

Sourcebook for social and economic surveys

Assessing landmanagers' capacity to change and adopt sustainable management practices

BRR45

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Published by: National Land & Water Resources Audit

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The National Land & Water Resources Audit is an initiative of the Natural Heritage Trust. The Audit provides data, information and nationwide assessments of Australia's land, water and biological resources to support sustainable development.

Publication data: Hanslip, M and Byron, I (2007) *Sourcebook for social and economic surveys: Assessing landmanagers' capacity to change and adopt sustainable management practices*, Bureau of Rural Sciences Report, prepared for the National Land & Water Resources Audit, Canberra.

Information contained in this report may be copied or reproduced for study, research, information or educational purposes, subject to inclusion of an acknowledgement of the source. This project was managed by Karen Cody, Social and Economic Information Coordinator, National Land & Water Resources Audit under funding from the Natural Heritage Trust.

Acknowledgements

The National Land & Water Resources Audit (the Audit) has commissioned this report to enable expertise in designing and implementing social and economic surveys for natural resource management (NRM) to be drawn together for the benefit of regional bodies, industry and government policy officers. The report forms part of the Audit's socio-economic workplan and aims to generate more efficient and effective investment in NRM data infrastructure.

This Sourcebook builds on two other Audit projects:

- the development of five headline indicators (Nelson et al. 2006) that form the basis for the survey design and analysis framework discussed in this report
- the testing of the traditionally used proxy indicators of practice adoption (Hanslip and Byron 2007). This project revealed the low information content of proxy indicators and how the use of the five headline indicators offered much better predictors of practice adoption.

The Social Sciences Programme of the Bureau of Rural Sciences (BRS) has had a long involvement in regional surveying. It is the expertise developed through years of administering surveys and refining the underlying process that has been incorporated into this document (Byron et al. 2004a, 2004b, 2006a, 2006b; Curtis et al. 2000, 2001; see also Dillman 1978, Hanslip et al. 2007a, 2007b, and Hanslip and Byron 2007). This program of activity could not have been conducted without the generous assistance of the following regional bodies:

- | | |
|---|---------------------------------------|
| - Burnett Mary Regional Group, Qld | - NRM South, Tas |
| - Lachlan Catchment Management Authority, NSW | - Northern and Yorke NRM Region, SA |
| - Glenelg Hopkins Catchment Management Authority, Vic | - South West Catchment Council, WA |
| | - Queensland Murray Darling Committee |

The authors would also like to acknowledge the feedback provided by officers from other agencies:

- Colin Mues, Australian Bureau of Agricultural and Resource Economics (ABARE)
- Allan Nicholls, Australian Bureau of Statistics (ABS)
- Rohan Nelson, Commonwealth Industrial Research Organisation (CSIRO)
- Karen Cody, the National Land & Water Resources Audit (the Audit).

In addition, feedback on early drafts of the report was provided from regional representatives during three jurisdictional workshops conducted in early 2007 by the Social and Economic National Coordinating Committee (SENCC) representatives in New South Wales, Queensland and Western Australia.

Thanks also to Simon Kneebone who provided the illustrations.

Executive summary

Surveying is a specialised discipline requiring numerous skills and experience.

This document outlines the steps involved in conducting a survey. It aims to provide regional bodies, industry and government policy officers with sufficient information to successfully engage a consultant to produce the results they desire.

There are seven steps involved in conducting a survey.

Set a **Goal**
Plan an **Approach**
Determine a **Sample**
Design the instrument
Conduct the survey
Analyse the data
Report the results

Surveying in NRM in Australia has surpassed the concept of numerous individual surveys.

Through coordination by the National Land & Water Resources Audit, there is scope for future social and economic NRM surveys to be based upon a common framework. This will allow nesting of individual surveys conducted at different spatial scales (e.g. national or regional) enhancing efficiencies and effectiveness of data collection and reporting.

Contents

Executive summary	iii
Contents	v
Introduction	1
Integrating surveys	5
Step one – Determine the goal	7
Step two – Plan the approach	10
Step three – Sampling strategy.....	13
Step four – Design the survey instrument	19
Step five – Run the survey.....	35
Step six – Analysis.....	38
Step seven – Reporting results.....	45
Conclusion	46
References	47
Appendix A - Online resources.....	51
Appendix B - An example survey.....	52
Appendix C - Timeframes and cost.....	69
Appendix D - An example contract.....	74
Appendix E - Social and economic indicators	81

Introduction

This sourcebook is a resource for people who are interested in conducting survey-based research into landholders' NRM practices. It is not meant to be a how-to instruction manual as surveying is a specialised task incorporating multidisciplinary elements such as psychology, sociology, economics and statistics. This guide is an introduction to the details of developing a survey, and has four important messages:

1. Developing and running a survey is a big task that requires a lot of skill to do properly.
2. Armed with information on the steps involved in running a survey, anyone should be able to contract a survey consultant, confidently ask sensible questions, and obtain value for money.
3. There is benefit in nesting surveys at different scales and aligning surveys at the same scale.
4. Coordination of survey activities can be accomplished through the use of a common framework - the social and economic national coordinating committee (SENCC) framework.

The Natural Heritage Ministerial Board tasked the National Land & Water Resources Audit (the Audit) with coordinating the collation of data to support reporting under the National NRM Monitoring and Evaluation Framework (NM&EF). The NM&EF framework identifies the need for a set of indicators for monitoring community and social processes relevant to or affected by NRM programs, as well as measures of the adoption of sustainable development and production techniques.

The Audit has relied upon the advice of the social and economic national coordination committee (SENCC), a multi-jurisdictional group responsible for advising on the development and implementation of socio-economic indicators for NRM programs. SENCC is one of a number of groups working to help the Audit achieve greater coordination of information in support of natural resource management.

In August 2006 SENCC recommended a national set of indicators and protocols to assist in assessing the impact of NRM programs on the capacity of landmanagers' to change and the adoption of sustainable management practices.

The SENCC indicators focus on the:

- aspirations of landmanagers
- capacity of landmanagers
- attributes of management practices
- external influences on adoption, such as trends/shocks
- outcomes of the adoption of improved NRM practices.

At their simplest the indicators can answer questions on:

- the proportion of a target group/area reached by regional activities
- the level of adoption of specific sustainable management practices

- whether participation in regional activities was associated with greater adoption
- the relative importance of different variables known to affect capacity to adopt sustainable management practices and whether regional activities had an impact on those factors by increasing landmanagers' access to five broadly defined types of capital:
 1. Human capital – influences the productivity of labour and management capacity including skills, health and education
 2. Social capital – reciprocal claims on others by virtue of social relationship and the bridging, bonding and linking capital via which ideas and resources are accessed
 3. Natural capital – the productivity of land, taking into account threats to this productivity, as well as the water and biological resources from which rural livelihoods are derived
 4. Physical capital – capital items produced by economic activity from other types of capital that can include infrastructure, equipment and improvements in genetic resources (crops and livestock)
 5. Financial capital – the level, variability and diversity of income sources, and access to other financial resources (credit and savings) that together contribute to wealth.

The SENCC indicators complement the Audit's work in developing national indicators for assessing:

- the social and institutional foundations of NRM, including the capacity of regional NRM bodies
- community vitality, viability and health and its link to natural resource condition.

In addition the Audit has commissioned a national data trawl to identify significant data sets that incorporate the SENCC indicators at the industry, state and regional scale.

So, what is a survey?

A survey collects information in a systematic way from a group (or sample) of people. This includes all types of data collection; workshops, interviews (both phone and in-person), internet and mail surveys. It includes the collection of quantitative and qualitative information. The distinction between the two data types is not necessarily clear cut. Income and age are two examples of clearly quantitative data types. Nearly everything else can be more, or less, qualitative. Satisfaction with a management practice or government agency can be qualitative in an interview setting or they can be scaled (e.g. one to five) which makes the findings quantitative. Ultimately this distinction does not matter in terms of understanding the adoption of management practices, but it does make a difference in how the survey is set out and analysed (which is covered below).

Much of the research undertaken on the subject of NRM has involved surveys, with examples of these provided below. Few, if any, surveys are undertaken with the intent to integrate results with the larger picture. We believe that designing each survey around a common approach will help integrate data from different NRM surveys into a common body of knowledge, comparable across varying scales of decision-making.

Consistency in design and collection of data should not be seen as restricting research. It is possible to use the sourcebook framework and methodology to build a survey for your specific purpose while still providing results that can be integrated with other surveys, conducted for different purposes.

Examples of NRM projects employing survey work

(see references for details)

ABS Ag Census & NRM survey	13 MLA projects
ABARE Farm Survey	4 Dairy Australia projects
10 Grains RDC projects	3 Charles Sturt Uni projects
1 Cotton RDC project	2 AWI projects
4 Qld NRW regional surveys	24 Sugar RDC projects
2 Rural Futures Institute projects	6 Horticulture Australia projects
8 BRS projects	

(ABARE 2000, 2004, 2005, Agnew 2002, Ainsworth 2001, Azzopardi 2002, Bagshaw 2005, Banney 2002, Blackwell 2001, Bonaventura 2005, Bound 2005, Braunack et al. 2003, Byron 2004, Byron et al. 2004a, b, 2006a, b, Cox et al. 2002, CSR 2007, Curtis and Byron 2002, Curtis et al. 2002, Curtis et al. 2003, Curtis et al. 2000, Curtis et al. 2001, Dairy Australia 2004, 2006?, DPI Victoria 2005, Dyer et al. 2003, EA Systems Pty Ltd 2000, Hanslip and Byron 2007, Hanslip et al. 2007a, b, Hardie et al. 1997, Hassall and Associates 2004, Higgins and al. 2005, Holden and McMahon 1997, Horticulture Australia 2004, Hughes 2006, Hunt and Samson 2002, Hurney and Brown 2000, Jakku et al. 2004, Jones 2004, Kirchner 2004, Linedale 2001, Lucy 2004, McCarthy 2002, McConchie 2005, McEachern et al. 2005, McKenzie et al. 2006, McKenzie et al. 2003, Mills et al. 2004, Pillar 2003, Reeve 2001, 2006, Reppel 2004, Ridley 2002, Rudd 2007, Salisbury 2003, Salmond 1998, Seventy Mile Range LandCare Group 2002, Shannon 2002, Sindel 2006, Sonogan 2002, SRDC 2005, Summerfruit Australia 2005, Swain 2004, Thorburn et al. 2006, Thyer 2006, Toribio et al. 2004, Toribio et al. 2005, Wallis 2005, Watson 2004, Willcox et al. 2005)

Main Steps in Survey Design

There are seven main steps in survey design as displayed in Figure 1:

1. **Goal** – What do you want to learn? When will the survey occur? Where will the survey take place?
2. **Scope and Approach** – the bridging step between goals and sampling strategy. How much detail is required? What scale is appropriate? How much precision is necessary? And the inevitably overriding factor of how much money will it cost?
3. **Sample** – Who will be sampled? What is the sampling unit? What sample size is necessary to meet the goals? What sampling strategy fits the established requirements?
4. **Design and Testing** – What questions will be asked? How will the questions be worded? How will the survey be conducted? How will the questions be tested?
5. **Conduct Survey** – The first four steps develop the survey instrument, step five is to implement it.
6. **Analysis** – How will the data be coded? What procedures will be used to find linkages within the data? This step makes sense of the answers provided by step five.
7. **Reporting** – Who is the target audience? How will communication with them be accomplished? Did the survey identify any issues that demand a follow-up in some way? Unless the results are disseminated the survey might not have occurred.

