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Exploring landholder willingness and capacity to manage dryland salinity: the Goulburn Broken Catchment

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Surveys were completed by landholders in the Goulburn Broken Dryland between August and October 1999. The authors would like to thank those landholders that completed the surveys.

TABLE OF CONTENTS

Page No.

LIST OF TABLES AND FIGURES

LIST OF MAPS

1.0 EXECUTIVE SUMMARY

The stimulus for this research was the realisation by stakeholders in the Goulburn Broken Catchment (GBC) that despite considerable effort, adoption of best-practices such as farm forestry, revegetation of recharge zones and perennial pastures has been slower than is required to arrest dryland salinity. Subsequent findings from the Murray-Darling Basin Commission (MDBC) Salinity Audit suggest the impact of dryland salinity, including off-site impacts on downstream water quality, will be greater than expected, reinforcing the need for action.

Part of the problem is that dryland salinity in the Murray-Darling Basin (MDB) often originates in the steeper foothills characterised by low fertility and high acidity where sheep and cattle grazing have been the dominant enterprises. Given current poor returns from grazing, most landholders cannot afford remedial lime and fertiliser regimes required to maintain introduced pastures and prevent a downward spiral in property incomes. The amalgamation of smaller, less profitable enterprises into larger units has occurred, but not on the scale expected. Within commuting distance of larger regional centres there has been considerable conversion and subdivision of existing holdings into lifestyle farming enterprises for retirees and people with off-property work. At the same time, Australia has an ageing rural population with life expectancy increasing and younger people relocating to urban centres. It can no longer be assumed that inter-generational transfer of properties will occur within families and that older landholders will be able to move off their properties on retirement.

Against this background, the MDBC, the Victorian Department of Natural Resources and Environment (DNRE) and the Goulburn Broken Catchment Management Authority (GBCMA) funded this study in the Goulburn Broken Dryland (GBD) to explore social factors affecting landholder capacity to implement changes in land management. An important element of this research was a mailed survey to a random selection of landholders in the GBD during 1999. Surveys were directed to rural land owners of properties larger than 4 hectares. The overall response rate for the mailed survey was 47 per cent with 480 completed surveys returned. Survey findings have been reviewed by an expert panel, which was part of their role in developing policy options to enhance natural resource management outcomes in the GBD.

Only a small proportion of survey respondents indicated that they had salinity problems and most were not concerned about the impact of salinity. Awareness of salinity problems on properties matched current distributions of saline ground water and discharge sites. While these findings indicate that landholders have a good understanding of where salinity is currently visible, it is unlikely that landholders are prepared for the significant increase in salinity impacts forecast by the recent MDBC Salinity Audit.

Survey findings suggest there was a link between landholder concern about the impacts of salinity and taking remedial action. A strong case could be advanced that high awareness of current salinity and generally positive attitudes of landholders reflect, at least in part, the effectiveness of past community education programs. There continues to be an important role for community education activities that raise awareness of salinity impacts and increase understanding of the complex processes contributing to land and water degradation. These activities will need to engage the wider regional community, not just rural landholders, if effective responses are to be developed.

Most respondents had positive attitudes towards conservation, working together, working with government and accept that individuals have most responsibility for work on their property to address salinity. Most respondents say that they have access to sufficient information to make informed decisions about adoption of best-practices.

Respondents with larger properties have adopted best-practices on a larger scale. Smaller property owners were however, adopting some best-practices at levels representing a higher proportion of their properties. It seems there is considerable interest in changing management practices amongst owners of both small and large properties.

A relatively small proportion of landholders owned most of the land, with 91 per cent owned by the 47 per cent of respondents with properties larger than 150 hectares. Farmers represented 54 per cent of respondents but owned 83 per cent of all land covered in the survey. There were some links between farming as an occupation and lower adoption of best-practices. This information suggests that efforts to improve implementation of GBDSMP goals should focus on farmers and larger property owners. At the same time, subdivision of properties is expected to continue and landholders with small properties also manage critical areas contributing to salinity. The reality is therefore, that resource managers will need to work with the owners of both small and large properties.

There were significant positive relationships between on-property profitability and the scale of adoption of best-practices. Off-property income exceeded on-property income, but neither off-property or total household income were linked to higher adoption of best-practices. It is possible that landholders earning income off-property are reluctant to invest in on-property enterprises.

Most landholders did not make an on-property profit and only 22 per cent of all landholders and 15 per cent of farmers had a total household income above $50,000. This is the threshold that is considered the minimum to sustain a family and provide sufficient funds to maintain the natural and capital assets of a property.

The small number of respondents and small median areas allocated to the emerging and potentially profitable enterprises, such as wine grapes and horticulture, suggests that these enterprises will not overcome low on-property profitability in the short-term. Trends for increased involvement in these emerging enterprises does suggest that landholders are willing to explore new options. Consideration should be given to directing community education resources to support landholder adoption of emerging enterprises.

Most landholders do not have the financial capacity to introduce new enterprises or change management practices on their properties. Where there is discontinuity between the source of salinity and salinity impacts, it may be difficult to change land management practices in the recharge areas. If salt loads originating in the GBD are a critical issue for the rest of the catchment and/or the MDB, this needs to be acknowledged and addressed through cost-sharing with downstream landholders; supporting landholders to move into profitable emerging enterprises; and government funding for natural resource management.

Non-farmers comprised almost half of all survey respondents. Involvement in off-property work contributed to high median hours worked and suggests there are limits to the capacity of most landholders to undertake voluntary conservation work.

Forty-nine per cent of respondents were over 55 years and 23 per cent were over 65 years. In this study older age was not associated with lower adoption of best-practices. Most respondents expect to continue living on their property in the long-term. This trend and increased life expectancy, suggest that inter-generational transfer of many properties will not occur for some time. Resource managers must therefore adopt a positive approach to working with older landholders.

Contrary to expectation, there was little evidence of a link between the likelihood that a property will pass to other family members and adoption of best-practices.

Forty-five per cent of the properties in the GBD were expected to change hands in the next 10 years. Many of these will be offered for sale over the next five years and this provides an opportunity for intervention by government or industry.

Whatever actions are contemplated, it is important to recognise that there are significant differences across Land Management Units (LMUs) in the GBD, including involvement in Landcare; median property size; landholders who are farmers; extent of on-property income; and total household income.

2.0 INTRODUCTION

This report presents a summary of key findings from a mailed survey to landholders in the Goulburn Broken Dryland (GBD) in 1999.

The landholder survey was stage two of a three-year collaborative project between the Department of Natural Resources and Environment (DNRE), the Murray-Darling Basin Commission (MDBC), the Goulburn Broken Catchment Management Authority (GBCMA) and Charles Sturt University (CSU).

The larger project aims to identify a mix of policy options that will improve the adoption of best-practices identified in the Goulburn Broken Dryland Salinity Management Plan (GBDSMP). This was to be accomplished in five stages.

1. A desk-top literature review and interviews with key stakeholders to identify:
   - key social factors affecting implementation of the GBDSMP at landholder and institutional levels; and
   - best-practices contributing to GBDSMP implementation, which can also be used to analyse the factors affecting adoption (Stage 2) and assess the likely impacts of policy initiatives (Stage 5).
2. A mailed survey of landholders to explore key social factors affecting implementation of the GBDSMP.
3. Use data from the mail survey of landholders, a literature review of natural resource management policy approaches in Australia and an expert panel to identify policy options that would improve implementation of a revised GBDSMP.
4. A mailed survey to assess potential landholder response to selected policy options.
5. A final report summarising recommended policy options for the GBD and reflecting on the extent that the project methodology represents a cost-effective and useful approach that can be applied to other Australian catchments.

Research funds and in-kind contributions were made by the MDBC, DNRE, GBCMA and CSU. Allan Curtis (CSU) is the project leader and Mark Cotter coordinates the project for DNRE.

3.0 BACKGROUND

3.1 The location and character of the Goulburn Broken Dryland

The Goulburn Broken Catchment (GBC) is located in North East Victoria and includes the Goulburn River and the Broken River catchments. The catchment covers a total area of 2.3 million hectares (17 per cent of Victoria), including approximately 1.9 million hectares of non-irrigated land, known as the GBD (GBCLPB 1996; GBCMA 1998). Irrigated land in the GBC produces 25 per cent of Victoria's export earnings worth $4.5 billion in economic output per year (GBCMA 1998).

The GBD includes the major townships of Benalla, Euroa, Seymour, Mansfield, Nagambie and Broadford, and supports major agricultural industries, food processing, forestry and tourism activities (GBCMA 1998).

Significant land and water degradation and loss of biodiversity has arisen in the GBD. Issues identified by the GBCMA (1998) included dryland salinity; soil acidity and sodicity; higher levels of nutrients in waterways; pest plants and animals; property viability; urban fringe issues; and soil and stream erosion.

3.2 The Goulburn Broken Dryland Salinity Management Plan

In the early 1980s, the Victorian Government initiated an inquiry into land and water salinity. This inquiry led to the establishment of a Natural Resources and Environment Committee of Cabinet. In May 1988, the government endorsed the Salt Action-Joint Action report and the *Salinity Control Strategy* prepared by that committee. This strategy proposed the establishment of salinity management plans for 19 sub-regions, beginning with a pilot program in the GBD. The GBDSMP that evolved from this pilot program was completed in August 1989 and endorsed by government in June 1990 (GBCLPB 1996).

The GBDSMP embraced environmental, social, economic and financial objectives [outlined in Figure 1], to be achieved through a mix of strategies.

- Recharge area control strategies including:
  - tree planting;
  - perennial pastures;
  - introduce deep rooted crop species and eliminate fallowing; and
  - groundwater pumping.
- Discharge area control strategies including:
  - perennial pastures establishment;
  - salt tolerant species establishment;
  - fencing and management of grazing to encourage natural vegetation; and
  - physical rehabilitation.

Some landholders doubted the viability of introduced perennial pastures due to soil acidity and aluminium toxicity. Research also suggested that low density tree planting has minimal impact on recharge control (GBCLPB 1996). As a result of the low uptake of the perennial pasture and low density tree planting options, break-of-slope tree planting was introduced as an additional control strategy.

FIGURE 1
Objectives of the GBDSMP (GBCLPB 1996)

Environmental Objectives	• To protect land and water ecosystems from the effects of salinity and, where feasible, undertake rehabilitation measures; • To protect, restore and enhance wetlands, rivers and streams threatened by salinity to ensure that ecological processes, native species, and features of scientific, cultural or scenic interest are maintained; • To use ecologically sustainable land management practices to control salinity and other forms of land degradation, to protect the environment; and • To develop community awareness of salinity threats to the environment and encourage involvement in environmental matters by increasing environmental education opportunities for the whole community.
Social Objective	• Where possible, the plan is to provide the community with equal access to decision making and the economic resources required for salinity control works. The plan will reduce inequalities resulting from uncontrolled salinity impacting differently on individuals.
Economic Objective	• Where salinity control works are undertaken to protect the land and water values of the region, the total value of their impacts both measurable and non-measurable should exceed their cost to the government and the community.
Financial Objective	• The plan is to be both equitable and affordable to the individual, the regional community and the nation, now, and in the future.

3.3 Land Management Units

The GBD was divided into 14 land management units (LMUs) based on geological and hydrogeological characteristics of the land [Map 1]. Each LMU has common causes and effects, downstream consequences and control options for salinity (SPPAC 1989). LMUs identified as having high impacts on both land and water salinisation were given higher priority in the GBDSMP (LMUs 6 and 7a). LMU 13 was given high priority status because basalt rock and soils contribute to high recharge, which is subsequently discharged into LMUs 6 and 7a (GBCLPB 1996). The potential salinity threat in LMU 10, which is both a discharge and recharge area, was not identified until recently (Cotter pers. comm. 1999; Fontana pers. comm. 1999). The relative priority given to each LMU in the GBD is summarised in Figure 2.

A plastic overlay with the 14 LMUs labelled has been included in a pocket at the back of this report to overlay on maps.

FIGURE 2
Current priority order of GBD Land Management Units (LMUs)
(adapted from GBCLPB 1996)

Priorities for Salinity Control Practices	Land Management Units for the GBD
Very High Priority	6, 7a, 10 & 13
High Priority	1, 2, 3 & 5
Medium Priority	Subcatchments of 7
Lower Priority	4 & 11
Low significance for salinity	8, 9 & 12

4.0 METHODOLOGY

4.1 Introduction

The stimulus for this research was the realisation by key stakeholders in the GBC that despite considerable investment of resources, uptake of land management best-practices was not occurring at rates that would achieve GBDSMP targets. Subsequent findings from the MDBC Salinity Audit (MDBC 1999), which suggest the impact of dryland salinity, including off-site impacts on downstream water quality, will be greater than expected, reinforces the need for action.

The Johnstone Centre, at CSU, was contacted to help develop and then undertake a research project that would provide better understanding of socio-economic factors affecting landholder willingness and capacity to implement changes to their land management practices in the GBD.

A mailed survey was seen as a critical element of this research. Surveying landholders over an area as large as the GBD is a challenging, time-consuming and expensive task. If there are other data sources available, they should be examined to avoid duplication of research effort. Other organisations, such as the Australian Bureau of Agriculture and Resource Economics (ABARE) and the Australian Bureau of Statistics (ABS), collect data on households and farms. In recent times there have been attempts to interpret these data bases and identify important social trends in rural Australia (Barr and Ridges 1998; Haberkorn *et al.* 1999). In both instances, publication of findings occurred after the commencement of this project. Discussions with Neil Barr ensured that variables identified from his important, but then unpublished work, were incorporated in the 1999 survey. However, analyses using these data bases have their limitations for those developing policy at the regional scale. Few questions used by ABARE or ABS directly assess factors affecting landholder capacity to change practices or enterprises. Researchers are often forced to infer from the available data and their findings can be misleading in that important variables were not able to be considered. Furthermore, data is only available to the public in aggregated form, the smallest scale being census collector districts that combine data for about 200 households. Aggregation reduces the usefulness of data, particularly when sub-regional or LMU contexts are important, as for the GBD.

Section 5.00 - Findings, of this report has been organised to respond to key research questions described in section 4.02. In section 5.00, a summary of specific survey questions is provided as an introduction to each key research question. Details of specific questions are also provided in the numerous tables in section 5.00. As a copy of the 12 page survey booklet is not included, the main topics in the survey are listed below.

- Landuse/ enterprise mix on your property.
- Management practices on your property.
- Capacity to change your enterprise mix.
- Views about salinity in your area.
- Planning on your property.
- Your long-term plans.
- Background information.

As part of the process of identifying variables to be included in the mailed survey, the research team examined the GBDSMP, held discussions with key stakeholders and conducted a literature search. Sections 4.03, 4.04 and 4.05 discussing background to this research, best-practices and enterprise options provide an overview of the logic behind the selection of variables for inclusion in the survey.

4.2 Key research questions for Stage 2: the mailed survey

The main purpose of collecting survey data was to explore the impact of factors expected to explain variance in the adoption of best-practices.

1. What is the status of variables expected to affect the capacity (financial or otherwise) of landholders in the GBD to change practices or enterprises? This information should:
   - assist analyses attempting to answer the remaining key questions;
   - provide benchmark information for future studies in the GBD; and
   - be a valuable source of information for those attempting to understand the social dimension of natural resource management in the GBD.
2. How important are these variables in explaining landholder adoption of the best-practices likely to enhance GBDSMP outcomes?
3. To what extent are landholders entering non-grazing enterprises, such as farm forestry and horticulture, and is this trend likely to enhance on-property profitability and financial capacity to adopt best-practices?
4. Are there significant differences in the status of variables at the LMU scale?
5. Does this research methodology represent a cost-effective and useful approach that can be applied to other Australian catchments?

4.3 Background to this research

4.3.1 Awareness, knowledge and skills and attitudes

Government has assumed that at least part of the explanation for landholders not adopting best-practices was that they were unaware of important land degradation issues; lacked sufficient knowledge and skills; or had attitudes that emphasised short-term economic returns over maintaining the long-term health of the land (ASCC 1991; MDBC 1990). There has been a large investment of resources over the past ten years in awareness raising and education programs, including those carried out by Landcare groups. There is credible evidence that these activities contribute to increased awareness and understanding, enhancing landholder capacity to adopt best-practice (Vanclay 1992; Curtis and De Lacy 1996). Links between attitudes such as stewardship and landholder behaviour, are more problematic in that most landholders already have a strong stewardship ethic and stewardship is not linked to increased adoption of best-practices (Curtis and De Lacy 1998).

4.3.2 Low profitability of grazing constrains financial capacity to change

Effort to improve natural resource management outcomes can focus on changing specific practices or the mix of on-property enterprises. However, it is unlikely that practices and enterprises that are unprofitable will be adopted. At the same time, low property income will constrain the financial capacity of landholders to adopt new practices or new enterprises. Sheep and cattle grazing have been the dominant enterprises in the GBD. Given poor current returns from grazing, most landholders cannot afford remedial lime and fertiliser regimes required to maintain pastures and prevent the decline in grass production which effects water uptake and eventually, property income (Millar and Curtis 1997).

4.3.3 Economic incentives required

Landholders are increasingly aware that, in a period of low property incomes, they are being asked to implement management practices that have community benefits in terms of biodiversity conservation, improved public health and protecting export income (agriculture and tourism). They also understand that many of the problems that they are being asked to address, have resulted from previous government policies. There are also issues of inter-generational equity in that the current generation of landholders is being asked to fix problems that have often been inherited. Establishment of the Natural Heritage Trust (NHT), with the Federal government sharing the costs of large-scale onground work on private land, was an acknowledgment of the legitimacy of these arguments (Curtis and Lockwood 2000).

4.3.4 Other drivers of change

Most broad acre farming enterprises in the MDBC are unprofitable using a benchmark of financial sustainability supplied by Barr and Ridges (1998). The benchmark assumes that a disposable family income exceeding $50,000 per year is required to sustain a household and fund investment in a farm's natural and capital resources (Rendell *et al.* 1996). The assumption has been that unprofitable farmers would sell their properties to more profitable farmers. In this process of adjustment, smaller properties would be amalgamated into larger units. While the amalgamation of some smaller grazing properties into larger units has occurred, it has not taken place on a large scale or uniformly (Barr and Ridges 1998). Within commuting distance of larger regional centres there has been considerable conversion and subdivision of existing holdings into lifestyle farming enterprises for retirees and people with off-property work. Land prices based on rural residential use will militate against the aggregation of smaller and less viable grazing holdings. Closer settlement may also impose environmental controls on broad acre farming (Garnaut *et al.* 1999; Barr and Ridges 1998). Non-farmers and retirees may respond less quickly to economic signals; be more averse to risking off-property income in on-property enterprises; and will possibly have less time for property management. On the other hand, non-farmers may bring new ideas, skills and financial resources that contribute to local communities and they may be more likely to respond to appeals for biodiversity conservation.

