research, the values landholders attach to their property were a strong predictor of behaviour. Values are generally stable over time and knowledge of values should underpin effective landholder engagement. Survey findings suggest there is a strong division between landholders with conservation and production values that are linked to the adoption of related CRP. Appeals that focus on the environmental benefits of CRP are therefore likely to appeal to those with pro-conservation values. Many farmers are likely to be alienated by such appeals. For example, there was strong resistance amongst farmers to the suggestion that planting out large areas of Wimmera farmland to native vegetation was justified. However, there were some values that transcended the conservation/ production schism. Being able to pass the property on to others in better condition appears to have both widespread appeal and strong links to the adoption of CRP related to biodiversity conservation and sustainable agriculture. Efforts to engage landholders should include

explicit reference to the ways CRP will contribute to improved social and economic wellbeing of rural communities.

Some landholders, particularly farmers, had strong reservations about proposals that might limit their property rights, including the implementation of a duty of care for biodiversity. Any proposals to add this lever to the NRM toolbox would need to take these concerns into consideration.

Dryland salinity has been an important focus for regional NRM delivery, particularly under the Natural Heritage Trust (NHT) and National Action Plan for Salinity and Water Quality (NAP). This research provides additional evidence that most landholders are prepared to acknowledge saline affected areas when they occur on their property. However, most landholders in this survey did not report saline affected areas, and those that identified saline areas reported small areas were affected. Not surprisingly, most respondents expressed low levels of concern about the potential impacts of dryland salinity. Interestingly, newer owners were more concerned about dryland salinity than longer-term owners. In many instances, saline affected areas were flagged by landholders but the expert maps provided to the research team did not identify these properties as having saline discharge sites.

Modelling of turnover in landholders using age, intentions to sell/ subdivide and life expectancy tables suggest that 45% of the properties in the WCMA will have a different person making management decisions within 10 years. This represents a significant increase from the 36% of properties predicted to change hands in the next decade using the 2002 survey data. This study confirms that newer and longer-term residents are very different and that these differences affect their adoption of CRP. The expected increase in property turnover also suggests there will be a major change from a relatively stable rural landholder population in the Wimmera. WCMA programs will need to accommodate the different values, capacities and information sources of these newer owners. For example, many newer owners will not be farmers and will have lower knowledge of NRM than the previous owner; many will live and work off the property and have less time to spend in on-property management; new owners will be less connected to local networks, including landcare and commodity groups that are important fora for dialogue, learning and action. We have recently published a paper exploring the implications of these issues (Mendham and Curtis, 2008).

Having a long-term plan or vision for their property, having a succession plan, involvement in whole farm planning and involvement in local action planning were all linked to higher adoption of most CRP. However, substantial proportions of landholders are not engaged in these planning processes. Over the past decade efforts to engage landholders in property planning have met considerable resistance. Indeed, comparisons of 2002 and 2007 Wimmera survey data suggest there has been a significant decline in self-rated knowledge of how to prepare a whole farm plan. The finding that a large majority of landholders acknowledge they have a long-term vision for their property may provide a way for CCMA staff to engage landholders who have not responded to effort to engage them in property planning.

Only 35% of all respondents made an on-property profit in 2006/07 and the median level of on-farm profit was down from \$45,000 in 2002 to \$15,000. In this study those reporting an on-property profit and higher levels of profitability were more likely to adopt CRP. Just over three-quarters of respondents said they or their partner received a net off-property income in 2006/07, up from 66% from 2002. The trend to more off-property work is likely to reflect the impact of drought conditions encouraging farming families to seek off-property work. This trend can also be attributed to the increased proportion of non-farmers and absentee owners. Data analysis established a sharp contrast in the relationships between adoption and on and off-property work: on-property work was positively linked to adoption of CRP and off-property income was negatively linked to adoption. Again, this finding illustrates the approaching challenge facing NRM in the Wimmera region. Other regions, including

Corangamite are closer to the cutting-edge of these trends and should provide a valuable source of information about how to engage these new cohorts of rural landholders.

Respondent interest in four policy delivery mechanisms was canvassed in the survey. Just over half of the respondents expressed strong interest in a reduction in local government rates and just under half expressed strong interest in a tax rebate administered by the Commonwealth. There was markedly less interest for a fixed grant incentive scheme or a market-based instrument (MBI).

Taken together, the four mechanisms attracted strong interest from 62% of respondents. Removing the rate reduction which has limited scope for delivering substantial NRM investment, the three remaining instruments attracted strong interest from 49% of respondents. The addition of the market-based instrument made no difference to the proportion of respondents indicating they had a strong interest in possible mechanisms to deliver NRM programs in the WCMA region. That is, all those expressing strong interest in an MBI also had expressed strong interest in one of the other mechanisms.

More than a third of respondents expressed strong interest in support that included funds for onground work, funds for them to engage contractors to undertake onground work and funds to support the work of landcare or similar groups. About a quarter of respondents expressed strong interest in access to equipment, access to volunteer labour and the WCMA organising contractors to undertake work for them.

Half the respondents said they were willing to undertake environmental work on their property without any external financial support. These respondents were more likely to be newer landholders.

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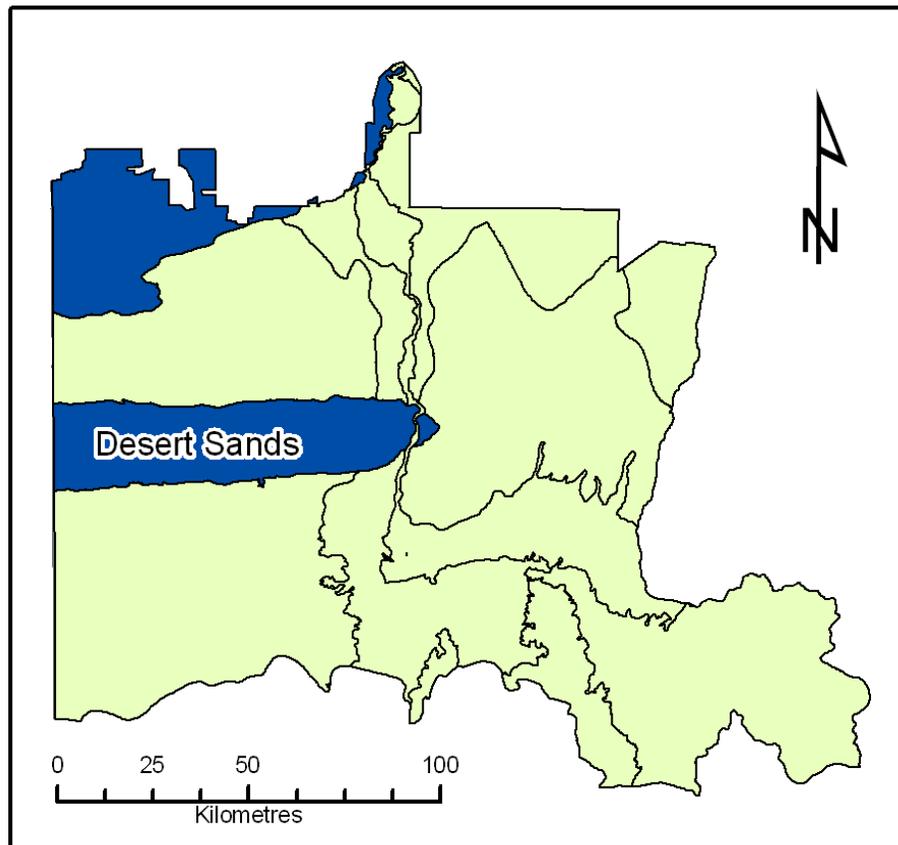
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## Appendix 1 RMU Profiles

