Social and economic data for regional and natural resource management in Western Australia's south west catchment: results of the 2006 landholder survey

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Social and Economic Data for Regional Natural Resource Management in Western Australia's South West Catchment: Results of the 2006 Landholder Survey

Michael Hanslip, Robert Kancans, Brigit Maguire and Ian Byron
Acknowledgments

We would like to thank all of the survey participants for taking the time to complete the survey. The members of the South West Catchment steering committee for their direction and assistance with preparing the survey. Thanks also to colleagues from the Bureau of Rural Sciences, in particular Shelley Kowalski, for assistance in the preparation of the survey and data entry and to Shannon Kellett for the review of literature. A final thanks to Gail Kelly and Anne Jenkins for review and comments on the draft report.
Executive Summary

Introduction

This report presents a summary of the key findings from a mailed survey to 2,000 landholders in the South West Region of Western Australia in 2006. The survey gathered information on the key social and economic factors affecting landholder decision-making about the adoption of practices expected to improve the management of natural resources in the region. The response rate for the survey was 69.4%.

The South West Catchment Council, Western Australian Department of Agriculture and Food and the Bureau of Rural Sciences were key project partners. Funding was from a mix of national, state and regional programmes, including the Natural Heritage Trust Extension (NHT).

The South West Catchment is geographically, socially and economically diverse and is made up of six sub-regions (Blackwood, Cape to Cape, Geographe, Leschenault, Peel-Harvey, and Warren). These sub-regions were used to report on differences across the catchment.

Characteristics of landholders and their properties

- The median age of property owners in the South West Catchment was 50 years. Blackwood had the highest proportion of older people. Of those who indicated their gender, 28% were women.
- Farming was the single most common occupation reported by respondents with 55% saying this was their primary occupation. The 45% of respondents who said farming was not their primary occupation only managed 14% of all land surveyed.
- Less than half of all respondents (43%) made an on-property profit for the 2004/05 financial year and the most common amount (mode) was the less than $10,000 category. Farmers were most likely to have reported an on-property profit. Three quarters (75%) of respondents reported an off-property household income for the 2004/05 financial year. The average total household annual income for all respondents for the 2004/05 financial year was $71,810, with a median of $55,000.
- Respondents indicated they had lived in their local district on average for 30 years, and on average had lived on their properties for 24 years.
- The mean property size for respondents was 538 ha. Only 15% of respondents reported owning or managing a property in excess of 1,000 ha, but these respondents managed 74% of the total area surveyed. Property sizes varied within and between sub-regions.
- 64% of respondents indicated agricultural production was the primary purpose of their property; 24% listed the primary purpose of the property to be a hobby or lifestyle farm.
- Native vegetation, beef cattle and dryland pasture were the most common land uses/enterprises reported by respondents in the South West Catchment.
Assessment of issues

- Managing pests and weeds and the quality and availability of ground water were the issues that most respondents said were important on their property.
- Respondents considered increasing costs of agriculture inputs, profitability of farming, poor commodity prices and high land prices limiting expansion to be the most important issues in their local district.
- The main environmental concerns were increasing climate variability and control of pests and weeds.
- The two most important social concerns affecting respondents’ local district were the lack of young people entering farming and the lack of affordable housing.
- Access to advice and support for NRM and lack of native plants and animals were not rated as important issues by most landholders.

Values attached to property

Landholders reported a high degree of attachment to their properties and a high degree of confidence that their property was right for achieving their goals. More than three quarters thought they could not enjoy the same quality of life if they did not live on a rural property.

A majority of landholders were mindful of the implications of their actions on others. Fewer respondents thought their neighbours would consider the impact their actions may have on them.

A large majority of respondents believed that landholders should receive incentives for providing environmental services that benefit the wider community.

Decision-making and trust

Respondents indicated they are more likely to involve their spouse and business partner in long-term decisions in comparison to routine or operational decisions about their property.

Other farmers were the most common source of advice for 65% of landholders, followed by family and accountants. The WA Farmers’ Federation and phone hotlines were the least commonly used source of information by the respondents.

Landholders indicated they had the highest levels of trust in their neighbours and other regional landholders for NRM management. Respondents reported a low level of trust in the State government.

Plans and goals

More than three quarters of respondents said it was likely they would continue to live on their property.

Over half of all respondents said it was likely they would pass the property on to family.

Most landholders indicated they have no intention of selling or leasing any or all of their property, but of those who were, more intended to sell than lease.
Very few of the respondents intended to expand their property by purchasing or leasing more land. However, 41% said it was likely they would intensify their current enterprises and 33% said it was likely they would diversify.

The highest priority by the greatest number of respondents (73%) was to maintain the lifestyle they want. The largest number of respondents (28%) indicated providing habitat for native animals was their lowest priority.

Over 72% of respondents did not have a property plan, but those who did indicated it frequently influenced decision-making.

**Management practices**

**Vegetation**

Almost two thirds (62%) of respondents said they had undertaken the planting of native trees, shrubs or grasses. Only 14% had planted deep rooted perennial pastures such as lucerne or saltbush. Results indicated that the respondents are aware of the value of native vegetation and over half (61%) had fenced native vegetation on all or some of their property.

**Livestock**

The majority of respondents with livestock on the property used controlled grazing in most or all of their paddocks to maintain surface cover. The vast majority (90%) said that maintaining good surface cover will improve the long-term productive capacity of the land. Over half (60%) of those with livestock did not practice quarantine of new stock which could potentially be a bio-security risk for the catchment.

For those respondents with livestock, impediments to the uptake of NRM practices included the costs associated with fencing, that fencing sensitive areas to control stock makes managing those areas more difficult, and that installing off-stream watering points is not always viable.

Results indicated a large number of respondents were unsure about the relative costs and benefits of livestock management practices indicating that providing NRM advice and information would be beneficial.

**Cropping and pasture**

For respondents undertaking cropping or pasture activities on their property, 75% had undertaken rotation to maintain soil health, 73% had retained stubble or pasture residue in some paddocks, 70% had undertaken farming for soil type, and 66% had used soil testing. ‘No till’ or reduced tillage was practiced by just over half of the respondents.

When evaluating relevant management practices for cropping and pasture, 70% of respondents showed broad agreement that reduced tillage improves soil health and reduces erosion. However, a substantial proportion of landholders were unsure about the costs and benefits of NRM practices for cropping and pasture and would benefit from further advice and information.
**Horticulture and Viticulture**

Respondents engaged in irrigated horticulture or viticulture indicated they do not use all of their property for irrigation. The most commonly used irrigation method was drip irrigation followed by low pressure irrigation. Almost two thirds of respondents did not use mulch to help improve water efficiency on their property. Respondents’ evaluation of relevant practices indicated support for good irrigation practices (drip or low pressure; irrigation scheduling). Impediments to uptake of better practices included the need to make major alterations to the layout of their properties and uncertainty about whether water savings would outweigh the costs of changing irrigation practices.