Australia has an ageing rural population with life expectancy increasing and younger people moving from rural areas to the more prosperous and attractive lifestyles in urban centres (Haberkorn *et al.* 1999). It can therefore no longer be assumed that a substantial proportion of the inter-generational transfer of properties will occur within families. Where family succession is unlikely, property owners may be less willing to invest in best-practice or new enterprises. In an era of reduced property profitability and lower land prices, particularly where demand for rural subdivisions is not high, some of these ageing landholders may feel they are locked into living on their properties in retirement. With increasing life expectancy, property transfer could be delayed. These elderly property owners may also be less willing to invest in best-practices or new enterprises. In a recently published review, Guerin (1999) found that existing studies showed no clear correlation between landholder age and adoption, suggesting that this was an important area for future investigation.

Farm forestry has been identified as a profitable option for many landholders and is an important element of strategies attempting to achieve revegetation for improved land and water management. Farm forestry has been promoted by Federal and State programs combining, amongst other things, awareness raising, training and financial incentives (Curtis and Race 1995). Despite considerable effort, adoption of farm forestry has been very slow. Research in farm forestry by Curtis and Race (1996a), indicated that some of the key factors affecting the willingness of landholders to change practices or enterprises include:

- stage of life of the landholder;
- likelihood of property transfer within the family;
- relative importance of on-property and off-property income, including the extent a property is an investment in a lifestyle;
- extent a practice or enterprise is consistent with existing practices and local social norms; and
- concerns about monopolies in regional markets.

The authors believe these are important topics that have been inadequately explored in the past. Considerable survey space was allocated to questions exploring these topics.

4.3.5 Need for a different mix of policy options

Resource degradation can be attributed to a lack of awareness of issues, poor knowledge and skills amongst landholders and limits to the willingness or financial capacity of landholders to change practices or enterprises (Vanclay 1992). Resource degradation has also resulted from market failure to value nature conservation or to recognise resource degradation as a production cost. The government's failure to

adequately resource or support conservation efforts has also contributed to the degradation (Curtis and Lockwood 2000).

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

- legislation or regulations to create the institutional framework for management, set aside areas of land, and enforce standards and prohibitions;
- self regulation;
- research to clarify problems, develop solutions, and monitor environmental conditions;
- education to convince people of the need to change behaviour, gain support for policies, and ensure the ability to apply policy instruments; and
- economic measures such as charges, subsidies, penalties, and tradeable permits to assist efficient allocation of resources and equitable distribution of costs and benefits.

4.3.6 Importance of understanding regional contexts

This research recognises that regional catchments are, increasingly, the scale at which natural resource management occurs in Australia. Understanding and monitoring critical social processes and trends, is an important part of the management that regional Catchment Management Committees/Authorities (CMCs) and agency staff need to do. In turn, regional experience should inform the development of national policies. There are also considerable differences at the sub-regional scale. There are differences in the physical settings of the GBD LMUs identified earlier, as well as some obvious contrasts in terms of proximity to larger regional centres, commuting time to Melbourne and the extent of rural subdivision. This suggests that there will need to be sub-regional differences in the policy mix implemented by the GBCMA and other organisations.

4.4 Best-practices

The GBDSMP established implementation targets for a range of best-practices or indicators for each LMU. The achievement of these targets has been monitored by the Dryland Implementation Committee of the GBCMA as part of plan implementation (DICGBCMA 1997). It was not intended that 1999 GBD landholder survey data would contribute to this monitoring process. The main purpose of collecting survey data was to explore the impact of factors expected to explain variance in the adoption of best-practices.

Respondents were asked to indicate the area of their property covered by each of the practices listed below which might be expected to improve the management of rising water tables.

1. All trees planted (combining the area of farm forestry and other trees, excluding remaining native bush).
2. Area of property sown to introduced perennial pastures.
3. Area of remnant native vegetation and waterways fenced to manage stock access.
4. Area of property where grazing or fertiliser regimes have been changed to encourage native perennial grasses.
5. Area of high density or intensive grazing.
6. Number of groundwater pumps installed to lower ground water levels.

Respondents were asked to indicate if the area of their property under different practices had changed over the past five years and for farm forestry and other trees, to indicate their aims for the upcoming five years.

Property size is likely to be a major influence on the area where a best-practice is implemented. Analyses were conducted using both the total area and the proportion of the total property where each best-practice was implemented.

4.5 Enterprise mix

Respondents were provided with a comprehensive list of land uses/enterprises. The list included both the more established and now declining enterprises, such as sheep and cattle grazing, as well as the emerging and more profitable enterprises, such as farm forestry, dryland cropping, lucerne, horticulture and wine grapes. The latter enterprises were assumed to involve implementation of best-practices, or were likely to generate returns that would enhance the financial capacity of landholders to adopt best-practices.

Amongst other things, respondents were asked to indicate:
- the area under different landuses/enterprises at September 1999;
- the extent this area had increased or decreased over the past five years; and
- the area they aimed to have under different landuses/enterprises over the next five years.

4.6 The mail survey process

A total of 6,449 rural properties were identified in the GBD from Country Fire Authority (CFA) rural property maps. These property listings were entered into a spreadsheet and a random sample of 1,640 properties was generated. Some re-weighting of the random sample was conducted to ensure that all 14 LMUs had a statistically useful number of landholders. Property mailing addresses were compiled from electoral rolls and phone books. Councils in the GBD were contacted to help with compilation of the mailing list. This process met with limited success. Shires in the area are currently in the process of compiling lists of "rural roadside numbers" to identify rural properties. At the time of the survey mailout, these lists were incomplete and unavailable.

The survey design and mail out process were undertaken using Dillman's (1979) *Total Design Method*. Pretesting of the survey was undertaken in two-hour workshops at Broadford and Tungamah. The first mailout of surveys took place on August 19, 1999. A reminder card was sent out one week later, with a second reminder card mailed on September 3, 1999. Six weeks after the initial survey mailout, another copy of the survey and a brief letter was sent to landholders that had not responded. The second mailout was followed by another two reminder cards, on October 6 and 18, 1999. In the second mailout it was indicated that landholders of properties less than 4 hectares in size were not required to respond to the survey. Any responses that were received from landholders with properties less than 4 hectares, were not included in the analyses.

A number of respondents did not complete one of the questions in the survey. This question was re-mailed to 56 landholders, with revised directions, to which 50 landholders responded. Some respondents did not indicate the size of their properties. A card was mailed to them asking that they indicate the size of their property and the units of measurement. A total of 101 landholders were sent the card, with 62 returning it. The remaining landholders were contacted by telephone. Overall, 88 of the 101 landholders contacted provided the property size information.

An overall response rate of 47 per cent was achieved. Surveys that were returned to sender or sent back due to the landholder no longer residing at the property, were taken off the original sample along with those where the landholder was too old, ill or deceased or the property had been sold. This left a final sample of 1021, with 480 completed surveys returned. Only two completed surveys were returned from LMU 9. Any results of analyses for LMU 9 need to be interpreted with caution and no significant conclusions should be drawn from these. Appendix A provides a summary of the survey response rates for the GBD and individual LMUs.

4.7 Data Analysis

The main forms of data analysis used in this research are listed below.

- Descriptive statistics, including the use of means, medians, range and totals, were used to provide summaries of responses to each survey question.
- Bivariate analyses, using Spearman, Pearson and Gamma correlations, were used to explore relationships between variables. For example, to explore the extent of a relationship between a dependent variable, such as a best-practice like tree planting, and an independent variable, such as Landcare participation, that may be related to the adoption of tree planting.
- Multi-variate analyses, using stepwise multiple regression, were used to determine the extent two or more independent variables, identified by bivariate analysis as correlated with a dependent variable, contributed to changes in the dependent variable.
- Chi square tests, using Kruskal-Wallis H and Crosstabs Chi square, were used to establish whether variations between the scores of different groups on a particular variable were in fact significantly different. That is, the difference observed was unlikely to have occurred simply by chance.

Notation:

r_s: The correlation coefficient (bivariate).

t: The t statistic, used to help determine the relative importance of variables in the multiple regression model (multivariate).

χ^2: The chi square statistic.

df: Degrees of freedom (the number of categories minus 1).

p: The significance level or probability of results occurring purely by chance (if greater than 0.05, the relationship is due to chance and not significant).

A finding of a significant relationship between variables under multi-variate analysis is a much stronger indication of a real relationship than a similar finding under bivariate analysis. One way to explain this is to use an example. Higher education and younger age are often correlated with higher levels of concern for the environment. In most parts of rural Australia, educational opportunities have increased since the 1950's and so higher education is often associated with younger age. Multi-variate analysis can take the relationship between age and education into account and identify the extent that each variable contributes to higher levels of concern for the environment.

All statistical analyses were performed using the SPSS statistical package.

4.8 Limitations of this research

No research instrument is able to collect data on all possible variables and therefore, some variables are not addressed in this research. Ultimately, professional judgement was used by the research team to determine the variables included in the survey.

It was not possible to collect information across time. This is an important limitation given the results of Barr and Ridges (1998) that identified important temporal trends across the MDB. The 1999 GBD survey should be followed by another survey, say in 5 years time. It would then be possible to identify trends over time

The response rate suggests that survey data should be representative of GBD landholders. Nevertheless, 53 per cent of the sample did not respond and survey findings may be unrepresentative. Overall, the response rate is sound, however there were some individual questions where a poor response rate was achieved. In these cases, the issue has been highlighted in the report, or that topic has been excluded from the report.

5.0 FINDINGS

5.1 Awareness of issues

Only landholder awareness of salinity was explored in the mailed survey. The key question asked respondents to indicate if there were areas on their property where plants showed signs of the effects of saline water. Respondents were then asked to indicate the total area of land affected on their property. This information was then compared with the map of saline discharge sites developed by DNRE (Allan *et al.* 1997); the recently updated DNRE map layer (CLPR 2000); and maps of water table depth and ground water salinity levels developed by Sinclair Knight Merz (SKM) (SKM 2000). Respondents were also asked to indicate their level of concern for potential economic, social and environmental impacts of salinity at both the property and wider community scales. Other questions asked if respondents were confident that onground work would be undertaken which would manage salinity problems in their area; and if they were more concerned about commodity prices than salinity.

5.1.1 Areas where plants show signs of salinity

Only 13 per cent of respondents indicated that they had areas where plants showed signs of the effects of saline water [Table 1]. For the critical LMUs (6, 7a, 10 and 13), between 15 per cent and 25 per cent of respondents indicated they had areas where plants showed signs of the effects of salinity. For most respondents, the area affected was relatively small (median 4.0 hectares, 63 per cent with one to five hectares).

There were no significant differences across the LMUs in the proportion of landholders reporting salinity [Table 1]. Amongst the four critical LMUs, salinity problem areas were reported by 25 per cent of respondents in LMU 6, 18 per cent in LMU 7a, 16 per cent in LMU 10 and 15 per cent in LMU 13 [Table 1].

TABLE 1
Area of property where plants showed effects of salinity
by Land Management Unit (LMU)
Goulburn Broken Dryland, 1999 (N=480)

LMU	Area of property where plants showed signs of the effects of salinity (ha), % respondents for each category								
	n	% 'yes' (n)	1-5	6-10	11-30	> 30	Mean	Median	Total
1	9	56% (5)	60%	20%	20%	0%	5.96	3	30
2	13	15% (2)	100%	0%	0%	0%	1.20	1	2
3	15	27% (4)	25%	25%	0%	50%	45.75	43	183
4	73	2.7% (2)	100%	0%	0%	0%	2.40	2	5
5	25	16% (4)	75%	0%	25%	0%	7.00	4	28
6	28	25% (7)	33%	33%	17%	17%	14.20	10	85
7	71	7% (5)	67%	33%	0%	0%	4.00	1.	12
7a	28	18% (5)	100%	0%	0%	0%	1.52	1.	8
8	25	8% (2)	50%	0%	50%	0%	12.50	13	25
9	2	0% (0)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
10	121	16% (19)	69%	15%	0%	15%	10.80	4	140
11	15	13% (2)	100%	0%	0%	0%	2.00	2	2
12	12	8% (1)	0%	0%	0%	100%	120.00	120	120
13	20	15% (3)	50%	50%	0%	0%	5.40	5	11

Total	457	13% (61)	63%	18%	8%	12%	13.28	4	651

Geographic Information Systems (GIS) analyses, using GBD survey data and data from DNRE (Allan *et al.* 1997) and SKM (SKM 2000) salinity mapping, suggested that respondents had a high level of awareness of current visible salinity indicators. Only four per cent of those reporting no effects of salinity on vegetation were within one kilometre of a discharge site on DNRE maps. Only 2.4 per cent of those reporting no effects of salinity had property with ground water within two metres of the surface and a total dissolved salt content higher than 3501 mg/L, as indicated by SKM maps. This is the level of total dissolved salt expected to impact on vegetation (Hoxley pers. comm. 2000).

Analysis of survey data did not establish a significant positive relationship between respondents reporting plants showing signs of salinity and adoption of best-practices [Table 3].

5.1.2 Concerns about the impact of salinity

Concern about economic, environmental and social impacts of salinity

Most respondents were not concerned about the potential economic, environmental or social impacts of rising water tables. For each of the nine topics in Table 4, less than 50 per cent of respondents indicated that they were 'alarmed/very concerned/concerned' about the impact of rising water tables. In summary, there were:

- similar levels of concern about economic and environmental impacts;
- relatively greater concern for long-term compared to short-term impacts; and
- relatively greater concern about impacts on the local area than on their property.

As might be expected, mean scores for each of the topics exploring concerns about the impact of rising water tables, were significantly lower in the GBD than for the same topics in a recent survey in the Shepparton Irrigation Region (SIR) (Byron *et al.* 1999). Nevertheless, the ranking of these topics was very similar in the two parts of the GBC. The exception being that in the GBD there appears to be relatively greater concern about the environmental impacts of rising water tables.

There were significant differences across the LMUs using an overall measure of concern about the impacts of rising water tables (χ^2=39.959, df=13, p< 0.001) [Table 2]. Using mean scores for all topics, concern was higher in LMUs 12 (highest), 11, 10, 1, 3, and 6, where more than 50 per cent of respondents indicated they were 'alarmed/very concerned/concerned' for several of the potential impacts. Concern was lower in LMUs 13, 2, 9, 5, 7a, 8, 7 and 4 (lowest) [Appendix B].

Under multi-variate analysis, using the proportion of the total property under each best-practice, there was a significant positive relationship between levels of concern about the impacts of salinity, and total trees established [Table 3]. This finding suggests there is a link between concern about the impacts of salinity and adoption of best-practices.

TABLE 2
Independent variables with significant differences across Land Management Units (LMU)
Goulburn Broken Dryland, 1999 (N=480)

Variables	Land Management Units (n)														
	1 (9)	**2 (14)**	**3 (15)**	**4 (80)**	**5 (26)**	**6 (31)**	**7 (73)**	**7a (29)**	**8 (25)**	**9 (2)**	**10 (127)**	**11 (15)**	**12 (13)**	**13 (21)**	**Total (480)**
1. Family has agreed to a plan for managing the transfer of the property to the next generation, % 'yes'	56%	7%	57%	34%	27%	20%	21%	15%	36%	100%	39%	27%	46%	24%	36%
2. Overall concern about the impact of rising water tables, % 'alarmed/very concerned/concerned'	47%	39%	54%	21%	32%	42%	25%	38%	31%	28%	47%	52%	45%	35%	38%
3. Have taken into account nature conservation values of some areas when planning work on property, % 'yes'	67%	39%	93%	77%	72%	77%	83%	73%	80%	50%	80%	67%	92%	76%	78%
4. Have written down personal and/or family goals to be achieved on the property, % 'yes'	22%	8%	57%	41%	38%	30%	26%	23%	28%	50%	35%	20%	8%	38%	30%
5. Landcare membership, % 'yes'	100%	50%	53%	70%	52%	19%	43%	36%	72%	50%	56%	73%	100%	20%	55%
6. Property size, median hectares	658 ha	40 ha	520 ha	116 ha	110 ha	40 ha	70 ha	21 ha	240 ha	192 ha	200 ha	350 ha	162 ha	56 ha	128 ha
7. Main occupation, % farmers	78%	36%	80%	52%	46%	36%	47%	25%	64%	0%	68%	73%	62%	40%	54%
8. On-property profit in last financial year (1998-99) before tax, % indicating a profit	100%	21%	50%	30%	42%	17%	28%	7%	44%	100%	52%	53%	33%	33%	38%
9. Total net income from on and off-property before tax, median	$50,000	$15,000	$22,500	$25,000	$25,000	$15,000	$30,000	$25,000	$25,000	$70,000	$30,000	$25,000	$25,000	$35,000	$25,000
10. Years of farming or living on a farm as an adult, median years	20	15	17	20	24	18	20	19	29	20	30	30	21	23	23
11. Have a property budget that is updated at least monthly, % 'yes'	22%	8%	43%	25%	15%	7%	17%	8%	40%	50%	26%	13%	0%	24%	21%
12. Time (hrs) spent on farming related activities, median	40	8	38	35	35	8	20	20	30	19	50	30	20	30	30

Note: above variables were found to be significantly different using Kruskal-Wallis H, nonparametric test for independent samples.

TABLE 3
Independent variables associated with the adoption of best-practices
Goulburn Broken Dryland, 1999 (N=480)

Unless indicated, best-practices are measured as a proportion of the total property under each practice						
Independent variables	**Area sown to introduced perennial pastures**	**Area of changed grazing/fertiliser regimes**	**Area of remaining native bush & waterways fenced**	**Total area of trees planted**	**Number of ground water pumps installed**	**Area of high density or intensive grazing**
Concern about salinity impacts (index)				**t=2.073, p=0.040**		
Concern about rising water tables being a threat to pasture production on respondent's property		***t=-1.993, p=0.049***				
More concern about commodity prices than effects of salinity			*r_s =-0.207, p=0.011*			
Property having plants showing signs of salinity			*r_s =-0.343, p=0.003*			***t=-2.876, p=0.005***
On-property profitability (total area of best-practice)	**t=-4.336, p<0.001**		**t=-2.889, p=0.005**			**t=2.285, p=0.027**
Off-property income			r_s =0.191, p=0.012			
Work on property partially funded by Federal or State government	***t=-2.439, p=0.017***					
Value of all government contributions to work on property	*r_s =-0.218, p<0.001*		***t=-2.589, p=0.023***	*r_s =-0.334, p<0.001*		*r_s =-0.317, p<0.001*
Hours worked on-property			*r_s =-0.412, p<0.001*		*r_s =-0.434, p=0.043*	
Hours worked off-property			**t=4.614, p<0.001**			
Property size (total area of best-practice)	**t=13.243, p<0.001**	**t=3.978, p=0.001**	**t=7.173, p<0.001**	**t=3.705, p<0.001**		**t=2.306, p=0.025**
Property size (proportion of total property under best-practice)	*r_s =-0.157, p=0.007*	*r_s =-0.281, p=0.004*	*r_s =-0.511, p<0.001*	***t=-2.008, p=0.047***		*r_s =-0.371, p<0.001*
Willingness to work with government			*r_s =-0.302, p=0.014*			
Acknowledgment that individual landholders must take responsibility for managing salinity				r_s =0.215, p=0.019		
Acknowledgment that local people must work together						*r_s =-0.330, p=0.028*
Acknowledgment that landholders need help from government to manage salinity				r_s =0.329, p=0.002		
Taking account of nature conservation values when planning work on property				r_s =0.417, p<0.001		*r_s =-0.298, p=0.021*
Taking account of a district, catchment or regional plan when planning work on property						*r_s =-0.288, p=0.002*
Having a written property plan that involved a map or other documents				**t=2.747, p=0.007**	*r_s =-0.525, p=0.002*	*r_s =-0.310, p=0.003*

Note: *Italics* denotes a negative relationship and **Bold** indicates variables significant under multi-variate analysis as well as bivariate analysis.