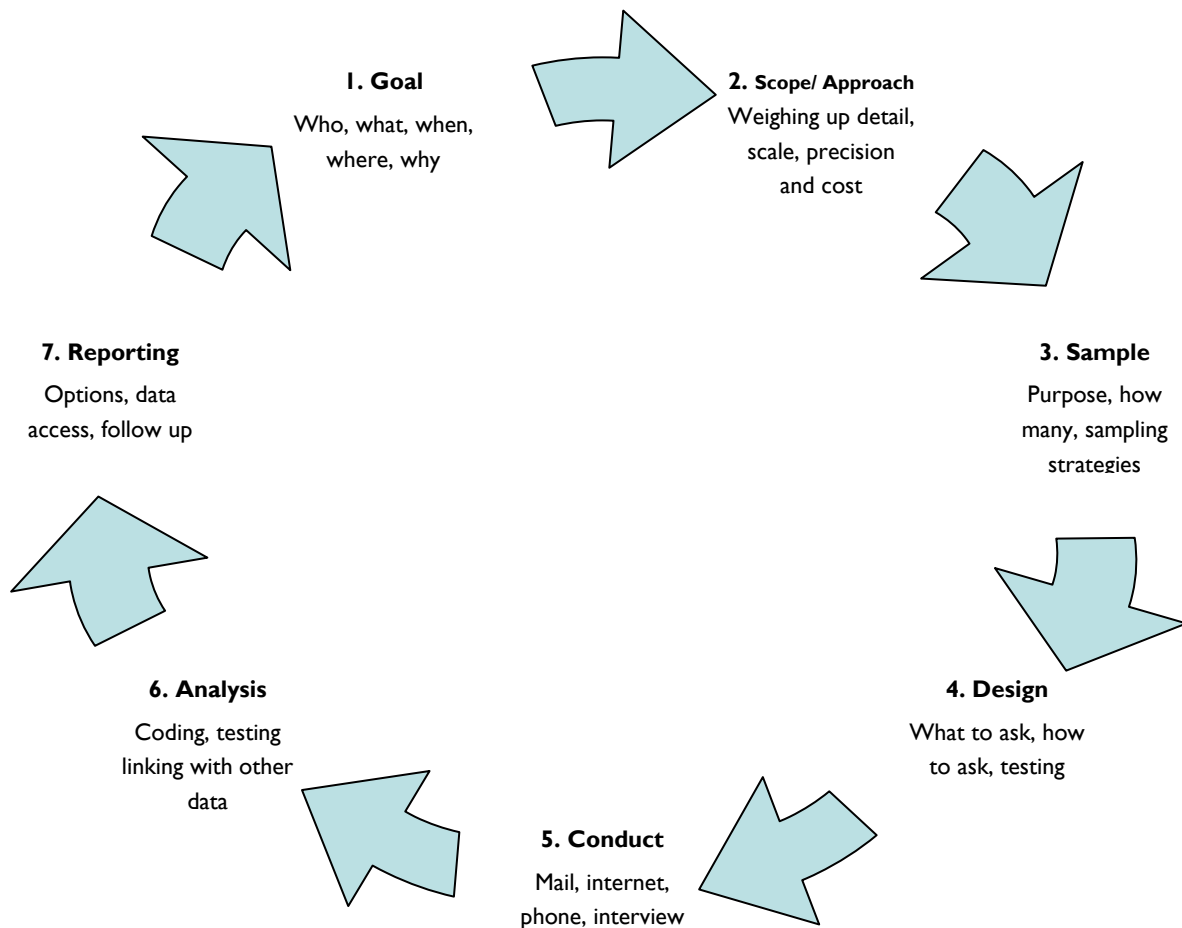


Figure I The seven steps in survey development and design

The process can be displayed as a closed loop for two reasons. The first is that survey processes are educational beyond the results of the survey – a good researcher learns from prior research and this is also true of survey clients. Lessons learned in previous surveys help frame and refine future surveys.

The second is that the survey cycle also has to be iterative and feed back into itself. Social systems are dynamic and what was true five years ago is not necessarily true now. Surveys have to be repeated every so often to ensure decision making is based on current information. It also helps to monitor the effectiveness of past policy decisions by highlighting changes between surveys. Even the best developed survey will raise new questions that might be explored in subsequent surveys.

Integrating surveys

Before discussing the steps in developing a survey it is necessary to examine how any survey can contribute to the larger picture on NRM issues. There are two concepts that are relevant here. The first is cross-survey linkage and the second is cross-scale nesting.

Linkage

Linkage is the process of merging data from two or more surveys conducted at similar scales. An example at the national level is combining ABS Population Census data with ABARE Farm Survey data. This is an established process due to the fact that ABS data are available in statistical local area (SLA) units, and ABARE data can be purchased cut to these ABS boundaries (there are alternatives that are beyond the scope of this book – see Hanslip and Kelson 2006 for an example). At the regional or industry scale the linkage process is not an established one.

Designing both surveys around the SENCC framework will provide enough common ground to enable the results to be put together. This provides both short and long-term benefits to the overall surveying process. The short-term benefits are realised as soon as two surveys are conducted based on the SENCC framework which can be combined immediately if appropriate. The long-term benefits come from the ability to glean longitudinal time series data on one particular topic from surveys conducted for dissimilar purposes. For example, a NSW regional survey about water use and a grain industry survey about tillage behaviour could integrate data on their aspirations to build a larger picture of farmers' aspirations.

Nesting

Nesting is the process of feeding specific information up and down the scale to benefit surveys at different scales. An upward example of nesting comes from the BRS landholder surveys. A successful method of measuring the adoption of management practices was developed, with a suite of these questions fed into the ABARE Farm Survey under the heading of the National Coordinated Industry Survey (NCIS). The NCIS is a supplementary set of questions tacked onto the end of the larger ABARE Farm Survey, and asks industry specific questions on management practices. NCIS data will be available in 2008. High level trends in practice adoption will be identified nationally for several industries out of the NCIS. Where there is spatial overlap with the regional BRS surveys, more detail can be filled in on additional practices and attitudes.

A downward example will have to be theoretical for now. One might pay the ABS to include a question on “salinity problems on your property” in the next Agricultural Census. As the Census is intended to be a 100 per cent sampling of the productive farms in Australia, the results from this question will reveal regions where salinity is thought to be more of a problem, and regions where it is thought to be less of a problem. If a government agency was looking to maximise return on investment in fighting salinity, a first step is to do a regional survey about salinity in a region of high salinity problems as identified in the Census. If, however, that agency was looking to maximise its knowledge about landholder salinity awareness, the first step might be to survey a region with a mix of high and low salinity problems to examine both sides of the issue.

An industry body might look at the results for that salinity question and decide that the farmers in their industry are particularly susceptible to salinity compared to farmers in other industries in the same locations. The industry body could then maximise its investment in learning about the impact of salinity in that industry by investigating those areas more fully.

Both linkage and nesting are illustrated in Figure 2. The concepts of linkage and nesting have been built into the survey design framework that follows.

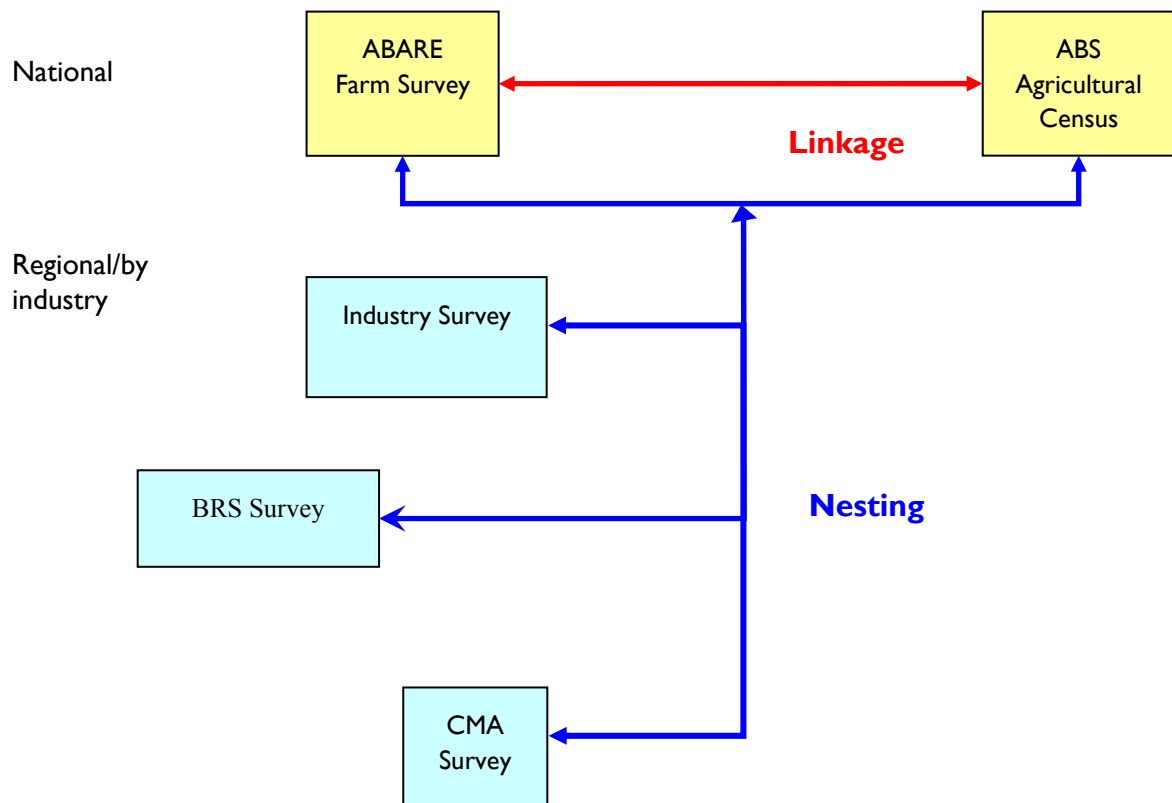


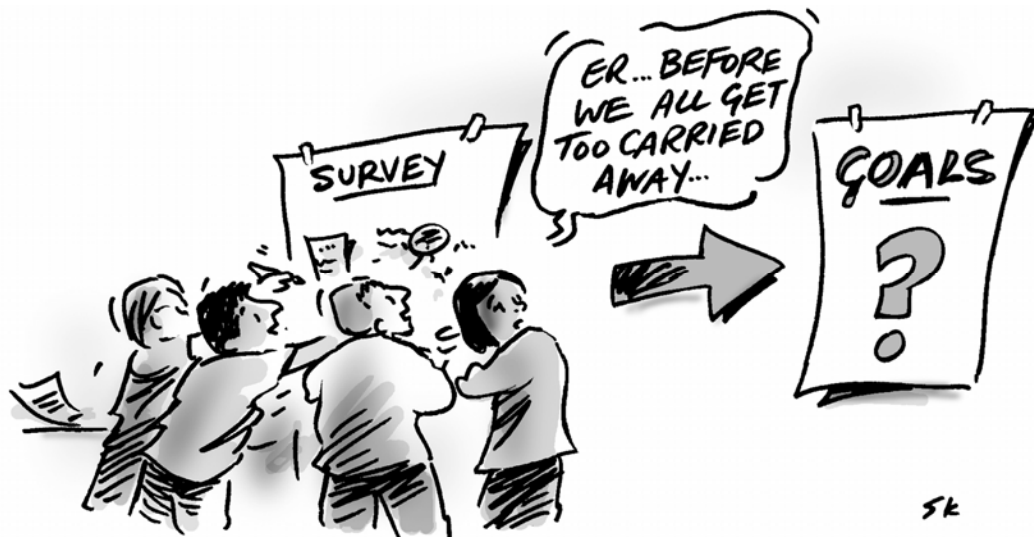
Figure 2 Linked and nested survey information

Step one – Determine the goal

Determining the goal of the research is perhaps the most critical, and an often overlooked, aspect of social and economic survey design. The goal will determine whom you will survey and what you will ask them. It is vital to determine the purpose and extent of the research before it is undertaken, either personally or by a third-party provider. A good consultant can assist in this step, but a complete project plan will save much time and money.

There are five key criteria that assist in determining the goal of the project.

1. What is it that you want to know?
2. Why is this information important?
3. Where is it appropriate to look for this information?
4. Who is best placed to provide the information you require?
5. When is the information required?



What?

The first step is to identify the key questions that are driving the survey process. The sourcebook is focussed on a landholder's capacity to adopt sustainable management practices. Surveys within this purview will necessarily have a strong focus on those questions. Nevertheless there are some other elements that must be considered in this step.

- Is there any other existing information that will help to frame the questions? Prior surveys on the same or similar topics will provide good examples.
- Are there specific problems that need investigation? A single issue or practices of interest which are poorly understood are examples.
- Is there a spatial component to the identified issues? An issue or a practice may only apply in particular locations within the study area, or it may be applicable to the whole area.

Once a list of potential issues and related questions is drawn up, the priority for each must be determined. If steps in goal, approach or sampling stages dictate, the survey may be scaled (up or down) and the priority list will determine where changes are best effected.

Why?

Throughout the development process of a survey, keep in mind the purpose of gathering the information and who will use it in the end. A survey must be designed to satisfy the intended outcome. There will always be a set of contextual questions that are useful to include in most surveys. Beyond that, if the research project is about water use in a rural area then asking questions about water use throughout the survey makes the most sense. Related questions about livestock and cropping practices which impact on water consumption or water quality could also be important.

Where?

The geographic region of interest is distinct from the geographic extent of the survey, although they are related. The people of interest may relate to a specific location (e.g. southern tablelands landholders or residents in fringe areas between city and country), a particular industry (e.g. grain growers or dairy farmers), a political division (e.g. NSW landholders or residents of the Glenelg-Hopkins catchment) or a land zone (e.g. grasslands or savannah).

It almost goes without saying (but we'll say it anyway) that the survey must be applied in a region appropriate to answering the questions at hand. To make an extreme example, a survey of the cane farmers of the Yorke Peninsula would be a short survey indeed, since cane only grows in sub-tropical conditions.

Who?