**Differences across sub-regions**

The South West Catchment was divided into six sub-regions to capture the diversity of the region. Findings from this research highlighted considerable differences across these sub-regions and reinforce the need for awareness of these differences to enable effective catchment planning and management. Differences between landholders from the six survey sub-regions included:

- Age profiles;
- Occupation;
- Property size;
- Land use;
- Assessment of issues;
- Long-term plans;
- Factors affecting decision-making about changing management practices;
- Adoption of practices; and
- Property planning.

**Drivers of NRM practice adoption**

The Social and Economic National Coordination Committee (SENCC) endorsed set of headline indicators related to landholder adoption of NRM practices were used to consider the barriers and drivers of adoption in the South West Catchment. The indicators included landholder aspirations (social, environmental and economic), capacity to adopt (natural, physical, financial, human and social capitals), attributes of the practices, external influences (neighbours, extension officers etc), and outcomes (adoption, success). This analysis looks at the strength of the relationships between the indicators and the uptake of each management practice.
Aspirations

The social aspirations of being able to work outdoors, being attached to their property, and being part of a close knit rural community emerged as being the strongest predictors of a range of management practices. The environmental aspirations of providing habitat for native animals, maintaining/improving soil health, considering impacts of decisions on others' land, and receiving incentives for providing environmental services were most strongly associated with the practice of encouraging regrowth of native vegetation. Economic aspirations to build/maintain a viable business and to set part of the property aside were the strongest predictors of using soil testing or nutrient budgeting.

Capacity

Landholders’ capacity to adopt practices was determined by the five types of capital. Natural capital was a significant predictor of 23 different practices, physical capital was not strongly related to practice uptake, financial capital significantly predicted ten NRM practices, human capital was linked to 22 practices, and measures of social capital were significantly predictive of 23 practices.

External influences

‘External influences’ includes institutions, people and regulations that push a landholder to adopt or not adopt a particular practice. External influences as measured in the survey significantly predicted 24 NRM practices.

Conclusions

Pests, in particular weeds, and native and introduced pest animals were seen as the greatest environmental threats to landholders’ properties. However, there is widespread uncertainty about the best method of controlling weeds. The most pressing concerns for landholders in the South West Catchment relate to the profitability of farming and were seen as more important problems than NRM issues.

Overall, the most common high priority goal is to maintain a desired lifestyle. The survey results indicate there are two distinct categories – farmers and others (tradespeople, retired, professionals). This suggests there are two different audiences that need to be targeted to inform and persuade landholders to take up NRM practices. Strategies to engage non-farmers in sustainable management of resources will also need to consider the time these people have available to spend on property activities.

Analysis exploring landholder adoption of recommended practices indicates that recognition of the threat in the natural environment is the first and strongest predictor of adoption. Information to assist landholders to identify the signs, symptoms and impacts of problems in the natural environment is an important first step to management practice uptake.
Access to advice and support networks were important factors in the adoption of many practices, for example, those who had used a private agricultural consultant were more likely to have adopted a range of sustainable practices. Promoting uptake of sustainable practices may best be done through local contacts and networks to build communities of support and local understanding about the best way to address landholders’ issues.
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1. Introduction

Research context

This report presents a summary of key findings from a mailed survey of 2,000 landholders in Western Australia’s South West region in 2006. The survey gathered information on the key social and economic factors affecting landholder decision-making about the adoption of practices expected to improve the management of natural resources in their region.

This project drew heavily on the methodology of similar projects completed in the Goulburn Broken Dryland in 1999 (Curtis et al. 2000), the Ovens Catchment in 2001 (Curtis et al. 2002), the Wimmera region in 2002 (Curtis and Byron 2002), the Lachlan catchment in 2003 (Byron et al. 2006a), the Glenelg Hopkins region in 2003 (Byron et al. 2004) and the Burnett-Mary region in 2004 (Byron et al. 2006b).

The South West Catchment Councils, Western Australian Department of Agriculture and Food and the Bureau of Rural Sciences (BRS) were key project partners. Funding for this project was sourced through a mix of national, state and regional programmes, including the Natural Heritage Trust Extension (NHT).

Research objectives

The objectives of the research were to:

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

Background to this research

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

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

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

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

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 (Lockwood et al. 2002, 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, setting aside areas of land, and enforcement of standards and prohibitions;
- self regulation;
- research to clarify problems, develop solutions, and monitor environmental conditions;
- education to facilitate improved practices, gain support for policies, and ensure the ability to apply policy instruments; and
- economic measures such as charges, subsidies, penalties, and tradeable permits to assist efficient allocation of resources and equitable distribution of costs and benefits.

This research also recognised that regional areas are increasingly the scale at which natural resource management occurs in Australia. As recent research in the Goulburn Broken Dryland (Curtis et al. 2000), Ovens catchment (Curtis et al. 2002), Wimmera region (Curtis and Byron 2002), the Lachlan catchment (Byron et al. 2006a), the Glenelg Hopkins region (Byron et al. 2004) and the Burnett-Mary region (Byron et al. 2006b) illustrated, there are also considerable differences at the sub-regional scale. To the extent that there are significant differences at the sub-regional scale, there will also need to be sub-regional differences in the policy mix implemented by the regional groups and other organisations (Curtis et al. 2001).

Governments have assumed that poor adoption rates for recommended practices arise at least in part because landholders are unaware of important land degradation issues, lack sufficient knowledge and skills, or have attitudes that emphasise short-term economic returns over maintaining the long-term health of the land (Australian Soil Conservation Council (ASCC) 1991, Murray-Darling Basin Commission (MDBC) 1990). There has been a large investment of resources over the past decade in awareness-raising and education programmes, including those carried out by Landcare groups. There is credible evidence that these activities do contribute to increased awareness and understanding and that these changes enhance landholder capacity to adopt recommended practices (Curtis and De Lacy 1996, Curtis et al. 2001, Vanclay 1992). However, although most landholders already have a strong stewardship ethic, such attitudes have not been linked to increased adoption of recommended practices (Curtis and De Lacy 1996).

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

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

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

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

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

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

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

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

Profiles of regional communities have usually relied on readily available census data to measure general aspects of the four capitals: human capital, produced-economic capital, social capital, and natural capital (Cavaye 2003, Webb and Curtis 2002). Barr et al. (2000) used census and other national databases to combine social and economic data to explore the structure of agriculture over time in the watersheds of the Murray Darling Basin. Using local government areas as the unit of analysis, this seminal study examined attributes such as farm size, farm family income, farmer age, entry and exit from farming, and changes in farming family numbers, and clearly demonstrated that these attributes had changed over time.

The analysis of data collected through farm and household censuses can provide useful information, but as Schultz et al. (1998) and Curtis et al. (2001) demonstrated, these data are unlikely to satisfy regional groups who need to understand the behaviour of the private landholders who control most of the land in their regions. In the first instance, these national data collection processes are unlikely to address most of the topics for which data is needed. Furthermore, data are only available to the public in aggregated form, the smallest scale being census collector districts that combine data for about 200 households. Aggregation reduces the usefulness of data, particularly when sub-regional contexts are important, as for the South West Catchment.