TABLE 3 continued
Independent variables associated with the adoption of best-practices
Goulburn Broken Dryland, 1999 (N=480)

Unless indicated, best-practices are measured as a proportion of the total property under each practice						
Independent variables	**Area sown to introduced perennial pastures**	**Area of changed grazing/fertiliser regimes**	**Area of remaining native bush & waterways fenced**	**Total area of trees planted**	**Number of ground water pumps installed**	**Area of high density or intensive grazing**
Having written personal and/or family goals to be achieved on property						***t=-3.065, p=0.003***
Including the cost of work to address salinity in property budget		***t=-2.560, p=0.012***				*r_s =-0.356, p=0.001*
Family having agreed to a plan for managing the transfer of the property to the next generation						*r_s =-0.210, p=0.039*
Having a property budget that is updated at least monthly				r_s=0.239, p=0.006		*r_s =-0.248, p=0.018*
Taking into account neighbours property layout when planning work on property	*r_s =-0.199, p=0.006*					*r_s =-0.301, p=0.002*
The property will be sold		**t=4.246, p<0.001**				
All or most of property will be leased						***t=-2.995, p=0.004***
Plan to continue to live on property		*r_s =-0.209, p=0.018*				
Plan to keep ownership of property within family		*r_s =-0.287, p=0.013*				
Age	r_s=0.157, p=0.008		r_s=0.160, p=0.002			
Number of years lived in local area			*r_s =-0.212, p=0.002*	*r_s =-0.103, p=0.027*	*r_s =-0.652, p=0.001*	
Age at which respondent began farming			r_s=0.328, p=0.001			
Number of years experience as a farmer			*r_s =-0.187, p=0.006*			
Number of children	***t=-2.568, p=0.009***		*r_s =-0.212, p=0.011*	r_s=0.192, p=0.023		
Farming as an occupation (total area of best-practice)			***t=-2.068, p=0.042***	***t=-2.450, p=0.015***		
Farming as an occupation (proportion of total property under best-practice)			*r_s =-0.534, p<0.001*		*r_s =-0.663, p=0.009*	*r_s =-0.191, p=0.047*
Landcare membership	***t=-2.332, p=0.022***		*r_s =-0.301, p<0.001*	r_s=0.270, p=0.002		*r_s =-0.304, p=0.001*
Gender (being female)					r_s=0.887, p=0.035	
Education			r_s=0.165, p=0.019			

Note: *Italics* denotes a negative relationship and **Bold** indicates variables significant under multi-variate analysis as well as bivariate analysis.

TABLE 4
Concern about the impact of rising water tables on respondent's property and the local area Goulburn Broken Dryland, 1999 (N=480)

Potential impacts	n	Extent of concern about rising water tables, % respondents for each category					Mean score**
		alarmed	very concerned	concerned	very small concern	not a problem	
Threat to the long-term productive capacity of this area	444	7%	21%	21%	22%	31%	2.51
Polluting fresh ground water in this area	442	10%	18%	17%	19%	37%	2.44
Threat to the long-term viability of the local economy	442	5%	19%	20%	24%	32%	2.41
Contributing to the decline of habitat or wildlife in this area	443	6%	15%	19%	24%	36%	2.32
Detracting from attractiveness of area as a place to live	443	3%	12%	21%	25%	39%	2.16
Reducing the value of my property	443	5%	12%	16%	24%	43%	2.12
Threat to long-term productive capacity of my property	442	4%	14%	14%	23%	45%	2.09
Threat to pasture production on my property in next 5 years	441	3%	10%	12%	27%	49%	1.93
Reducing my current property income	441	3%	9%	11%	20%	57%	1.79
Total (mean)	444	5%	14%	17%	23%	41%	2.20

** Score where 1 = not a problem through to 5 = alarmed

Concerns about commodity prices compared to salinity

Respondents were asked to compare their concern about the potential impact of salinity and commodity prices on the long-term viability of their property. A majority (57 per cent) agreed that commodity prices would be a more important influence than salinity. This finding was very similar to the 1999 SIR survey result where 63 per cent agreed that commodity prices would be a more important influence than salinity (Byron *et al.* 1999). Even those reporting salinity problems were more concerned about commodity prices. There were no significant differences across the LMUs on this topic.

Confidence that onground work will be undertaken

Only 36 per cent of respondents indicated that they were confident that onground work would be undertaken to prevent salinity undermining the viability of their area. By comparison, there was a significantly higher level of confidence amongst respondents to the 1999 SIR survey (51 per cent, χ^2=15.386, df=2, p< 0.001). In the GBD, there was no significant difference between those that did and didn't have salinity problems, in terms of their confidence that onground work would be undertaken to prevent salinity undermining the viability of the area. There were also no significant differences across the LMUs on this topic.

5.2 Knowledge and skills

It is possible to include survey questions that ask respondents to self-assess or that directly assess landholder knowledge and skills. The GBD landholder survey only included three questions that explored landholder knowledge and skills. Respondents were asked to assess the extent that their capacity to take up/increase the area of their property under farm forestry, perennial pastures and wine grapes, would be affected by 20 topics (15 expressed as constraints and five as positives).

The landholder knowledge and skills questions were:

- the time and effort it would take to acquire new knowledge and skills;
- access to sufficient information to make an informed decision; and
- access to government field staff to make an informed decision.

Respondents were asked to assume they had sufficient land to take up each enterprise and to indicate the importance of each topic in their decision making for each enterprise by selecting a response option from a five-point Likert-type scale. Table 5 presents a summary of this data by combining information for two of the five response options - 'important' and 'very important', and by providing the mean scores per topic (very unimportant scored one, unimportant scored two, not sure scored three, important scored four, very important scored five).

5.2.1 Time and effort to acquire new knowledge and skills

Only 42 per cent or less respondents indicated that 'too much time and effort to acquire new knowledge and skills' would be an important/very important factor influencing their decision to take up farm forestry, perennial pastures or wine grapes [Table 5]. Compared to other potential constraints listed in Table 5, this topic was ranked lowly at 13 out of 15 constraints listed for farm forestry, 10 out of 13 for perennial pastures, and 12 out of 15 for wine grapes.

There were no significant differences across the LMUs for this variable.

Analyses were also conducted comparing responses for those who had/were likely to start and those who did not have/were unlikely to start farm forestry (n=68), perennial pastures (n=306) and wine grapes (n=31). There was significant difference on 'too much time and effort to acquire new knowledge and skills' for farm forestry (χ^2=5.144, df=1, p=0.023) and wine grapes (χ^2=4.060, df=1, p=0.044). However, with the exception of wine grapes, less than 40 per cent of respondents who have not/are unlikely to enter these industries, indicate that this was an important/very important factor.

By comparison, for farm forestry the highest rating constraint was 'markets dominated by industry and not confident growers will receive fair returns' (mean score of 3.71 and 62 per cent rated this important/very important). For perennial pastures the highest rating constraint was 'soil fertility low or acidity high on property' (mean score of 3.89 and 73 per cent). For wine grapes 'need a large investment of additional funds' (mean score 3.99 and 75 per cent) was the highest rating constraint [Table 5].

TABLE 5
Factors affecting decision making: farm forestry, perennial pastures and wine grapes
Rated 'important' and 'very important'
Goulburn Broken Dryland, 1999 (N=480)

Factors that may influence decision making	Importance of factors % respondents indicating 'important/very important' (mean score**)					
	n	Farm forestry	n	Perennial pastures	n	Wine grapes
Markets dominated by industry & not confident growers will receive fair returns	334	62% (3.71)	N/A	N/A	321	65% (3.81)
Insufficient income to invest in any new property enterprise/ land use	341	66% (3.65)	361	59% (3.47)	322	71% (3.80)
Better returns available from off-property investments	336	62% (3.59)	359	59% (3.58)	318	61% (3.63)
Uncertainty about longer term markets	335	62% (3.58)	352	41% (3.00)	320	70% (3.82)
Need a large investment of additional funds	336	60% (3.53)	355	46% (3.15)	321	75% (3.99)
Investment would push debt level too high	336	59% (3.52)	352	44% (3.05)	320	74% (3.96)
Returns too far in the future at stage of life	339	51% (3.27)	356	29% (2.59)	315	45% (3.10)
With less access to government field staff it is more difficult to make informed decisions	334	48% (3.24)	356	46% (3.16)	320	47% (3.20)
Would require extensive reorganisation of paddocks	337	45% (3.05)	357	31% (2.63)	320	57% (3.42)
This industry may lead to smaller rural populations	331	40% (3.01)	N/A	N/A	309	29% (2.65)
Soil fertility low or acidity high on property	339	39% (3.00)	377	73% (3.90)	324	50% (3.25)
No need to change as existing mix of enterprises provide sufficient returns	319	39% (2.93)	349	44% (3.08)	305	37% (2.94)
Too much time & effort to acquire new knowledge & skills	335	27% (2.57)	362	30% (2.60)	323	42% (2.93)
Hesitant because there are not many people doing this in area	336	27% (2.49)	357	16% (2.17)	319	27% (2.52)
Earlier bad experience with this in area	314	21% (2.33)	334	19% (2.23)	296	22% (2.36)
Have access to sufficient information to make an informed decision*	337	69% (3.78)	363	71% (3.79)	323	64% (3.68)
This activity would lower rising water tables*	335	59% (3.60)	351	47% (3.23)	308	29% (2.87)
Have enough suitable land for a viable enterprise on property*	332	60% (3.50)	358	63% (3.60)	315	56% (3.41)
Fits well with existing lifestyle*	321	56% (3.31)	360	69% (3.67)	308	45% (3.00)
Fits well with work requirements of existing enterprise/ landuse*	330	53% (3.22)	365	73% (3.76)	311	45% (2.99)

* These statements are expressed in the survey as constraints. Scores have been reversed in this table to allow comparisons with responses to the other topics.
** Score where 1 = very unimportant through to 5 = very important

5.2.2 Access to sufficient information to make informed decisions

Most respondents indicated that they had 'access to sufficient information to make informed decisions' about farm forestry (69 per cent), perennial pastures (71 per cent) and wine grapes (64 per cent) [Table 5]. Compared to other positive statements in Table 5, this topic ranked highly at one out of five for each of farm forestry and wine grapes and two out of five for perennial pastures.

Again, there were no significant differences across the LMUs for this variable.

Significant differences were found under analyses conducted that compared responses for those who had/were likely to start and those who did not have/were unlikely to start farm forestry (χ^2=6.090, df=1, p=0.014) and wine grape (χ^2=5.537, df=1, p=0.019). However, most of those respondents, who did not have/were unlikely to start these industries, indicated that they had access to sufficient information.

5.3 Attitudes

Given that most landholders have a strong stewardship ethic and that links between conservation attitudes and the adoption of best-practices are problematic, scales (series of statements for one attitude) exploring conservation attitudes were not included in the survey. Respondents were asked if they had taken nature conservation values of some areas into account when planning work on their property over the past three years. Other survey questions explored landholder attitudes about working with government; the importance of community cooperation; the extent individual landholders were responsible for managing salinity; and the extent landholders needed help from government to manage salinity. There were also some surrogate measures of these attitudes, including Landcare group membership.

5.3.1 Assessing nature conservation values

Seventy-six per cent of respondents indicated that in the past three years they had taken into account nature conservation values of some areas when planning work on their property [Table 6]. Forty per cent of respondents also indicated that they were concerned about salinity contributing to the decline of habitat and wildlife in their area [Table 4]. This information appears consistent with other research, including in the North East CMA (adjacent to the GBD, where there is mostly dryland agriculture), suggesting that most landholders have a strong stewardship ethic (Curtis and De Lacy 1998).

There was a significant difference across the LMUs in the proportion of respondents who had taken into account conservation values of some areas when planning work on their property (χ^2=47.487, df=13, p=0.006) [Table 2, Appendix C].

There were no significant positive relationships between taking into account nature conservation values of some areas when planning work on their property, and adoption of best-practices under multi-variate analysis [Table 3].

TABLE 6
Aspects of planning undertaken as part of property management
Goulburn Broken Dryland, 1999 (N=480)

Planning as part of property management	n	Aspects of planning, % respondents for each category		
		Yes	Unsure	No
Do you currently have a property budget that is updated at least monthly?	457	21%	0.2%	79%
Have you prepared a written property plan?	465	31%	3%	66%
In the past 3 years, have you taken into account a district, catchment of regional plan when planning work on your property?	454	33%	2%	65%
Have you written down personal &/or family goals to be achieved on your property?	456	32%	0.7%	67%
Has your family agreed to a plan for managing the transfer of your property to the next generation?	454	31%	3%	66%
In the past 3 years, have you taken your neighbour's property layout into consideration when planning work on your property?	453	27%	1%	72%
In the past 3 years, have you taken into account nature conservation values of some areas when planning work on your property?	455	76%	2%	23%
In the past 3 years, have you included the cost of work to address salinity in your property budget?	451	14%	2%	84%

5.3.2 Willingness to work with government

Seventy-eight per cent of respondents indicated that they were willing to work with government to improve the management of salinity problems in their area [Table 7]. The extent that most GBD respondents have positive attitudes towards government was highlighted by the very small proportion (5 per cent) indicating that they were not willing to work with government [Table 7]. Those respondents reporting a salinity problem were significantly more willing to work with government (χ^2=9.260, df=1, p=0.002).

It seems that part of the explanation of such widespread willingness to work with government was that most GBD respondents (76 per cent) appreciate that local people will need help from government to manage salinity in their area [Table 7]. Those respondents reporting a salinity problem were significantly more likely to agree that local landholders needed help from government to manage salinity (χ^2=13.928, df=1, p< 0.001).

There were no significant differences across the LMUs for willingness to work with government or needing help from government to manage salinity.

Involvement in a government program is a strong indication of a positive attitude towards cooperation with government. Thirty-six per cent of respondents reported receiving contributions from Federal or State governments for work on their property over the past five years (median $2,000).

There were no significant relationships between willingness to work with government or the value of all government contributions to work on-property, and adoption of best-practices using multi-variate analysis [Table 3].

TABLE 7
Attitudes about working with government, importance of community cooperation and individual responsibility for managing salinity problems
Goulburn Broken Dryland, 1999 (N=480)

Statement	n	Respondent's views, % for each category					Mean score**
		strongly agree	agree	not sure	disagree	strongly disagree	
Local people must work together if they are to prevent water tables rising	421	38%	50%	8%	3%	2%	4.19
Landholders need help from government to manage salinity in this area	418	30%	46%	15%	5%	4%	3.93
I am willing to work with government to improve the management of salinity problems in our area	419	22%	56%	17%	3%	2%	3.92
Individual landholders must take most responsibility for managing salinity on their land	426	17%	44%	15%	17%	7%	3.46

** Score where 1 = strongly disagree through to 5 = strongly agree

5.3.3 Landcare participation

Fifty-three per cent of respondents indicated that they were members of a Landcare group. Landcare groups do not operate in every area of the GBD and it is possible that in some LMUs some respondents may not have the option of joining a group close by. Indeed, there were significant differences between the LMUs (χ^2=63.938, df=13, p< 0.001). Of the critical LMUs, LMU 6, 7a and 13 had Landcare participation rates of 36 per cent or less [Table 2].

There were significant positive relationships between Landcare membership and:

- property size (χ^2=54.827, df=1, p< 0.001);
- farming as an occupation (χ^2=21.173, df=1, p< 0.001);
- on-property profitability (χ^2=13.325, df=1, p< 0.001);
- willingness to work with government (r_s=0.349, p< 0.001);
- acknowledgment that local people need help from government to manage salinity (r_s=0.224, p=0.004);
- acknowledgment that local people need to work together to prevent water tables rising (r_s=0.303, p< 0.001);
- greater concern about commodity prices than salinity (r_s=0.167, p=0.019);
- identifying signs of salinity on property (r_s=0.273, p=0.047);
- greater concern about rising water tables (χ^2=7.835, df=1, p=0.005);
- the inclusion of the cost of work to address salinity in property budget (r_s=0.355, p=0.004);
- greater likelihood of taking nature conservation values into account when planning work in the past three years (χ^2=15.210, df=1, p< 0.001); and
- having a written property plan (χ^2=50.038, df=1, p< 0.001).

Findings from earlier research (Curtis and De Lacy 1996) that Landcare participation is linked to significantly higher levels of adoption of best-practices were not replicated in the GBD survey. In fact, there was a significant negative relationship between Landcare participation and the area sown to introduced perennial pastures [Table 3].

5.3.4 Importance of community cooperation

Almost all respondents (88 per cent) agreed that local people must work together if they are to prevent water tables rising [Table 7].

It seems there is still a considerable gap between holding positive attitudes and adopting behaviours consistent with those attitudes. Only 27 per cent of respondents reported that in the past three years they had taken their neighbour's property layout into account when planning work on their property [Table 6]. A similar proportion of respondents (33 per cent) reported that in the past three years they had taken into account a district, catchment or regional plan when planning work on their property.

There were no significant differences across the LMUs on these topics.

There were no significant relationships between these variables and adoption of best-practices [Table 3].

5.3.5 Individual responsibility

Most respondents (61 per cent) acknowledged that individual landholders must take most responsibility for managing salinity on their land [Table 7].

There were no significant differences across the LMUs on this variable.

There were no significant relationships between this attitude and adoption of best-practices under multi-variate analysis [Table 3].

5.4 Farming as an occupation and on-property enterprise profitability

Questions to address occupation and on-property enterprise profitability included:

- property size;
- occupational grouping that best describes the main area of paid/unpaid work;
- hours per week worked on and off-property;
- whether there was a profit from on-property activities last year;
- the amount of on and off-property pre-tax income last year;
- the extent that capacity to enter new enterprises was constrained by lack of suitable land for a viable enterprise;
- the extent of involvement in formal property planning;
- the number of years lived in the local area;
- the number of years worked as a farmer or lived on a farm; and
- a number of questions asking respondents to indicate the extent that different factors would influence their decision to take on some new enterprises (farm forestry, perennial pastures and wine grapes).

5.4.1 Property size

Survey data shows that most properties in the GBD were less than 150 hectares (53 per cent) and that 70 per cent were less than 300 hectares. The median property size for the GBD was 128 hectares [Table 8 and Map 2].