### 1. Desert Sands



**Median age:** 55.5 years

**Farmer by occupation:** 57%

**Median length of residence:** 40.5 yrs

**Property not principal place of residence:** 60%

**Property size (median):** 950 ha

**Proportion of saline affected areas:** 21%

**Area of salinity (median):** 10 ha

**% properties likely to change owner next 10 years:** 47%

- Pass property to family: 64%
- Expand property: 33%
- Dispose property: 44%

**% reporting on-property profit:** 21%

**On-property income (median):** Less than \$10,000

**Landcare membership:** 36%

**Commodity group membership:** 7%

**Proportion with government funded work on property (past 5 years):** 0%

**% respondents with remnant vegetation:** 100%

**5 most common land uses:**

- Dryland pasture - 60%
- Sheep for meat - 53%
- Broadacre cropping - 53%
- Part of property under conservation covenant - 47%
- Sheep for wool - 47%

## Appendix 1 RMU Profiles

### Top 3 district issues:

- Impact of reduced water flows on the long-term health of rivers/ streams/ wetlands) - 100%
- Getting the balance between water for the environment, agriculture and recreation - 85%
- Dryland salinity threatening water quality in rivers/ streams/ wetlands - 82%

### Lowest 3 district issues:

- Loss of habitat for birds and animals due to the loss of paddock trees - 50%
- Nutrient and chemical run-off affecting water quality in rivers/ streams/ wetlands - 50%
- Changes to river/stream banks and flows affecting the quality of recreational experiences for people living here or visiting - 50%

### Top 3 values attached to property:

- The freedom of working for myself - 89%
- Sense of accomplishment from building/maintaining a viable business - 89%
- A great place to raise a family - 86%

### Lowest 3 values attached to property:

- Work on the property is a welcome break from my normal occupation - 20%
- Provides most of the household income - 33%
- Rural land represents a sound long-term investment - 50%

### 3 most commonly adopted CRP:

- Sustainable agriculture-*
- Maximum area of crop sown in any year using minimum tillage techniques – last 5 years - 53%
- Maximum area of crop sown in any year using no-til techniques – last 5 years - 47%
- Area sown to perennial pasture and lucerne - 47%

### 3 least commonly adopted CRP:

- Sustainable agriculture-*
- Area of farm forestry established - last 5 years - 0%
- Area of gully erosion addressed - 0%
- Area of farm forestry established - 0%

### 3 most commonly adopted CRP:

- Biodiversity-*
- Area of trees and shrubs planted (including direct seeding) - 40%
- Area of native bush/grasslands fenced to manage stock access - last 5 years - 33%
- Area of native bush/grasslands fenced to manage stock access - 33%

### 3 least commonly adopted CRP:

- Biodiversity-*
- Length of fencing erected to manage stock access to rivers/ streams/ wetlands - last 5 years - 7%
- Area of trees and shrubs planted (including direct seeding) - last 5 years - 13%
- Area of native bush/grasslands fenced to manage stock access - 33%

### NRM topics respondents reported highest knowledge:

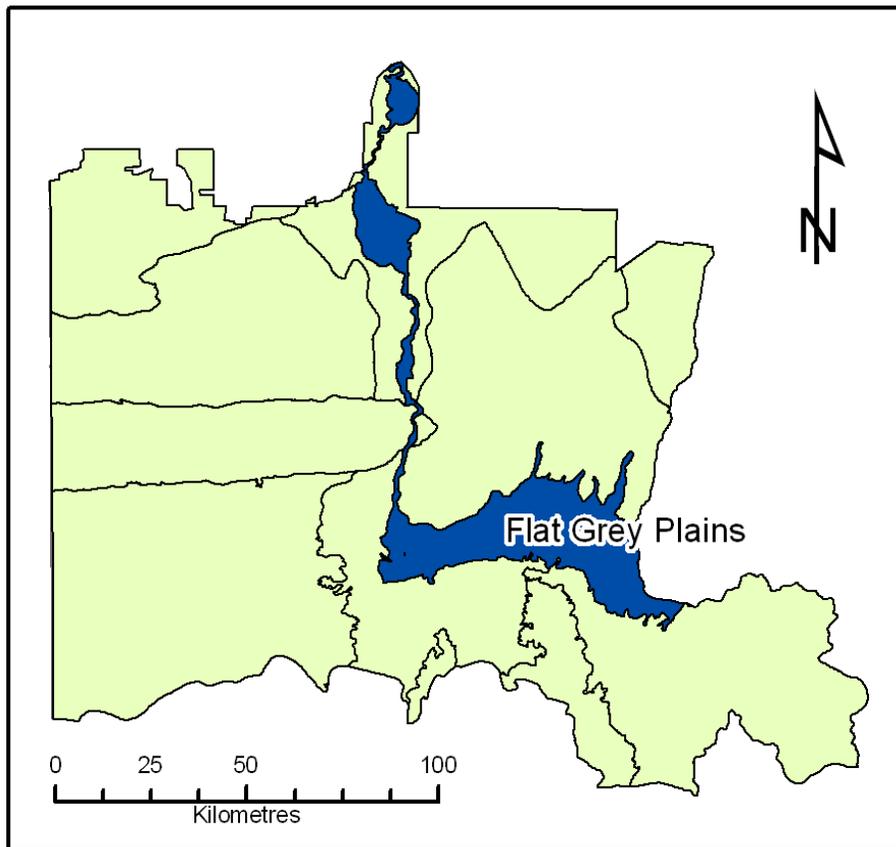
- Grazing strategies to manage paddock ground cover to minimise soil erosion - 71%
- How to prepare a farm or property plan that allocates land use according to different land classes - 54%
- The environmental/production benefits of retaining native vegetation on properties - 53%

### NRM topics respondents reported lowest knowledge:

- The approximate per hectare returns for farm forestry in this district - 0%
- The extent of gully erosion across the Wimmera region - 8%
- The area of land (hectares) with saline affected vegetation in your district - 14%

## Appendix 1 RMU Profiles

### 2. Flat Grey Plains



**Median age:** 54 years

**Farmer by occupation:** 60%

**Median length of residence:** 46 yrs

**Property not principal place of residence:** 15%

**Property size (median):** 459.4 ha

**Proportion of saline affected areas:** 15%

**Area of salinity (median):** 1.5 ha

**% properties likely to change owner next 10 years:** 48%  
Pass property to family: 64%  
Expand property: 26%  
Dispose property: 35%

**% reporting on-property profit:** 50%

**On-property income (median):** \$10,000 to \$20,000

**Landcare membership:** 60%

**Commodity group membership:** 36%

**Proportion with government funded work on property (past 5 years):** 33%

**% respondents with remnant vegetation:** 92%

**5 most common land uses:**  
Dryland pasture - 88%  
Broadacre cropping - 80%  
Sheep for meat - 75%  
Other tree planting - 58%  
Sheep for wool - 58%

## Appendix 1 RMU Profiles

### Top 3 district issues:

- Getting the balance between water for the environment, agriculture and recreation - 85%
- Declining number of landholders means fewer people are involved in local organisations - 81%
- Impact of reduced water flows on the long-term health of rivers/ streams/ wetlands) - 77%

### Lowest 3 district issues:

- Farming practices contributing to erosion - 24%
- Dryland salinity threatening the long-term productive capacity of land - 44%
- Dryland salinity threatening water quality in rivers/ streams/ wetlands - 48%

### Top 3 values attached to property:

- Provides the lifestyle that I want - 84%
- The freedom of working for myself - 76%
- Being able to pass the property on to others in better condition - 76%

### Lowest 3 values attached to property:

- A place for recreation - 38%
- To preserve tradition as the property has been in my family for a long time - 41%
- Work on the property is a welcome break from my normal occupation - 45%

### 3 most commonly adopted CRP:

- Sustainable agriculture-*
- Tested the water quality of the main water source for stock or irrigation purposes on your property in the last 5 years - 71%
- Maximum area of crop sown in any year using minimum tillage techniques - last 5 years - 46%
- Area sown to perennial pasture and lucerne - 38%