Report structure

The next chapter provides background details of the South West Catchment and the survey area. The subsequent methodology chapter includes a description of the survey process, location of survey respondents, approaches used to analyse the data and limitations of this type of research. Chapter 4 presents the findings of the survey using a thematic approach based on the major topics explored in the mail survey (see Chapter 3).
2. Catchment Details

People and Place

The South West Catchment begins just south of Perth and encompasses 33 Local Government Areas. The South West Catchment covers an estimated 5,152,000 hectares (South West Catchments Council 2005), extending for five kilometres off the coast from the town of Mandurah, 722 kilometres down the coast to Walpole in the Shire of Manjimup and east to the Shires of Dumbleyung and Kent. The Catchment consists of six sub-regions: Blackwood, Cape to Cape, Geographe, Leschenault, Peel-Harvey, and Warren. Some of the major cities and towns in the Catchment include Bunbury (a major service centre), Mandurah, Margaret River, Busselton and Harvey.

The South West Catchment has a population of approximately 200,000 residents, most of whom live in coastal towns. The Indigenous people of the region, the Nyungar people, make up about two per cent of this number. The Catchment has the second highest average annual population growth rate for the State, and over the next 20 years is expected to account for seven per cent of Western Australia’s population growth (South West Area Consultative Committee Inc. 2007).

Figure 1 - South West Catchment sub-regions
Figure 2 - Location of the South West Catchment Council within Western Australia
Land

Primary industries in the South West Catchment include agriculture, forestry and mining. The region generates approximately $947 million gross value of agricultural production, almost 28.4 per cent of Western Australia's total agricultural production (Australian Bureau of Statistics (ABS) 2003). Forest harvest includes both hardwoods and softwoods with hardwood production contributing almost 80 per cent of Western Australia's total production (South West Catchments Council 2005). Mining contributes as much as $4 billion annually to the local economy (South West Catchments Council 2005). The region is a significant site for biodiversity (South West Catchments Council 2005) and for Western Australian natural forests. The region's vast coastline is considered an asset but much of it is threatened by a host of environmental issues, both natural and anthropogenic (South West Catchments Council 2005).

Catchment Plan

The South West Regional Strategy for Natural Resource Management is a plan for achieving sustainability and excellence for the region, and

"...to provide an integrated, cooperative and adaptive approach to guide strategic investment in the sustainable management of the Region's land, water, biodiversity, marine, coastal, air and climatic resources" (South West Catchments Council 2005 p.1).

The strategy outlines a framework for natural resource sustainability and management with reference to and for use by stakeholders. These include individuals and Indigenous groups, business and industry, and local and state government. The plan is the basis and guide for other regional management plans including the South West Regional Investment Plan for Natural Resource Management and the Natural Heritage Trust and National Action Plan for Salinity and Water Quality (NAP). The SWCC states that the strategy complies with all NRM standards and legislation (South West Catchments Council 2005).

The strategy includes (in Section three) a plan of action, including NRM targets, for 12 regional 'assets'. These natural assets include mineral resources, forests and water resources, and people and culture. The SWCC determines these 'assets' as contributory elements that must be maintained and cared for in an effort to sustain the economy and the quality of life in the region.
3. Methodology

Topics and questions included in the mail survey

Drawing on the literature and given the constraints of a mailed survey (space and type of questions that can be effectively posed), the BRS worked in collaboration with the project partners in the Western Australian South West region to identify the topics listed below for inclusion in the survey.

- Background socio-economic and demographic data, including: age, gender, education, occupation, on- and off-property workload, on- and off-property household income, number of people supported by the property, number of people residing on the property, time lived in the region, and level of government funded work on property.
- Property data, including: property size, number of blocks/properties owned or managed, existence of natural waterways, primary purpose of the property, land use (vegetation, livestock, cropping and pasture, and horticulture and viticulture), the amount of area under a specific land use, and number of livestock.
- Assessment of issues affecting property and local community.
- Goals for the property/business.
- Long-term plans for the property.
- Current plans for the property and future management and development plans.
- Decision-making processes and the main sources of information used.
- Views about a range of issues, including the impact of actions on other properties, quality of life, and attachment to the property.
- Level of trust in other natural resource management stakeholders.
- Landuse/enterprise management practices and an evaluation of those practices.

Survey process

The following briefly outlines the sampling method used in the mail survey to the landholders of the South West Catchment.

- Through consultation with the South West Catchment Council, catchment and sub-catchment boundaries were identified.
- Landholder addresses within the catchment were obtained through local land tenure lists.
- All properties of less than ten hectares were excluded from the potential survey sample.
- Names and addresses were forwarded to the research group, where duplicate names were identified and removed, as were any other land parcels that were not privately owned (i.e. government land holdings).
- Tables containing the rural property information were entered into ESRI ArcMap software and each property assigned to one of the six sub-catchments.
- A simple random sample of 2,000 landholders was obtained from the remaining names and addresses.
The sampling process was stratified to provide data across the six sub-catchment areas identified in the South West Catchment, this process was used to enable comparisons to be made across these sub-catchments.

The survey was conducted using a well-established process developed by the BRS and used in similar work elsewhere (a modification of Dillman's Total Design Method) (Dillman 1978). For each selected property, the owner was mailed a cover letter explaining the survey's purpose, a survey questionnaire and a stamped return envelope. After seven days, any landholders who had not returned their survey (the majority) were mailed a postcard-sized reminder. A second reminder was sent out after another seven days later.

Three to four weeks after the initial mailing, a second survey questionnaire, a second letter stressing the importance of the survey process and a second return envelope were sent to those who had yet to return their survey. One week after the second survey mailing, a third reminder card was sent. Finally, a fourth reminder card was sent out two weeks after the second survey mail out. In the seventh week after the first mailing, the return rate was down to less than one per day and at this point the survey was closed and the data entry process completed. The response rate for the survey was 69.4 per cent.

Figure 3 illustrates the geographic spread of survey respondents across the South West Catchment, demonstrating a good representation of respondents from across the whole catchment area. The survey focus was on rural landholders and consequently fewer responses were received from areas corresponding to the location of urban centres. The spread of respondents also reflects the size of landholdings, with fewer landholders available to complete the survey in areas with large acreages, particularly in more remote areas (i.e. eastern areas of the catchment).

Data analysis

Data were entered into Microsoft Excel directly from the questionnaire booklets. Once entered and checked, these data were exported to Statistical Package for the Social Sciences (SPSS) software for analysis. Preliminary data exploration was carried out, resulting in summary statistics about who the landholders were, and how they felt about natural resource management. These results were presented to the steering committee in the South West region (who helped develop the original survey instrument) in order to highlight important outcomes and place the results in context. Finally, the correlation between individual traits and practice adoption was determined through the use of the Chi-square test and linear regression.

Limitations of this research

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

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

This research provides an important baseline from which changes over time can be monitored. The 2006 South West Catchment survey should be followed by another in three to five years time to identify trends over time. This is particularly important given the results of Barr et al. (2000) who have identified important temporal trends in rural areas.
Figure 3 - Location of survey respondents across the South West Catchment
4. Findings by Survey Topic

Characteristics of landholders and their properties

The mail survey included a range of questions to elicit basic information about landholders in the Western Australia South West Catchment and their properties. It is important to note that the survey was sent to a random selection of all landholders with properties in excess of ten hectares. This information provides basic socio-demographic information about landholders in the South West Catchment, and is not restricted to farmers and farm managers or any other single group of landholders. Unfortunately comparisons with other data sets based on a more restricted sample may be problematic. Appendix 3 provides the results of analyses exploring differences in responses between those respondents whose properties were primarily used for agricultural production, and those whose properties were not. This will help facilitate comparisons with other data sets and better understand the different types of landholders in the South West Catchment.