There were significant differences in median property size across the LMUs (χ^2=66.428, df=13, p< 0.001) [Table 2].

Property size is an important element in determining the financial viability of grazing and dryland cropping enterprises. There was a significant positive relationship between increased property size and likelihood of respondents returning an on-property profit (χ^2=107.383, df=1, p< 0.001); as well as a higher amount of on-

property profit (r_s=0.421, p< 0.001). The threshold considered the minimum to sustain a family and provide sufficient funds to maintain the natural and capital assets of a property is $50,000 (Rendell *et al.* 1996). The smallest property to report an on-property profit of over $50,000 was 278 hectares. Only 15 properties reported a profit in excess of $50,000. The median property size for this group of respondents was 1,090 hectares.

Analysis showed that property size was also an important element in property management issues. There were significant relationships between larger property size and:

- the likelihood of having a property budget (r_s=0.408, p< 0.001);
- having a plan for managing property transfer to the next generation (r_s=0.348, p< 0.001);
- having a written property plan (r_s=0.203, p< 0.001);
- having written personal or family goals (r_s=0.156, p=0.007);
- including the cost of work to address salinity in property budgets (r_s=0.170, p=0.021);
- having greater concern about commodity prices than salinity (r_s=0.167, p=0.019);
- identifying signs of salinity on property (r_s=0.417, p< 0.001);
- having lower off-property income (r_s= -0.171, p=0.001);
- reporting work done on-property which was partially funded by government (χ^2=9.915, df=1, p=0.002);
- receiving higher government contributions (r_s=0.317, p< 0.001); and
- being less educated (r_s= -0.106, p=0.026).

A relatively small proportion of the respondent landholders owned most of the land. Ninety-one per cent of land was owned by the 47 per cent of respondents with properties larger than 150 hectares [Tables 8 and 9]. The proportion of land managed by small property owners was relatively small. Twenty-nine per cent of all properties were 40 hectares or less [Table 8], but these properties represented only 2.1 per cent of all land [Table 9 and Maps 2 and 3].

Property size is potentially an important constraint on the capacity of land managers to adapt to changed circumstances. For example, LMUs 1 and 3 had a median property size greater than 500 hectares, suggesting that there were high proportions of potentially viable properties. Of the four critical LMUs, LMU 10 had a median property size of 200 hectares and LMUs 6, 7a and 13 had median property sizes of less than 60 hectares [Table 8], suggesting there were few properties with the potential to establish viable grazing enterprises in these areas. On the other hand, LMUs 6, 7a and 13 are located adjacent to a major transport corridor and within commuting distance of Melbourne and therefore provide considerable opportunity for lifestyle farming and a range of non-grazing enterprises.

When using the total area under each best-practice, there were significant positive relationships between property size and adoption of most best-practices, including:

- area sown to introduced perennial pasture (bivariate and multivariate);
- area of remaining native bush and waterways fenced to manage stock access (bivariate and multivariate);
- total area of trees planted (bivariate and multivariate);
- area of pasture where grazing/fertiliser regimes have been changed to encourage native perennial grasses (bivariate and multivariate); and
- area of high density or intensive grazing (bivariate and multivariate) [Table 3].

Interestingly, when using the proportion of the total property under each best-practice, analyses established significant negative relationships between property size and adoption of most best-practices, including:

- area sown to introduced perennial pasture (bivariate);
- area of changed grazing/ fertiliser regimes (bivariate);
- area of high density or intensive grazing (bivariate);
- area of remaining native bush and waterways fenced to manage stock access (bivariate); and
- area of trees planted (bivariate and multi-variate) [Table 3].

TABLE 8
Proportion of respondents by property size
by Land Management Unit (LMU)
Goulburn Broken Dryland, 1999 (N=480)

LMU	n	Property size (ha), % respondents in each size category					Mean	Median	Total
		< 10	10 - 40	41 - 150	151 - 300	> 300			
1	9	0%	0%	0%	11%	89%	695.5	658	6,260
2	14	7%	50%	22%	14%	7%	89.7	40	1,256
3	15	0%	27%	7%	7%	60%	698.4	520	10,475
4	80	1%	25%	30%	24%	20%	191.2	116	15,297
5	26	12%	27%	23%	11%	23%	207.7	110	5399
6	31	7%	45%	16%	10%	26%	252.2	40	7,817
7	73	10%	25%	26%	15%	25%	252.6	70	18,438
7a	29	10%	45%	28%	10%	7%	79.8	20	2,314
8	25	16%	4%	22%	8%	48%	337.4	240	8,435
9	2	0%	0%	50%	50%	0%	192.0	192	384
10	127	2%	16%	24%	23%	37%	304.5	200	38,670
11	15	0%	13%	20%	13%	54%	643.7	350	9,655
12	13	0%	23%	23%	23%	31%	206.1	162	2,679
13	21	5%	38%	28%	14%	14%	147.0	56	3,087
Total	480	5%	24%	24%	17%	30%	271.2	128	130,166

TABLE 9
Proportion of land occupied by property size category
by Land Management Unit (LMU)
Goulburn Broken Dryland, 1999 (N=480)

LMU	n	Property size (ha), % of land occupied by each size category					Total for LMU	% of total GBD
		< 10	10 - 40	41 - 150	151 - 300	> 300		
1	9	0%	0%	0%	4%	96%	6,260	5%
2	14	0.5%	16%	22%	32%	30%	1,256	1%
3	15	0%	1%	1%	2%	96%	10,475	8%
4	80	0.1%	3%	13%	28%	56%	15,297	12%
5	26	0.4%	2%	12%	10%	76%	5,399	4%
6	31	0.2%	4%	4%	5%	86%	7,817	6%
7	73	0.2%	2%	8%	12%	77%	18,438	14%
7a	29	1%	10%	22%	24%	43%	2,314	2%
8	25	0.4%	0.3%	7%	5%	87%	8,435	6%
9	2	0%	0%	32%	68%	0%	384	0.3%
10	127	0.1%	1%	7%	17%	75%	38,670	30%
11	15	0%	0.5%	2%	4%	93%	9,655	7%
12	13	0%	2%	9%	21%	67%	2,679	2%
13	21	0.2%	5%	16%	18%	60%	3,087	2%
Total	480	0.1%	2%	7%	14%	77%	130,166	100%

These findings suggest that, compared to larger property owners, owners of smaller properties were adopting some best-practices at levels representing higher proportions of their total property. At the same time, larger property owners had implemented most best-practices on a larger scale (ie. total area). This suggests that there is interest in adoption amongst both small and large property owners.

Small majorities of respondents indicated that they had suitable land for a viable enterprise in farm forestry (60 per cent), perennial pastures (63 per cent) and wine grapes (56 per cent) [Table 5].

5.4.2 Occupation

Respondents were asked to list the occupational grouping that they thought best described their main area of paid/unpaid work in terms of the time and energy they put into that activity. Some examples were provided including farmer, teacher, accountant, and investor. Responses on the open-ended question were collapsed into five broad occupational groupings: farmer; professional; trades; retired; and other [Table 10].

Farmers were the largest occupational grouping and comprised the majority of all respondents (54 per cent). Thirty-seven per cent of respondents indicated that their main employment was off-property. When combined with retirees, who comprised 9 per cent of respondents, almost half of all respondents were not farmers [Table 10]. In three of the four critical LMUs (6, 7a & 13), farmers comprised 40 per cent or less of respondents.

Farmers owned 83 per cent of all land held by respondents.

There were significant differences in the proportion of respondents who were farmers across the LMUs (χ^2=40.357, df=13, p< 0.001) [Table 2 and Map 4].

Analysis showed that there were significant relationships between farming as an occupation and:
- larger property size (χ^2=91.090, df=1, p< 0.001);
- higher on-property profitability (χ^2=4.826, df=1, p=0.028);
- lower total household income (χ^2=9.331, df=1, p=0.002);
- having a succession plan (χ^2=26.890, df=1, p< 0.001);
- having a written property budget (χ^2=13.895, df=1, p=0.001);
- older age (χ^2=52.501, df=1, p=0.001);
- less education (χ^2=43.657, df=1, p< 0.001);
- more on-property work (χ^2=77.323, df=1, p< 0.001); and
- higher Landcare membership (χ^2=21.129, df=1, p< 0.001).

Under multivariate analysis using the total area under each best-practice, there was a significant negative relationship between farming as an occupation and adoption of some best-practices, including:
- the total area of trees planted; and
- the area of remaining native bush and waterways fenced to manage stock access [Table 3].

These relationships may reflect the lower household incomes of farmers; reluctance to cede land to conservation given the importance of on-property income in the household budget of farmers; and the possible impact of older age and less education of farmers on their attitudes towards conservation.

TABLE 10
Landholder occupations
by Land Management Unit (LMU)
Goulburn Broken Dryland, 1999 (N=480, n=466)

LMU	n	Occupation, % of respondents				
		Farmer	Professional	Trades	Retired	Other: clerical, admin, retail, home duties
1	9	78%	22%	0%	0%	0%
2	14	36%	29%	7%	21%	7%
3	15	80%	7%	7%	0%	7%
4	75	52%	24%	9%	13%	1%
5	26	46%	19%	19%	8%	8%
6	31	36%	23%	19%	16%	7%
7	70	47%	20%	19%	9%	6%
7a	28	25%	36%	18%	18%	4%
8	25	64%	24%	8%	0%	4%
9	2	0%	100%	0%	0%	0%
10	123	68%	11%	10%	8%	3%
11	15	73%	13%	7%	7%	0%
12	13	62%	8%	15%	8%	8%
13	20	40%	10%	30%	5%	15%
Total	466	54%	19%	13%	9%	5%

5.4.3 Time lived in local area and years experience as a farmer or lived on a farm

Time lived in the local area and years of experience as a farmer/having lived on a farm were related to various other independent variables. This data should give some insights into the extent respondents have had time to learn from experiences about managing a property in their area; to locate themselves within their community; and the extent that land has changed hands.

Ninety-two per cent of respondents had more than five years and 81 per cent had more than 10 years experience as a farmer/living on a farm (median 23 years).

There were significant differences across the LMUs for experience as a farmer/living on a farm (χ^2=27.898, df=13, p=0.009) [Table 2]. Amongst the critical LMUs, lack of farming experience might be an issue in LMU 6, where 24 per cent of respondents had 10 years or less experience as a farmer/living on a farm. By comparison, 88 per cent of respondents in LMU 10 had more than 10 years experience as a farmer/living on a farm.

There were important differences between those respondents who had spent larger or smaller proportions of their life as a farmer/living on a farm. Those respondents who had spent a higher proportion of their life as a farmer/living on a farm were significantly more likely to:

- be farmers (χ^2=109.565, df=1, p<0.001);
- work longer hours on-property (r_s=0.434, p<0.001);
- have a larger property (r_s=0.590, p<0.001);
- report on-property profits (χ^2=90.598, df=1, p<0.001),
- have a lower total income (r_s= -0.137, p=0.005);
- be older (r_s=0.228, p<0.001); and
- have less education (r_s= -0.357, p<0.001).

Length of experience as a farmer/living on a farm was not significantly associated with adoption of best-practices under multivariate analysis [Table 3].

Ninety-two per cent of respondents had been living in their local area for more than five years and 78 per cent for more than 10 years (median 20 years). Overall, 28 per cent (30 if those not living in the region were included) of respondents had lived in their local area for less than 25 per cent of their life. This information suggests that the GBD had a fairly stable rural population. At the same time, lack of "new blood" should not be a major impediment to change in the GBD.

There were no significant differences across the LMUs for this variable.

There were significant differences between those who had lived for longer and shorter periods in the local area. Respondents who had lived for longer periods in the local area:

- had larger properties (r_s=0.498, p< 0.001);
- were less likely to work off-property (χ^2=61.172, df=1, p< 0.001);
- were more likely to have an on-property profit (χ^2=58.446, df=1, p< 0.001);
- were older (r_s=0.150, p=0.001); and
- were less educated (r_s= -0.322, p< 0.001).

Time lived in the local area was not significantly associated with adoption of best-practices under multivariate analysis [Table 3].

5.4.4 Hours per week worked on and off-property

On-property hours worked

Almost all respondents (94 per cent) indicated that they had spent time on farming related activities in the past 12 months. The median hours worked on-property per week over the past 12 months was 30 hours. The extent of part-time farming was highlighted by the finding that 29 per cent of respondents worked less than 15 hours per week on-property.

There were significant differences across the LMUs for hours worked on-property (χ^2=50.690, df=13, p< 0.001) [Table 2]. The median hours worked on-property ranged from 50 hours in LMU 10 to 8 hours in LMUs 2 and 6 (LMU 7a with 20 hours and LMU 13 with 30 hours).

On-property hours worked was not significantly associated with the adoption of best-practices under multivariate analysis [Table 3].

Hours worked off-property

Forty-one per cent of respondents indicated that they had paid off-property employment that lasted at least three months in the past 12 months. Off-property hours worked represented 46 per cent of on-property hours worked. For those respondents working off-property, the median was 38 hours, the equivalent of full-time employment.

Respondents indicating that they had paid part or full-time off-property work were significantly younger (χ^2=83.957, df=1, p<0.001); were better educated (χ^2=12.615, df=1, p=0.001); owned smaller properties (χ^2=12.897, df=1, p<0.001); and were less likely to have a succession plan (χ^2=10.716, df=1, p=0.001).

There were no significant differences across the LMUs for hours worked off-property.

Under multivariate analysis there was a significant positive relationship between the hours worked off-property and the area of remaining native bush and waterways fenced to manage stock access as a proportion of the total property [Table 3].

Most respondents (394) had a spouse/partner and 47 per cent of these had paid part or full-time off-property employment that lasted for at least three months during the past 12 months. The median hours worked in these cases was 28 hours per week.

Total hours worked

Combining on and off-property work showed that 77 per cent of respondents worked more than 30 hours per week, with a median of 50 hours per week.

There were significant differences in the total number of hours worked across the LMUs (χ^2=26.172, df=13, p=0.016) [Table 2].

There are some important differences between these findings and those for the SIR (Byron *et al*. 1999).
- A higher proportion of GBD respondents had off-property work (29 per cent SIR, 41 per cent GBD).
- GBD respondents with off-property work were involved for longer hours per week (mean 35.4 hours GBD, 30 hours SIR).
- A higher proportion of GBD spouses/partners worked off-property (47 per cent GBD, 40 per cent SIR).
- SIR respondents worked longer hours on-property (mean 32.5 hours GBD, 50 hours SIR).
- SIR respondents had higher total workloads (mean 47.9 hours GBD, 57 hours SIR).

Total hours worked was not significantly associated with the adoption of best-practices under multivariate analysis [Table 3].

5.4.5 On-property, off-property and total household income

On-property income

Almost all respondents completed the two survey questions seeking information about on-property income.
1. Did their property return a profit last financial year (1998/99). A profit was defined as to whether the amount of income from the property exceeded all expenses before tax.
2. Indicate the approximate amount of their profit. This was indicated by selecting one of seven options that increased by ten thousand dollars. For the purpose of data analysis, each respondent was allocated the mid-point of the chosen dollar interval.

Most respondents (62 per cent) did not report any on-property pre-tax profit for 1998/99 [Table 11]. Amongst those reporting a profit, almost half (46 per cent) had less than $10,000 profit, with the median

profit being $15,000. Only nine per cent of these respondents reported an on-property profit exceeding the $50,000 threshold discussed earlier in this report (Rendell *et al.* 1996).

There were significant differences across the LMUs in on-property profitability (χ^2=53.792, df=13, p<0.001) [Table 2]. The proportion of respondents indicating a profit was highest in LMUs 1, 9, 11, 10, and 3 and lowest in LMUs 7a, 6 and 2. The median profit equalled or exceeded $25,000 in LMUs 1 and 12, but not in any of the four critical LMUs [Table 11]. Again, this has important implications for regional planning, particularly in terms of the effectiveness of applying cost sharing arrangements across the different LMUs in the GBD.

Farmers were more likely to report an on-property profit (52 per cent) than other occupations (professionals 27 per cent, tradespeople 15 per cent, retirees nine per cent and others 10 per cent). However, even amongst farmers who made a profit, the median profit was only $15,000. Higher on-property profitability was significantly associated with:

- larger property size (χ^2=107.301, df=1, p< 0.001);
- more hours worked on-property (χ^2=64.898, df=1, p< 0.001);
- having a written property budget (χ^2=13.297, df=1, p< 0.001);
- succession planning (χ^2=9.747, df=1, p=0.002);
- lower education (χ^2=8.063, df=1, p=0.005); and
- increased Landcare membership (χ^2=13.325, df=1, p< 0.001).

On-property profitability was not significantly associated with higher adoption of any best-practices using the proportion of the total property under each best-practice. Under multivariate analysis, there were some significant positive relationships between on-property profitability and adoption using the total area under each best-practice, including:

- the area sown to introduced perennial pasture;
- the area of high density or intensive grazing; and
- the area of remaining native bush and waterways fenced [Table 3].

Off-property income

Respondents were asked to indicate the extent of off-property income (after expenses and pre-tax) that they or their partner received in the last financial year, including that from wages/salaries, dividends, interest, rent or social security. Again, the approximate amount of off-property income was indicated by selecting one of seven options that increased by ten thousand dollars and, for data analyses, each respondent was allocated the mid-point of the chosen dollar interval.

Eighty per cent of the respondents had a surplus on pre-tax, off-property income for 1998/99. The median income for these respondents was $25,000.

These trends were consistent across the LMUs with no significant differences in off-property income [Table 11].

Off-property income was most prevalent amongst the professional occupation grouping, with 91 per cent of these respondents indicating off-property income with a median of $55,000. This compares to tradespeople ($35,000), retirees ($25,000), others ($35,000) and farmers ($15,000). Those with off-property income were significantly younger (χ^2=9.148, df=1, p=0.002); owned significantly smaller properties (χ^2=4.926, df=1, p=0.026); and were significantly more educated (χ^2=10.391, df=1, p=0.001) than those without off-property income.

Total off-property income was significantly higher than total on-property income in the GBD with off-property income worth $11.69 million compared to $3.3 million on-property income (a multiple of 3.5). In all LMUs, with the exception of LMU 1, total off-property income exceeded total on-property income. Even

amongst farmers, the total off-property income ($4.12 million, mean $23,786) exceeded the total on-property income ($2.83 million, mean $21,769).

There were no significant relationships between off-property income and adoption of best-practices under multivariate analysis [Table 3].

Total income available to households

The median combined on and off-property income was $32,500 for 1998/99. Twenty-five per cent of respondents had a combined on and off-property income over $50,000 for 1998/99. For farmers, only 16 per cent of respondents had a combined income over $50,000.

Respondents with above median total household incomes had significantly larger properties (χ^2=15.531, df=1, p< 0.001); were younger (χ^2=20.855, df=1, p< 0.001); had more education (χ^2=18.428, df=1, p< 0.001); and were more likely to work off-property (χ^2=41.147, df=1, p< 0.001).