A survey can be focused on the land area, in which case the survey might target large-block landholders to cover the most land through the fewest surveys. Or it can focus on the people, so that land size does not matter and each opinion is equally worthy. It might consider the interaction of people and land, where high production farms might be the most appropriate focus to maximise survey return for investment. A survey might be industry specific - if the interest is dairy farmers, the survey sample must contain only dairy farmers. Or perhaps something else entirely where the who-factor is more difficult to define - such as farming in city-fringe areas which is not so much an industry as a location with productivity covering everyone from professional horticulturalists to office workers with a hobby. Knowing about the "who" in a survey is a critical early step.

When?

In any survey there are numerous time issues to consider. The first issue to consider is a practical one, to do with the people being surveyed – will they be available? Sending surveys to grain industry farmers in the middle of their harvest is likely to result in a lot of unfilled survey booklets. Send the same survey to the same people a few weeks later and the response rate could be much higher.



A second issue is when the results are required. Planning to insert appropriate questions into the ABARE nationally coordinated industry survey or the next ABS Agricultural Census requires waiting until these organisations run their surveys. If the time frame is acceptable this could be a good way to obtain the desired information. If the information is required with a short period of time, a different tack is required.

The challenge is to establish what you need to know, why you need to know it, where and from whom you can find the answers, and when you require the answers. Armed with this knowledge, proceed to the next step, but remember that you may need to go back to the scoping stage if the approach (or even later steps) dictates.

The better you think through the what, why, where, who and when before developing your survey, the less likely you will need to go back to square one.

Step two – Plan the approach

There are four factors which collectively define the approach to the survey.

1. How much detail will the survey collect?
2. How precisely will the survey answer your decision making questions?
3. What scale does the survey need to cover?
4. What budget is available for the survey?

In addition, you need to consider and write down the ethical base from which the survey will be conducted. This includes how participants will be treated, how confidentiality will be protected and how results will be distributed back to participants.

Detail

The level of detail relates to the scale at which the data will be collected. Surveys focussed on specific locations or industries have a greater level of detail in the questions, while questions in a national survey need to be fairly broad and low in detail. (Farming terminology varies across Australia so a question about a practice will not mean the same thing to all farmers.)

A survey applied in a single catchment will tend to ask a series of questions about the same practice, and request a high level of detail. For example, a low detail question is: do you practice no-till? A high detail example would also ask:

- How much of your property do you use no-till on?
- Do you episodically incorporate regular tillage?
- How long have you practised this?
- What is your evaluation of no-till?, and so on.

Choosing low detail questions means missing out on a lot of potential information that could prove valuable. But seeking too much detail in the questions can also have a down side. Some people will abandon the survey and the response rate will be lower, others will attempt to answer the questions inappropriately or without understanding them thereby giving meaningless survey results. A well targeted set of questions with the right level of detail encourages good response rates.

Precision

Precision concerns the desired accuracy of the survey results. Precision can apply at the level of scale, which is more of a sampling question (that is, can the results of this survey be applied more widely with known error margins?) or it can apply at the level of individual questions, which relates to the survey approach. We are using precision and accuracy interchangeably in this context, even though they can have different meanings in scientific research. Scale level precision really refers to accuracy (i.e. whether the measurements are repeatable) while survey approach level precision is actually precision

(e.g. 21.6 is more precise than 22). A low precision question on income requests an answer to the nearest \$10, 000. A high precision variant obtains income to the nearest \$1.

Unneeded precision creates more work for the analysts than is necessary. For example, if you collect and analyse income to the cent but the critical difference in an adoption scenario is being over or under a \$50,000 income level, a lot of unnecessary time and effort goes into the analysis.

When precision is too low, opportunities to better analyse the data are missed. An example is an age-related difference that separates baby boomers (born 1946-1965) from gen-X (born 1966-1978) farmers, but perhaps you have only collected age in broad categories (<30, 30-50, 50-65, >65) where the majority of both groups are in the second age category. Therefore you would miss this conclusion.

Scale

Scale considers how widely the net needs to be cast in order to obtain answers. If the scope covers a specific region or industry then the scale will be these regions or industries. Typical scales include national, regional, local and industry.

Scale can be limited by relevant geographic zones, political boundaries, industry sectors or even climate types. Both the ABS Agricultural Census and the ABARE Farm Survey have a national scope, but the ABS Agricultural Census has a much larger scale than the ABARE Farm Survey (around 100 times as many survey questionnaires are distributed by the ABS than by ABARE in their respective processes).

Cost

Increasing detail, precision or scale always increases cost. The highest level of detail, precision and scale available would be to interview at length every appropriate person in the nation; the cost would be exorbitant. For identical scale but much lower detail, precision and cost, it would be possible to insert five questions into the next ABS Agricultural Census. In contrast, a workshop with 25 landholders in a shire would yield moderate detail, low precision and low scale; and would cost very little money to complete.

When budgeting for expenses you should consider all the real costs involved. Consider a BRS catchment survey as an example:

- It takes around 18 months from beginning to end to complete one survey with three people working on a part-time basis.
- Travel to the catchment has to be considered twice – once at the beginning for regional workshops to plan the survey and again at the end to present the results.
- There are printing and posting expenses associated with survey questionnaires, reminder cards, and envelopes (outgoing and return).
- There is inevitably some expense for the land tenure list from the state government and cadastral information.

- Analysis time is a large expense – it physically takes a long time to deal with a thousand surveys of more than 250 questions to make sense of it.
- Writing, editing and printing the final product(s) is the final consideration.

In summary, the scope or approach of a survey will be a balance among desired and affordable detail, precision and scale to meet the purpose of the study.

Obligations

The planning stages of a survey are a very good time to consider ethical obligations towards the respondents. For example, universities have a strict ethical policy usually enforced by a central office of specialists. Often these are designed around participation in medical or psychological experiments and as such are probably excessive for surveying. If a university researcher is a participant in the survey process, their ethics policy will be involved.

For everyone else, informed consent is a good starting point. Whether you are recruiting participants in the survey by mail, telephone or in-person they should be fully informed of why the survey is being conducted, who is conducting it, and to what use the information they provide will be put. An expectation that the survey data will be integrated with other surveys should be allowed for in the information provided to them.

Survey participants have the right to withdraw their participation at any point in the survey process. With a mail survey this is implicit – if they do not return the survey they have not participated even if they completed the question list. For personally recruited surveys (from workshop to telephone) each person should be informed of their rights and be required to state their agreement to participate.

The planning stage is also the appropriate time to remember the obligations of Australian Government departments. All federal agencies that conduct a survey which contacts more than 50 small businesses (and a farm is a business for these purposes) have to obtain permission from the ABS Statistical Clearing House prior to engaging in the survey process. This requirement is to minimise duplication of effort across government and to reduce the burden borne by small businesses in answering the questions of various government departments. This obligation does not pass on to state or local governments.

Step three – Sampling strategy

Establishing the sampling protocol for the survey involves two main steps.

1. Select a sampling procedure for choosing potential respondents to the survey.
2. Select the survey method (such as telephone interviews or mailed questionnaires).

Below is a discussion of four sampling and five surveying methods to consider, plus a brief discussion of the statistical considerations of sampling in order to have confidence in the survey results.

Sampling procedures

The sampling procedure affects the conclusions that can be drawn from an analysis of the results, as each procedure will return a different cut or segment of the overall population. Sampling is an inherently mathematical process, so the following discussion may be challenging to the non-mathematical reader. We have simplified the discussion as much as possible.

For surveying purposes there are four potential sampling strategies: simple random samples; stratified random samples; stratified selected samples; and selected samples. The more specific the surveying method, the more selective the appropriate sampling strategy will likely be. For example, if the intention is to spend four hours personally interviewing each of fifteen landholders across the state it makes sense to carefully select which fifteen are chosen. However, if the intention is to send a twelve page survey book to five thousand landholders in one catchment it makes much more sense to select them at random.

The sampling method chosen has implications for generalising about the larger population. A random sample can be scaled up to generate comments about the larger population, whereas a stratified random sample can only be extrapolated to cover the whole of the stratum that was sampled (e.g. the BRS survey sample frame is land parcel size – the results can only be generalised to cover those people who possess similar size parcels of land). In both cases a confidence interval applies to the findings. Selection of appropriate sampling strategy is not a trivial process. (See the section below for more information on sample size.)

The sample frame, the source of the population from which the sample is drawn, is also important to survey success and to the ability to extrapolate findings. For example, the ABS Agricultural Census surveys all farms above a certain productivity level. No extrapolation is necessary as this is a complete sample, but it tells us nothing about farms below the cut-off point. For an example using sampling, the BRS surveys used a land parcel frame. Property size was the determinant – properties greater than a certain area (often ten hectares but modified to suit each region) were sampled while smaller ones were not.

There is also potential for bias and currency issues in sample frames. Bias could be introduced if the population list came from an industry association or community group – any farmer not a member of the association or group would not be included in the

population. The results would be representative only of members of the group. Currency affects sample size. If the population list is a few years old, a number of people on it will have moved. While these non-responses are not counted in the response rate, they do lower the number of units sampled. Often the best source of lists is from local government ratepayers, which tend to be both current and unbiased.

Census

A census is not a sampling strategy as such, it is a 100 per cent survey. It is an ideal situation when surveying with no sample bias issues, but is obviously considerably more expensive.

Simple random sample

A simple random sample is just what it sounds like – a random selection of people from the pool of all people. When a random sample is employed, the conclusions of the survey can be applied to all people in the survey region.

Simple random samples are easy to undertake with no prior knowledge of the population required. A method of generating a random sample is to use the random function in Microsoft Excel, use paste-as-value to put the random numbers into a blank column, and sort the landholder list on the pasted column (the paste step is essential because random is a dynamic function in Excel and it will change every time you perform any other software function). Select the first X samples for a survey of X landholders.

Stratified samples

Selected sampling chooses survey respondents on some basis without considering the overall population at any point. The selection may be pragmatic or carefully managed, and for many workshop type surveys this is entirely appropriate, but it prevents any generalisations at all being drawn from the survey to a larger population grouping.

A sampling strategy is also affected by the survey process. Telephone interviews, in-person interviews, online survey, mail survey, focus group(s) and workshop(s) are the main methods available to conduct the survey. There are also specialist composite methods that can be employed for specific reasons, such as using the survey results to stratify the group for follow-up interviews.

Stratified random sample

A stratified random sample differs from a simple random sample in that the whole population is divided into layers, or strata, on the basis of one or more traits (e.g. gender, age, income, etc.) that are relevant to the survey process prior to the sampling action. The sampling within the stratum is then done randomly. Obviously dividing the population into strata requires knowledge about which people will satisfy each requirement of a particular stratum.

One frequent method of stratifying the population for NRM surveys is on the basis of the size of landholding. Typically some ten per cent of the population control 90 per cent of

the land. To achieve maximal land coverage within a given sample size, it can make sense to select only the largest landholdings.

Stratified selected samples

Stratified selected samples differ from stratified random samples after the stratification process is complete because those targeted by the survey are selected for their participation and not randomly chosen. It is virtually impossible to generalise the results from the sample group to the rest of the strata (let alone the total survey population) because they were chosen through a non-random process. The bias that led to the choice of participants carries through to the survey results.

If the interest is in the largest-area landholders as in the previous example, but the ten per cent represents only a small number of individuals (perhaps because of the small area the survey covers, or because it is an industry-specific survey and there are not many large operators in this industry), then it might be impractical to randomly sample within this group. It may also be the case that there are few people to extrapolate results onto, and any benefit from the random sampling process is lost.

Snowball sampling

A sampling strategy that applies only to interview style surveys is snowball sampling. So named because the researcher begins with a few names seeded (usually) by the client, and with each contact asks for more names to speak with on the topic. The contact list grows like a ball of snow rolling downhill.

It is a pragmatic approach to surveying. One cannot know how representative the sample is of the population, so the way it works best is for small population groups where the final sample is a reasonable proportion of the total (perhaps 50 per cent or more). It also works best with purely qualitative data that one does not try to characterise statistically.

Confidence intervals and levels

What is a confidence interval? Literally it is the range of values of a sample within which one has confidence that the actual value of a population falls. Think of a pre-election poll (a survey by another name). These are often reported as “60 per cent $\pm$ 8 per cent will vote for a particular party”. The confidence interval is eight. That is, the value reported as 60 actually lies between 52 and 68. It is identical with a landholder survey.

Do not confuse confidence interval with confidence level – the latter being the likelihood that a random sampling process will actually produce a number in the range specified by the interval. Throughout our survey work we use a 95 per cent confidence level. If sampling was performed on the same population 100 times, we would expect that five of the samples would NOT agree with our expectations, despite the fact that they did come from the population in question. However, 95 times it would agree. In five per cent of our trials we would find a difference between the sample and the expectation when no difference actually existed. To return to the example, just by random chance, in one out of 20 trials the resulting number would NOT lie between 52 and 68 even though we know it does.