Age

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

The age profile of respondents is presented in Figure 4. The age range was from 23 years to 87 years, the median age was 50, and the mean age was 53 years. Almost one quarter of respondents (24%) were under 44 years, and 17 per cent were aged 65 years or over. Respondents over 65 years managed 13 per cent of the total area surveyed.

Figure 4 - Age distribution of respondents, South West Catchment
The age profile of respondents across the six survey sub-regions shows considerable variability (Table 1). Blackwood had the greatest proportion of older people (e.g. 21% over 65 years, compared to 14% in Leschenault). Warren had the highest proportion of people under 45 years (33% under 45 years compared to 21% in Cape to Cape).

### Table 1 – Age by South West Catchment sub-regions

<table>
<thead>
<tr>
<th>Under 24</th>
<th>Cape to Cape</th>
<th>Geographe</th>
<th>Leschenault</th>
<th>Peel-Harvey</th>
<th>Warren</th>
</tr>
</thead>
<tbody>
<tr>
<td>1%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>25 – 34</td>
<td>4%</td>
<td>3%</td>
<td>5%</td>
<td>4%</td>
<td>5%</td>
</tr>
<tr>
<td>35 – 44</td>
<td>17%</td>
<td>18%</td>
<td>22%</td>
<td>19%</td>
<td>17%</td>
</tr>
<tr>
<td>45 – 54</td>
<td>32%</td>
<td>27%</td>
<td>38%</td>
<td>37%</td>
<td>29%</td>
</tr>
<tr>
<td>55 – 64</td>
<td>25%</td>
<td>38%</td>
<td>19%</td>
<td>26%</td>
<td>31%</td>
</tr>
<tr>
<td>65 – 74</td>
<td>15%</td>
<td>11%</td>
<td>11%</td>
<td>13%</td>
<td>14%</td>
</tr>
<tr>
<td>75 – 84</td>
<td>5%</td>
<td>3%</td>
<td>3%</td>
<td>1%</td>
<td>4%</td>
</tr>
<tr>
<td>Over 85</td>
<td>1%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

**Gender**

As the survey sample from this project was drawn from rural ratepayer databases, it was not possible to identify the gender of individuals to be included in the sample and there was no attempt to target a specific mix of respondents.

Of the 863 respondents who indicated their gender, 240 or 28 per cent were women. This figure is consistent with the findings of Elix and Lambert (2000) who estimated that about 30 per cent of the Australian farm workforce is female and slightly less than 20 per cent of agricultural decision-makers are women. Respondents who said that farming was their primary occupation were significantly more likely to be male; 83 per cent of males nominated farming as their primary occupation compared to 17 per cent of females. There were no significant differences in the gender balance across survey sub-regions, however in Warren the gender split was more even, with 46 per cent respondents indicating they were female (see figure 5).

### Figure 5 – Females and males within each occupation category

![Figure 5](image-url)
Occupation

Respondents were asked to describe their primary occupation. Examples provided in the questionnaire included farmer, accountant, teacher and retiree. For the purpose of analysis, responses to this open-ended question were grouped into four occupational categories: farmer, professional, tradespeople, and retired. Figure 6 shows that farmers were the largest occupational grouping and comprised more than half of all respondents (55%).

**Figure 6 - Respondents' occupations in occupational category**

![Pie chart showing occupational distribution](chart)

Table 2 shows the age profile of respondents in each of the four primary occupation types. Close to one in five farmers (19%) were aged 65 years or over. One in 20 farmers (5%) were aged 75 years or over. Respondents whose primary occupation was a trade had the youngest age profile, with more than three quarters (77%) of tradespeople under the age of 55 years.

**Table 2 - Age distribution within respondents' occupational groups (per cent)**

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Farmer (n= 470)</th>
<th>Professional (n=79)</th>
<th>Trade (n=226)</th>
<th>Retired (n=80)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 24</td>
<td>1%</td>
<td>0%</td>
<td>1%</td>
<td>0%</td>
</tr>
<tr>
<td>25 – 34</td>
<td>4%</td>
<td>5%</td>
<td>7%</td>
<td>2%</td>
</tr>
<tr>
<td>35 – 44</td>
<td>17%</td>
<td>13%</td>
<td>27%</td>
<td>4%</td>
</tr>
<tr>
<td>45 – 54</td>
<td>29%</td>
<td>43%</td>
<td>42%</td>
<td>6%</td>
</tr>
<tr>
<td>55 – 64</td>
<td>30%</td>
<td>31%</td>
<td>21%</td>
<td>38%</td>
</tr>
<tr>
<td>65 – 74</td>
<td>14%</td>
<td>7%</td>
<td>2%</td>
<td>38%</td>
</tr>
<tr>
<td>75 – 84</td>
<td>4%</td>
<td>1%</td>
<td>0%</td>
<td>12%</td>
</tr>
<tr>
<td>Over 85</td>
<td>1%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
<td><strong>100%</strong></td>
<td><strong>100%</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>
At the sub-region level (Table 3 and Figure 7), Blackwood had the greatest proportion of farmers, with 67% of respondents from that locality indicating their primary occupation was farming. Blackwood also had the lowest proportion of both professionals and tradespeople. The Cape to Cape area had the lowest proportion of farmers (39%) but the highest proportion of professionals (18%) and retirees (11%).

<table>
<thead>
<tr>
<th>Table 3 – South West Catchment sub-regions by respondent occupation (per cent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sub-region</td>
</tr>
<tr>
<td>---------------------</td>
</tr>
<tr>
<td>Blackwood</td>
</tr>
<tr>
<td>Cape to Cape</td>
</tr>
<tr>
<td>Geographe</td>
</tr>
<tr>
<td>Leschenault</td>
</tr>
<tr>
<td>Peel-Harvey</td>
</tr>
<tr>
<td>Warren</td>
</tr>
</tbody>
</table>

Across the South West Catchment, farmers managed 86 per cent of all land surveyed. Figure 8 shows how much land was controlled by farmers in each survey sub-region.

Hours worked on property

Respondents were asked to estimate the average number of hours per week they worked on farming or property related activities over the previous 12 months. On average, respondents said they had spent 38 hours per week working on farming or property related activities over that time period (the median was also 38). More than a quarter of all respondents (28%) worked on their properties for more than 60 hours per week.