There were significant differences across the LMUs for total household income (χ^2=24.457, df=13, p=0.027) [Table 2]. Only in LMUs 1 and 9 was the combined median income at or above $50,000 [Table 11 and Map 5].

There were no significant relationships between total household income and the adoption of best-practices using the proportion of the total property under each best-practice.

5.4.6 Extent involved in property budgeting and property planning

Property budgeting

Only 21 per cent of respondents indicated that they had a property budget which was updated at least monthly [Table 6]. Other respondents may have had budgets and simply update them at longer intervals. Not withstanding this possibility, few properties were being managed using sound business practices.

There were significant differences across the LMUs for the proportion of respondents who had a property budget that was updated at least monthly (χ^2=55.540, df=13, p< 0.001) [Table 2 and Appendix C].

Respondents having a property budget that has been updated monthly were significantly more likely to:

- be Landcare members (χ^2=11.399, df=1, p< 0.001);
- be younger (χ^2=4.938, df=1, p=0.026);
- have larger properties (χ^2=35.566, df=1, p< 0.001);
- be farmers by occupation (χ^2=13.037, df=1, p< 0.001); and
- return an on-property profit (χ^2=12.422, df=1, p< 0.001).

There were no significant relationships between property budgeting and the adoption of best-practices under multivariate analysis [Table 3].

TABLE 11
On and off-property income available to households
Goulburn Broken Dryland, 1999 (N=480)

LMU	n	% resp. indicating on-property profit	Median on-property profit	% resp. indicating off-property income	Median off-property income	Combined median income	% resp.earning > $50,000
1	9	100%	$25,000	78%	$25,000	$50,000	33%
2	14	21%	$5,000	71%	$25,000	$30,000	8%
3	14	50%	$5,000	86%	$15,000	$22,500	7%
4	77	30%	$5,000	86%	$25,000	$30,000	25%
5	26	42%	$15,000	85%	$15,000	$25,000	15%
6	29	17%	$5,000	79%	$15,000	$25,000	8%
7	71	28%	$5,000	83%	$35,000	$35,000	27%
7a	27	7%	$5,000	93%	$25,000	$25,000	19%
8	25	44%	$15,000	84%	$25,000	$25,000	16%
9	2	100%	$5,000	100%	$65,000	$70,000	100%
10	124	52%	$15,000	72%	$25,000	$35,000	24%
11	15	53%	$15,000	80%	$20,000	$27,500	33%
12	12	33%	$25,000	50%	$30,000	$27,500	0%
13	21	33%	$5,000	81%	$35,000	$35,000	30%
Total	466	38%	$15,000	80%	$25,000	$32,500	22%

Other aspects of property planning

Five questions explored respondent's involvement in different aspects of property planning [Table 6]. Some of these topics have already been discussed and others will be covered in later sections on landholder stage of life and property transfer.

The overall finding was of limited involvement in the range of planning topics. Only 31 per cent of respondents indicated that they had prepared a written property plan that involved a map and/or other documents that addressed the existing property situation and included future management and development plans [Table 6]. Most of these respondents (77 per cent) reported that they used their plan when making property management or development decisions during 1999.

There were no significant differences across the LMUs for the proportion of respondents who had a written property plan.

Respondents with a written property plan were significantly more likely to:

- own larger properties (χ^2=12.472, df=1, p< 0.001);
- be younger (χ^2=5.033, df=1, p=0.025);
- be better educated (χ^2=6.724, df=1, p=0.010);
- have higher total household incomes (χ^2=8.758, df=1, p=0.003); and
- be members of Landcare groups (χ^2=50.941, df=1, p< 0.001).

Multivariate analysis showed a significant positive relationship between having a written property plan and the total number of trees planted as a proportion of the total property [Table 3].

5.4.7 Assessment of financial risks associated with different enterprises

Information discussed in this section comes from 10 statements exploring respondent's assessment of the financial risks associated with a decision to enter farm forestry, perennial pastures or wine grapes. This section complements previous information, for example about household income. These statements formed the bulk of the 15 constraints included in Table 5.

- No need to change as existing mix of enterprises provide sufficient returns.
- Insufficient income to invest in any new property enterprise/land use.
- Need a large investment of additional funds.
- Investment would push my debt level too high.
- Better returns available from off-property investments.
- Would require expensive reorganisation of my paddocks.
- Uncertainty about longer term markets.
- Markets dominated by industry and I'm not confident growers will receive fair returns.
- Earlier bad experience with this in our area.
- I would be hesitant because there are not many people doing this in our area.

Insufficient income to invest/Sufficient returns from existing enterprises

About two-thirds of the respondents indicated they had insufficient income to invest in any new property enterprise/land use [Table 5]. This constraint ranked two out of 15 on mean score for farm forestry, three out of 13 for perennial pastures and five out of 15 for wine grapes. There was a significant difference in the importance of this factor between those who had/were likely to start and those who did not have/were unlikely to start farm forestry (χ^2=7.867, df=1, p=0.015).

At the same time, only a minority of respondents indicated that they had no need to enter into a new enterprise because their existing mix of enterprises was providing sufficient returns (farm forestry 39 per cent, perennial pastures 44 per cent, wine grapes 37 per cent) [Table 5].

Large investment of additional funds needed/Expensive reorganisation of paddocks

A large investment of additional funds appears to be an important constraint, particularly for wine grapes (75 per cent) and farm forestry (60 per cent), but less so for perennial pastures (46 per cent) [Table 5]. This constraint ranked one out of 15 on mean score for wine grapes, five out of 15 for farm forestry and five out of 13 for perennial pastures. There was no significant difference in the importance of this factor between those who had/were likely to start and those who did not have/were unlikely to start farm forestry, perennial pastures or wine grapes.

A small majority of respondents (57 per cent) indicated that the cost associated with reorganising fencing was an important constraint on their capacity to grow wine grapes. Fencing was a less important issue for farm forestry (45 per cent) and perennial pastures (31 per cent) [Table 5]. There was however, a significant difference in the importance of this factor between those who had/were likely to start and those who did not have/were unlikely to start farm forestry (χ^2=7.057, df=1, p=0.008) and wine grapes (χ^2=4.901, df=1, p=0.027).

Investment would push debt levels too high

Respondents were asked to indicate whether investment in new enterprises would push debt levels too high. This was the only survey question exploring the impact of debt levels. Investment pushing debt levels too high was an important constraint for wine grapes (74 per cent) and farm forestry (59 per cent) but less so for perennial pastures (44 per cent) [Table 5]. This constraint ranked two out of 15 on mean score for wine grapes, six out of 15 for farm forestry and seven out of 13 for perennial pastures. There was no significant difference in the importance of this factor between those who had/were likely to start and those who did not have/were unlikely to start any of the three enterprises.

Concerns about long-term markets/Concern that growers will not receive fair returns

There appear to be strong concerns about the existence of long-term markets for wine grapes (70 per cent) and farm forestry (62 per cent), but less concern for perennial pastures (41 per cent) [Table 5]. This constraint ranked three out of 15 on mean score for wine grapes, four out of 15 for farm forestry and only eight out of 13 for perennial pastures. These concerns are important constraints for landholders contemplating these enterprises. Forming a grower cooperative is one way of enhancing the bargaining power of growers. Industry needs to improve communications with growers and to develop contractual arrangements that meet the needs of different groups of growers (Curtis and Race 1996b).

There was no significant difference in the importance of this factor between those who had/were likely to start and those who did not have/were unlikely to start any of the three enterprises.

About two-thirds of respondents indicated that they were concerned about industry dominated markets and they were not confident that growers would receive fair returns for farm forestry (62 per cent) and wine grapes (65 per cent) [Table 5]. This constraint ranked one out of 15 on mean score for farm forestry and four out of 15 for wine grapes. There were no significant differences in the importance of this factor between those who had/were likely to start and those who did not have/were unlikely to start either farm forestry or wine grapes.

Earlier bad experience in area/Not many people doing this in area

Perceptions of risk are likely to be higher where landholders have had unsuccessful attempts to trial an enterprise or where there is little experience that they can draw on from their local area. Given the low levels of uptake of enterprises like farm forestry and wine grapes (see later sections), it was not surprising that few respondents reported that prior bad experience was an important constraint for these enterprises (22 per cent for wine grapes, 21 per cent for farm forestry).

Information in Table 5 suggests that the absence of a large number of people involved in an enterprise was not an important constraint for the majority of respondents, as 27 per cent or less indicated this was important. However, there is considerable evidence highlighting the importance of establishing local trials and working to transfer information from those trials. Indeed, there was a significant difference in the importance of this variable between those who had/were likely to start and those who did not have/were unlikely to start farm forestry and wine grapes.

5.5 Landholder stage of life and property transfer

Survey questions gathered information on the following topics.

- The age of respondents.
- If the respondent was contributing to the care of children under 18 years that live with them.
- If respondents have a spouse or partner who lives with them.
- If the respondents family had agreed to a plan for managing the transfer of the property to the next generation.
- If the respondent had a retirement plan that sets out how the property will eventually be disposed.
- The extent that respondent's long-term plans involved a number of choices, including that:
  - the property will be sold;
  - the property will be subdivided and a large part of the property sold;
  - the property will be subdivided and a small part of the property sold;
  - all or most of the property will be leased;
  - management decisions will be made by someone else within the family;
  - ownership of the property will stay within the family;
  - the respondent will retain ownership but no longer undertake much physical work;
  - the respondent will live on the property;
  - the respondent will live off the property in a neighbouring town or rural setting; and
  - the respondent will live outside the region where the property is located.
- The extent that the financial capacity to enter new enterprises was constrained because returns were too far in the future at respondent's stage of life.
- The extent that work associated with a new enterprise would fit well with respondent's existing lifestyle.
- To explore the likely time-line for property transfer, respondents who indicated they were likely to sell all or part of their property, were asked to indicate what year they might sell.

5.5.1 Age

Most of rural Australia has an ageing population and this trend was expected to be an important constraint affecting landholder willingness and capacity to change practices and enterprises.

The median age of GBD survey respondents was 55 years, ranging from 23 to 90 years [Map 6]. Forty-nine per cent of GBD respondents were over 55 years of age with 23 per cent over 65 years. The over 65 years age group continues to manage a substantial proportion of land (18 per cent). The median age of GBD respondents was considerably older than the median age (48 years) for respondents in the 1999 SIR survey (Byron *et al.* 1999).

There was no significant difference in the median age of respondents across the LMUs.

As might be expected, a significantly higher proportion of the over 65 years group was retired (23 per cent), compared to the 55 to 65 years group (14 per cent) and the under 55 years group (one per cent), (χ^2=42.882, df=2, p< 0.001). There was also a significantly higher proportion of farmers in the over 65 years group with 63 per cent, compared to 57 per cent for the 55 to 65 years group and 48 per cent for the under 55 years group (χ^2=10.029, df=2, p=0.007). These trends provide at least part of the explanation for the significant association between younger age and the likelihood of having off-property work (r_s=0.513, p< 0.001); higher off-property income (r_s=0.221, p< 0.001); and higher total incomes (r_s=0.211, p< 0.001). Younger respondents were also significantly more likely to:

- be involved in budgeting (r_s=0.148, p=0.025);
- have a written property plan (r_s=0.134, p=0.018);
- take nature conservation values into account when planning work on their property (r_s=0.207, p=0.002);
- take their neighbour's property characteristics into account when planning (r_s=0.160, p=0.009); and
- be willing to work with government (r_s=0.109, p=0.025).

The common perception of younger age being linked with higher adoption of best-practices was not supported by survey findings. There was no significant relationship between younger age and higher adoption of best-practices under multivariate analysis [Table 3]. This finding suggests that the ageing of rural landholders was not a major constraint to the adoption of best-practices.

5.5.2 Living with a spouse or partner/Caring for children

Eighty-six per cent of respondents indicated that they had a spouse or partner living with them.

Thirty-one per cent of respondents indicated that they were contributing to the care of children living with them who were under the age of 18 years. Forty-one per cent of respondents under the age of 65 years were contributing to the care of children.

There were no significant variations across the LMUs for respondents caring for children.

5.5.3 Sale of properties in the Goulburn Broken Dryland: past 10 years

Mike Read of Read Sturgess & Associates provided data obtained from the Victorian Surveyor General's office for the number of properties sold in the GBD between 1988 and 1999. There are 188 parishes in the GBD and data was available for 174, or 93 per cent, of those parishes. For those parishes not located entirely within the GBD, only those with approximately 50 per cent of their area within the GBD were included in these analysis. All data for these parishes were included in the analyses. The data set did not distinguish between rural and urban properties. To overcome this problem, property transfers were calculated with and without properties of less than four hectares. It is possible that some properties were sold more than once in the past 10 years. For the purpose of analyses in this report, it was assumed that properties were only sold once.

Analysis suggests that for the period from 1990 to the end of 1999, a total of 5,327 properties were sold in the GBD. Of these properties, 4,254 were greater than four hectares in size. If the latter figure is assumed to be a more accurate measure of rural property transfers, then 66 per cent of all rural properties (6,449 as the total, based on CFA directories) changed hands in the past 10 years. This trend is likely to impact on: landholder willingness to change; demand for and effectiveness of community education activities; and the potential for initiatives such as government or industry intervention to acquire property in critical LMUs.

5.5.4 Long-term plans for transfer of property

Only 19 per cent of respondents indicated that they had developed a retirement plan which set out how they would eventually dispose of their property. A further 20 per cent had considered and started on a plan.

Almost all respondents completed a table asking them to indicate their long-term plans for their property. Respondents were asked about the likelihood of their plans involving a number of possible choices, including that the property would be sold; that it would be passed to someone else in the family; or that they would continue to live on the property.

It was expected that this data would contribute to a better understanding of changes in the ownership and management of land in the GBD.

- Due to the hypothesised links between landholders expecting to transfer property within the family and increased willingness to adopt best-practices or enter into new enterprises, there is a particular interest in identifying the extent of family succession.
- Younger landholders might be more likely to adopt best-practices and enter new enterprises. Property transfer to younger owners can occur through family succession or as the result of a property sale. There was particular interest in seeing if there is likely to be a high rate of property transfer in the next 10 years, as the increasing proportion of older landholders pass normal retirement age.
- If there is a large change in property ownership there will be a new group of property owners that require extension support and the impact of past extension is likely to be reduced.
- Identifying the time of property transfer would also provide information useful to those evaluating the potential for initiatives such as government or industry purchases of land in critical LMUs. The opportunity for intervention is likely to be strongest where properties are put up for sale as opposed to those that are transferred in the family.

Property will be sold or large part subdivided and sold

Thirty-four per cent of respondents thought it was likely/highly likely that their property would be sold [Table 12]. Some respondents indicated that they would subdivide and then sell a large part of their property. Combining the two groups, 36 per cent of respondents thought it likely/highly likely that they would be selling all or a large part of their property. Only 26 of these 164 respondents also indicated their property was likely/highly likely to stay within the family (in this case, be sold to someone else in their family).

There were no significant differences in the proportion of people planning to sell their property or subdivide and sell a large part of their property across the LMUs.

Those intending to sell their property owned 25 per cent of the land covered by the survey, but there were large differences across the LMUs in the proportion of land likely to be sold. In the four critical LMUs: LMU 6 had one per cent; LMU 7a had 61 per cent; LMU 13 had 58 per cent; and LMU 10 had 23 per cent of all land owned by those intending to sell in the long-term.

There was an increased likelihood for selling of properties with increased age, with 13 per cent of the under 40 years; 29 per cent of the 41 to 55 years; and 45 per cent of the 56 to 65 years indicated that their property would be sold [Table 13]. The exception to this was the over 65 years group (discussed in a later section).

Intention to sell was not significantly associated with awareness of a salinity problem on the respondent's property.

Apart from area of pasture where grazing/ fertiliser regimes were changed to encourage native perennial grasses, there were no other significant relationships between those respondents intending to sell their properties and the adoption of best-practices under multivariate analysis [Table 3].

Continue to live on the property

Information in Table 12 shows that a majority (66 per cent) of respondents believed it was likely that they would continue to live on their property in the long-term. Some of these people might also intend to pass some or all of the management decisions to others. This could happen if they pass decision making to others in their family; to those who will lease all or most of the property; or to those who will purchase land when they subdivide and sell part of the property. For the purpose of this research it has been assumed that most respondents who continue to live on their property will continue to make most of the management decisions.

There were no significant differences across the LMUs in the proportion of respondents who planned to continue living on their property.

TABLE 12
Likelihood that long-term plans will involve a range of choices
Goulburn Broken Dryland, 1999 (N=480)

Likelihood of long-term plans involving, % respondents for each category					Mean score**
Choices	**n**	**highly likely/ likely**	**not sure**	**unlikely/ highly unlikely**	
The property will be sold	450	34%	14%	53%	2.63
Ownership of the property will stay within the family	450	58%	12%	30%	3.45
I will live on the property	447	66%	13%	21%	3.75
I will retain ownership but no longer undertake much physical work	447	37%	19%	45%	2.78
I will live outside the region where the property is located	445	19%	10%	71%	2.03
Management decisions will be made by someone else within our family	444	20%	7%	73%	2.00
I will live off the property in a neighbouring town or rural setting	444	17%	11%	73%	1.98
The property will be subdivided & a large part of the property sold	446	11%	10%	80%	1.79
All or most of the property will be leased	445	8%	16%	76%	1.77
The property will be subdivided & a small part of the property sold	443	8%	10%	82%	1.73

** Score where 1 = highly unlikely through to 5 = highly likely

Younger respondents were significantly more likely to believe that they would continue to live on their property (χ^2=9.892, df=2, p=0.007). Seventy-seven per cent of respondents under 40 years; 67 per cent of the 41 to 55 years group; and 60 per cent of the 56 to 65 years group indicated that they would continue to live on their property [Table 13]. Part of the explanation for this trend may be that older property owners were more likely to have had to consider the implications of older age and retirement. Older people may be more aware of their need to access medical services or the need to sell their property to fund retirement when they are not physically able to farm. The over 65 years group was, once again, the exception to this trend (discussed in a later section).

Intention to continue living on the property was not significantly associated with property size, farming as an occupation or the awareness of salinity problems on the respondent's property.
There were no significant relationships between intention to continue living on the property and the adoption of best-practices under multivariate analysis [Table 3].

Family succession

Fifty-eight per cent of respondents thought that their long-term plans would involve property ownership staying within the family [Table 12].

There were no significant differences across the LMUs for the proportion of respondents who planned for family succession.

Younger respondents were significantly more likely to believe that property ownership would stay within the family (χ^2=7.201, df=2, p=0.027). Sixty-nine per cent of those under 40 years; 58 per cent of those between 41 and 55 years; and 50 per cent of those between 56 and 65 years reported that there would be family succession of their property [Table 13]. Part of the explanation of this trend could be that in families of older property owners, there was more likelihood that offspring had finalised career choices and that these choices did not involve farming. In the over 65 years group however, most respondents (63 per cent) planned for property ownership to stay within the family [Table 13].