If the desire is to determine how many landholders undertake a particular practice in the whole population with a potential error of five per cent (a confidence interval of ± 2.5 per cent), then based on approximately 135,000 agricultural landholders in Australia and a 95 per cent confidence level the required survey size is about 1,500 individuals. The four numbers (confidence level, confidence interval, population size and sample size) are related mathematically. If you know any three, you can calculate the fourth. Usually this means calculating sample size on the basis of the other three.

In a normal distribution (a bell curve) a 95 per cent confidence level corresponds to two standard deviations away from the mean value. The other commonly used, and considerably tougher to satisfy, confidence level is 99 per cent. This corresponds to three standard deviations away from the mean value (50 per cent more stringent than 95 per cent). The flipside of this process is that it becomes more difficult – it requires more secure evidence – to distinguish between genuinely different groups. While a 99 per cent confidence level would fail only one in 100 times (compared with one in 20 for the 95 per cent level) it becomes correspondingly harder to distinguish between genuinely different populations. Much larger sample sizes are required to successfully employ the higher confidence level. For survey work a 95 per cent confidence level is fine.

Sample size

Size is an important consideration for sampling issues beyond confidence intervals and confidence levels. Within the parameters established in the steps so far, there will be a limited range for sample size that makes research sense. From a statistical point of view a sample size of 50 individuals is almost always enough for any analytic procedure, and often half that will do. If the survey intends to look at sub-regional units, the sample size must be large enough to have tens of responses in each unit. If no breakdown is planned, then a few tens of respondents for the entire survey is enough. These suggested minimum numbers are merely to feed sufficient data into the procedure to get meaningful answers out – independent of the population size.

To give an example, it is often the case that survey data are compared with ABS data at the SLA. The sample size must be large enough to begin with to take into account people who will not respond and still retain a statistically useful number (e.g. 30-50) of responses at the end of the survey. Just how useful a particular sample size will be can be characterised by confidence interval and confidence level. As mentioned above, with a 95 per cent confidence level and a sample size determined by survey response rates from a given population size, the confidence interval can be calculated.

Sampling bias

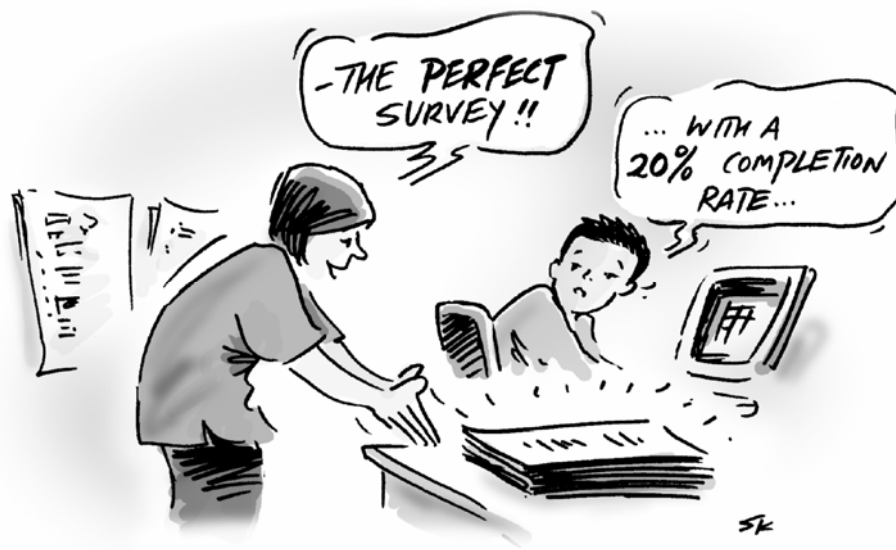
Any survey that is not a census has the potential for sample bias to creep into the results. Whether due to the sampling frame or to the type of people who choose not to respond. It is important to know if there is a bias in the survey results. Demographic data collected in the survey can be compared to demographic data from the ABS Census. Details such as age, income and education levels should compare between the two data sets if the sample is unbiased. While this topic only receives a paragraph of discussion, it is quite an involved process to determine and then correct for sample bias in survey results.

Survey methods

Telephone interviews

Telephone interviews are generally cost effective. Contact with people across a vast geographical area can be accomplished by one person with a telephone. They don't take much time and are suitable for most sample sizes. Due to waning attention over the phone, there is a definite limit to the number and complexity of the questions that can be included. People lose interest after about 15-20 minutes in the phone interview meaning you can have a broad range of questions or a good depth of questions, but not both.

Telephone interviews have very low response rates (or very high rejection rates in that typically more than 90 per cent of people phoned will refuse to participate in the survey), and it is very hard to determine the population that the sample represents. Typically large phone interviews use a quota system whereby people on a list are phoned until a pre-defined number of interviews are completed. Targeted telephone surveys, where the population phoned is not entirely random (for example Landcare members being asked about Landcare activities), do have much better response rates than purely random samples.



Personal interviews

The personal interview tends to be very costly on a per-survey basis, and they are time consuming. The interviewer has to physically relocate to each interviewee's location. They can provide great detail as questions can be followed-up appropriately for each respondent. There is also a great deal of flexibility in the type of questions that can be asked, and difficult questions can be explained by the interviewer. Questions that the interviewee cannot answer themselves can be taken to an appropriate person for follow-up (e.g. seeking financial information from an accountant about the farm's income last financial year).

'Response rate' is not an appropriate term for interviews in general. Interviews are used for surveying small groups of well targeted individuals and the key to getting good participation during the interview is networking before the interview process to ensure a

good rapport. It is rarely a good idea statistically (just as it is rarely done in practice) to extrapolate from a few interviewees to a much larger population.

Online

The online survey is an increasingly useful tool for consideration. At present there are still sample skewing effects because of those who have internet access and those who do not. Rurally based Australians lag well behind the urban dwellers in internet access but the situation is improving each year. Internet surveys can be very inexpensive, provide rapid turnaround times, are suitable to all scales, and can cover a broad range of questions with some depth. If the access issue can be managed then it is a very suitable form of surveying. The ultimate effectiveness of online surveys in returning a high response rate may exceed most other methods. In our limited experience with them, they can produce a higher return rate than a mail survey in the same population (see below) at a much lower cost due to easy data entry.

Mail

Mail surveys are moderately expensive if done properly. It is quick and easy to throw together a survey booklet, but the results obtained from rushed surveys are poor. A mail survey, like all surveys, relies on workshops and committee meetings (which add time and expense to the process) to ensure that the questions are not confusing for the target audience and that they are relevant to the desired results. This is particularly important with a mail survey due to the fact that it is impossible to easily answer questions or clarify issues the way a phone or in-person survey permits.

Mail surveys allow a moderate to high level of detail in their results – the breadth versus depth trade off mentioned in telephone surveys has latitude for much more coverage in the mail survey. Finally, they are applicable to all scales and sampling methods. Done properly, response rates can be 60-80 per cent which is usually high enough to ensure the original sample is not skewed.

Focus groups and workshops

Focus groups and workshops can also be used for surveying. They both involve assembling a small group of the target population in a room where a discussion about the survey topics are held. They can be very cost effective, can be put together relatively quickly and can result in good detail. However, it is hard to quantify differing opinions in a group and therefore almost impossible to extrapolate to the broader population – workshops tell you about consensus opinion in that group only. Response rates and issues about sampling strategy are almost irrelevant for workshops because of the inability to extrapolate the results to the larger population.

Step four – Design the survey instrument

Survey design consists of three steps.

1. Developing the specific questions is the main step – this includes the wording of each individual question, the mix of questions and the order in which the questions are asked.
2. Ensuring that the survey instrument allows for integration and nesting with other surveys is done after the main body of questions is determined.
3. Finally the instrument must be tested to ensure it will be successful.

Question development

Designing the actual survey instrument is the key step to obtaining the most useful and informative results. If the first three steps – goal, scope and sample – are well addressed, survey and question design is easier but it is never trivial. Many people think they can design an adequate survey but often run into trouble when the quickly-developed question set does not bring out the desired data. For a more detailed discussion of question wording, see the online ABS design manual referred to in the Appendix.

A simple question designed to find out about a respondent's income highlights the above point. A question on income may be asked in a number of ways:

- A. *What is your income?* _____
- B. *What was your total property-derived and off-property combined taxable income for last financial year?* _____
- C. *Please select your household's on-property taxable income for last financial year:*
- | | |
|--|---|
| ☐ <\$10 000 | ☐ \$40 001-50 000 |
| ☐ \$10 000-20 000 | ☐ \$50 001-60 000 |
| ☐ \$20 001-30 000 | ☐ \$60 001-100 000 |
| ☐ \$30 001-40 000 | ☐ >\$100 000 |

Question A is very simple, but too vague. Does it apply to farm income, total income, the income of the respondent or the entire household? Further, many people are reluctant to give exact income figures so it is quite likely that A will go unanswered a lot of the time in non-interview settings. In an interview, the interviewees might say “about \$50 000” or “more than \$80 000” or even “\$22 392 and can be queried by the interviewer as to what the figure refers to. Such variety of answers (some vague and some specific) is not very useful in the interpretation of the results for all survey types.

Question B is much more specific. This might be the appropriate question for a telephone interview, but people will still be reluctant to answer the question. Question C is less precise than B, and in our experience it often goes unanswered in paper surveys, but

because it uses tick boxes more people will complete this question than either A or B. Of course, in a telephone interview reading out all 8 options would be cumbersome and the question might be modified to “To the nearest ten-thousand dollar increment, what was your household’s taxable income from on-property sources in the last financial year?”



In general questions should be designed to fit the medium (e.g. phone survey respondents can’t see pictures or graphs) and be kept as short and simple as possible. It is arguably important to allow for ‘don’t know’ or ‘not applicable’ responses to most questions to encourage people to complete the survey (some people feel they are being coerced if these options are not available to them). This is a contentious issue in survey design and no consensus exists on the inclusion of non-answers. We feel it is appropriate for many questions in the NRM context.

Regardless of what questions are chosen, and how the survey is to be conducted, it is very important to trial the survey. Ambiguous wording, missed issues, grammatical and spelling mistakes – the list of potential pitfalls that can be avoided through trialling a survey is extensive.

Part of good survey design is allowing for different human behaviour – a few examples will illustrate. More people will choose “not sure” if it is the last choice in a string of choices than if it is the middle option, so put it in the middle (see examples 1 and 2 below). People will often give up on a survey if they are forced to make a choice that does not apply to them (in example 3, what does a corn farmer select?). The scale should be symmetrical for responses (see 4 for a good example and 5 for a poor example). The distance between answer options should be equal for scale responses (6 is good, 7 is poor).

A final point is that 50 per cent of the questions should be phrased positively (see 8) and 50 per cent negatively (see 9) and they should be presented alternately. If they are all positive, or all negative, then respondents can fall into a response pattern and not fully consider the questions – lowering the quality of the data. It can be difficult to write negative questions that read correctly and that cannot be misread in the positive. In general people do not seem to like negative question wording – we have always had negative phrasing removed by steering committees at the Bureau of Rural Sciences – but the principle remains a sound one.

We have pointed to some common issues here, but the full details of developing a good question set are beyond the scope of this text.

1. Good

Strongly agree Agree Not sure Disagree Strongly disagree

2. Bad

Strongly agree Agree Disagree Strongly disagree Not sure

3. Incomplete

Please select your crop(s) from the list:

Barley

Wheat

Rye

4. Good

Very dissatisfied Dissatisfied Neutral Satisfied Very satisfied

5. Bad

Dissatisfied Neutral Somewhat satisfied Satisfied Very satisfied

6. Good

Not a problem Small problem Moderate problem Major problem

7. Bad

Not a problem Moderate problem Major problem Extreme problem

8. Positive phrasing

Salinity is a problem on my property – Agree Neutral Disagree

9. Negative phrasing

Salinity is not a problem on my property – Agree Neutral Disagree

Question types

There are three basic types of questions: multiple choice, numeric open end and text open end (sometimes called "verbatim"). Rating Scales and Agreement Scales are two common varieties of questions used which can be multiple choice or numeric open end questions. The most appropriate question types to collect the desired data are illustrated by the

following examples. These utilise the five headline indicators discussed in chapter 1: ***Landholder aspirations, capacities, attributes of the practices, external influences and outcomes.***

The purpose of this section is to demonstrate the nature of the nested approach to survey scaling rather than being concerned with specific questions.

Examples of questions at a national scale

National level questions usually require a certain amount of brevity because of cost constraints. These questions are a balance between detail and expedience. The aspiration questions fall into two groups. Including one of these in a national survey would be good, but including both groups would be better. Similarly, there are two groups of capacity questions and it requires both to adequately address capacity at a broad level.