### 3 least commonly adopted CRP:

- Sustainable agriculture-*
- Area of gully erosion addressed - 4%
- Area of farm forestry established – last 5 years - 4%
- Area of farm forestry established - 15%

### 3 most commonly adopted CRP:

- Biodiversity-*
- Area of trees and shrubs planted (including direct seeding) - 73%
- Area of trees and shrubs planted (including direct seeding) – last 5 Years – 42%
- Area of native bush/grasslands fenced to manage stock access - 31%

### 3 least commonly adopted CRP:

- Biodiversity-*
- Area of native bush/grasslands fenced to manage stock access – last 5 years - 12%
- Length of fencing erected to manage stock access to rivers/ streams/ wetlands – last 5 years - 19%
- Area of native bush/grasslands fenced to manage stock access - 31%

### NRM topics respondents reported highest knowledge:

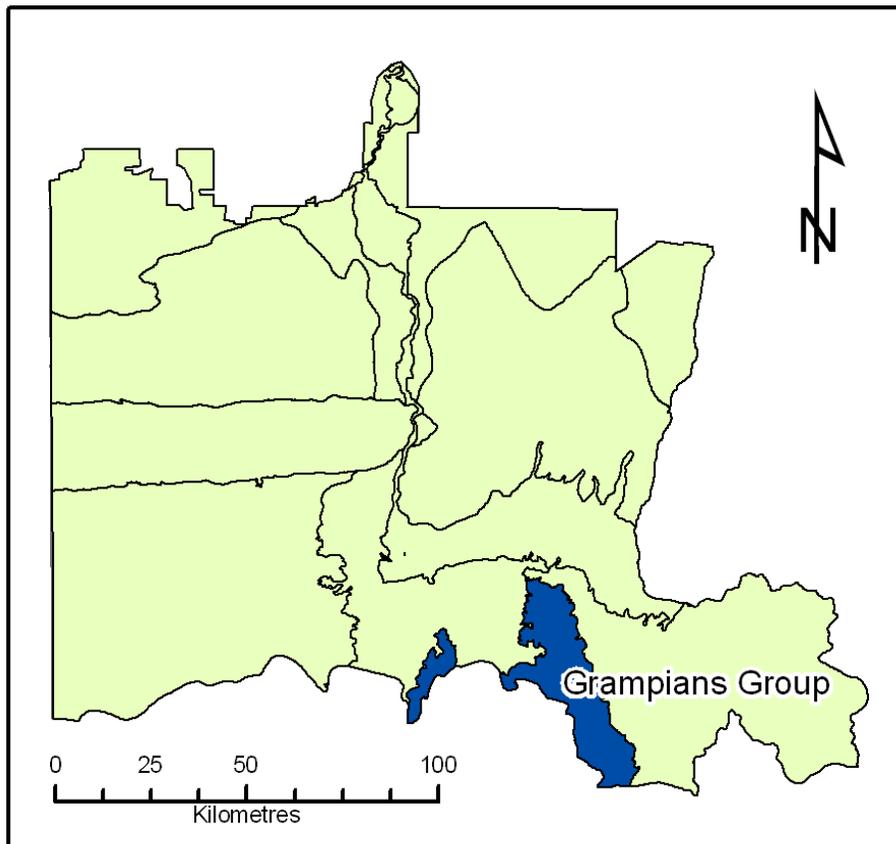
- The use of stock containment areas to manage stock in drier seasons - 57%
- How to establish introduced perennial pastures (eg. lucerne) in this district - 52%
- Grazing strategies to manage paddock ground cover to minimise soil erosion - 50%

### NRM topics respondents reported lowest knowledge:

- The amount of native tree cover remaining in the Wimmera region as a percentage of what was there before the arrival of European settlers - 0%
- The approximate per hectare returns for farm forestry in this district - 0%
- How to identify local plant species in the understorey vegetation - 4%

## Appendix 1 RMU Profiles

### 3. Grampians Group



**Median age:** 65 years

**Farmer by occupation:** 9%

**Median length of residence:** 20 yrs

**Property not principal place of residence:** 20%

**Property size (median):** 27.65 ha

**Proportion of saline affected areas:** 0%

**Area of salinity (median):** NA

**% properties likely to change owner next 10 years:** 45%  
Pass property to family: 78%  
Expand property: 14%  
Dispose property: 0%

**% reporting on-property profit:** 18%

**On-property income (median):** Less than \$10,000

**Landcare membership:** 18%

**Commodity group membership:** 0%

**Proportion with government funded work on property (past 5 years):** 0%

**% respondents with remnant vegetation:** 100%

**5 most common land uses:**

Other tree planting - 50%  
Dryland pasture - 44%  
Sheep for meat - 40%  
Sheep for wool - 40%  
Farm-based tourism - 25%

## Appendix 1 RMU Profiles

### Top 3 district issues:

- Impact of reduced water flows on the long-term health of rivers/ streams/ wetlands) - 100%
- Getting the balance between water for the environment, agriculture and recreation - 78%
- Dryland salinity threatening water quality in rivers/ streams/ wetlands - 75%

### Lowest 3 district issues:

- Changes to river/stream banks and flows affecting the quality of recreational experiences for people living here or visiting - 43%
- Farming practices contributing to erosion - 43%
- Nutrient and chemical run-off affecting water quality in rivers/ streams/ wetlands - 50%

### Top 3 values attached to property:

- The freedom of working for myself - 100%
- An attractive place to live - 100%
- Sense of accomplishment from knowing that my property is contributing to improved environmental health in the district - 100%

### Lowest 3 values attached to property:

- Provides most of the household income - 9%
- Rural land represents a sound long-term investment - 33%
- To preserve tradition as the property has been in my family for a long time - 33%

### 3 most commonly adopted CRP:

#### *-Sustainable agriculture-*

- Tested the water quality of the main water source for stock or irrigation purposes on your property in the last 5 years - 40%
- Number of off-stream watering points established - 30%
- Area of gully erosion addressed - 20%

### 3 least commonly adopted CRP:

#### *-Sustainable agriculture-*

- Area sown to perennial pasture and lucerne - 0%
- Maximum area of crop sown in any year using no-til techniques – last 5 years - 0%
- Maximum area of crop sown in any year using minimum tillage techniques - last 5 years - 0%

### 3 most commonly adopted CRP:

#### *-Biodiversity-*

- Length of fencing erected to manage stock access to rivers/ streams/ wetlands - last 5 years - 40%
- Area of trees and shrubs planted (including direct seeding) - last 5 years - 40%
- Area of trees and shrubs planted (including direct seeding) - 40%

### 3 least commonly adopted CRP:

#### *-Biodiversity-*

- Area of native bush/grasslands fenced to manage stock access – last 5 years - 20%
- Area of native bush/grasslands fenced to manage stock access - 20%
- Area of trees and shrubs planted (including direct seeding) - 40%