Some property owners may pass ownership or management of their properties to younger family members on retirement. In a separate question, 31 per cent of respondents reported that their family had agreed to a plan for managing the transfer of their property to the next generation [Table 6].

Analysis of survey data failed to establish the expected links between family succession and higher adoption of best-practices [Table 3].

The long-term plans of the over 65 years age group

The over 65 years age group makes up almost a quarter (23 per cent) of the GBD survey respondents and they manage 18 per cent of all land. Property transfer would normally be expected to occur more quickly for this group than any other.

In an era of declining property profitability and stagnant property prices, some of the over 65 years group, who may have planned to sell or pass on their properties, may now be locked into living long-term on their properties. This assessment was supported by evidence (discussed previously) that the over 65 years group went against the overall trend that as age increased more people expected to sell. Thirteen per cent of those respondents aged less than 40 years; 29 per cent of those aged 41 to 55 years; and 45 per cent of those aged 56 to 65 years believed that they would sell. This compared to only 39 per cent of the over 65 years group indicating they were likely to sell their properties in the long-term [Table 13]. This group also went against the overall trend that as age increased, people were less likely to believe that they would live on their property in the long-term. Most respondents (67 per cent) in the over 65 years group indicated that they planned to continue to live on their property.

Sixty-three per cent of the over 65 years group also believed that ownership of the property would stay within their family. It seems reasonable to conclude that a sizeable proportion of the properties of the over 65 years group will not pass to the next generation until after the death of, or inability of the owners to farm their properties. With increased life expectancy, the inter-generational transfer planned for many of the properties held by the over 65 years age group, will not occur for some time.

TABLE 13
Likelihood that long-term plans will involve a range of choices by age groups
Goulburn Broken Dryland, 1999 (N=480)

Likelihood of long-term plans involving choices, by age group, % respondents for each category												
Choices	**40 & less (n*=48)**			**41 - 55 (n*=182)**			**56 - 65 (n*=116)**			**> 65 (n*=99)**		
	likely	**not sure**	**unlikely**	**likely**	**not sure**	**unlikely**	**likely**	**not sure**	**unlikely**	**likely**	**not sure**	**unlikely**
The property will be sold	13%	19%	69%	29%	14%	57%	45%	11%	44%	39%	12%	49%
The property will be subdivided & a large part of the property sold	4%	8%	88%	11%	7%	82%	12%	13%	75%	12%	10%	78%
The property will be subdivided & a small part of the property sold	4%	6%	90%	7%	8%	84%	10%	14%	76%	10%	11%	80%
All or most of the property will be leased	4%	8%	88%	9%	14%	77%	7%	19%	74%	10%	16%	74%
Management decisions will be made by someone else within our family	6%	11%	83%	9%	6%	85%	25%	7%	68%	42%	5%	53%
Ownership of the property will stay within the family	69%	15%	17%	58%	13%	29%	50%	12%	38%	63%	9%	28%
I will retain ownership but no longer undertake much physical work	15%	21%	65%	29%	16%	55%	41%	24%	35%	55%	17%	28%
I will live on the property	77%	6%	17%	67%	11%	22%	60%	17%	24%	67%	16%	18%
I will live off the property in a neighbouring town or rural setting	8%	6%	85%	18%	8%	74%	20%	10%	70%	14%	19%	68%
I will live outside the region where the property is located	10%	8%	81%	19%	11%	70%	29%	6%	65%	11%	13%	75%

* n = highest number of respondents in that age group

5.5.5 *Extent of property subdivision*

Sixteen per cent of all respondents thought that in the long-term they would subdivide and sell at least a part of their property [Table 12]. Those intending to subdivide owned 18 per cent of the land covered by the survey. Apart from the under 40 years group, where only eight per cent thought they would subdivide, all other age groups had between 18 per cent and 22 per cent of respondents indicating that they would subdivide their properties in the future [Table 13].

This type of property speculation should not hinder large-scale adoption of best-practices or new enterprises in the GBD. However, it was evident that there will be increased subdivision. This could result in an increased proportion of properties that will not viable as cropping or grazing enterprises as well as an increased proportion of land managers who are non-farmers.

5.5.6 *Long-term commitment to living in the local region*

If property owners expect to live in their local region on retirement, they might be more committed to taking action to address salinity problems. Respondents were asked to indicate if their long-term plans involved them moving away from the region where their property is located. Most respondents were committed to living in their region in the long-term. However, 19 per cent of all respondents indicated they were likely/highly likely to live outside their region [Table 12]. Using the proportion of the total property under each best-practice, there were no significant differences on this variable for the adoption of best-practices. Expectation of migration away from the region on retirement should not be a factor constraining the overall implementation of the GBDSMP.

5.5.7 *When the transfer of property ownership is likely to occur*

Respondents who indicated that their long-term plans involved selling all or a large part of their property (165) were asked to indicate the likely year this would occur. For the small number of cases (28) where a date was not indicated, the mean of all other sellers was used. Only 26 of these 164 respondents also indicated their property was likely to go to someone else in their family. This subset has been included with the group of respondents intending to sell.

Respondents who indicated that ownership of the property would stay within their family (233) were assumed to be planning for family succession. Family succession can occur after the death of a property owner or through retirement. For those under 65 years, it was assumed that they would transfer the property on retirement, at age 65 years. For those over 65 years, it was assumed that they would stay on the property until death. ABS Life Tables (ABS 1997) were used to calculate the remaining life expectancy and provide the expected date of property transfer.

Respondents with other long-term plans (59) were assumed to be planning to continue living on and retaining ownership of their properties until death required the transfer of their properties. Obviously, transfer could then be within the family or to others. The ABS Life Tables (ABS 1997) and the ABS Life Expectancy Tables (ABS 1998) were used to calculate remaining life expectancy and provide the expected date of property transfer.

The mean age was assigned to those respondents (five) who hadn't provided an age.

The overall regional pattern

Adopting the approach outlined above, 36 per cent of respondents were likely to sell their property (25 per cent of all land); 51 per cent intended to pass the property to someone else in the family (63 per cent of all land); and 13 per cent had other long-term plans (9 per cent of all land) [Table 14 and Map 7].

The median year of transfer was 2010 [Table 15], with 19 per cent of properties expected to change hands by the end of 2004 (within five years from 2000) and 45 per cent by the end of 2009 (within 10 years from 2000) [Table 16 and Map 7].

There were no significant differences across the LMUs in the median year of transfer. However, in two of the four critical LMUs (LMUs 7a and 13), the median year of transfer was 2008 [Table 15].

TABLE 14
Property transfer by selling, retaining within family or other long-term plans by Land Management Unit (LMU)
Goulburn Broken Dryland, 1999 (N=480)

LMU	n	% of respondents in each category, by LMU		
		Selling property	Retain in family	Other plans
1	9	33%	56%	11%
2	13	46%	46%	8%
3	15	20%	73%	7%
4	73	41%	43%	17%
5	24	29%	42%	29%
6	29	10%	79%	10%
7	69	44%	36%	20%
7a	28	43%	39%	18%
8	25	32%	60%	8%
9	2	0%	100%	0%
10	123	36%	56%	8%
11	15	33%	53%	13%
12	12	42%	58%	0%
13	20	40%	55%	5%
Total	457	36%	51%	13%

Note: percentages differ to some other tables due to only one score being given for each respondent

Transfer by sale

Thirty-six per cent of respondents were likely to sell their property [Table 14]. Those respondents intending to sell owned 25 per cent of all land covered by the survey.

The median year of property transfer by sale was 2005 [Table 15], with 37 per cent of properties expected to be sold by the end of 2004 and 74 per cent expected to be sold by the end of 2009 [Table 17].

There were no significant differences across the LMUs in the median year of transfer. However, in all four critical LMUs, 75 per cent or more of those selling expected to sell their properties within 10 years.

Transfer by family succession

Fifty-one per cent of respondents intended to pass their property to someone else in their family, representing 63 per cent of all land covered by the survey.

The median year of property transfer through family succession was 2012 (13 years from 2000) [Table 15]. Twelve per cent of these were expected to be transferred by the end of 2004 and 37 per cent expected to be transferred by the end of 2009 [Map 7].

There were no significant differences across the LMUs in the median year of transfer by family succession. In all of the four critical LMUs, the median year of transfer was before or the same as the overall GBD median [Table 15].

Transfer by other plans

Thirteen per cent of respondents had no plans to sell or pass their property on within the family. This group of respondents owned only 9 per cent of all land covered by the survey.

The median year for property transfer for this group was 2021 (22 years from 2000) [Table 15]. Five per cent of these properties were expected to change hands by the end of 2004 and 15 per cent were expected to change hands by the end of 2009 [Map 7].

TABLE 15
Median year of property transfer by any plan
by Land Management Unit (LMU)
Goulburn Broken Dryland, 1999 (N=480)

LMU	Year of property transfer							
	Selling property		Retaining in family		Other plans		Total	
	n	Median	n	Median	n	Median	n	Median
1	3	2010	5	2014	1	2001	9	2010
2	6	2005	6	2012	1	2034	13	2009
3	3	2000	11	2012	1	2010	15	2010
4	30	2008	31	2011	12	2022	73	2010
5	7	2005	10	2009	7	2019	24	2010
6	3	2005	23	2012	3	2015	29	2012
7	30	2005	25	2014	14	2024	69	2010
7a	12	2005	11	2012	5	2030	28	2008
8	8	2004	15	2012	2	2027	25	2010
9	0	N/A	2	2010	0	N/A	2	2010
10	44	2008	69	2011	10	2020	123	2009
11	5	2005	8	2014	2	2035	15	2011
12	5	2010	7	2012	0	N/A	12	2010
13	8	2008	11	2009	1	2006	20	2008
Total	164	2005	248	2012	59	2021	457	2010

TABLE 16
Proportion of property transfers by year grouping
by Land Management Unit (LMU)
Goulburn Broken Dryland, 1999 (N=480)

Year that property will most likely be transferred, % respondents for each category						
LMU	**n**	**2000 - 2004**	**2005 - 2009**	**2010 - 2014**	**2015 +**	**Transferred by 2010**
1	9	22%	22%	22%	33%	44%
2	14	14%	36%	21%	29%	50%
3	15	40%	7%	20%	33%	47%
4	80	11%	29%	20%	40%	40%
5	26	19%	27%	19%	35%	46%
6	31	10%	19%	26%	45%	29%
7	73	21%	21%	16%	43%	42%
7a	29	21%	31%	14%	35%	52%
8	25	20%	24%	20%	36%	44%
9	2	50%	0%	0%	50%	50%
10	127	22%	28%	18%	32%	50%
11	15	20%	27%	7%	47%	47%
12	13	31%	8%	31%	31%	39%
13	21	19%	48%	10%	24%	67%
Total	480	19%	26%	18%	37%	45%

TABLE 17
Year of property sale for respondents selling all or large part of property
by Land Management Unit (LMU)
Goulburn Broken Dryland, 1999 (N=480)

Year that property will most likely be sold, % respondents for each category						
LMU	**n**	**2000 - 2004**	**2005 - 2009**	**2010 – 2014**	**2015 +**	**Sold by 2010**
1	3	33%	0%	33%	33%	33%
2	6	33%	67%	0%	0%	100%
3	3	100%	0%	0%	0%	100%
4	30	27%	37%	30%	17%	64%
5	7	43%	29%	29%	0%	72%
6	3	33%	67%	0%	0%	100%
7	30	37%	37%	17%	10%	72%
7a	12	42%	33%	17%	8%	75%
8	8	50%	38%	0%	13%	88%
9	0	N/A	N/A	N/A	N/A	N/A
10	44	39%	39%	14%	9%	78%
11	5	40%	40%	0%	20%	80%
12	5	40%	0%	60%	0%	40%
13	8	25%	63%	13%	0%	88%
Total	164	37%	37%	16%	10%	74%

5.6 Other variables

5.6.1 Impact of low soil fertility and high acidity

Seventy-three per cent of respondents identified that concern about low soil fertility or high acidity would be an important factor in a decision about adoption of perennial pastures; 50 per cent for wine grapes; and 39 per cent for farm forestry [Table 5]. This constraint was ranked one out of the 15 negative impacts on mean scores for concern about constraints affecting perennial pastures. There was a significant difference in this variable between those who had/were likely to start and those who did not have/were unlikely to start perennial pastures (χ^2=16.541, df=1, p<0.001). However, there were no significant links between this variable and adoption of best-practices.

5.6.2 Years of post-primary education

Respondents were asked to indicate the number of years of full-time or equivalent, post-primary school education that they had completed. Most (92 per cent) respondents completed this question. The median number of years of post-primary school education was six years. Education is typically correlated with age as previous generations of rural Australians had fewer opportunities to pursue higher education. This was reflected in the significant negative correlation between age and years of education (r_s= -0.1774, p<0.001).

There were no significant differences across the LMUs in the number of years of post-primary education.

There were no significant relationship between higher education and the adoption of best-practices under multivariate analysis [Table 3].

5.6.3 Gender

Women play an important role in decision-making in farming families but their voice is often not heard (Curtis *et al.* 1997). About 32 per cent of Australia's farm work force is female but slightly less than 20 per cent of agricultural decision-makers are women (Elix and Lambert 2000).

Surveys were addressed to property owners identified from CFA maps. In the majority of cases only a surname and an initial were provided. It was therefore impossible to tell exactly what proportion of the survey sample were women.

Of the 462 respondents who gave an indication of their gender, 12 per cent were women. Women were clearly under-represented in this survey. Women respondents were younger, with a median of 52 years compared to 56 years for men; were better educated, with a median of six and a half years post-primary compared to six years for men; and had significantly smaller properties, with a median of 32 hectares compared to 155.2 hectares for men (χ^2=23.002, df=1, p< 0.001). Differences in property size may explain differences in on-property profitability, with 23 per cent of women indicating an on-property profit compared to 40 per cent of men. It may also explain differences in approaches taken to property budgeting, where 16 per cent of women had a property budget updated at least monthly compared to 21 per cent of men.

There were no significant relationship between gender and the adoption of best-practices using multivariate analysis [Table 3].

5.7 Best-practices

5.7.1 Adoption of best-practices by respondents and by Land Management Unit

Table 18 summarises information about the proportion of respondents indicating that they had adopted each best-practice and the median area per respondent. Table 19 summarises this information by LMU. There were no significant differences across the LMUs in the proportion of respondents reporting that they had undertaken each of these best-practices.

TABLE 18
Extent different best management practices have been implemented
Goulburn Broken Dryland, 1999 (N=480)

Topic	n	Situation at present			
		% (no.) responding activity done	Mean ha	Median ha	Total ha
Area sown to introduced perennial pastures, including lucerne	462	66% (305)	180.6	80.0	55,077
Area of remaining native bush and waterways fenced to manage stock access	461	47% (218)	25.5	8.0	5,555
Area of pasture where you have changed grazing/ fertiliser regimes to encourage native perennial grasses	460	23% (104)	99.3	40.0	10,329
Area of high density or intensive grazing	461	33% (153)	130.7	52.0	19,996
Number of ground water pumps installed to lower ground water levels	461	5% (23)	1.2*	1.0*	28*
All trees	480	27% (131)	15.6	5.0	2,044

* no. of ground water pumps, not hectares

5.8 Enterprise mix

5.8.1 Introduction

Respondents were provided with a comprehensive list of land uses/enterprises. These enterprises/landuses were:

- beef cattle grazing/ feedlot and sheep/goats grazing;
- dairying;
- irrigated cropping (not grapes);
- dryland lucerne;
- dryland cropping (not lucerne);
- wine grapes;
- farm forestry;
- other trees (not farm forestry);
- horticulture (including flowers, olives, herbs and nuts);
- all remaining bush; and
- others.

Respondents were then asked to indicate:

- the area under different landuses/enterprises at September 1999;
- the extent this area had increased or decreased over the past five years;
- the area of their property suitable for some enterprises;
- whether they intended increasing or decreasing the area under different landuses/enterprises over the next five years; and
- the likelihood that they would accomplish the target identified for different landuses/enterprises over the next five years. By combining information from those who were likely to accomplish their target with information about existing landuses/enterprises, a new variable measuring landuse/enterprise adoption was produced.

TABLE 19
Extent different best management practices have been implemented by Land Management Unit (LMU) Goulburn Broken Dryland, 1999 (N=480)

LMU	n	% of properties implementing best management practice (Median ha)					
		Introduced perennial pastures sown	Remaining native bush & waterways fenced	Changed grazing/ fertiliser regimes	High density or intensive grazing	Ground water pumps installed*	All trees
1	9	89% (99)	11% (5)	0% (0)	44% (63)	11% (1)	11.1% (1)
2	13	39% (100)	54% (12)	23% (6)	23% (40)	0% (0)	14% (5)
3	15	67% (320)	47% (20)	47% (40)	27% (22)	0% (0)	20% (4)
4	75	65% (72)	53% (12)	20% (44)	33% (80)	8% (1)	25% (4)
5	24	54% (60)	58% (20)	17% (7)	38% (40)	13% (1)	31% (9)
6	31	52% (123)	55% (10)	23% (40)	26% (40)	0% (0)	39% (5)
7	71	65% (40)	46% (4)	21% (40)	36% (42)	3% (1)	27% (10)
7a	27	48% (54)	44% (2)	23% (12)	44% (20)	4% (1)	17% (3)
8	25	71% (160)	46% (5)	17% (64)	32% (90)	4% (1)	36% (5)
9	2	50% (20)	50% (260)	50% (40)	0% (0)	0% (0)	50% (120)
10	123	77% (76)	44% (8)	26% (75)	36% (78)	3% (1)	31% (7)
11	15	80% (215)	67% (13)	13% (22)	20% (200)	7% (1)	33% (4)
12	13	46% (60)	31% (14)	31% (46)	23% (240)	0% (0)	15% (6)
13	20	70% (34)	40% (3)	20% (22)	25% (28)	20% (1)	19% (3)
Total	462	66% (80)	47% (8)	23% (40)	33% (52)	5% (1)	27% (5)

* Number of ground water pumps, not hectares

5.8.2 Involvement in enterprises: current, past 5 years and next 5 years

Grazing of sheep and cattle

Grazing of sheep and cattle occupied 83 per cent of all land covered by this survey excluding remaining native bush. This was the dominant enterprise on GBD properties with 83 per cent of respondents indicating that they had beef and/or sheep grazing on their properties [Table 20 and Appendix D].

About half of the respondents with sheep or cattle grazing report that there was a change in the area grazed in the past five years. Respondents were almost evenly split into those that indicated an increase and a decrease in the area under grazing enterprises [Appendix D]. Information in Table 21 suggests respondents were aiming to reduce the area under grazing enterprises by about 19 per cent over the next five years.

Dryland cropping (excluding lucerne)

Dryland cropping (excluding lucerne) comprised 75 per cent of the remaining 17 per cent of agricultural land (13 per cent of total agriculture land excluding remnant vegetation) [Appendix D].