Figure 9 provides a profile of the farming or property activity of each of the main occupational groups. The majority of farmers (69%) worked over 40 hours per week on farming or property-related activities. As might be expected from the income and work requirements of non-farmers, landholders who are professionals generally spent less than 10 hours per week on farming or property related activities (59% of professionals are in this category). Close to 70% of tradespersons spent under 20 hours per week on farming and property activities (41% less than 10 hours and 27% between 10 and 20 hours). The majority of retirees (66%) also spent less than 20 hours per week on farming or property-related activities but a small proportion worked considerably longer hours than this; some over 50 hours per week (4%).
Figure 7 - Proportion of respondents who are farmers in South West Catchment sub-regions
Figure 8 - Proportion of land managed by farmers in South West Catchment sub-regions
Consistent with the *National Action Plan on Salinity and Water Quality* providing local government with a very tangible opportunity to be involved with setting the direction for NRM in WA; and

- Ready linkage to land use planning powers.

**Limitations**

- Significant new direction for most existing local government authorities.
- Could be seen by local government as an attempt by the State to shift additional responsibility without additional resources, or as an attempt to rationalise local governments.
- May meet strong resistance with arguments that NRM is not a direct function of local government.
- High risk that many rurally based local governments do not have the capacity, skills base or values to effectively coordinate NRM.
- No independent rating power.
- No independent power to develop regional laws; and
- No direct representation of State government or community NRM interests.

**Statutory changes recommended to meet criteria:**

- NRM role of the model should be spelled out in the Act.
- Include ability of the regional council to develop regional NRM laws and rating.
- Provide for broader membership (including community and government representation).

### 4.6 Formalise current NRM Groups

Given the nature of rural WA, the current four agricultural regions may be about the right number. It may be desirable therefore to build on the strengths and progress of the current regional groups, reconstituting them to ensure representativeness (social cohesion) and legitimacy and providing them with the necessary statutory standing and accountability mechanisms.

Draft regional strategies for natural resource management have been prepared for the four agricultural regions: south west (SWCC in 2001), northern agriculture (NAIMS in 2000), central agriculture (AWG in 2000) and southern agriculture (SCRIPT in 2000). The four regional NRM groups cover the entire agricultural region, and include some areas that are not at risk or currently affected by salinity. Generally, the regional NRM strategies recognise that the role of the regional NRM group is that of integrator and coordinator for the region, and that ‘on-ground’ action and implementation is carried out by the responsible agencies in partnership with catchment and community groups.

All four regional NRM strategies address a range of natural resource management issues including sustainable management of land and water resources, water quality, biodiversity protection, dryland salinity, community coordination and development, and integration of government agency support and services. The South West and South Coast NRM Strategies also address coastal management issues.
All regional NRM groups have attempted to reflect the strategies of State and national level NRM programs and policies, however most are still in draft form and detailed Business Plans or Action Plans to implement regional strategies have not yet been developed. All regional NRM groups are planning on completing this work once their Strategy documents are completed.

All regional strategies address salinity issues in ways that are generally consistent with the State Salinity Strategy 2000. An assessment of this is detailed in the following table. The criteria are drawn from the State Salinity Strategy 2000 assuming it reflects State agreement on appropriate salinity actions.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>NAIMS</th>
<th>SWCC</th>
<th>SCRIPT</th>
<th>AWG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regional planning</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Priority setting</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Biodiversity conservation</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Water resources</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Infrastructure protection</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>Flood risk assessment</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>Research and development</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Changing agricultural practices</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Commercial farm forestry</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>Using saline lands productively</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>N*</td>
</tr>
<tr>
<td>Productive use of saline water</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Irrigated agriculture</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Native vegetation management</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Engineering options for SWM and drainage</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>Social impact management</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
</tbody>
</table>

* AWG mentions support for Salt-land Pastures Group, but no specific actions or strategies.

While the general goal areas of the State Salinity Strategy 2000 are addressed in each regional NRM strategy, there is little definition at regional level of the Salinity Actions, detailed in the March 2000 report. Strategies such as changing farming systems, reducing recharge, investigating hydrological processes and developing suitable commercial deep-rooted perennials are all addressed in regional NRM strategies, however are not coordinated with State Salinity Strategy 2000 actions in a consistent way. The exception is the SWCC draft regional strategy, which has detailed strategies aligned with State Salinity Strategy 2000 actions.

The Avon Working Group has documented an Operational Plan that focuses on integrated water management to address the main NRM priorities in the region. The Operational Plan lacks detail on how actions will be implemented, expected outcomes, costs, who will implement the actions and expected timeframes. The AWG regional strategy includes dates for major milestones in changing agricultural practice, community awareness, improved water use, and improved land management techniques. Some targets are quantified and measurable, however most are general in nature and will be difficult to establish clearly when it has been achieved. SCRIPT has developed targets (objectives) for each outcome or goal.
area in the South Coast regional strategy. South Coast targets vary with many being clear and measurable, and some being general objective statements that are not measurable.

The NAIMS and SWCC regional strategies do not include clear targets aligned with the State Salinity Strategy 2000, however SWCC has recognised that community agreed targets for NRM need to be developed for the region to underpin the regional strategies.

Current groups thus have a considerable track record in regional planning and coordination, partnership development and project development. In the process, a network of people with considerable influence and capacity in strategic planning and project assessment has developed.

Concerns have been expressed over their legitimacy and profile in the regions. Nevertheless a community of interest related to regional NRM is emerging and some regional sub groups, for example, Blackwood and Geocatch are strong. Such bodies will see little value in forming new regions unless they end up as regions in their own right.

An option could be to amend the Soil and Land Conservation Act to provide for regional NRM groups. Given the Act provides for the establishment of the statutory groups at the State and local level, it would also be appropriate that it provide for the establishment of regional groups. The regional NRM Councils could be formally established as a sub-committee of the Soil and Land Conservation Council.

This can be achieved through insertion of a separate division into the Act to provide for regional NRM groups. The groups could have prescribed membership and appointment processes, and roles and functions in the same way that SLCC does.

According to Jennings and Moore (2000) for regionally based NRM planning and implementation to occur, it is essential for regional institutions to maintain a presence and function over time. If this argument is accepted then this may favour making adjustments to the existing Groups, or at least those with a long history such as the BBG or AWG. On the other hand if new NRM structures are formed it seems they need to be there for the long haul to be successful. The findings of Jennings and Moore (2000) are somewhat at odds with a strict project management approach.

**Strengths:**
- Representation based on ‘earned knowledge and ability’.
- Representatives personal standing, relationships, networks and influence allows outcomes to be progressed.
- Decision making tends to be based on negotiated agreements rather than representative positions held by constituent groups.
- Previously involved in developing catchment management plans and regional strategies.
- Currently established good working relations amongst State agencies and key community members.
- Enables building on current capacity (strategic planning, project assessment, priority setting) and achievements.
Limitations:

- Existing regional groups are voluntary, lack independent or institutional funding and rely on NHT funds and on-going agency support for survival.
- Would need financial accounting, administrative support and contractual powers to perform implementation roles.
- Some concerns over fairness, equity and breadth of representation.
- Despite attempts to provide feedback to local communities, little local knowledge/recall, particularly in peripheral areas within the regions.
- No statutory accountability (i.e. through FAAA) for the use and management of public funds.
- NRM groups currently run independently and it may be difficult to incorporate these groups into a single statutory model without substantially changing some management practices.

Statutory changes recommended to meet criteria:

Can possibly be constituted as a sub-committee of the SLCC and would need to ensure that this established financial accountability, contract management and levying powers.