Attributes of a practice are addressed in a single section. It would require asking this question for each practice you wish to know more about. The limitations of using a survey mean that you could only get information about five key practices at most. A significant problem with practice-specific questions at a national level is that the language used to describe practices varies across regions – like the various names given to a glass of beer, there are also numerous names for many similar practices across Australia. The only outcome specific question in the national questions list is the first part of the attributes section – “do you do practice X?”

There are only a half-dozen influences considered in the example influence question, plus the open-ended option. The options are quite vague (e.g. was it a specific commodity price that was the problem? or, is a specific regulation driving behaviour?) covering a range of options with little depth.

These examples are all drawn from surveys conducted by mail, because most NRM surveys are mailed. Issues for other survey types will be discussed in the following section.

1. Aspiration question

How important are the following aspects of your property or business over the next 5 years?

	Very low priority	Low priority	Moderate priority	High priority	Very high priority
1. Improving productivity	☐	☐	☐	☐	☐
2. Improving profitability	☐	☐	☐	☐	☐
3. Reducing workload	☐	☐	☐	☐	☐
4. Improving lifestyle	☐	☐	☐	☐	☐
5. Improving soil and water health	☐	☐	☐	☐	☐
6. Improving the health/cover of native vegetation	☐	☐	☐	☐	☐

2. Aspiration question

Rate the likelihood of the following actions taking place on your property in the next 5 years?

	Highly unlikely	Unlikely	Not Sure	Likely	Highly likely
The property will be sold or leased	☐	☐	☐	☐	☐
Property will be passed on to family	☐	☐	☐	☐	☐
Expand by purchasing/leasing land	☐	☐	☐	☐	☐
Change or add enterprises	☐	☐	☐	☐	☐
Change management practices	☐	☐	☐	☐	☐
Reduce/scale back production	☐	☐	☐	☐	☐
Increase off-property income	☐	☐	☐	☐	☐
Reduce off-property income	☐	☐	☐	☐	☐

3. Capacity question

Part A: Which of the following sources of information or advice have you used over the past 2 years?

Part B (for each used): Was this information/advice useful to inform decisions about your property/business?

	Not used	Used but not influential	Used and important in decision making
Local government	☐	☐	☐
State government	☐	☐	☐
Federal government	☐	☐	☐
Catchment groups	☐	☐	☐
Industry groups	☐	☐	☐
Agri-business agents	☐	☐	☐
Accountants	☐	☐	☐
Rural financial counsellor	☐	☐	☐
Care groups	☐	☐	☐
Other farmers	☐	☐	☐

4. Capacity question

To what extent does each of the following factors limit your ability to achieve the goals you have for your property/business?

	Not at all	Some	A lot
Cash flow	☐	☐	☐
Debt level	☐	☐	☐
Area of arable land	☐	☐	☐
Access to necessary equipment	☐	☐	☐
Suitability of soils	☐	☐	☐
Availability of water	☐	☐	☐
Availability of skilled labour	☐	☐	☐
Access to training	☐	☐	☐
Stage of life	☐	☐	☐
Available time	☐	☐	☐
Availability of information	☐	☐	☐

5. Attributes question

Is practice X part of your farm management program?

YES ☐

If **YES**:

Has this practice helped achieve your goals?

None **Some** **All**

How well has this practice fitted with your property and available resources?

Not well **Partially** **Very well**

Will you continue with this practice in the future?

Yes **No** **Maybe**

NO ☐

If **NO**:

Do you think this practice could help you achieve your goals?

None **Some** **All**

How well do you think this practice would fit with your property and available resources?

Not well **Partially** **Very well**

Are you likely to undertake this practice in the future?

Yes **No** **Maybe**

6. Influences question

Which of the factors listed below have had an impact on the management of your property/business over the past 12 months?

	Tick all that apply
Commodity prices	☐
Input prices	☐
Compliance and regulations	☐
Access to services	☐
Climate/drought	☐
Government incentives	☐
What has or has not worked elsewhere	☐
Other (please specify)	

7. Influences question

From the list above, or using your own examples, what are the three most important factors that have had an impact on the management of your property/business over the past 12 months?

1. _____
2. _____
3. _____

Examples of questions at a regional scale

Questions that cover aspirations and capacities are necessarily general. As such it is quite possible to ask these questions across all scale levels. Cost, however, often prevents too many of these context building questions at the national scale. The example aspiration questions listed under the national scale are questions that BRS put forth for inclusion in a national survey, but came from a catchment level survey we undertook. Seeking more detail we used additional aspiration questions in the catchment survey.



National level capacity questions are necessarily brief. There are, for example, only two questions about physical capital (one on soil, one on water). In a catchment level survey however, one can go into much greater depth on capacity issues.

Looking at practice attributes is much easier at the regional level because there are fewer language problems and the range of practices relevant to the region will be better defined than at the national scale. In the example below there is a full page of questions linked to livestock management – primarily fencing. The landuses section is useful to establish which landholders are appropriate to ask about fencing – if they have no stock then fencing is not an issue for them. The management practices section looks at levels of adoption and therefore is an outcome rather than an attribute. The evaluation section is about examining attributes.

When considering influences on adoption at a regional level it is possible to go into much more detail than at a national scale. For example, questions regarding the influence of particular agents, such as the WA Farmer's Federation, are not applicable outside of WA, and are therefore not appropriate for a national level survey.

1. Aspiration question

What priority do you give to each of the following **goals for the management of your property and/or farm business**? [Tick the box that best describes the priority you give to achieving each goal listed.]

	Not a priority	Low priority	Medium priority	High priority
Maintain the lifestyle I/we want	☐	☐	☐	☐
Provide most of the household income	☐	☐	☐	☐
Maintain/improve resource conditions on the property	☐	☐	☐	☐
Pass the property on to family	☐	☐	☐	☐
Build/maintain a financially viable business	☐	☐	☐	☐
Contribute to the environmental health of the region	☐	☐	☐	☐
Being able to work outdoors	☐	☐	☐	☐
Build/maintain an asset that can fund my/our retirement	☐	☐	☐	☐
Provide habitat for native animals	☐	☐	☐	☐
Being able to live in an attractive natural or rural environment	☐	☐	☐	☐
Maintain family tradition	☐	☐	☐	☐
Provides an opportunity to be innovative/creative	☐	☐	☐	☐
Build a sound long-term economic investment	☐	☐	☐	☐
Maintain/improve soil health	☐	☐	☐	☐
Be part of a close knit rural community	☐	☐	☐	☐
Increase on-property production / net income	☐	☐	☐	☐
Conserve water and improve water quality	☐	☐	☐	☐
Have the freedom to work for myself	☐	☐	☐	☐
Other goals [please specify]				

2. Capacity question

To what extent are the following land and water issues a problem on **your property**?
[Examine each issue and tick the most appropriate box.]

	Don't know	No problem or NA	Small problem	Moderate problem	Major problem
1. Dryland salinity	☐	☐	☐	☐	☐
2. Soil pH (acidic/alkaline)	☐	☐	☐	☐	☐
3. Soil compaction	☐	☐	☐	☐	☐
4. Irrigation salinity	☐	☐	☐	☐	☐
5. Wind erosion	☐	☐	☐	☐	☐
6. Water erosion	☐	☐	☐	☐	☐
7. Nutrient deficiency or imbalance	☐	☐	☐	☐	☐
8. Waterlogging	☐	☐	☐	☐	☐
9. Nutrient toxicity (e.g. Boron)	☐	☐	☐	☐	☐
10. Introduced pest animals	☐	☐	☐	☐	☐
11. Native pest animals	☐	☐	☐	☐	☐
12. Disease resistance	☐	☐	☐	☐	☐
13. Weeds	☐	☐	☐	☐	☐
14. Availability of good quality surface water (e.g. dams, creeks, rivers)	☐	☐	☐	☐	☐
15. Availability of ground water (e.g. bores)	☐	☐	☐	☐	☐
16. Health of waterways	☐	☐	☐	☐	☐
17. Quality of ground water	☐	☐	☐	☐	☐
18. Reduced native vegetation cover	☐	☐	☐	☐	☐
19. Decline in the health of remnant native vegetation	☐	☐	☐	☐	☐
20. Decline of native animals	☐	☐	☐	☐	☐
21. Herbicide resistance	☐	☐	☐	☐	☐
22. Acid sulphate soils	☐	☐	☐	☐	☐
23. Impacts from neighbouring properties (e.g. smoke taint, spray drift etc.)	☐	☐	☐	☐	☐
24. Biological health of soils (e.g. earthworms etc.)	☐	☐	☐	☐	☐

3. Attributes and outcomes question

Do you have any of the following land uses/enterprises on your property?

[Please tick the appropriate box and where relevant provide an estimate of the total number.]

Land uses	NO	YES	If YES, number
Beef cattle	☐	☐	_____ number
Dairy cattle	☐	☐	_____ number
Sheep	☐	☐	_____ number
Intensive livestock (e.g. chicken, pigs)	☐	☐	_____ number
Horses	☐	☐	_____ number
Other livestock <i>[Please list]</i>	☐	☐	_____ number

IF NO to all please go to next question

Have you undertaken any of the following practices on your property?

[Please tick the appropriate box.]

Management practices	None	Some	Most	All
Fenced waterways to control stock access	☐	☐	☐	☐
Fenced native vegetation to control stock access	☐	☐	☐	☐
Quarantined new stock	☐	☐	☐	☐
Used controlled grazing (e.g. rotational, management of pasture residuals etc.) to maintain surface cover in stocked paddocks	☐	☐	☐	☐
Used feedlots in times when paddock cover is too low	☐	☐	☐	☐
Recycled effluent	☐	☐	☐	☐

How do you feel about the following statements? [Please tick the most appropriate box.]

Evaluation of practices	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Fencing sensitive areas to control stock makes it harder to manage these areas (e.g. Fire, flood, pests)	☐	☐	☐	☐	☐
Controlling stock traffic is critical to improve soil water health	☐	☐	☐	☐	☐
Installing off-stream watering points is not always viable	☐	☐	☐	☐	☐
The costs associated with fencing are outweighed by benefits to stock, soil and water conditions	☐	☐	☐	☐	☐
Fencing to allow controlled grazing interferes with other operations on my property	☐	☐	☐	☐	☐
Maintaining good surface cover will improve the long-term productive capacity of the land	☐	☐	☐	☐	☐

4. Influences question

What are the **main sources of information and/or advice** that you use to help make decisions about the management of **your property**? [Please tick all that apply.]

☐	1. Agri-business agents	☐	13. Department of Agriculture staff
☐	2. Private agricultural consultants	☐	14. Government Agencies (e.g. Centrelink, CALM, Dept. of Environment, Dept. of Water etc.)
☐	3. Mass media (e.g. newspapers, tv)	☐	15. Environmental groups
☐	4. Family	☐	16. Internet
☐	5. Other farmers	☐	17. WA Farmers Federation
☐	6. Local Landcare group	☐	18. Local government
☐	7. Books/magazines	☐	19. Industry group (e.g. Lucerne Growers Assoc., Salt Land Pastures Assoc., Kondinin Group etc.)
☐	8. Accountant	☐	20. Benchmark or best practice groups (e.g. Prograze, Topcrop)
☐	9. Market trends	☐	21. Wholesalers/purchasers/customers
☐	10. Field days, workshops and Agricultural shows	☐	22. Catchment/natural resource management groups
☐	11. Brochures/leaflets/newsletters	☐	23. Training courses
☐	12. Banks/financial institutions	☐	24. Phone hotlines (e.g. cropline, Pest & Disease Information Service, Small Landholders Information Service)

Of those you have used, which were the **most useful in providing the sort of information you required?** [You can use the numbers from the list above or write in your own. Use A as the source that was most useful.]

A. _____ B. _____ C. _____

It is not necessary to continue with examples of either industry-specific or local-scale survey questions. Local area and industry surveys will be more similar to regional style questions than national style. Both types of surveys would be even more focussed than the regional survey, as there would be questions about a single issue relevant to that local area or industry.

Interview questions

The questions above, as noted, are all from mailed surveys. Online surveys should look almost identical. Depending on the software used for the online survey, the actual appearance of the questions will almost certainly change. For example, instead of a 5-response scale with a tick-box for each option, you might see a pull-down menu with all the options in it.

Interview-based surveys are different because the respondent does not see the survey instrument, they hear it. Questions are generally the same, but they need to be phrased differently. Some response options will not be offered outright, but will be included in reminders for the interviewer to read and act on as required. Mentally people deal most easily with 5 and 10-point scales, so it is beneficial to modify the survey as required. As an example, the regional questions above are rewritten for an interview context.

1. Aspiration question

On a scale of 1 to 5, with 1 being not a priority at all, and 5 being the highest priority, please rate each of the following goals for your business/property.