Dryland cropping was undertaken on 22 per cent of properties. For most respondents involved in dryland cropping it was a substantial area, with a median of 80 hectares [Table 20 and Map 8].

There were significant differences across the LMUs in the proportion of respondents engaged in dryland cropping (χ^2=32.398, df=11, p< 0.001) [Table 20].

Fifty-nine per cent of those respondents with dryland cropping indicated a change in the area under this enterprise in the past five years. Of these, 69 per cent had increased the area under dryland cropping [Appendix D]. It appears however, that there has been a change of attitude about dryland cropping. Fifteen per cent of the 105 landholders that were engaged in dryland cropping in 1999, believed that they would not be in this enterprise in five years time. This is likely to lead to a decline of 13 per cent in the area of land under dryland cropping over the next 5 years [Table 21].

Farm forestry

Nine per cent of landholders indicated that they were involved in farm forestry in 1999 [Table 20]. This enterprise occupied only 0.5 per cent of all land covered by the survey excluding remnant vegetation [Table 20 and 21].

There were no significant differences across the LMUs in the proportion of properties with farm forestry.

Seventy-five per cent of the 44 respondents with farm forestry in 1999, had increased the area under farm forestry in the past five years. However, the median area under farm forestry was very small at four hectares in 1999, as was the total area of farm forestry at 568 hectares [Appendix D]. Fifty-four respondents indicated that they were aiming to have farm forestry enterprises in the next five years. These plans will increase the area of farm forestry by 52 per cent, to 867 hectares, with 76 per cent of respondents indicating that they were likely to accomplish their aims [Table 21 and Map 9].

Dryland Lucerne

Nine per cent of all respondents reported having land under dryland lucerne in 1999, with a median area of 16 hectares [Table 20]. This enterprise occupied only one per cent of all land covered by this survey excluding remnant vegetation [Appendix D].

There were no significant differences across the LMUs for this enterprise.

Sixty-one per cent of the 41 respondents with dryland lucerne in 1999 had increased the area under this enterprise in the past five years [Appendix D]. Forty-seven respondents, an increase of 15 per cent, were aiming to have dryland lucerne in five years time. Their plans will more than double the total area under dryland lucerne to 2,717 hectares [Table 21].

Horticulture (not wine grapes)

Seven per cent of all respondents were involved in horticulture in 1999, with a median area of two hectares [Table 20 and Map 10]. Horticulture occupied a very small 0.1 per cent of all land covered by this survey excluding remnant vegetation [Appendix D].

There were no significant differences across the LMUs for this enterprise.

Seventeen of the 31 respondents with horticulture in 1999 indicated that they had changed the area under this enterprise in the past five years, with 82 per cent reporting an increase [Appendix D]. Fifty-seven respondents, an increase of 84 per cent, were aiming to have horticulture in five years time. Once again, these plans will almost double (95 per cent) the total area to 320 hectares [Table 21].

TABLE 20
Proportion of properties under each landuse/ enterprise
by Land Management Unit (LMU)
Goulburn Broken Dryland, 1999 (N=480)

LMU	n	% of properties under each landuse/ enterprise for each LMU (Median ha)												
		Beef grazing	**Sheep grazing**	***Total grazing***	**Dairy**	**Irrigated cropping**	**Dryland lucerne**	**Dryland cropping**	**Grapes**	**Farm forestry**	**Other trees**	**Horti-culture**	**Native bush**	**Other**
1	9	11% (200)	100% (200)	100% (57)	0% (0)	33% (108)	33% (32)	100% (220)	22% (12)	0% (0)	11% (1)	11% (64)	22% (15)	111% (50)
2	14	50% (52)	36% (76)	64% (100)	7% (24)	0% (0)	0% (0)	0% (0)	7% (8)	7% (4)	7% (6)	7% (0.4)	50% (24)	7% (8)
3	15	40% (346)	53% (336)	67% (100)	7% (0.4)	7% (2)	27% (30)	33% (120)	7% (1)	7% (4)	13% (5)	0% (0)	27% (19)	27% (24)
4	80	65% (76)	48% (134)	85% (100)	1% (0.4)	4% (0.4)	3% (0.4)	9% (13)	6% (1)	9% (1)	24% (3)	11% (2)	35% (16)	10% (10)
5	26	62% (114)	69% (114)	89% (100)	4% (5)	0% (0)	0% (0)	8% (11)	4% (4)	12% (5)	31% (6)	12% (2)	39% (6)	15% (15)
6	31	32% (33)	42% (214)	61% (94)	3% (3)	3% (8)	10% (5)	19% (23)	13% (5)	10% (5)	36% (4)	16% (2)	36% (16)	10% (15)
7	73	73% (65)	23% (260)	80% (100)	1% (144)	3% (62)	3% (8)	7% (20)	3% (21)	12% (15)	16% (4)	7% (2)	27% (24)	12% (4)
7a	29	69% (20)	28% (36)	76% (79)	0% (0)	0% (0)	3% (18)	3% (6)	0% (0)	0% (0)	17% (3)	3% (2)	28% (15)	21% (11)
8	25	84% (160)	44% (300)	88% (100)	4% (3)	0% (0)	0% (0)	16% (220)	4% (26)	16% (17)	28% (4)	0% (0)	20% (80)	12% (9)
9	2	50% (240)	50% (120)	100% (96)	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	50% (120)	0% (0)	0% (0)	0% (0)	0% (0)
10	127	58% (100)	54% (200)	87% (98)	3% (106)	6% (16)	15% (14)	38% (94)	3% (3)	9% (3)	28% (6)	3% (2)	26% (6)	8% (24)
11	15	53% (34)	67% (291)	100% (57)	0% (0)	7% (440)	13% (60)	73% (140)	0% (0)	13% (2)	27% (5)	0% (0)	33% (25)	0% (0)
12	13	46% (160)	46% (108)	77% (95)	8% (60)	0% (0)	15% (29)	31% (91)	15% (15)	0 (0)%	15% (6)	15% (10)	31% (16)	8% (42)
13	21	71% (64)	43% (164)	86% (100)	0% (0)	0% (0)	14% (5)	14% (4)	5% (4)	10% (8)	10% (3)	0% (0)	24% (8)	10% (7)
Total	480	60% (86)	46% (184)	83% (100)	3% (42)	4% (16)	9% (16)	22% (80)	5% (4)	9% (4)	23% (4)	7% (2)	30% (15)	11% (15)

Wine grapes

Five per cent of all respondents were growing wine grapes in 1999, covering a median of four hectares per property [Table 20 and Map 10]. This enterprise occupied only 0.2 per cent of all land covered by this survey excluding remnant vegetation [Appendix D].

There were no significant differences across the LMUs for this enterprise.

Thirteen of the 24 respondents with wine grapes in 1999 indicated that they had increased the area under this enterprise in the past five years [Appendix D]. Twenty-six respondents, an increase of only eight per cent, were aiming to have wine grapes in five years time. These plans will increase the total area by 21 per cent to 262 hectares [Table 21].

Irrigated cropping (not grapes)

Four per cent of all respondents were practicing irrigated cropping in 1999, with a median of 16 hectares [Table 20]. Again, this covered a very small proportion (one per cent) of all surveyed land, excluding remnant vegetation, in the GBD [Appendix D].

There were no significant differences across the LMUs for this enterprise.

Eight of the 18 respondents with irrigated cropping in 1999 indicated that they had changed the area under this enterprise in the past five years, with 88 per cent reporting an increase [Appendix D]. Eleven per cent of the 18 landholders that were engaged in irrigated cropping in 1999, believed that they would not be in this enterprise in five years time [Table 21]. However, information in Table 21 suggests there is likely to be an increase of 50 per cent in the actual area of land under irrigated cropping over the next five years.

TABLE 21
Aims for the next 5 years for landuse/ enterprise mix and likelihood of those changes taking place
Goulburn Broken Dryland, 1999 (N=480)

Landuse/ enterprise	n	Current at Sept 1999 Total ha	n*	Aiming to be in 5 years Total ha	n**	Assessment of likelihood you will accomplish your aims, % respondents		
						likely	not sure	unlikely
Beef cattle grazing/ feedlot	289	47,888	253	43,764	242	70%	15%	15%
Sheep/ goats grazing	221	60,015	177	43,929	177	69%	19%	12%
Dairy	12	713	11	699	16	56%	13%	31%
Irrigated cropping (not grapes)	18	1,062	16	1,589	20	60%	10%	30%
Dryland lucerne	41	1,191	47	2,717	55	60%	27%	13%
Dryland cropping (not lucerne)	105	16,605	89	14,372	93	73%	17%	10%
Grapes	24	216	26	262	29	62%	14%	24%
Farm forestry	44	568	54	867	55	76%	16%	7%
Other trees (not farm forestry)	109	1,476	77	1,115	82	82%	13%	5%
Horticulture (flowers, olives, herbs, nuts)	31	164	53	320	57	65%	18%	18%
All remaining native bush	142	4,272	N/A	N/A	N/A	N/A	N/A	N/A
Other (horses, deer, alpacas, orchards, vegetables, residential/domestic, wetlands)	52	1,589	39	1,611	41	76%	15%	10%

* n = no. of respondents who gave an indication of their aims
** n = no. of respondents providing an assessment of likelihood of accomplishing their aims
Note: Total area is 130,166 hectares

6.0 SUMMARY AND CONCLUSION

Awareness of issues

Most respondents (87 per cent) indicated that their property showed no signs of salinity and most of those that did, had only small areas of vegetation affected by salinity. Most respondents were not concerned about the environmental, economic or social impacts of salinity and thought that commodity prices would be a more important factor than salinity in determining long-term property viability. GBD respondents were significantly less concerned about the impacts of salinity than respondents to a recent survey in the SIR. They were also less optimistic that onground work would be undertaken to address salinity in the GBD (Byron *et al.* 1999).

Landholders appeared to have a high level of awareness of current salinity problems. Only four per cent of survey respondents who indicated that they had no vegetation showing the effects of salinity, were within one kilometre of a discharge site on DNRE maps (Allan *et al.* 1997). Only 2.4 per cent of those reporting no effects of salinity had properties where ground water was within two metres of the surface and where the total dissolved salt content was higher than 3501 mg/L, as mapped by SKM (SKM 2000). This is the level of total dissolved salts that is expected to impact on vegetation (Hoxley pers. comm. 2000).

These findings highlight the relationship between the obvious expression of salinisation in the landscape and landholder awareness of the existence of salinity problems. At the same time, it is unlikely that landholders in the GBD are prepared for the significant increase in the area of land affected by salinity that is forecast by the recent MDBC Salinity Audit.

Where there is discontinuity between the source of salinity and salinity impacts, it will be difficult to change land management practices in the recharge areas. If salt loads originating in the GBD are a critical issue for the rest of the GBC and/or the MDB, then this needs to be acknowledged and addressed. Given survey findings about very low levels of on-property profits, there may be a strong case for intervention through cost-sharing with downstream landholders; supporting landholders to move into profitable emerging enterprises; and government funding for natural resource management.

Survey findings predict that about half (45 per cent) the properties surveyed can be expected to change hands by 2010. This suggests that there may be a new group of landholders taking over property management who could be largely unaware of salinity issues in the GBD. There is therefore an important role for community education activities that raise awareness of salinity impacts and increase understanding of the complex processes contributing to land and water degradation in the GBC. These activities will need to engage the wider regional community, not just rural landholders, if effective responses are to be developed.

Under multi-variate analysis using the proportion of the total property, there was a significant positive relationship between the overall measure of concern about the impacts of rising water tables and total trees established. This finding suggests that there is a link between concern about salinity and adoption of some best-practices.

Efforts to achieve more sustainable resource management in the GBD need to move beyond a narrow focus on salinity. Survey findings show that respondents were more concerned about the impacts of commodity prices than the impacts of salinity. It therefore seems likely that landholders would respond to incentives addressing concerns about low on-property incomes. Community education should also address the high level of environmental concerns regarding the quality of ground water; habitat and wildlife; and the attractiveness of the area as a place to live.

There were no significant differences across the LMUs in the proportion of landholders reporting salinity. There were however, significant differences across the LMUs for the overall measure of concern about the impacts of rising water tables. These differences highlight the importance of understanding the subregional

context.

Knowledge and skills

Whilst the survey did not attempt to directly assess landholder knowledge or skills, most respondents indicated that access to information or the time and effort to acquire new knowledge and skills were not important constraints affecting their capacity to take up farm forestry or perennial pastures. There were no significant differences across the LMUs on these topics. Issues that related to fair returns to growers from farm forestry; limited financial capacity to establish wine grapes; and high soil acidity/low fertility for perennial pastures were rated much higher than knowledge and skills.

Attitudes

Landholder attitudes about the importance of community cooperation (88 per cent agreed); the importance of working with government (78 per cent agreed); and individuals having most responsibility for work on their land (61 per cent agreed), were overwhelmingly positive and should aid the achievement of GBDSMP objectives. There was also evidence that most landholders had taken conservation values into account when planning work on their property over the past three years (76 per cent).

There were significant differences across the LMUs for individuals having most responsibility for work on their land and for landholders taking conservation values into account when planning work on their properties.

The problematic nature of links between attitudes and behaviour was illustrated by the finding of no significant positive relationships between attitudes surveyed and the adoption of best-practices under multivariate analysis.

Landcare

In three of the four critical LMUs (6, 7a and 13), Landcare participation was well below the average of 55 per cent for all LMUs and this finding is worthy of further investigation.

Findings from earlier research that Landcare participation is linked to significantly higher levels of adoption of best-practices were not replicated in the GBD survey. In fact, there was a significant negative relationship between Landcare participation and the area sown to introduced perennial pastures under multi-variate analyses. These trends need to be investigated further.

Property management

Most respondents were not approaching their property management using sound business practices, including establishing a property plan, regularly updating a property budget and planning for family succession. Using the proportion of the total property under each best-practice, there were few links between planning and adoption of best-practices. The only significant positive relationship under multivariate analysis was between having a property plan and the total number of trees planted.

Property size

Property size is an important element in determining the viability of grazing and dryland cropping enterprises. Survey data shows that most properties in the GBD were less than 150 hectares (53 per cent) and that 70 per cent were less than 300 hectares.

There was a significant positive relationship between increased property size and the likelihood of respondents returning an on-property profit as well as a higher amount of on-property profit. This relationship was highlighted by survey findings that the smallest property to report an on-property profit of over $50,000, was 278 hectares. Given that the threshold considered as being the minimum to sustain a family and maintain property assets is $50,000 (Rendell *et al.* 1996), it is alarming that only fifteen

properties reported an on-property profit in excess of $50,000. The median property size for this group of respondents was 1,090 hectares.

Property size is potentially an important constraint on the capacity of land managers to adapt to changed circumstances. There were significant differences in median property size across the LMUs, with LMUs 1 and 3 having a median property size greater than 500 hectares, suggesting there was a high proportion of potentially viable properties. Of the four critical LMUs, LMU 10 had a median property size of 200 hectares and LMUs 6, 7a and 13 had median property sizes of less than 60 hectares, suggesting there were few properties with the potential to establish viable grazing or cropping enterprises in these areas.

Multivariate analysis using the total area under each best-practice, established significant positive relationships between property size and adoption of most best-practices. When using the proportion of the total property under each best-practice, there were some significant negative relationships between property size and adoption of best-practices. These findings suggest that, compared to larger property owners, owners of smaller properties were adopting some best-practices at levels that were a higher proportion of their total properties. At the same time, larger property owners had implemented most best-practices on a larger scale. These findings suggest there is considerable interest in adoption amongst both large and small property owners.

The proportion of land managed by small property owners was relatively small, with 29 per cent of all properties being 40 hectares or less, but occupying only 2 per cent of all land covered. A relatively small proportion of the respondent landholders owned most of the land, with 91 per cent of land owned by the 47 per cent of respondents with properties larger than 150 hectares. This information suggests that efforts to improve implementation of GBDSMP goals should focus on larger property owners. However, owners of small properties may manage critical areas contributing to salinity. The reality is that resource managers will need to work with both small and large property owners.

To a large extent, farmers owned bigger properties, with farmers representing 54 per cent of respondents but owning 83 per cent of all land covered in the survey. This information highlights the importance of working with farmers. However, in three of the four critical LMUs, farmers comprised 40 per cent or less of all respondents in the LMU. When using the total area under each best-practice, there was a significant negative relationship between farming as an occupation and the adoption of best-practices, including:

- the total area of trees planted; and
- the area of remaining native bush and waterways fenced to manage stock access.

These relationships may reflect the lower household incomes of farmers and the reluctance to allocate land to conservation given the importance of on-property income in the household budget of farmers.

Enterprise profitability

Most respondents (62 per cent) did not report an on-property profit for 1998/99. The median on-property profit was $15,000. Only nine per cent of those respondents reporting an on-property profit, had a profit exceeding the $50,000 threshold (Rendell *et al.* 1996).

There were significant differences across the LMUs for on-property profitability. The proportion of respondents indicating a profit was highest in LMUs 1, 9, 11, and 10 and lowest in LMUs 7a, 6, 2 and 7. The median profit equalled or exceeded $25,000 in LMUs 1 and 12, but not in any of the four critical LMUs. This has important implications for regional planning, particularly in terms of the effectiveness of applying cost sharing arrangements across the different LMUs in the GBD.

Under multivariate analysis, there were some significant positive relationships between on-property profitability and adoption using the total area under each best-practice. These include the area sown to introduced perennial pastures; the area of high density or intensive grazing; and the area of remaining native bush and waterways fenced.

Eighty per cent of respondents had a surplus on pre-tax, off-property income for 1998/99. The median income of these respondents was $25,000. This trend was consistent across the LMUs. Total off-property income was worth $11.7 million compared to $3.3 million on-property income (a multiple of 3.5). Farmers had the lowest median off-property income ($15,000). There were no significant relationships between off-property income and the adoption of best-practices under multivariate analysis.

The median combined on and off-property income was $32,500 for 1998/99. Twenty-five per cent of respondents had a combined on and off-property income over $50,000 for 1998/99. For farmers, only 16 per cent of respondents had a combined income over $50,000. Only in LMU 1 was the combined median income at or above $50,000. Multivariate analysis indicated no significant relationships between total household income and adoption of best-practices.

This information highlights the limited financial capacity of most GBD landholders to sustain a household and provide sufficient funds for investment that will maintain their property's assets. Survey respondents confirmed the importance of financial issues when asked to indicate the extent that a range of factors might constrain their financial capacity to change land management practices and enterprises. The importance of financial issues was also reflected by the concerns of respondents regarding long-term markets and growers receiving fair returns when contemplating new enterprises such as farm forestry. Forming a grower cooperative is one way of enhancing the bargaining power of growers. Industry needs to improve communications with growers and to develop contractual arrangements that meet the needs of the different groups of growers (Curtis and Race 1996b).