### NRM topics respondents reported highest knowledge:

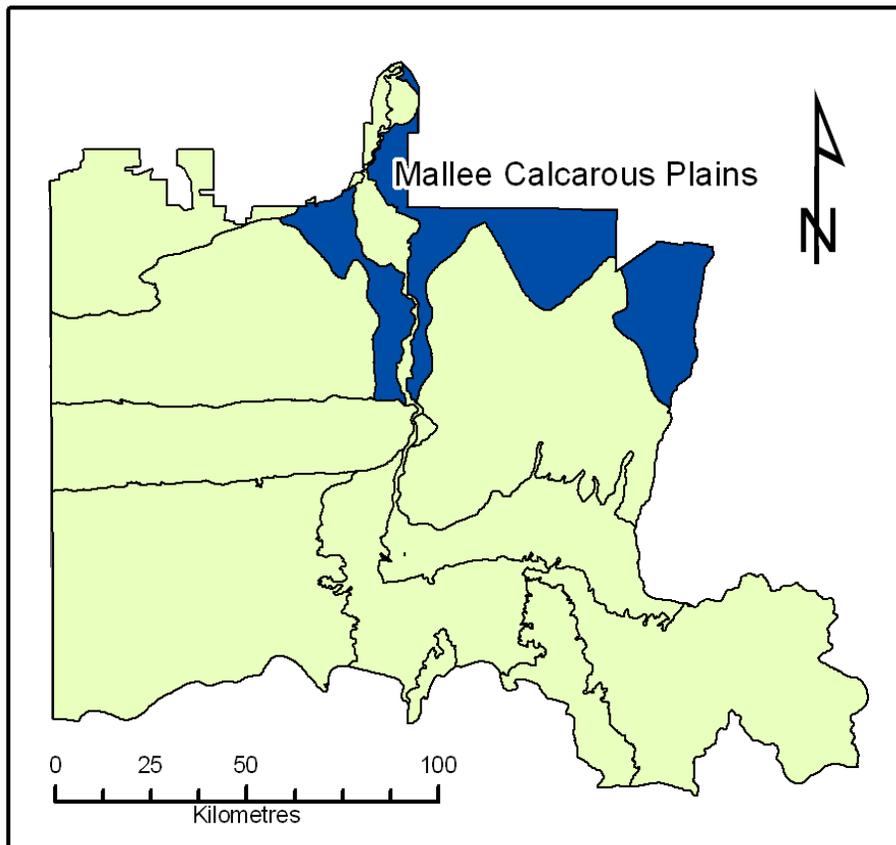
- How to collect soil test samples - 44%
- How to prepare a farm or property plan that allocates land use according to different land classes - 38%
- Grazing strategies to manage paddock ground cover to minimise soil erosion - 38%

### NRM topics respondents reported lowest knowledge:

- The extent of water savings as a result of the Wimmera/Mallee pipeline - 0%
- The amount of native tree cover remaining in the Wimmera region as a percentage of what was there before the arrival of European settlers - 0%
- The extent of gully erosion across the Wimmera region - 0%

## Appendix 1 RMU Profiles

### 4. Mallee Calcarous Plains



**Median age:** 54 years

**Farmer by occupation:** 82%

**Median length of residence:** 49 yrs

**Property not principal place of residence:** 15%

**Property size (median):** 781 ha

**Proportion of saline affected areas:** 45%

**Area of salinity (median):** 9 ha

**% properties likely to change owner next 10 years:** 43%  
Pass property to family: 62%  
Expand property: 35%  
Dispose property: 49%

**% reporting on-property profit:** 45%

**On-property income (median):** \$10,000 to \$20,000

**Landcare membership:** 50%

**Commodity group membership:** 39%

**Proportion with government funded work on property (past 5 years):** 69%

**% respondents with remnant vegetation:** 97%

**5 most common land uses:**  
Broadacre cropping - 98%  
Dryland pasture - 69%  
Sheep for meat - 67%  
Farm forestry - 5%  
Beef cattle - 5%

## Appendix 1 RMU Profiles

### Top 3 district issues:

- Getting the balance between water for the environment, agriculture and recreation - 88%
- Impact of reduced water flows on the long-term health of rivers/ streams/ wetlands) - 85%
- Loss of important services (e.g. health, banks, schools) - 85%

### Lowest 3 district issues:

- Nutrient and chemical run-off affecting water quality in rivers/ streams/ wetlands - 35%
- Loss of habitat for birds and animals due to the loss of paddock trees - 38%
- Decline in soil health (e.g. declining fertility or structure) - 41%

### Top 3 values attached to property:

- Provides the lifestyle that I want - 90%
- The freedom of working for myself - 89%
- Being part of a rural community - 85%

### Lowest 3 values attached to property:

- Work on the property is a welcome break from my normal occupation - 33%
- A place for recreation - 43%
- Native vegetation on my property provides habitat for native animals - 46%

### 3 most commonly adopted CRP:

- Sustainable agriculture-*
- Tested the water quality of the main water source for stock or irrigation purposes on your property in the last 5 years - 61%
- Maximum area of crop sown in any year using no-til techniques - last 5 years - 45%
- Max area of crop sown in any year using minimum tillage techniques - last 5 years - 42%

### 3 least commonly adopted CRP:

- Sustainable agriculture-*
- Area of gully erosion addressed - 0%
- Area of farm forestry established – last 5 years - 5%
- Area of farm forestry established - 8%

### 3 most commonly adopted CRP:

- Biodiversity-*
- Area of trees and shrubs planted (including direct seeding) - 60%
- Area of trees and shrubs planted (including direct seeding) – last 5 years – 30%
- Area of native bush/grasslands fenced to manage stock access - 30%

### 3 least commonly adopted CRP:

- Biodiversity-*
- Area of native bush/grasslands fenced to manage stock access – last 5 years – 15%
- Length of fencing erected to manage stock access to rivers/ streams/ wetlands - last 5 years - 15%
- Area of native bush/grasslands fenced to manage stock access - 30%

### NRM topics respondents reported highest knowledge:

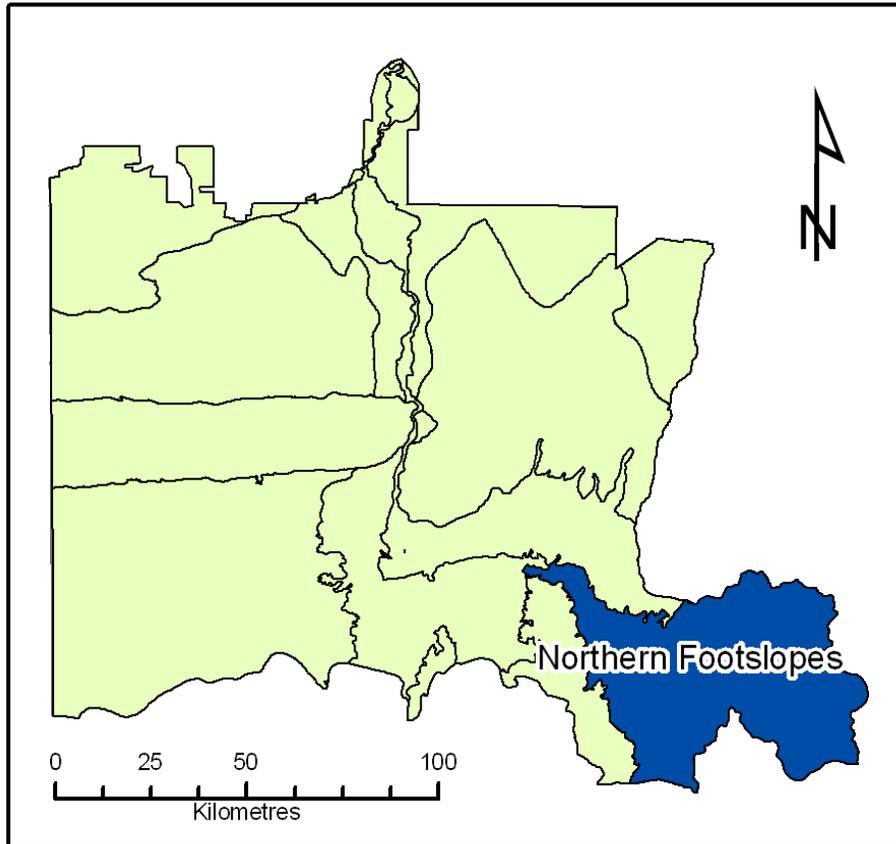
- Grazing strategies to manage paddock ground cover to minimise soil erosion - 71%
- How to collect soil test samples - 51%
- The use of stock containment areas to manage stock in drier seasons - 46%

### NRM topics respondents reported lowest knowledge:

- The amount of native tree cover remaining in the Wimmera region as a percentage of what was there before the arrival of European settlers - 3%
- The extent of gully erosion across the Wimmera region - 3%
- The approximate per hectare returns for farm forestry in this district - 3%