4.7 Catchment Management Authorities

This model is recommended in the Report of the Inquiry into Catchment Management by the House of Representatives Standing Committee on Environment and Heritage. This approach sees the establishment of a National Catchment Management Authority (NCMA) to coordinate catchment planning across the country. As part of this national framework, each State will establish their own regionally administered Catchment Management Authorities (CMAs) to provide the link between the national objectives and local implementation. The report recommends CMAs be established in respect of each catchment system, being surface water management areas as designated by the Australian Water Resources Council.

Irrespective of this WA could establish it’s own regionally administered Catchment Management Authorities (CMAs) to provide the link between the national objectives and local implementation. CMAs would be statutory authorities under State legislation.

Functions of the CMAs would include:

- engage the community in catchment planning;
- provide shop-front for NCMA to deliver services;
- provide local community with expertise in NRM;
- develop management plans;
- approval and accreditation of plans; and
- coordination with other CMAs.

Strengths:

- Being a new model, the difficulties with the existing structures can be corrected (such as boundaries, representativeness, functions, legislative authority etc); complies with a suggested national approach.
- Complies with a suggested national approach.
• Consistent with the *National Action Plan*.
• Provides mechanism for better coordination between local, State and Commonwealth in relation to NRM initiatives.
• Recognises land degradation problems are of national importance, and should be tackled in a consistent and integrated way; and
• May provide impetus for rationalising other NRM structures in the State, such as LCDCs, Waterway Management Authorities, Water Resource Management Committees, etc.

**Limitations:**
• New structure, requiring new legislation and national agreement.
• Time consuming to establish.
• Potentially very costly.
• Might be perceived as the Commonwealth taking over NRM in the States.
• Establishes a new level of bureaucracy in a State overlaid with numerous statutory and non-statutory boards and authorities.
• Additional level of complexity leading to competition/tension amongst existing government structures; and
• Likely to institutionalise conflict in relation to statutory responsibilities.

**Statutory changes recommended to meet criteria:**

Being a new model, new legislation will need to be drafted.
### Tables summarising assessment of each management model against Commonwealth and State criteria

<table>
<thead>
<tr>
<th>Commonwealth criteria</th>
<th>Waterways Management Model</th>
<th>LCD Model</th>
<th>EPA/WRC Model</th>
<th>RDC Model</th>
<th>Regional LGA Model</th>
<th>NRM Group (adapted model)</th>
<th>CMA Model</th>
</tr>
</thead>
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<td>Regional/Catchment based body.</td>
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<td>Catchment plans which address salinity, water quality, and other NRM issues.</td>
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<td>Monitoring and measurement against agreed targets.</td>
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<td>Reporting against delivery requirements.</td>
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<td>Project management through regional delivery body?</td>
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<td>Funds management and accountability.</td>
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<td>Ability contract with landholders and State agencies to carry out certain actions.</td>
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<td>Integration of social, economic and environmental factors.</td>
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<td>State criteria</td>
<td>Waterways Management Model</td>
<td>LCD Model</td>
<td>EPA/WRC Model</td>
<td>RDC Model</td>
<td>Regional LGA Model</td>
<td>NRM Group (adapted model)</td>
<td>CMA Model</td>
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<td>Efficiency of administrative arrangements - does not require separate regional admin. structure.</td>
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<td>Fosters integration of community and government actions.</td>
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<td>Statutory basis or linked to current institutions.</td>
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<td>Representative of community interest.</td>
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<td>Effective community consultation, reporting and feedback.</td>
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<td>Local government in more central role.</td>
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<td>Minimise duplication of legislation and ability to build on current statutory strengths.</td>
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* Can fully meet criteria.  
● Major impediment.  
* Can partially meet criteria.  
● Not well suited.
References:
Appendix 1. NRM Structures - Communities of interest and other factors in determining regional NRM boundaries.

Key informants in each of the existing four NRM regions were contacted and asked to define regional communities of interest around potential natural resource management regions. All key informants were given the same instructions, which stipulated that their task was to identify communities of interest as seen by rural communities themselves and to ignore existing agency or regional NRM boundaries.

These maps reflect the difficulty and complexity in attempting to define one clear boundary for regional communities of interest for natural resource management. Communities of interest do not exist in isolation - they are socially constructed around a specific interest and will have different meanings for different stakeholder groups and among individuals within stakeholder groups. Nonetheless the following maps are presented to stimulate discussion about the role communities of interest may play in determining spatial boundaries.

Map 1 is the first preliminary result of the exercise and indicates 19 regional communities of interest for natural resource management.

Map 2 reflects a variation based on slightly altered criteria and is a crude attempt to amalgamate the regional NRM communities of interest at a larger scale. This results in eleven ‘regions’.

Map 3 shows existing boundaries for regional NRM groups together with Shire and Regional Development Commission boundaries.

An analysis of Map 1 reflects the complexity that occurs because of different interpretations of criteria and because people’s social interactions will inevitably influence spatial boundaries. Each person has a different understanding or definition of an appropriate scale for regional groupings, how a community operates and how it is defined.

For instance, three communities of interest in the Northern Region are determined primarily based on local government boundaries. An underlying assumption being that existing rural communities most readily identify with local government boundaries and that these remain the simplest and most unifying definition of rural communities in terms of a range of services and interests.

Within the more Central Wheatbelt region, communities of interest were defined by perceptions of how people related to each other, their orientation towards service centres, where they send their children to school or shop. It also reflects expectations or beliefs about how people orientate towards different regional towns, the transport routes they travel along and a perception of how closely they align with each other in terms of commonalities of farming types, etc. Communities of interest defined for this part of Western Australia do not align closely to local government boundaries.

Along the South Coast region, communities of interest have been defined according to existing river catchment boundaries as it is believed that people here have already developed an affinity within that subcatchment in relation to natural resource management activities. It is believed this is the primary determinant of the community of interest as opposed to local government boundaries or purely social boundaries based on other predominant factors.
Within the South West communities of interest have been drawn based on local government boundaries and a perception of a well understood definition of the existing Regional Development Commissions (with some minor adjustments). At this scale, there has been no attempt to break up communities of interest in accordance with other social factors such as used in the Central Wheatbelt example. If this was done case, further subdivisions would emerge, particularly around the Augusta-Margaret River/Busselton and the Warren-Blackwood regions.

There is also a broad community of interest that exists in what some people know as the Wool Belt. This has been developed not so much because it exists as a clear community of interest, rather is a collection of communities of interest that have limited social ties, but are brought together by a series of overlapping commonalities. For example, Kojonup and Boyup Brook relate to each other, Kojonup and West Arthur relate to each other, West Arthur and Williams relate to each other and Boddington and Williams relate to each other and so on.

Quite clearly communities of interest are complex and socially constructed around different issues or interests. There are several broad options to deal with this issue:

- Recognise that they are complex and accept best bet options.
- Accept that overlapping of regions will occur and work with these irrespective of the exact boundaries.
- Employ sophisticated techniques to map communities of interest once an appropriate model has been decided (since the model chosen may influence the weighting of criteria for determining boundaries); and
- Seek community input.