Farming as an occupation or lifestyle

Almost all respondents (94 per cent) reported spending time on farming related activities in the past 12 months. The median hours worked on-property over the 12 months was 30 hours per week. The extent of part-time farming was highlighted by information that 29 per cent of respondents worked less than 15 hours per week on-property. On-property hours worked was not significantly associated with the adoption of best-practices under multivariate analysis.

It seems that many holdings were lifestyle-farming enterprises for retirees and people with off-property work. Almost half the survey respondents reported that they were not farmers (46 per cent). In three of the four critical LMUs (6, 7a and 13), farmers comprised 40 per cent or less of respondents. This would seem an important finding in that non-farmers and retirees may respond less quickly to economic signals; be more averse to risking off-property income in on-property enterprises; and would possibly have less time for property management. On the other hand, non-farmers may be more likely to respond to incentives for biodiversity conservation and may bring new ideas, skills and financial resources that contribute to local communities. As already discussed, multivariate analysis indicated a negative relationship between farming as an occupation and adoption of some best-practices.

Forty-one per cent of respondents indicated that they had paid off-property employment that lasted at least three months in the past 12 months. There were no significant differences across the LMUs for this variable. For those working off-property, the median was 38 hours, which is the equivalent of full-time employment. Multivariate analysis indicated a significant link between hours worked off-property and the area of remaining native bush and water ways fenced to manage stock access.

Combining on and off-property work showed that 77 per cent of respondents worked more than 30 hours per week, with a median of 50 hours. This information confirms other research in Victoria suggesting that many land managers have limited time available to take on additional conservation related work (Curtis and Van Nouhuys 1999; Byron *et al.* 1999; Curtis 2000). These findings suggest that there are limits to the capacity of individuals and community groups to effect landscape scale improvements in natural resource condition through voluntary action.

Ninety-two per cent of respondents had more than five years, and 81 per cent more than 10 years, experience as a farmer/living on a farm (median 23 years). This information suggests that inexperience or lack of awareness of farming/property management should not be a major constraint affecting GBDSMP outcomes.

Ninety-two per cent of respondents had been living in their local area for more than five years and 78 per cent for more than 10 years (median 20 years). Overall, 28 per cent of respondents had lived in their local area for less than 25 per cent of their life. This information suggests that the GBD had a fairly stable rural population.

Landholder stage of life

Most of rural Australia has an ageing population and it was thought that this might be an important constraint affecting landholder willingness and capacity to change practices of land management.

The median age of survey respondents was 55 years, significantly higher than the median age (48 years) for respondents in the 1999 SIR survey (Byron *et al.* 1999). There were no significant differences in the median age of respondents across the LMUs.

Younger respondents were significantly more likely to be involved in budgeting; take nature conservation into account when planning work on their property; take their neighbour's property characteristics into account when planning; have a written property plan; and be willing to work with government. However, the expected significant relationship between younger age and higher adoption of best-practices was absent. These findings suggest that the ageing of rural landholders may not be a major constraint to the adoption of best-practices.

Forty-nine per cent of GBD respondents were over 55 years and 24 per cent were over 65 years. The over 65 years age group continued to manage a substantial proportion of land (18 per cent). As might be expected, a significantly higher proportion of the over 65 years group was retired (23 per cent), compared to the 55 to 65 years group (14 per cent) and the under 55 years group (one per cent). There was also a significantly higher proportion of farmers in the over 65 years group with 63 per cent, compared to 57 per cent for the 55-65 years group and 48 per cent for the under 55 years group.

The over 65 years group went against the overall trend that as age increased fewer people believed that they would live on their property in the long-term. In an era of declining property profitability and stagnant property prices, some of the over 65 years group, who may have planned to sell or pass on their properties, may now be locked into living long-term on their properties. This assessment was supported by evidence that the over 65 years group went against the overall trend that as age increased more people expected to sell. Sixty-three per cent of the over 65 years group also believed that ownership of the property would stay within their family. It seems reasonable to conclude that a sizeable proportion of the properties of the over 65 years group will not pass to the next generation until after the death of, or inability of the current owner to farm their properties. These trends and the trend for increased life expectancy, suggest that inter-generational transfer of many of the properties held by the over 65 years age group will not occur for some time. This information emphasises the need to continue to work with existing landholders.

Property transfer

Analysis of data on rural property transfers suggests that 65 per cent of all rural properties in the GBD (from a total of 6,449 based on CFA directories) changed hands in the past ten years. This trend was expected to impact on landholder willingness to change; demand for and effectiveness of community education activities; and the potential for initiatives such as government or industry intervention to acquire property in critical LMUs.

Findings discussed below highlight the extent that there will continue to be:

- large changes in property ownership – 45 per cent of all properties were expected to change hands in the next 10 years; and
- a substantial proportion of property transfers will occur through sales on the open-market as opposed to family transfer – at least 75 per cent of transfers in the four critical LMUs will be on the open-market in the next 10 years.

Survey data suggests that for a large proportion of properties (66 per cent of respondents believed they would continue living on their property in the long-term), the transfer of ownership and a change in management will be delayed until the death of or inability of current owners to farm. Analysis established no positive associations between intention to continue living on the property and adoption of best-practices.

Some property owners may pass ownership or management to younger family members on retirement. Fifty-eight per cent of respondents thought that their long-term plans would involve property ownership staying within the family. In a separate question, 31 per cent of respondents indicated that their family had agreed to a plan for managing the transfer of their property to the next generation. However, given the low viability of most properties and the current movement of younger people from rural areas, it seems likely that many of these properties will be sold or available for purchase. Analysis of survey data failed to establish the expected links between family succession and significantly higher adoption of best-practices.

Thirty-four per cent of respondents thought that in the long-term their property would be sold. Some respondents indicated that they would subdivide and then sell a large part of their property. Combining the two groups, 36 per cent of respondents thought that they would be selling all or a large part of their property. Those intending to sell their property owned 25 per cent of the land covered by the survey, but there were large differences across the LMUs in the proportion of land likely to be sold. In the four critical LMUs: LMU 6 had one per cent; LMU 7a had 61 per cent; LMU 10 had 23 per cent; and LMU 13 had 58 per cent of all land owned by those intending to sell in the long-term. Apart from the area of pasture where grazing/ fertiliser regimes were changed to encourage native perennial grasses, there were no other significant relationships between intention to sell and the adoption of best-practices under multivariate analysis.

Sixteen per cent of all respondents thought that in the long-term they would subdivide and sell at least a part of their property. Those intending to subdivide owned 18 per cent of the land covered by this survey. This type of property speculation should not hinder large-scale adoption of best-practices or new enterprises in the GBD. However, it is evident that there will be increased subdivision. This could result in an increased proportion of properties that will not be viable as cropping or grazing enterprises as well as an increased proportion of land managers who are non-farmers.

Predicted year of property transfer

Thirty-six per cent of respondents were likely to sell their property (25 per cent of all land); 51 per cent intended to pass the property to someone else in the family (63 per cent of all land); and 13 per cent had other long-term plans (nine per cent of all land).

The median year of transfer was 2010, with 19 per cent of properties expected to change hands by the end of 2004 and 45 per cent by the end of 2009. There were no significant differences across the LMUs in the median year of transfer. However, in two of the four critical LMUs (LMUs 7a, and 13), the median year of transfer was 2008.

The median year of property transfer by sale was 2005, with 37 per cent of properties expected to be sold by the end of 2004 and 74 per cent expected to be sold by the end of 2009. There were no significant differences across the LMUs in the median year of transfer.

The median year of transfer under family succession was 2012, with 12 per cent expected to be transferred by the end of 2004 and 37 per cent expected to be transferred by the end of 2009. There were no significant differences across the LMUs in the median year of transfer. In all of the four critical LMUs, the median year of transfer was before or the same as the overall GBD median.

If property owners expect to live in their local region on retirement they might be more committed to take action to address salinity. Respondents were asked to indicate if their long-term plans involved them moving away from the region where their property is located. Most respondents were committed to living in their region in the long-term. Only 19 per cent of all respondents indicated that they would live outside their region. Expectation of migration away from the region on retirement should not be a factor constraining the overall implementation of the GBDSMP.

While the predicted level of property transfer may suggest that community education would be a poor investment of limited resources, there is evidence that community education approaches can cope with this level of turnover, in that Landcare groups across Victoria have experienced higher rates of membership turnover (Curtis and Van Nouhuys 1999).

Enterprise mix

Grazing of sheep and cattle occupied 83 per cent of all land covered by this survey, excluding remaining native bush. This was the dominant enterprise on GBD properties. Survey data suggest that respondents were aiming to reduce the area under grazing enterprises by about 19 per cent over the next five years.

Dryland cropping comprised 75 per cent of the remaining 17 per cent of agricultural land, and was undertaken on 22 per cent of properties. There were significant differences across the LMUs in the proportion of respondents engaged in dryland cropping. It seems there has been a change of attitude about dryland cropping. About 15 per cent of the 105 landholders that were engaged in dryland cropping, believed that they would not be in this enterprise in five years time. There was also likely to be a similar decline in the area of land under dryland cropping over the same period.

There are likely to be substantial increases in the proportion of respondents and/or the area of land engaged in alternative and potentially more profitable enterprises. Unfortunately, the number of landholders involved and/or the areas established, was so small that these enterprises are unlikely to make a significant change to the overall low level of on-property profitability. Based on these current small numbers and areas, these enterprises are unlikely to overcome what appears to be a major constraint on the financial capacity of landholders in the GBD to adopt best-practices in the near future.

The main changes to the new and more profitable enterprises expected over the next five years are as follows.

- Farm forestry; an existing median of four hectares, with an expected increase of 52 per cent in area but only 10 more landholders.
- Dryland lucerne; an existing median of 16 hectares, with an expected increase of more than 100 per cent in area but only six more landholders.
- Horticulture; an existing median of two hectares, with an expected increase of 95 per cent in area and 22 more landholders.
- Wine grapes; an existing median of four hectares, with an expected increase of 21 per cent in area but only 2 more landholders.
- Irrigated cropping; an existing median of 16 hectares, with an expected increase of 50 per cent in area, but a decrease of two landholders involved.

Usefulness of this research method

The researchers and agency partners, as well as the expert panel believe that the survey data gives important insight for those wanting to understand landholder willingness and capacity to address dryland salinity. This type of data is not provided by other sources, including the ABS household and farm surveys. The 1999 survey presents base-line data for the GBD and the survey would need to be repeated in five to ten years time.

Research findings emphasised the importance of on-property income as a factor constraining change in land management practices and enterprises. At the same time, there were important but counter-intuitive findings, including that age and family succession were not associated with higher adoption of best-practices. It would therefore be useful to conduct similar research in other catchments. It would also be useful to conduct qualitative research, through interviews, that explores the intentions and expectations of landholders at different life stages

The current research also identified important differences between LMUs for key variables such as on-property income, occupation and property size. The maps included in the report highlight these differences at the LMU scale.

An important aspect of this research was the comparisons of survey data with existing technical data. A GIS was used to compare landholder awareness of salinity with maps of salinity discharge sites and water table levels. This approach identified important research findings.

Although each regional context will be different, experience in the GBD has helped identify social factors affecting landholder willingness and capacity to change their land management practices. The research methodology developed, appears both useful and cost effective, with the cost of similar projects being approximately $100,000 per catchment.

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8.0 APPENDICES

Appendix A
Number of respondents
by Land Management Unit (LMU)
Goulburn Broken Dryland, 1999 (N=480)

LMU	Total no. of properties	Random no. properties sent a survey	Surveys returned, not completed	Return to sender	Resp. not at address	Surveys returned & assessed	Response rate (%)
1	83	27	6	1	0	9	50.0
2	133	39	5	1	1	14	45.2
3	146	40	5	4	3	15	51.7
4	728	233	21	56	5	80	51.9
5	227	67	12	8	0	26	65.0
6	405	118	7	50	10	31	56.4
7	1592	335	26	80	43	73	39.2
7a	544	156	13	49	17	29	37.7
8	366	111	4	30	6	25	36.2
9	80	20	3	5	1	2	15.4
10	1795	364	32	33	19	127	45.4
11	89	24	2	2	1	15	60.0
12	148	32	3	6	2	13	59.1
13	113	74	4	15	8	21	50.0
Total	**6449**	**1620**	**272**	**335**	**115**	**480**	**46.7**

Appendix B
Concern about the impact of rising water tables
by Land Management Unit (LMU)
Goulburn Broken Dryland, 1999 (N=480)

Potential impacts	Extent of concern about rising water tables, % respondents 'alarmed/very concerned/concerned', and mean score** for each impact, by LMU													
	1 (n=9)	**2 (n=13)**	**3 (n=14)**	**4 (n=76)**	**5 (n=25)**	**6 (n=29)**	**7 (n=64)**	**7a (n=27)**	**8 (n=24)**	**9 (n=2)**	**10 (n=116)**	**11 (n=15)**	**12 (n=12)**	**13 (n=21)**
Polluting fresh ground water in this area	67% 3.111	39% 2.538	71% 3.071	24% 1.895	46% 2.583	62% 2.793	35% 2.127	56% 2.556	33% 2.167	50% 3.000	51% 2.649	64% 2.714	58% 3.0	38% 2.381
Threat to the long-term productive capacity of this area	56% 3.889	46% 2.462	64% 2.714	28% 1.974	46% 2.542	69% 3.034	36% 2.063	55% 2.63	33% 2.083	50% 3.000	59% 2.886	73% 2.933	50% 2.75	43% 2.571
Contributing to the decline of habitat or wildlife in this area	33% 2.333	62% 2.769	50% 2.214	28% 1.974	32% 2.400	41% 2.483	29% 1.889	48% 2.481	29% 2.000	50% 3.000	50% 2.544	50% 2.643	50% 3.083	48% 2.619
Threat to the long-term viability of the local economy	56% 2.444	69% 2.923	50% 2.500	22% 1.862	39% 2.435	55% 2.724	29% 1.921	41% 2.370	38% 2.250	50% 2.500	61% 2.817	71% 3.000	50% 2.917	33% 2.381
Reducing the value of my property	56% 3.000	31% 1.923	37% 2.571	19% 1.737	29% 2.083	24% 1.966	22% 1.81	30% 1.963	33% 2.250	0% 1.500	45% 2.461	43% 2.500	42% 2.417	33% 1.952
Threat to long-term productive capacity of my property	44% 2.000	15% 1.769	50% 2.214	19% 1.707	25% 1.917	31% 2.000	21% 1.81	33% 2.000	37% 2.167	0% 1.500	45% 2.452	36% 2.249	50% 2.5	19% 2.048
Detracting from attractiveness of area as a place to live	56% 2.667	39% 2.308	50% 2.357	23% 1.813	25% 2.125	48% 2.414	22% 1.73	37% 2.259	33% 1.875	50% 2.500	47% 2.466	40% 2.267	33% 2.333	45% 2.250
Threat to pasture production on my property in next 5 years	22% 2.000	31% 1.846	50% 2.286	15% 1.533	25% 1.958	24% 1.897	16% 1.603	18% 1.778	25% 2.038	0% 1.500	30% 2.204	47% 2.467	33% 2.25	33% 2.190
Reducing my current property income	33% 2.000	8% 1.462	43% 2.143	15% 1.595	21% 1.875	14% 1.655	16% 1.556	18% 1.630	21% 1.875	0% 1.500	32% 1.991	40% 2.133	42% 2.417	14% 1.619
Total (mean)	47% 2.494	38% 2.222	52% 2.452	21% 1.788	32% 2.213	41% 2.330	25% 1.834	37% 2.185	31% 2.078	28% 2.222	43% 2.500	52% 2.545	45% 2.630	34% 2.223

** Score where 1 = not a problem through to 5 = alarmed

Appendix C
Aspects of planning undertaken as part of property management
by Land Management Unit (LMU)
Goulburn Broken Dryland, 1999 (N=480)

Planning as part of property management	% respondents indicating 'yes' & 'unsure' to aspect of planning undertaken, by LMU													
	1 (n=9)	**2 (n=13)**	**3 (n=14)**	**4 (n=74)**	**5 (n=26)**	**6 (n=30)**	**7 (n=70)**	**7a (n=26)**	**8 (n=25)**	**9 (n=2)**	**10 (n=121)**	**11 (n=15)**	**12 (n=12)**	**13 (n=21)**
In the past 3 years, have you taken into account nature conservation values of some areas when planning work on your property?	67%	39%	93%	77%	72%	77%	83%	73%	80%	50%	80%	67%	92%	76%
In the past 3 years, have you taken into account a district, catchment of regional plan when planning work on your property?	56%	25%	43%	49%	28%	24%	32%	23%	24%	50%	35%	33%	33%	38%
Have you written down personal &/or family goals to be achieved on your property?	22%	8%	64%	41%	39%	30%	26%	23%	32%	100%	35%	20%	8%	38%
Has your family agreed to a plan for managing the transfer of your property to the next generation?	56%	8%	71%	36%	31%	23%	24%	19%	36%	100%	40%	40%	46%	29%
In the past 3 years, have you taken your neighbour's property layout into consideration when planning work on your property?	67%	17%	50%	35%	25%	21%	30%	29%	15%	0%	29%	13%	33%	14%
Do you currently have a property budget that is updated at least monthly?	22%	8%	43%	25%	15%	7%	17%	8%	40%	50%	26%	13%	0%	24%
In the past 3 years, have you included the cost of work to address salinity in your property budget?	33%	0%	21%	11%	20%	24%	4%	19%	16%	0%	19%	20%	8%	29%

Appendix D
Present landuse/ enterprise mix on property and changes over the past 5 years
Goulburn Broken Dryland, 1999 (N=480)

Landuse/ enterprise Goulburn Broken Dryland	n	Current at Sept 1999		% of total property (excluding remnant native bush)		n**	Change over past 5 years, % respondents	
		Total ha	Median ha	Mean	Median		increase	decrease
Beef cattle grazing/ feedlot	289	47,888.1	86	73%	90%	114	58%	42%
Sheep/ goats grazing	221	60,015.4	184	71%	79%	101	49%	52%
Dairy	12	713.0	42	54%	55%	3	100%	0%
Irrigated cropping (not grapes)	18	1,062.4	16	10%	5%	8	88%	13%
Dryland lucerne	41	1,191.4	16	7%	4%	26	96%	4%
Dryland cropping (not lucerne)	105	16,604.9	80	30%	24%	62	69%	31%
Grapes	24	215.8	4	9%	3%	13	100%	0%
Farm forestry	44	568.2	4	12%	3%	33	100%	0%
Other trees (not farm forestry)	109	1,475.6	4	12%	4%	58	100%	0%
Horticulture (flowers, olives, herbs, nuts)	31	164.3	2	13%	8%	17	82%	18%
All remaining native bush	142	4,271.9	15	23%*	10%*	30	77%	23%
Other (horses, deer, alpacas, orchards, vegetables, residential/domestic, wetlands)	52	1,589.0	15	36%	20%	24	88%	13%

* per cent of total property area that is remnant native bush
** No. of respondents indicating a change in particular enterprise
Note: Total area is 130,166 hectares