## Appendix 1 RMU Profiles

### 5. Northern Footslopes



**Median age:** 56 years

**Farmer by occupation:** 36%

**Median length of residence:** 30 yrs

**Property not principal place of residence:** 37%

**Property size (median):** 162.5 ha

**Proportion of saline affected areas:** 25%

**Area of salinity (median):** 10 ha

**% properties likely to change owner next 10 years:** 52%

- Pass property to family: 69%
- Expand property: 22%
- Dispose property: 41%

**% reporting on-property profit:** 26%

**On-property income (median):** \$10,000 to \$20,000

**Landcare membership:** 43%

**Commodity group membership:** 13%

**Proportion with government funded work on property (past 5 years):** 44%

**% respondents with remnant vegetation:** 78%

**5 most common land uses:**

- Dryland pasture - 77%
- Other tree planting - 67%
- Sheep for wool - 55%
- Farm forestry - 6%
- Irrigated pasture/cropping - 6%

## Appendix 1 RMU Profiles

### Top 3 district issues:

- Getting the balance between water for the environment, agriculture and recreation - 82%
- Impact of reduced water flows on the long-term health of rivers/ streams/ wetlands) - 74%
- Dryland salinity threatening water quality in rivers/ streams/ wetlands - 67%

### Lowest 3 district issues:

- Loss of habitat for birds and animals due to the loss of paddock trees - 44%
- Changes to river/stream banks and flows affecting the quality of recreational experiences for people living here or visiting - 48%
- Farming practices contributing to erosion - 49%

### Top 3 values attached to property:

- An attractive place to live - 88%
- Provides the lifestyle that I want - 87%
- Sense of accomplishment from improving property infrastructure (fencing, sheds, water supply, pasture) - 80%

### Lowest 3 values attached to property:

- Provides most of the household income - 29%
- An asset that will fund my retirement - 46%
- Sense of accomplishment from producing food or fibre for others - 47%

### 3 most commonly adopted CRP:

- Sustainable agriculture-*
  - Area sown to perennial pasture and lucerne - 48%
  - Tested the water quality of the main water source for stock or irrigation purposes on your property in the last 5 years - 44%
  - Maximum area of crop sown in any year using minimum tillage techniques - last 5 years - 38%

### 3 least commonly adopted CRP:

- Sustainable agriculture-*
  - Area of farm forestry established - last 5 years - 6%
  - Area of farm forestry established - 12%
  - Maximum area of crop sown in any year using no-til techniques - last 5 years - 23%

### 3 most commonly adopted CRP:

- Biodiversity-*
  - Area of trees and shrubs planted (including direct seeding) - 56%
  - Area of trees and shrubs planted (including direct seeding) – last 5 years - 48%
  - Length of fencing erected to manage stock access to rivers/ streams/ wetlands - 33%

### 3 least commonly adopted CRP:

- Biodiversity-*
  - Area of native bush/grasslands fenced to manage stock access - last 5 years - 23%
  - Length of fencing erected to manage stock access to rivers/ streams/ wetlands - last 5 years - 30%
  - Area of native bush/grasslands fenced to manage stock access - 31%

### NRM topics respondents reported highest knowledge:

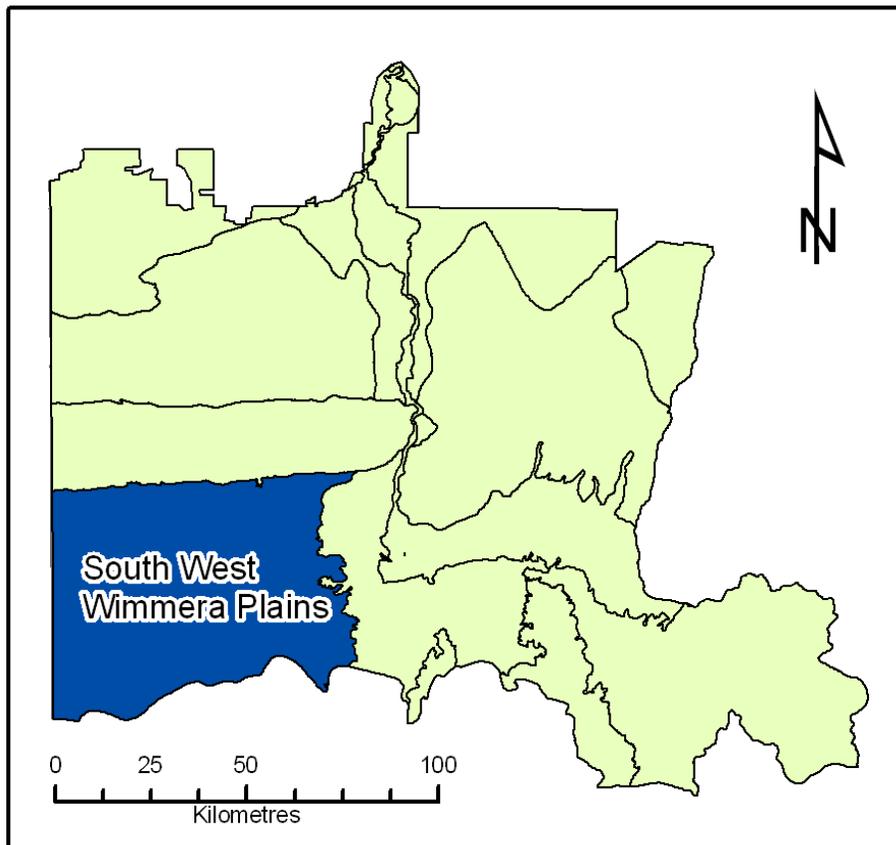
- Organisations or individuals to contact for advice about government programs supporting landholders to manage gully or stream bank erosion - 41%
- Grazing strategies to manage paddock ground cover to minimise soil erosion - 40%
- How to collect soil test samples - 36%

### NRM topics respondents reported lowest knowledge:

- The approximate per hectare returns for farm forestry in this district - 4%
- The area of land (hectares) with saline affected vegetation in your district - 6%
- The amount of native tree cover remaining in the Wimmera region as a percentage of what was there before the arrival of European settlers - 11%

## Appendix 1 RMU Profiles

### 6. South West Wimmera Plains



**Median age:** 55 years

**Farmer by occupation:** 74%

**Median length of residence:** 44 yrs

**Property not principal place of residence:** 24%

**Property size (median):** 800 ha

**Proportion of saline affected areas:** 15%

**Area of salinity (median):** 8 ha

**% properties likely to change owner next 10 years:** 51%  
Pass property to family: 71%  
Expand property: 41%  
Dispose property: 42%

**% reporting on-property profit:** 47%

**On-property income (median):** \$20,000 to \$30,000

**Landcare membership:** 24%

**Commodity group membership:** 19%

**Proportion with government funded work on property (past 5 years):** 43%

**% respondents with remnant vegetation:** 96%

**3 most common land uses:**  
Dryland pasture - 94%  
Sheep for wool - 84%  
Sheep for meat - 79%

## Appendix 1 RMU Profiles

### Top 3 district issues:

Loss of important services (e.g. health, banks, schools) - 81%

Declining number of landholders means fewer people are involved in local organisations - 79%

Getting the balance between water for the environment, agriculture and recreation - 76%

### Lowest 3 district issues:

Loss of habitat for birds and animals due to the loss of paddock trees - 28%

Dryland salinity threatening the long-term productive capacity of land - 28%

Farming practices contributing to erosion - 31%

### Top 3 values attached to property:

Sense of accomplishment from improving property infrastructure (fencing, sheds, water supply, pasture) - 86%

Being able to pass the property on to others in better condition - 85%

The freedom of working for myself - 84%

### Lowest 3 values attached to property:

Native vegetation on my property provides habitat for native animals - 42%

A place for recreation - 44%

Work on the property is a welcome break from my normal occupation - 47%

### 3 most commonly adopted CRP:

*-Sustainable agriculture-*

Tested the water quality of the main water source for stock or irrigation purposes on your property in the last 5 years - 68%