**Using existing NRM boundaries**

Each of the key informants was also asked whether the existing regional NRM structures were recognised as a community of interest. In all cases the key informants felt that at a larger regional scale, the existing boundaries were reasonably well understood by the community and appropriately sized and delineated for regional NRM management purposes.

Issues of representativeness and community engagement that arise at the margins of the larger regions, for example, Esperance/Ravensthorpe in relation to the South Coast and the Lockart/Yilgarn in relation to the Avon region do, however, need to be actively addressed.

There are two ways in dealing with this marginalisation problem. One is that existing NRM structures revise how they do their business and explicitly ensure that groups at the extremities of the region are included much more and feel that their issues are being dealt with. There will, however, be a cost attached to this.

A second option is to create additional sub-regions covering these marginal areas. This may overcome the tyranny of distance and thereby foster more inclusive regional involvement and promote enhanced communication.

If, however, an overriding issue is a lack of relevance and lack of interest in being involved in regional NRM issues, then creating a different structure will not necessarily improve efficiency or effectiveness. In addition the potential need for regional groups to take a greater role in statutory enforcement in the future, may be hindered by the existence of smaller, more
socially coherent communities. The latter would more be more desirable if a voluntary adoption model based on ‘win-win’ solutions was envisaged.

**A composite approach to defining communities of interest**

Based on existing NRM involvement, a belief that most rural communities are able to identify with their local government boundaries and with neighbouring local areas, and that there is some recognition of existing NRM regional structures, it is suggested that the most suitable criteria for developing or identifying regional NRM boundaries are:

- A conformation of local government boundaries.
- Existing, recognised catchments; and
- Some commonality in farming systems.

If the State chooses to have less regional NRM structures then it would appear that the community of interest criteria may be a more appropriate as a subordinate criteria for determining sub-regional representation or ‘project management’ boundaries within a larger NRM region.

Maps 4(a) and 4(b) indicate broadscale landuse mapping and is shown to illustrate the value of using land use units as a basis for determining potential NRM regions. From the data presented below, it seems obvious that between 1985-1997 there has been a dramatic shift in land use within Western Australia. Essentially the mixed cropping/wool belt area has largely shifted to a predominantly cropping area. With the exception of parts of the coastal plain and the coastal areas of the great southern were more intensive land uses based on animal industries or horticulture exist, much of inland Western Australia or wheatbelt is characterised by cereal growing regions with a small specialist wool growing zone. To determine NRM structures purely on this feature alone is not feasible since any regional boundary would be far too large. Similarly the map of current or potential soil salinity as described in the NLWRA, also indicates that salinity risk is pervasive throughout the wheatbelt and the coastal plain of Western Australia. Again there are no clear reasons for delineating regional boundaries on this basis alone.

Maps 5(a) and 5(b) shows Interim Biogeographical Regions. When overlain with community of interest maps it is difficult to see any clear logical boundaries which integrate both criteria. It does serve to show that within a region different biophysical processes are at work that may impact on the actions taken.

Each of the key factors such as managing salinity, managing biodiversity, managing waterways and managing other land degradation problems, as well as integrating natural resource management with economic development involves a complex array of factors, none of which fit easily with natural (biogeographical) or social and economic boundaries.

**Integrating spatial boundaries with appropriate models**

For two of the models - the LGA Regional Council and the RDC models - the use of local government boundaries to define spatial units is clear cut. Under these two models it would not be appropriate to use catchment or social boundaries since the legislation seems to require that boundaries are composed of whole government units.
Under the CMA and the Water Management Authority models, it may be possible to use local government/community of interest boundaries to determine regional boundaries, however, the logic of this is dubious given that both models are premised on the principle of managing waterways and related land use within a defined catchment. However, under the Cockburn Sound Management Council model, it is the EPP that defines the boundaries of the Council. In this case it is possible to use local government boundaries or other boundaries if logical.

Under each of the other models it may be possible to use either local government boundaries or physical catchment boundaries to determine the spatial limits of each of the regions. Though this may not appear logical in the case of existing NRM groups, what it would mean is that for most cases, the boundary of the region would be adjusted to the nearest local government boundary. This would enhance effective local government involvement so that local governments were only within one region instead of being spread across two or three and also provide a stronger sense of community involvement.
Map 1
Areas of Community Interest
(as determined by regional informants)
Overlying Shire Boundaries
(Note shows 19 potential "regions")
Map 2
Amalgamation of Areas of Community Interest Modified as far as Possible to Align with Shire Boundaries
(Note shows 11 "regions")
Map 3
Current NRM Regions showing Regional Development Commission and Local Government Authority Boundaries

NATURAL RESOURCE MANAGEMENT REGIONS
- NAIRMS Boundary
- Avon Working Group Boundary
- SW Catchments Council Boundary
- SCRIPT Boundary

Regional Development Commission Boundary
Local Government Authority Boundaries
Agricultural Region Boundary

0 100 200 kilometres

Job No. 2001096
Date 2001001
File Name: 2001096map3v4.dgn
Spatial Resource Information Group
Map 4 (a)  Majority area put to crop or pasture in 1985
Map 4 (b)  Majority area put to crop or pasture in 1997
Map 5 (a)
Areas of Community Interest Overlying Interim Biophysical Zones

INTERIM BIOGEOGRAPHIC REGIONALISATION OF AUSTRALIA (IBRA) REGIONS

- Great Victoria Desert
- Murchison
- Warren
- Coolgardie
- Mallee
- Esperance Sandplain
- Jarrah Forest
- Swan Coastal Plain
- Avon Coastal Plain
- Yalgoo
- Geraldton Sandplain

Community of Interest Boundaries
Agricultural Region Boundary

Spatial Resource Information Group

Job No. 200196
Date 06/02
File Name: 200196mapA4v1.dgn
Agriculture Western Australia
Map 5 (b)
Amalgamated Areas of Community Interest Overlying Interim Biophysical Zones

INTERIM BIOGEOGRAPHIC REGIONALISATION OF AUSTRALIA (IBRA) REGIONS

- Great Victoria Desert
- Murchison
- Warren
- Coolgardie
- Mallee
- Esperance Sandplain
- Jarrah Forest
- Swan Coastal Plain
- Avon Wheatbelt
- Yalgoo
- Geraldton Sandplain

Community of Interest Boundaries
Agricultural Region Boundary

0 100 200 kilometres

Job No. 2001096
Date: 6/06/01
File Name: 2001096_map6Bv1.shp
Spatial Resource Information Group
Appendix 2. Other NRM Structures in Australia.

Victoria

a) Catchment Management Authorities

The Catchment Management Authorities (CMAs) were established on 1 July 1997 with the aim of creating a whole of catchment approach to natural resource management in the State. The new CMAs combined the roles of the former, River Management Boards and Catchment and Land Protection Boards, and community based advisory groups such as salinity plan implementation groups and water quality working groups.

The primary goal of each CMA is to ensure the protection and restoration of land and water resources, the sustainable development of natural resources-based industries and the conservation of our natural and cultural heritage. The five principles that govern the way catchment management is implemented throughout the State are:

1. **Community empowerment**
   
   Catchment management is a partnership between community and Government. Planning and implementation of natural resource management programs should maximise opportunities for community involvement.