- Maintain the lifestyle I/we want
- Provide most of the household income
- Maintain/improve resource conditions on the property
- Pass the property on to family
- Build/maintain a financially viable business
- Contribute to the environmental health of the region
- Being able to work outdoors
- Build/maintain an asset that can fund my/our retirement
- Provide habitat for native animals
- Being able to live in an attractive natural or rural environment
- Maintain family tradition
- Provides an opportunity to be innovative/creative
- Build a sound long-term economic investment
- Maintain/improve soil health
- Be part of a close knit rural community

- Increase on-property production / net income
- Conserve water and improve water quality
- Have the freedom to work for myself
- Any other goals not specified [list goal and its rating]

2. Capacity question

On a scale of 1 to 5, with 1 being no problem and 5 being major problem, please rate each of the following issues for its effect on your own land. [if respondent does not know, note this]

1. Dryland salinity
2. Soil pH [prompt *either acidic or alkaline*]
3. Soil compaction
4. Irrigation salinity
5. Wind erosion
6. Water erosion
7. Nutrient deficiency or imbalance
8. Waterlogging
9. Nutrient toxicity [prompt e.g. *Boron*]
10. Introduced pest animals
11. Native pest animals
12. Disease resistance
13. Weeds
14. Availability of good quality surface water [prompt e.g. dams, creeks, rivers]
15. Availability of ground water [prompt e.g. bores]
16. Health of waterways
17. Quality of ground water
18. Reduced native vegetation cover
19. Decline in the health of remnant native vegetation
20. Decline of native animals
21. Herbicide resistance
22. Acid sulphate soils
23. Impacts from neighbouring properties [prompt e.g. smoke taint, spray drift etc.]
24. Biological health of soils [prompt e.g. earthworms etc.]

3. Attributes and outcomes question

Do you have ____ on your property? [If yes, prompt *how many?*]

- Beef cattle
- Dairy cattle
- Sheep
- Intensive livestock [prompt e.g. chicken, pigs]
- Horses
- Any other livestock [prompt for a list]

[If they answered no to all (i.e. no livestock on property) then skip to next question]

Have you ____ ? [if yes, prompt in some, most or all of your paddocks?]

- Fenced waterways to control stock access
- Fenced native vegetation to control stock access
- Quarantined new stock
- Used controlled grazing to maintain surface cover in stocked paddocks [prompt e.g. rotational, management of pasture residuals etc.]
- Used feedlots in times when paddock cover is too low
- Recycled effluent

How do you feel about each of these statements? Do you strongly disagree, disagree, feel neutral, agree or strongly agree?

- Fencing sensitive areas to control stock makes it harder to manage these areas [prompt e.g. Fire, flood, pests]
- Controlling stock traffic is critical to improve soil water health
- Installing off-stream watering points is not always viable
- The costs associated with fencing are outweighed by benefits to stock, soil and water conditions
- Fencing to allow controlled grazing interferes with other operations on my property
- Maintaining good surface cover will improve the long-term productive capacity of the land

Question ordering is another important consideration. An ideal survey begins with a question that is both simple to answer and directly relevant to the survey topic. Controversial questions, such as income, should be near the end so that they are not encountered until an investment in completing the survey has already been made. Difficult questions should be in the middle somewhere, particularly in mail surveys, so that potential participants are not turned away early. This is also the reason for keeping relevancy of the first few questions, it helps attract respondents into the survey.

Survey linkage and nesting

One main objective of the sourcebook is to encourage readers to incorporate nesting and linkage into their survey design process. The concepts were introduced previously in the second chapter. The following examples highlight the benefits of pursuing this pathway in surveys and demonstrate possible ways to implement the theory in practical terms.

First, an example of the nesting approach in the top-down mode. It begins when a problem – say salinity – has been identified in a national survey such as the ABS Agricultural Census. Across the country there will be ‘hot spots’ for salinity, and places where it is comparatively unimportant. A catchment authority containing a salinity hot spot may decide to learn more about the salinity within their region. A questionnaire is drawn up by the authority investigating local issues surrounding salinity and the survey process is completed. It can be argued that the money was spent wisely because the salinity survey was done in a location where there was much to be learned about soil salinity. A

neighbouring catchment might not learn very much from the same survey if it was obvious from the ABS results that salinity was not a big problem there.

Second, here are two examples of the nesting approach in a bottom-up mode. In undertaking to survey one catchment in each state, the BRS landholder surveys were able to highlight several issues of potential national significance. These issues didn't point to any particular biophysical problem, but rather a lack of data concerning landholder aspirations and their impact on adoption at the national level. As a result, we have promoted the inclusion of a few high level landholder aspiration questions into future ABARE and ABS national surveys.

In addition, the BRS surveys had a question in them about landholder concern for climate variability. The compilation of the surveys is not yet complete, but for this example assume that it is complete and that it identified that a concern for climate variability was not uniform across Australia. This would identify a potential question for inclusion in the next Agricultural Census on concern for climate variability. Once the national survey, including the question about climate variability, was completed, areas of high and low concern could be investigated more closely (using existing datasets and/or future surveys).

These bottom-up examples demonstrate other aspects of survey linkage. One catchment survey alone does not identify a nationally significant question. Linking several surveys that address similar topics together results in a sum that is greater than the individual parts. Nesting is an ongoing process that feeds data in both directions and benefits from linkage.

Linkage can also occur if two surveys conducted on different sample farms are combined. A survey of grain growers and a second survey of beef producers will have only moderate overlap in the population surveyed (depending on the chosen region). That is, mixed enterprise farming does occur, but it is amongst a minority of farmers. Linking the two surveys would permit comparing (for example) the demographic profile of grain and beef farmers, the similarities and differences in barriers and drivers to adoption of grain and beef specific practices or the information sources used by the two industries.

Testing

Once a survey instrument is developed, it has to be tested. Ideally it should be tested on three groups of people (Dillman 1978: 156). The first group is experienced survey researchers. This group will identify problems based on their collective experiences in conducting similar surveys. The second group is the end user of the survey data. This group should find gaps between the purpose of the survey and the results the question set will produce. The third, and most important, group is people from the same survey frame as the intended respondents. This group will point out logical and linguistic problems in the survey instrument. As representatives of those who will actually participate in the survey, they have to have the final word.

It is important not to confuse two steps of survey design that can seem closely related: developing the instrument in workshops involving the sample population and testing the instrument on members of the sample population. The purposes for these two steps are quite different and cannot be effectively combined. While development and testing both

require feedback from potential survey respondents, the best test outcomes result from using people who have never seen the survey before (as much as this is possible) while the best development outcomes result from people who have been involved in the development process (and therefore understand the survey purpose).

Testing will also determine if the survey is adequately focussed on the main topic. There are temptations to throw in extra questions that burden the respondent without much return to the end results and lower response rates. Testing will reveal surveys which are too long, have a poor layout or branding issues. There is no hard limit on how long a survey can be. If it is clearly focussed on a single issue it can be longer. A survey should have a clear and inviting layout for either the interviewer's or the respondent's benefit. Finally, it should be obvious for whom the survey is being conducted and how the results will be used. Response rates decline if there is ambiguity on this point.

Step five – Run the survey

There are a few issues specific to each type of survey. Below is a discussion of:

- issues specific to mail surveying
- modifications necessary for using the internet rather than the mail
- interview surveys, whether conducted in-person or over the telephone.

Mail surveys

It is foreseeable that most large NRM related surveys will be mail based. Take a well designed survey instrument that has been tested on target audiences and developed with the assistance of a steering committee (representing both end users of the survey data and survey respondents). Make it look nice (a glossy photo-filled cover won't hurt) and pay careful attention to layout and font. Add an introductory letter that explains who is involved in the survey, what the survey hopes to accomplish, how the respondent's data will be handled, including maintaining privacy, and offer them a summary of the final survey report.

In the case of our surveys at the Bureau of Rural Sciences, those involved included; BRS, state governments, catchment management authorities, the Natural Heritage Trust and sometimes others. We noted that confidentiality would be maintained with the data, and no one would ever be given access to either the raw data or forms of summary data that might identify an individual respondent. It is a good idea to include a phone number – best if it is toll-free – so that people will have their questions answered rather than throwing out the survey.

It would be worthwhile in a large mail-out to match the sampled mailing list with address validity checking software available through Australia Post. In the case of the BRS landholder survey in Western Australia, there was an unusually large number of return-to-sender mail as a result of a change in local addresses. The land tenure list obtained from the Western Australian government included both current and out-of-date versions of landholder addresses. For more on mail software, see: <http://www.auspost.com.au/BCP/0,1080,CH2404%257EMO19,00.html>.

The next task is to mail out the survey booklets with the introduction letter to all intended respondents. It pays to use a stamp rather than bulk mailing because of the better reception stamped mail gets at the receiving end (bulk mail = junk mail). It makes a marked difference in response rates to use stamps and it is worth the extra expense.

Following up the mail out is important to get the response rate up. BRS has used two reminder cards – just small postcards with a simple reminder message on them – mailed out after a one and two weeks delay from the initial mailing. For the third reminder we sent out a second survey booklet along with a reminder letter at around four weeks after the initial mailing. Two final reminder cards were sent at five and six weeks before stopping the harassment process! Response lists must be kept up to date to minimise the number of respondents being sent further mail. There is no sense harassing more people than

necessary. The timing of the reminders is quite important, sending the first reminder too soon can decrease the response rate rather than increase it. Sending subsequent reminders too soon decreases their effectiveness.

To identify the respondents there must be a coding system on the survey booklets. We used a small hand-written number on the back of the booklet that corresponded with the same number in the address list. Not only can people be removed from the mailing list when they respond, but their responses can be spatially analysed by doing this. We only get a small number of people obscuring the code number on their survey in each survey. It would be easy to think of hidden coding methods to avoid this problem. Surveys which have tried hidden coding that was uncovered by respondents had poor response rates; people dislike such attempts.

As the responses come back, data entry has to be completed. A good data entry person is invaluable. There can be hundreds of questions per survey across thousands of surveys – leaving scope for many errors. A good coding system can help to avoid errors (see next section), but there is no substitute for accurate data entry and good quality control systems.

After the cut-off date (perhaps eight weeks from initial mailing) when all of the surveys are entered the data must be checked for errors. We typically examine between ten and fifteen per cent of the survey booklets for accuracy. This is a rolling process for us. Only ten per cent are checked when there are no errors found and a much higher percentage when there are more errors present. The worst error of all is to be out by one question near the top of the page and enter all the following responses in the wrong column down the page. It throws out many questions. In contrast a single response miscoded during entry will have no effect on a large sample size and is barely worth worrying about.

Internet surveys

An internet survey should be undertaken as if it were a mail survey. The final product is entered into an online survey system, instead of being printed on paper. We recommend hiring a provider for this as it makes the process much easier and is not particularly expensive.

Some online surveys will be “open entry” where anyone can point their browser at the survey site and complete the questions. It is impossible to know who is filling out your survey form or if they fill it out multiple times. A “closed entry” survey provides a unique URL for each respondent. They are invited by email to participate. The identity of each respondent can be tracked in the same way as the code on the survey booklet in a mail survey. Reminder emails can be sent to those who have not participated at appropriate dates after the initial invitation.

The big advantage of the internet survey is the total absence of data entry. Your respondents do it for you. There is also no requirement for data checking. The coding system has to be developed either before the website is built (best idea) or after the data are in your computer (still quite workable).

Interviews

Interviewing is quite a different process to internet and mail surveys. The survey instrument is still developed to assist the interviewer with the process, including prompts, reminders and answer options for both the interviewer and interviewee. But rather than developing the survey through workshops, it is better to run trial interviews on those people who would have been in the workshops. It is probably best not to trial a subsequent version on someone who underwent the process on an earlier version.

The main difference between in-person interviews and telephone interviews is how the participants are selected. Typically in-person interviewees are either carefully selected beforehand and nearly 100 per cent agree to participate or the selection process is more serendipitous and willing participants are used in the time available. An example of the former is interviewing landholders who received grant money for a specific remedial project about the outcome of that project. Most will feel at least some obligation to the granting agency to discuss what they did with this money so participation rates should be high. An example of the latter is attending a regional field day and finding willing interviewees from amongst the attendees at the show.

While it is possible to conduct in-person style interviews over the telephone – and then all of the above applies – more typically a telephone interview process relies on ‘cold calling’ potential participants from a regional phone list. A quota system is used so that the interviewer goes down the list until a predetermined number of successful responses have been achieved. A ten per cent participation rate for telephone interviews is considered very high, and there is strong evidence to suggest that the results from a phone survey do not apply to the whole population because there is a “type” of person who tends to participate which is not representative of the larger population mix.



Step six – Analysis

Once the survey responses have been collected, these responses must be analysed. The discussion below concerns three steps involved in quantitative analysis:

1. coding the survey results
2. running statistical tests on the numbers
3. interpreting the results.