Area sown to perennial pasture and lucerne - 51%

Area sown to perennial pasture and lucerne - last 5 years - 46%

### 3 least commonly adopted CRP:

*-Sustainable agriculture-*

Area of farm forestry established – last 5 years - 2%

Area of gully erosion addressed - 5%

Area of farm forestry established - 15%

### 3 most commonly adopted CRP:

*-Biodiversity-*

Area of trees and shrubs planted (including direct seeding) - 56%

Area of trees and shrubs planted (including direct seeding) – last 5 years – 40%

Area of native bush/grasslands fenced to manage stock access - 40%

### 3 least commonly adopted CRP:

*-Biodiversity-*

Length of fencing erected to manage stock access to rivers/ streams/ wetlands - last 5 years - 21%

Area of native bush/grasslands fenced to manage stock access - last 5 years - 22%

Area of trees and shrubs planted (including direct seeding) - last 5 years - 40%

### NRM topics respondents reported highest knowledge:

Grazing strategies to manage paddock ground cover to minimise soil erosion - 67%

The use of stock containment areas to manage stock in drier seasons - 54%

How to collect soil test samples - 54%

### NRM topics respondents reported lowest knowledge:

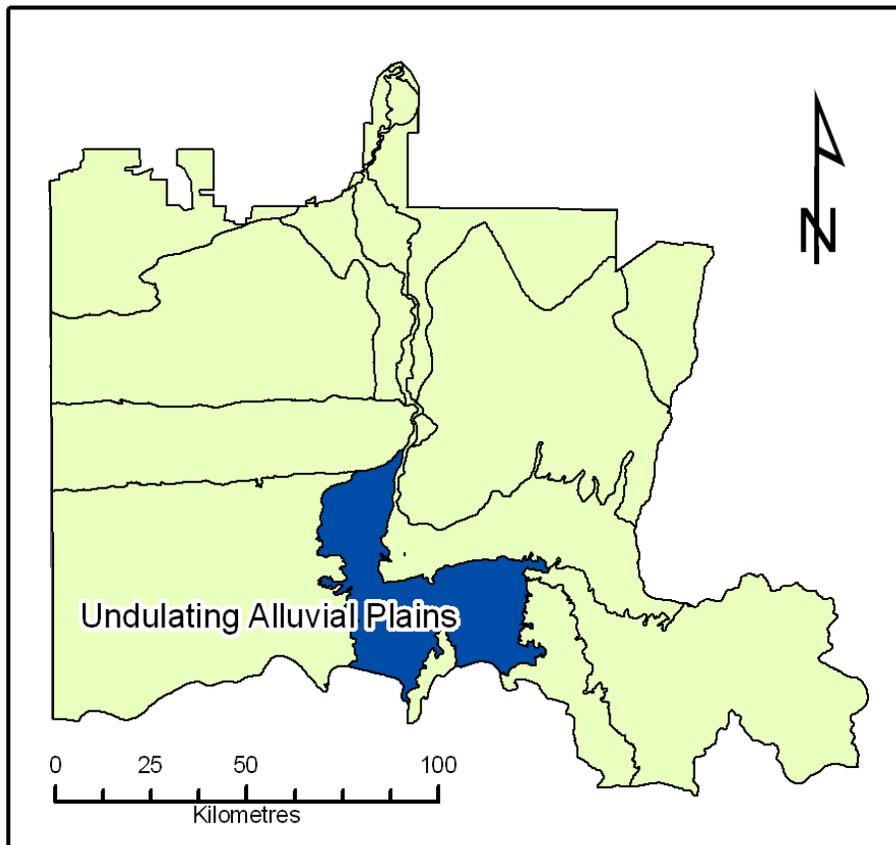
The extent of gully erosion across the Wimmera region - 7%

The area of land (hectares) with saline affected vegetation in your district - 8%

How to identify local plant species in the understorey vegetation - 10%

## Appendix 1 RMU Profiles

### 7. Undulating Alluvial Plains



**Median age:** 50 years

**Farmer by occupation:** 56%

**Median length of residence:** 21 yrs

**Property not principal place of residence:** 27%

**Property size (median):** 320 ha

**Proportion of saline affected areas:** 12%

**Area of salinity (median):** 50 ha

**% properties likely to change owner next 10 years:** 55%  
Pass property to family: 50%  
Expand property: 20%  
Dispose property: 20%

**% reporting on-property profit:** 38%

**On-property income (median):** \$10,000 to \$20,000

**Landcare membership:** 56%

**Commodity group membership:** 25%

**Proportion with government funded work on property (past 5 years):** 33%

**% respondents with remnant vegetation:** 88%

**4 most common land uses:**

Dryland pasture - 100%  
Sheep for meat - 88%  
Sheep for wool - 88%  
Broadacre cropping - 88%

## Appendix 1 RMU Profiles

### Top 3 district issues:

- Loss of important services (e.g. health, banks, schools) - 100%
- Getting the balance between water for the environment, agriculture and recreation - 100%
- The effect of increased ground and surface water extraction - 67%

### Lowest 3 district issues:

- Loss of habitat for birds and animals due to the loss of paddock trees - 22%
- Nutrient and chemical run-off affecting water quality in rivers/ streams/ wetlands - 25%
- Dryland salinity threatening the long-term productive capacity of land - 33%

### Top 3 values attached to property:

- Sense of accomplishment from improving property infrastructure (fencing, sheds, water supply, pasture) - 100%
- An asset that will fund my retirement - 88%
- Being able to pass the property on to others in better condition - 88%

### Lowest 3 values attached to property:

- Work on the property is a welcome break from my normal occupation - 20%
- A place for recreation - 38%
- Native vegetation on my property provides habitat for native animals - 50%

### 3 most commonly adopted CRP:

- Sustainable agriculture-*
- Maximum area of crop sown in any year using minimum tillage techniques - last 5 years - 78%
- Tested the water quality of the main water source for stock or irrigation purposes on your property in the last 5 years - 62%
- Length of fencing erected to manage stock access to rivers/ streams/ wetlands - 56%

### 3 least commonly adopted CRP:

- Sustainable agriculture-*
- Area of farm forestry established – last 5 years - 0%
- Area of farm forestry established - 0%
- Area sown to perennial pasture and lucerne - 22%

### 3 most commonly adopted CRP:

- Biodiversity-*
- Area of native bush/grasslands fenced to manage stock access - last 5 years - 38%
- Area of trees and shrubs planted (including direct seeding) - 38%
- Length of fencing erected to manage stock access to rivers/ streams/ wetlands - 33%

### 3 least commonly adopted CRP:

- Biodiversity-*
- Area of native bush/grasslands fenced to manage stock access - 25%
- Area of trees and shrubs planted (including direct seeding) - last 5 years - 25%
- Length of fencing erected to manage stock access to rivers/ streams/ wetlands - last 5 years - 33%