2. **Integrated management**
   
   Management of natural resources should recognise the linkages between land and water and that the management of one element can impact on the other.

3. **Targeted investment**
   
   Government and community need to ensure that resources are targeted to address priorities and deliver maximum on-ground benefits.

4. **Accountability**
   
   Those making decisions on natural resource management should be clearly accountable to Government and the community, both in a financial sense and for outcomes.

5. **Administrative efficiency**
   
   To maximise on ground results catchment management structures should facilitate more efficient procedures and protocols.

**The CMA Structure**

The basic structure of a CMA is designed to maximise community involvement in decision-making. This structure comprises:

1. The Board - who are directly responsible for the development of strategic direction for land and water management in the Region. They set priorities, evaluate the effectiveness of outcomes, monitor the external and internal environment and identify opportunities.

2. The Implementation Committees (ICs) are the conduits for local community input, and are responsible for the development of detailed work programs and the oversight of on-ground program delivery for specific issues or sub-catchments.
3. The Staff are there to support the Board and ICs, oversee development and implementation of programs and liaise with the community, government and other catchment-focused organisations.

b) Port Phillip Catchment and Land Protection Board

The Port Phillip Catchment and Land Protection Board manage the catchments of the Melbourne metropolitan region and its rural fringe.

Currently, the role of the Port Phillip CaLP Board includes:
- review of the Regional Catchment Strategy and provide advice to the Government on its implementation;
- advising the Minister on:
  (i) regional priorities;
  (ii) matters relating to catchment management and land protection; and
  (iii) the condition of land and water resources in the region;
- promoting cooperation in the management of land and water resources in the region; and
- promoting community awareness and understanding of catchment management.

Unlike the CMAs, the Port Phillip CaLP does not have operational responsibility for provision of waterway and floodplain management activities and programs.

New South Wales

In December 1999, the Minister for Land and Water Conservation announced that the community-government partnership in natural resource management would be strengthened by the establishment of 18 new Catchment Management Boards across New South Wales. The new boards now replace 43 of the 45 catchment management committees and the five regional catchment committees.

On 31 May 2000, the Minister announced the appointment of members to the boards drawn from representatives from the community, industry and government:
- Nature conservation interests.
- Primary producers/natural resource users.
- Local government.
- Aboriginal interests.
- State government.

The new boards are established under the Catchment Management Act 1989 and the Catchment Management Regulation 1999. The objective of the establishment of the Catchment Management Boards is to enhance the capacity of total catchment management to substantially improve the quality and sustainability of NSW’s natural resources and environment.

The Department of Land and Water Conservation’s staff, along with other government agency staff and local government work with communities and industry groups to implement strategies developed by the new boards.
Role of the Boards

The boards will focus on five specific tasks:

1. Identify the opportunities, problems and threats associated with the use of natural resources to support rural production and protection and enhancement of the environment.
2. Identify the first order objectives and targets, within the overall legislative and policy framework, for the use and management of the region’s natural resources.
3. Develop management options, strategies and actions to address the identified objectives and targets.
4. Assist in developing a greater understanding within the community of the issues identified and action required to support rural production and enhance the environment.
5. Initiate proposals for projects and assess against the targets, all projects submitted for funding under Commonwealth and State natural resource management grant programs.

Catchment Management Plans

In the first year of operation, each Board will produce the key components of a draft Catchment Management Plan as represented by the first three of the above tasks. The draft Plan will be submitted for consideration by the Minister in consultation with other Ministers involved in natural resource management. The purpose of the draft Plan is to ensure the health of the landscape is improved by meeting key targets. The draft Plan will provide focus and direction to individual and community initiatives, help coordinate government investment, such as extension work and grant funding, and contribute to the implementation of legislation such as the Native Vegetation Conservation Act 1997 and the Water Management Act currently being drafted.

South Australia

In the past four years the Minister for Environment and Heritage has appointed six Catchment Water Management Boards in South Australia under the provisions of the Water Resources Act 1997. Board members are selected through a public call for persons with skills and experience in catchment issues and knowledge of the catchment area. The Act requires the Board to prepare a Catchment Water Management Plan for its area and to develop the Plan in close consultation with the catchment community so that the major issues for the community are addressed. The Catchment Water Management Plan is funded through a levy with each of the Boards operating with an annual budget of between $2-3.5 million.

Prescribed resources are subject to more stringent management and Water Allocation Plans are developed. The Water Allocation Plans can apply to both surface and/or ground water depending upon which source is stressed.

In addition to the above (legislated) activities there are numerous community based natural resource management programs and projects which have catchment management as a focus. These programs broker resources for implementation of catchment management projects which are carried out by community landcare groups. The landcare groups generally operate within the planning and coordination frameworks of the larger programs. Most of these projects are funded through NHT with community support.
South Australia is currently working to develop a mechanism for integrated natural resource management. Soil Conservation Boards, Animal and Plant Control Boards, Catchment Water Management Boards and other natural resource management groups will all feed into probable natural resource management regional bodies. South Australia is looking initially to developing overarching legislation to enable this to occur.

Queensland

To assist in the objectives of integrated resource management (IRM) the Landcare and Catchment Management Council (LCMC) provides strategic advice on landcare and catchment management issues to the Minister for Natural Resources and Minister for Environment and Heritage. The LCMC also provides strategic direction for the NHT in Queensland.

Landcare and ICM groups develop strategies and management practices for effective land management. There are more than 187 landcare groups across the State and more are forming on a regular basis. Whilst landcare is concerned about local action, integrated catchment management draws together, on a catchment basis, those involved in primary production, environmental conservation, land-use planning, river engineering and other aspects of natural-resource management. There are in the order of 30 catchment management groups in Queensland.

Community organisations relating to IRM in Queensland

In Queensland, there are various community bodies that are involved in managing and delivering natural resource management outcomes. The main groups are regional strategy groups (RSGs), river improvement trusts (RITs) and catchment committees.

a) Regional strategy groups (RSGs)

Regional strategy groups can help communities answer questions about what they want their region to look like in the future, and give them direction on how to go about achieving this. They do this through vision and values statements, in the context of identifying the critical issues, setting long-term objectives, priorities and strategies.

b) Catchment committees

Catchment committees are established to address catchment management issues that are relatively complex and involve a significant number of community groups and government agencies. They comprise representatives of the major sectors of the community and government which are involved in, or influenced by, the management of land, water and vegetation resources in the catchment.

c) River Improvement Trusts (RITs)

An RIT is a statutory authority, which:
- protects and improves the bed and banks of rivers;
- repairs and prevents damage to the bed and banks of rivers; and
- prevents or mitigates the flooding of land by waters flood.

The primary roles are to plan, design, finance, undertake and maintain stream-improvement works to benefit the community within its river improvement area.
Each RIT is required to submit an annual report to the Minister for Natural Resources, Environment and Heritage in accordance with the River Improvement Trust Act 1940. The Minister has in accordance with the Financial Administration and Audit Act 1977, directed the preparation of a summarised report for presentation to parliament.