For qualitative surveys, a rather different approach must be taken. While acknowledging that qualitative research has great merit, we believe that most NRM survey questions will be either strictly quantitative or can be dealt with using similar statistical tests. Therefore there is no discussion of how to analyse or interpret qualitative data.

There are two related issues also discussed in this section:

- ownership of the instrument and the data
- storing the data.

Analysis of survey data is not a purely objective exercise. The researcher/analyst brings a particular subjectivity to the process in making judgements about which analyses to do, how to present the results and so on. This may be one of the best reasons we can offer for obtaining outside assistance when conducting a survey – these judgements cannot be avoided so using the expertise of someone who will make sound choices is clearly sensible.

Intellectual Property

There are two intellectual property (IP) issues involved in conducting a survey – the ownership of the survey instrument and the ownership of the data derived from the survey process. Thanks to Kirsti Haipola at the Attorney-General's Department for reviewing this topic. The brief view is that IP can be assigned in the contract. The organisation initiating the survey, the survey contractor or both can be assigned the rights to the instrument and the resulting data. IP is included in the analysis section due to the fact that there is generally more concern about the IP of the data generated through the survey than about the survey instrument itself.

By way of example, ABARE is quite protective of their survey instruments as they have evolved over decades of survey work. BRS, on the other hand, has encouraged widespread distribution of the landholder survey instrument in recent times in the hope that others will learn from them. On the data side, the ABS is obliged to maintain strict control over their survey data by law. Other surveying bodies, including both ABARE and BRS, generally have confidentiality issues to deal with in the control of their survey data (see the section on confidentiality).

Coding

Proper coding is the first step to a successful analysis. It is highly likely that the coding system will be decided upon before the first survey is completed, but it is still an analytic step. Data entry goes hand-in-hand with data coding because the data entry personnel will enter the coded results rather than the raw results (in most cases).

For data entry it helps to set the parameters of an excel spreadsheet so that incorrect data cannot be entered. For example, it is possible to set a column to accept only the digits 1 through 5 corresponding to a question that has these response choices.

A good coding system will be consistent across multiple questions and make sense to the analysts. An example response scale includes “strongly agree”, “agree”, “not sure”, “disagree” and “strongly disagree”. These are best coded from high (strongly agree) to low (strongly disagree) because the more positive response (agreement) is a higher numeric value (see examples below). If you do alternate between positive and negative phrasing for questions as suggested in the design section (page 18), then the negative half of the questions will have to be recoded the other way so that all questions move from low to high – otherwise the analysis is a nightmare.

Coding examples:

1. Yes = 1 No = 0
2. Don't know = 0 No problem = 1 Small problem = 2 Moderate problem = 3 Major problem = 4
3. None = 0 Low = 1 Medium = 2 High = 3
4. Uncertain = 0 Definitely not = 1 Unlikely = 2 Likely = 3 Definitely yes = 4
5. Neutral = 0 Strongly disagree = 1 Disagree = 2 Agree = 3 Strongly agree = 4
6. Male = 1 Female = 2

Exactly what you do with the neutral/don't know/uncertain options is often irrelevant. In many cases, they will not be included in the analyses. In example 5, above, if neutral is to be included in the analysis it is important to preserve the spacing between answers. Arguably the neutral option belongs between disagree and agree resulting in a scale of 1 (strongly disagree) to 5 (strongly agree) with neutral on 3.

The entire question is usually too long for the column heading in the data spreadsheet or statistics package so all headings should be systematically coded for ease of reference. It is so much easier to look at the data output and know that min_til refers to “do you practice minimum tillage?” rather than Q37b, 4.3.3 (its question numbers) or even 4Hmtyn (section 4, question H, minimum tillage yes/no) which are too obscure.

Number crunching

Not all surveys are quantitative. Qualitative surveys do not necessarily involve statistics and numbers. Some qualitative subjects are captured in a numerical form, such as rating things on a scale of one to ten, and these scales can be treated statistically. Discussions of how to handle purely qualitative data is beyond the scope of this document.

While ignoring the underlying statistical principles, it is useful to explore some of the thinking that goes into the statistical analysis of surveys. A logical first step in investigating the survey data is to look at demographic groupings. Age, occupation, education, income level, etc may be reflected in enterprise mix, practice adoption, perception of problems and other interesting ways. However, we have found repeatedly (Hanslip and Byron 2007, Hanslip 2007) that they do not provide the explanatory power required to understand the adoption of management practices. Division by gender is also unlikely to provide any real answers because couples often fill out a paper survey together and even when only one person is answering the questions the other spouse can be intimately involved in land management decisions.



Analysing the data spatially is often very interesting. Perhaps geography or climate has a role in adoption? This may become apparent if the data are linked to the cadastre and plotted in ArcGIS or similar software.

Good results come from careful data analysis. Simply looking at who has fenced waterways to control stock doesn't tell you very much, but if you examine those who have stock and a waterway, then the fencing statistics become more relevant and interesting. Similarly, pastoralists are unlikely to even answer questions about minimum tillage – it is just not relevant for them. Removing non-cropping properties from the dataset prior to investigating who does minimum tillage and what the croppers think about it produces a much more meaningful output.

Analytic options

There are alternative options for analysis other than having the survey consultant conduct everything. A well designed survey often provides unexpected analytic options at a later date. This is part of the integrative approach advocated above, but even for a stand-alone

survey these opportunities frequently arise. If the instructions here are followed and a consultant is engaged, the surveying agency could be left with much data and no knowledge of how to subsequently interrogate the data. A product such as Asteroid (see www.roymorgan.com/products/asteroid/) allows the data to be entered into a user-friendly environment that can be queried as the need arises. Asteroid is aimed at market research for companies that are too small to have a marketing department, but it has worked quite well for presenting NRM survey data in a useful format.

Interpretations

The interpretation of barriers and drivers to the adoption of management practices can be quite involved. For example, a financial barrier is only relevant to those who do not have the finances (or who are unwilling to spend them). However, a lack of finances can indicate a lack of on-property income to invest back into the property (more common) or a lack of total income (less common).

Similarly, drivers of adoption practices can be psychologically complex. The very same thing that pushes one type of person to adopt may be a barrier to adoption for another person. Things such as enterprise mix, perception of problems on the land, manager personality and many other factors can be involved. A well developed survey will include many of these things within questions about the landholder's life.

Composite indices can be useful in a number of ways. For example, there might be ten questions in the survey which relate directly to natural capital. No single response will accurately represent the level of natural capital, but it is possible to create a variable that is made up of all ten responses to represent natural capital.

When comparing survey data with SLA level data from the ABS Census, the composite natural capital index appears to be a better indicator of levels of natural capital than any ABS derived proxy indicator.

A well run survey can be let down by inadequate interpretations, but no finesse in the analysis can save a poorly developed survey. The first step is a breakdown of how questions were answered for the whole survey. Averages for such items as respondent age and property area are unlikely to be overlooked, but range, standard deviation and median are other measures of central tendency that are also valuable (see result one below).

For questions with a yes/no answer choice, a simple percentage of yes responses should suffice (result two below). Attitude questions with a closed range of responses are best presented in either a table or a graph that provides the complete breakdown (result three below).

Sample results outputs from a survey:

1. 528 ha mean
96 ha median
2-18 000 ha range
2. 19 per cent were involved in a government funded programme on their property in the previous five years

3.

Property Issue	Don't know	No problem	Small problem	Moderate problem	Major problem
Native pest animals	1.6	36.4	32.3	19.0	10.8
Availability of ground water	11.1	60.7	10.3	8.9	8.8
Weeds	0.9	13.7	51.0	26.1	8.2
Quality of ground water	10.7	55.7	18.0	9.7	5.9
Introduced pest animals	2.0	29.7	42.3	21.1	5.0
Health of waterways	5.1	55.3	22.2	12.3	5.0
Availability of surface water	0.8	65.5	17.2	11.9	4.6

Sometimes you have to seek outside data to make maximum use of the survey data. Take the Glenelg-Hopkins catchment work for example (Figure 3 – Byron and Lesslie 2005, see also Curtis, Lockwood and MacKay 2001, Curtis, MacKay and McDonald 2002). In a survey, landholders were asked questions about the condition of their land with regards to salinity. All properties were located in ArcGIS and labelled with their salinity status, and then compared to the state salinity map for Victoria. Four main groups were identified.

1. These were those who were near a known salinity problem and identified that they had a salinity problem.
2. Those who were near a known problem and did not identify a problem.
3. Those distant from a known salinity problem and not identifying a salinity problem.

Those distant from a known salinity problem and identifying a salinity problem on their land.

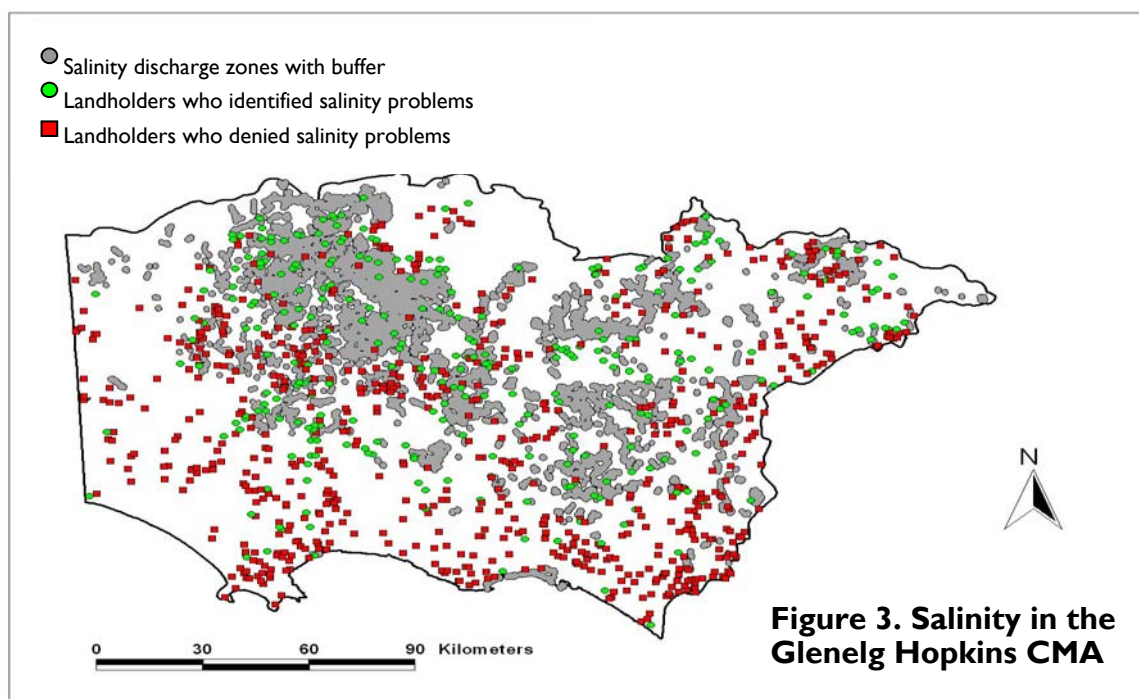


Figure 3. Salinity in the Glenelg Hopkins CMA

The first and third groups, where the expert map and the landholder are in agreement, are of lesser interest – but what of the mismatched two?

Some of those who were in a known salinity area but did not identify a problem were people for whom the salinity problem was under management and therefore no longer a problem. Some were people who did not use their land in a manner that would lead to readily identifying salinity (e.g. residential dwellers). The remainder may be people who have a salinity problem (and should know about it) and are unaware of it. Or perhaps the expert salinity map is incorrect.

Many of those who identified a salinity problem yet were distant from known salinity areas could be identified as people who may not be able to accurately assess soil salinity (e.g. part-time farmers without much experience). Again, some of these cases may point to errors in the salinity map rather than misconstrued concerns in the landmanagers.

The group which is most worthy of attention depends on the aims of the survey and the specific end-user of the analysis. It is equally valid to ask what can be learnt from those who have the salinity problem under control (and who are they, etc) as to ask how can we help those who do not (and again, who are they and why don't they)? The farmers in salinity areas with salinity problems could also be a priority.

Data storage

A major expense in surveying is data entry. Interview notes or survey booklet entries need to be fed into a computer to create a data list that can be analysed. While data entry was discussed above in *Coding*, it is how to manage these data once entered that is discussed here.

These data must be stored. In the short term, storage is not an issue. From the hard drive of the data entrant to the hard drive of the data analyst (with suitable backup arrangements). Even though these files can be quite large it is not a difficult process with current storage capacity in a typical desktop computer. A larger issue is how to archive the data for future reference. Confidentiality issues must be respected. The largest issue, however, is ensuring the safety of the data. Safety from an archival sense, for example some CD-R discs only provide a 10-20 year storage life, and safety from the operating system/hardware sense. For example, survey results stored a decade ago on a Zip drive would be quite difficult to retrieve today due to changes in storage technology – the once ubiquitous Zip drive is rare today.