### NRM topics respondents reported highest knowledge:

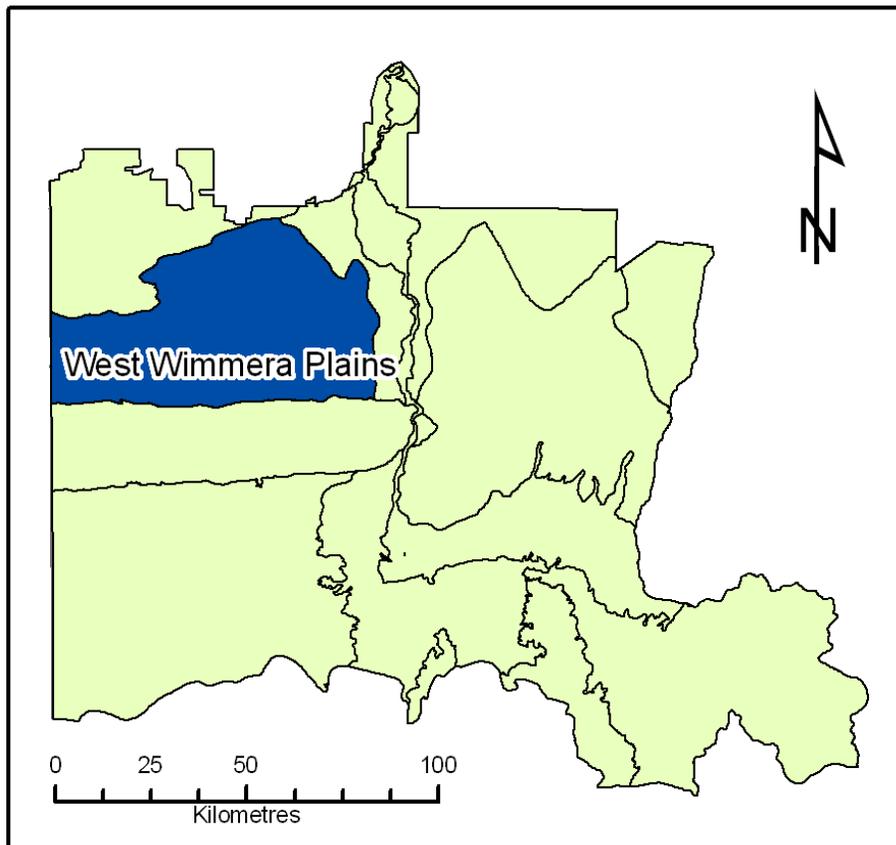
- Grazing strategies to manage paddock ground cover to minimise soil erosion - 50%
- How to establish introduced perennial pastures (eg. lucerne) in this district - 38%
- The environmental/production benefits of retaining native vegetation on properties - 38%

### NRM topics respondents reported lowest knowledge:

- The amount of native tree cover remaining in the Wimmera region as a percentage of what was there before the arrival of European settlers - 0%
- How to identify local plant species in the understorey vegetation - 0%
- The approximate per hectare returns for farm forestry in this district - 0%

## Appendix 1 RMU Profiles

### 8. West Wimmera Plains



**Median age:** 50 years

**Farmer by occupation:** 85%

**Median length of residence:** 48 yrs

**Property not principal place of residence:** 7%

**Property size (median):** 800 ha

**Proportion with saline affected areas:** 8%

**Area of salinity (median):** 6 ha

**% properties likely to change owner next 10 years:** 37%

- Pass property to family: 73%
- Expand property: 36%
- Dispose property: 44%

**% reporting on-property profit:** 29%

**On-property income (median):**  
\$20,000 to \$30,000

**Landcare membership:** 47%

**Commodity group membership:** 24%

**Proportion with government funded work on property (past 5 years):**  
30%

**% respondents with remnant vegetation:** 94%

**5 most common land uses:**

- Broadacre cropping - 93%
- Dryland pasture - 83%
- Sheep for meat - 77%
- Sheep for wool - 77%
- Part of property under conservation covenant - 6%

## Appendix 1 RMU Profiles

### Top 3 district issues:

- Loss of important services (e.g. health, banks, schools) - 82%
- Declining number of landholders means fewer people are involved in local organisations - 82%
- Impact of reduced water flows on the long-term health of rivers/ streams/ wetlands) - 75%

### Lowest 3 district issues:

- Nutrient and chemical run-off affecting water quality in rivers/ streams/ wetlands - 32%
- Loss of habitat for birds and animals due to the loss of paddock trees - 36%
- Dryland salinity threatening the long-term productive capacity of land - 39%

### Top 3 values attached to property:

- The freedom of working for myself - 91%
- A great place to raise a family - 91%
- Sense of accomplishment from improving property infrastructure (fencing, sheds, water supply, pasture) - 87%

### Lowest 3 values attached to property:

- Work on the property is a welcome break from my normal occupation - 32%
- Native vegetation on my property provides habitat for native animals - 39%
- A place for recreation - 46%

### 3 most commonly adopted CRP:

- Sustainable agriculture-
- Max area of crop sown in any year using minimum tillage techniques - last 5 years - 71%
- Tested the water quality of the main water source for stock or irrigation purposes on your property in the last 5 years - 58%
- Maximum area of crop sown in any year using no-til techniques - last 5 years - 48%

### 3 least commonly adopted CRP:

- Sustainable agriculture-
- Area of farm forestry established – last 5 years - 2%
- Area of gully erosion addressed - 5%
- Area of farm forestry established - 6%

### 3 most commonly adopted CRP:

- Biodiversity-
- Area of trees and shrubs planted (including direct seeding) - 49%
- Area of native bush/grasslands fenced to manage stock access - 36%
- Area of trees and shrubs planted (including direct seeding) - last 5 years - 34%

### 3 least commonly adopted CRP:

- Biodiversity-
- Length of fencing erected to manage stock access to rivers/ streams/ wetlands - last 5 years - 8%
- Area of native bush/grasslands fenced to manage stock access - last 5 years - 19%
- Area of trees and shrubs planted (including direct seeding) - last 5 years - 34%

### NRM topics respondents reported highest knowledge:

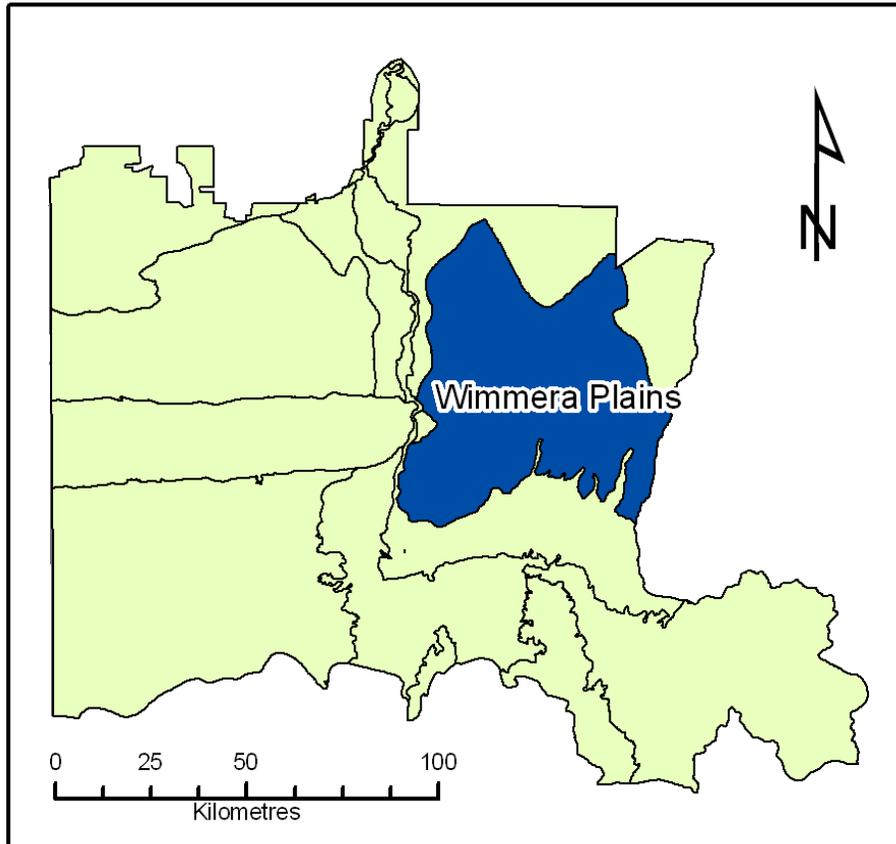
- Grazing strategies to manage paddock ground cover to minimise soil erosion - 69%
- The use of stock containment areas to manage stock in drier seasons - 51%
- How to collect soil test samples - 48%

### NRM topics respondents reported lowest knowledge:

- The approximate per hectare returns for farm forestry in this district - 1%
- The area of land (hectares) with saline affected vegetation in your district - 8%
- The extent of gully erosion across the Wimmera region - 9%

## Appendix 1 RMU Profiles

### 9. Wimmera Plains



**Median Age:** 53 years

**Farmer by occupation:** 85%

**Median length of residence:** 50.5 years

**Property not principal place of residence:** 21%

**Property size (median):** 886 ha

**Proportion with saline effected areas:** 19%

**Area of salinity (median):** 20 ha

**% properties likely to change owner next 10 years:** 39%

Pass property to family: 80%

Expand property: 48%

Dispose property: 53%

**% reporting on-property profit:** 38%

**On-property income (median):**  
\$20,000 to \$30,000

**Landcare membership:** 31%

**Commodity group membership:** 38%

**Proportion with government funded work on property (past 5 years):**  
26%

**% respondents with remnant vegetation:** 90%

**5 most common land uses:**

Broadacre cropping - 97%

Dryland pasture - 69%

Sheep for meat - 66%

Other tree planting - 48%

Sheep for wool - 48%

## Appendix 1 RMU Profiles

### Top 3 district issues:

- Declining number of landholders means fewer people are involved in local organisations - 86%
- Getting the balance between water for the environment, agriculture and recreation - 85%
- Loss of important services (e.g. health, banks, schools) - 85%

### Lowest 3 district issues:

- Dryland salinity threatening the long-term productive capacity of land - 29%
- Nutrient and chemical run-off affecting water quality in rivers/ streams/ wetlands - 32%
- Loss of habitat for birds and animals due to the loss of paddock trees - 36%

### Top 3 values attached to property:

- Sense of accomplishment from building/maintaining a viable business - 92%
- Being able to pass the property on to others in better condition - 90%
- A great place to raise a family - 87%

### Lowest 3 values attached to property:

- Work on the property is a welcome break from my normal occupation - 20%
- A place for recreation - 40%
- Native vegetation on my property provides habitat for native animals - 48%

### 3 most commonly adopted CRP:

#### *-Sustainable agriculture-*

- Tested the water quality of the main water source for stock or irrigation purposes on your property in the last 5 years - 68%
- Maximum area of crop sown in any year using minimum tillage techniques - last 5 years - 61%
- Maximum area of crop sown in any year using no-til techniques - last 5 years - 55%

### 3 least commonly adopted CRP:

#### *-Sustainable agriculture-*

- Area of gully erosion addressed - 1%
- Area of farm forestry established – last 5 years - 6%
- Area of farm forestry established - 9%

### 3 most commonly adopted CRP:

#### *-Biodiversity-*

- Area of trees and shrubs planted (including direct seeding) - 54%
- Area of native bush/grasslands fenced to manage stock access - 35%
- Area of trees and shrubs planted (including direct seeding) - last 5 years - 30%

### 3 least commonly adopted CRP:

#### *-Biodiversity-*

- Length of fencing erected to manage stock access to rivers/ streams/ wetlands - last 5 years - 7%
- Area of native bush/grasslands fenced to manage stock access - last 5 years - 19%
- Area of trees and shrubs planted (including direct seeding) - last 5 years - 30%

### NRM topics respondents reported highest knowledge:

- Grazing strategies to manage paddock ground cover to minimise soil erosion - 61%
- How to collect soil test samples - 53%
- The extent of water savings as a result of the Wimmera/Mallee pipeline - 49%

### NRM topics respondents reported lowest knowledge:

- The approximate per hectare returns for farm forestry in this district - 1%
- How to identify local plant species in the understorey vegetation - 4%
- The extent of gully erosion across the Wimmera region - 5%

## Appendix 2

### Social & farming variables - significant differences by RMU (N=500)

RMU	n	Area leased, share farmed or agisted from others (median ha)	Area leased, share farmed or agisted to others (median ha)	Property size (median ha)	Years owned or managed their property	Have completed a short course	Hours per week worked on-farm past 12 months	Days worked off-farm past 12 months	Hours per week volunteered past 12 months
Desert Sands	15	0	640	950	18	46%	50	0	3
Flat Grey Plains	27	0	98	459	30	42%	25	7	3
Grampians Group	11	0	15	28	22	18%	12	0	0
Mallee Calcarous Plains	40	278	298	781	28	58%	50	0	2
Northern Footslopes	119	0	48	163	18	34%	20	3	2
South West Wimmera Plains	83	0	404	800	25	42%	40	0	2
Undulating Alluvial Plains	11	120	125	320	12	50%	45	18	2
West Wimmera Plains	107	241	300	800	27	55%	50	0	2
Wimmera Plains	87	70	187	886	33	62%	50	0	2
<b>Overall</b>	500	0	202	630	25	47%	45	0	2
		Kruskal Wallis Rank Sum test	Kruskal Wallis Rank Sum test	Kruskal Wallis Rank Sum test	Kruskal Wallis Rank Sum test	Proportions Test	Kruskal Wallis Rank Sum test	Kruskal Wallis Rank Sum test	Kruskal Wallis Rank Sum test
<b>p-value</b>		0	0	0	0	0.0017	0	0.0006	0.0416

## Appendix 2

### Social & farming variables - significant differences by RMU (N=500)

RMU	n	Years resident in district (median)	Are a member of a Landcare group	Off-farm income range (median)	Property improvements or 'vision' accomplished	Age when succession plan is put into effect	Had involvement in Local Action Plan	Absentee owners
Desert Sands	15	41	36%	\$20,000 to \$30,000	halfway	65.0	none	60%
Flat Grey Plains	27	46	60%	\$30,000 to \$40,000	early stages	60.0	some	15%
Grampians Group	11	20	18%	\$30,000 to \$40,000	early stages	75.0	none	20%
Mallee Calcarous Plains	40	49	50%	\$20,000 to \$30,000	halfway	68.5	little	15%
Northern Footslopes	119	30	43%	\$30,000 to \$40,000	early stages	65.0	none	37%
South West Wimmera Plains	83	44	24%	\$20,000 to \$30,000	halfway	65.0	little	24%
Undulating Alluvial Plains	11	21	56%	\$20,000 to \$30,000	early stages	60.0	little	27%
West Wimmera Plains	107	48	47%	\$10,000 to \$20,000	halfway	60.0	none	7%
Wimmera Plains	87	51	31%	\$10,000 to \$20,000	halfway	65.0	none	21%
Overall	500	45	39%	\$10,000 to \$20,000	halfway	65.0	none	22%
		Kruskal Wallis Rank Sum test	Proportions Test	Kruskal Wallis Rank Sum test	Kruskal Wallis Rank Sum test	Kruskal Wallis Rank Sum test	Kruskal Wallis Rank Sum test	Proportions Test
<b>p-value</b>		0	0.0034	0.0006	0.0063	0.0276	0.0232	0

## Appendix 2

### Social & farming variables - significant differences by RMU (N=500)

RMU	n	Lived elsewhere prior to managing property	Male survey respondent	Main occupation is a farmer	Member of a local commodity group	Have employed a consultant	Have used a Rural Financial Councillor	Had an on-property profit
Desert Sands	15	40%	93%	57%	7%	36%	29%	21%
Flat Grey Plains	27	42%	88%	60%	36%	60%	16%	50%
Grampians Group	11	78%	73%	9%	0%	18%	0%	18%
Mallee Calcarous Plains	40	37%	95%	82%	39%	50%	28%	45%
Northern Footslopes	119	65%	78%	36%	13%	43%	6%	26%
South West Wimmera Plains	83	49%	89%	74%	19%	24%	13%	47%
Undulating Alluvial Plains	11	33%	78%	56%	25%	56%	33%	38%
West Wimmera Plains	107	30%	94%	85%	24%	48%	26%	29%
Wimmera Plains	87	33%	91%	85%	38%	31%	22%	38%
Overall	500	43%	88%	67%	24%	35%	17%	35%
		Proportions Test	Proportions Test	Chi-squared Test	Proportions Test	Proportions Test	Proportions Test	Proportions Test
<b>p-value</b>		0	0.0101	0	0.0003	0.0032	0.0016	0.0323