Whatever method of storage is chosen, a plan for continuous updating of the stored data (a huge task for many organisations) is essential. With each change in computing platforms, data continuity has to be considered.

Another issue with data storage is secondary research on the survey results. The BRS landholder surveys run to around 250 questions. This makes for a fairly comprehensive data set on landholders in the survey region. In total these questions address the reason the surveys were undertaken, namely to understand the adoption of management practices better. Secondary uses of this data abound for addressing other questions. For example, the Glenelg Hopkins data:

- was compared with biophysical maps (see *Interpretations* immediately above)

- contributed to a document on farming families in Australia (using the pooled demographic data)
- contributed to a report on vegetation management (using the questions about trees on farms).

While this list is not exhaustive, it should make the point that survey data in the correct hands can continue to contribute beyond the initial expectations. This also ties in with survey integration. Only if the data is available can two (or more) surveys be integrated.

This does present a problem beyond the scope of this document – how exactly to preserve confidentiality and still permit integration. Depending on the agreement that is made between surveyor and respondent, it might be sufficient to strip names from the survey data and pass that on to an interested researcher. This is an area to consider both prior to the survey happening and afterwards. The context of the intended secondary research will play a large part in how this can best take place.

The reason for worrying about data storage is that longitudinal studies are a powerful tool in quantifying changes in management practices and the impact of program investment. If a survey ten years ago revealed that 28 per cent of landholders participated in a desirable practice, increasing to 44 per cent five years ago, and then to 52 per cent in the current survey then it can be securely stated that promotion of that practice is working in the survey region. This is much more useful knowledge than any of the individual results on their own.

This leads to the related topic of metadata. Metadata, or information about the dataset, is the supporting contextual base on which a survey rests. It is essential that this be recorded and stored with the survey data itself. At the time the survey is conducted everyone involved in the project will be intimately familiar with the survey instrument, the region surveyed and maybe even the sampling frame. A year later, even if you retain the same personnel, the exact details can be lost to the annals of time. Without this type of information subsequent surveys may inadvertently end up unable to be compared; yet this comparison will still occur and the apparent change in results may be erroneous.

Ideally one should record everything that went into the survey process in the results metadata.

- Where did the list that was sampled come from?
- How was it sampled?
- How many were sampled?
- What was the response rate?
- Who did the survey? Preferably record who was responsible for each piece from instrument development to data entry.
- When was it conducted?
- Who did the analysis? What procedures did they use?
- Lessons learned. While not strictly metadata, this information fits here very well.

Step seven – Reporting results

When writing a report about the survey results it is best to target the report to a particular audience. We have found that farmers are very interested to learn about the results of surveys they have participated in, but they are not keen to wade through pages of statistical output. Sometimes it is best to put together several different reports so that you can get your message across to different groups. Farmers might be interested in a different set of results than government policy people. Separate reports produced for different audiences will probably contain about 80 per cent of the same data, but it usually needs to be presented in different ways. Research development corporations, catchment management authorities and other interested parties will likewise benefit from slightly different presentations of the data.

For our large Natural Heritage Trust funded surveys in BRS, we produce three reports for each survey: a summary booklet showing highlights; a brief report comprised mostly of relevant tables or graphs, and a full length report (perhaps 80 pages) containing the whole analysis. Just as the survey instrument is customised for each survey, the report should also be customised to incorporate the local concerns and any issues identified by the analyses.

Inevitably, no matter how thorough or careful the analysis process is, someone will want a different variation on an existing analysis. The easiest way for this to occur is to make the raw data available to anyone who legitimately requires it. However, there are confidentiality issues involved with this.

If your survey included the claim that data would be confidential, that claim must be honoured. Regardless, it is unwise to distribute the full data set to other parties. Stripping the name and address, and removing the link to the cadastre, will usually leave the data intact enough to make new analyses possible. If it does not, then the data collector will have to be engaged to perform the subsequent procedures.

Confidentiality also needs to be considered in the spatial presentation of the results. A regional map with the polygons for each property holding marked on it will make many people identifiable. Unusual properties will always be picked up by locals: very large, odd shapes, specific locations next to a river or highway – all of these are identifiable. Presenting the properties as dots is usually sufficient to obscure these connections. Several hundred, or several thousand dots across a catchment will rarely leave any single property identifiable.

Keeping the data set intact and accessible is important for at least a five to ten year time span. If the same survey is to be repeated to determine change, good comparisons can only be made with access to the raw data. Alternatively, the neighbouring catchment could be surveyed for comparison and the raw data will again be needed.

Finally one can use the lessons of any individual survey to improve the process for subsequent surveys. It may mean you reword a question that several people thought was ambiguous (even though the steering committee and a thousand respondents all thought it was fine), include a new interested party, or incorporate new questions based on comments from respondents.

Conclusion

Conducting a survey is a non-trivial task that requires specialist skills. As a minimum, you should appreciate this fact better after reading this document. It is also a key step in the whole process of successful natural resource management. Planning, policy and monitoring and evaluation all require knowledge of both what landholders think about their land and what practices they are undertaking.

Beginning with a strong notion of what your survey goal is will ensure a useful result. Carefully considering the scope for the survey will help determine the budget (or conversely, what you can do within the budgetary constraints). Sampling strategy, including getting the confidence levels and confidence intervals right, is critical for robust results.

In order to maximise the information gained from local through to national NRM based surveys, adopting a common approach to nesting and linking datasets would significantly enhance the knowledge base in this field of research. In other words, building a survey for one purpose, but incorporating questions addressing additional concerns, will significantly enhance our knowledge base.

Conducting the survey is often just about the easiest step in the process. Analysis can be simple or complex, but having a good analyst to do this step will produce surprisingly good results for even a simple survey. Finally, reporting is important for getting the message across. Don't be afraid to repackaging data to get your message across to different end users.

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Appendix A – Online resources

To get started on the survey process we suggest a few online resources.

- The “vovici” site (formerly web surveyor – <http://www.vovici.com>) contains a lot of information about surveys and tools that may assist in surveying. A good basic coverage on similar grounds to the section *Design the survey instrument* of this document is: <http://vovici.com/pdf/designtips.pdf>
- Another commercial site that contains loads of information about surveys, some of it free, is the “survey system” site <http://www.surveysystem.com/sdesign.htm>
- In the section *Sampling strategy – Confidence intervals and levels* when we refer to sample sizes; for more information and a calculator to determine the sample size for you visit <http://www.surveysystem.com/sscalc.htm>
- There are numerous commercial survey design/hosting companies around. The first place to look is <http://www.surveymonkey.com/Pricing.asp> because this page lists tens of other survey companies that they want you to look at before you choose Survey Monkey. An Australian option that we have personal experience with is onetest – <http://www.onetest.com.au/home/> who hosted an online survey instrument for us.
- The ABS Statistical Clearing House is a review body for government agency surveys. Even if your survey does not come under the rules of the ABS SCH, it is definitely worthwhile looking at their website in general and their e-pack (electronic information pack) that runs through the design steps required to make a survey that would pass the clearance process. A survey that would not pass the clearance process (<http://www.nss.gov.au/nss/home.nsf/pages/About+SCH>) is a survey not worth running!
- Finally, the ABS publishes its internal guidelines for production of ABS surveys which result in a well-designed and readable survey instrument. Following these guidelines as much as applicable for any survey (obviously much of the information applies only to mail surveys, but clarity applies to all surveys) will produce better results:
<http://www.nss.gov.au/nss/home.nsf/SurveyDesignDoc?OpenView&RestrictToCategory=ABS+Forms+Design+Standards+Manual>
- If you are considering working in the survey business you definitely need to read this article: Pannell, P B and Pannell, D J (1999). *Introduction to Social Surveying: Pitfalls, Potential Problems and Preferred Practices*. SEA Working Paper 99/04: <http://www.general.uwa.edu.au/u/dpannell/seameth3.htm>

Appendix B – An example survey

Throughout this document, examples have been used from the BRS landholder survey project. As a final example, the following pages contain the Western Australia regional survey instrument in its entirety. It should be obvious from the preceding pages that it would be highly inappropriate to reuse this survey verbatim, but it does make a reasonable starting point from which to develop a new instrument or to see what a successful survey questionnaire looks like.

IMPROVING OUTCOMES FOR LANDHOLDERS IN THE SOUTH WEST NRM REGION

LANDHOLDER SURVEY 2006



IMPROVING OUTCOMES FOR LANDHOLDERS IN THE SOUTH WEST NRM REGION

This survey is being conducted to help ensure that support for natural resource management will meet the needs of landholders living and working in the South West NRM Region of Western Australia. This region includes six sub-regions or catchment areas: Cape to Cape; Geographe; Leschenault; Peel-Harvey; Blackwood and Warren. Please refer to the back page for a map of the South West NRM Region and sub-regions.

Your views and opinions are important to make sure information collected is reliable. We would greatly appreciate you completing and returning the survey using the enclosed stamped return envelope.

If you have any questions about the survey, please use the toll free number 1800 723 777 to contact a member of the research team from the Bureau of Rural Sciences.

1. YOUR PROPERTY

What is the total amount of land you own or manage in the South West NRM Region (refer to map on back cover)? *[From now on this area will be referred to as **your property**.]*

_____ hectares _____ acres

Do you have a natural waterway on your property (eg. Stream, river or creek)?

[Please circle your answer.]

YES

NO

Do you own or manage two or more blocks of land that are not next to each other? *[Please circle your answer.]*

YES

NO

IF YES:

How many blocks do you own/manage? _____ number

What is the maximum distance between any two of these blocks? _____ kms

[Approximate driving distance in kilometres].

What is the primary purpose of your property? *[Please select most appropriate option.]*

☐	agricultural production (horticulture, viticulture)
☐	conservation of native plants and animals
☐	hobby/lifestyle farm
☐	residential
☐	other [please list]

2. YOUR ASSESSMENT OF ISSUES

To what extent are the following land and water issues a problem on **your property**? *[Examine each issue and tick the most appropriate box.]*

	Don't know	No problem or NA	Small problem	Moderate problem	Major Problem
1. Dryland salinity	☐	☐	☐	☐	☐
2. Soil pH (acidic/alkaline)	☐	☐	☐	☐	☐
3. Soil compaction	☐	☐	☐	☐	☐
4. Irrigation salinity	☐	☐	☐	☐	☐
5. Wind erosion	☐	☐	☐	☐	☐
6. Water erosion	☐	☐	☐	☐	☐
7. Nutrient deficiency or imbalance	☐	☐	☐	☐	☐
8. Waterlogging	☐	☐	☐	☐	☐
9. Nutrient toxicity (eg. Boron)	☐	☐	☐	☐	☐
10. Introduced pest animals	☐	☐	☐	☐	☐
11. Native pest animals	☐	☐	☐	☐	☐
12. Disease resistance	☐	☐	☐	☐	☐
13. Weeds	☐	☐	☐	☐	☐
14. Availability of good quality surface water (eg. Dams, creeks, rivers)	☐	☐	☐	☐	☐
15. Availability of ground water (eg. bores)	☐	☐	☐	☐	☐
16. Health of waterways	☐	☐	☐	☐	☐
17. Quality of ground water	☐	☐	☐	☐	☐
18. Reduced native vegetation cover	☐	☐	☐	☐	☐
19. Decline in the health of remnant native vegetation	☐	☐	☐	☐	☐
20. Decline of native animals	☐	☐	☐	☐	☐
21. Herbicide resistance	☐	☐	☐	☐	☐
22. Acid sulphate soils	☐	☐	☐	☐	☐
23. Impacts from neighbouring properties (eg. smoke taint, spray drift etc.)	☐	☐	☐	☐	☐
24. Biological health of soils (eg. earthworms etc.)	☐	☐	☐	☐	☐

What are the three **most important natural resource management issues on your property**? You can use the numbers for the issues above or write in your own. *[Use A as the most important issue].*

A. _____ B. _____ C. _____

3. ISSUES IN YOUR LOCAL COMMUNITY

To what extent are the following issues a problem in your **municipality/local government area**?
[Examine each issue and tick the most appropriate box.]

	Don't know	No problem or NA	Small problem	Moderate problem	Major Problem
1. Lack of employment opportunities	☐	☐	☐	☐	☐
2. Increasing cost of agricultural inputs (eg. fuel, labour, fertiliser)	☐	☐	☐	☐	☐
3. Decline in soil health	☐	☐	☐	☐	☐
4. Rural community decline	☐	☐	☐	☐	☐
5. Higher land prices limiting future options for property expansion	☐	☐	☐	☐	☐
6. Patchiness of native vegetation	☐	☐	☐	☐	☐
7. Young people leaving the area	☐	☐	☐	☐	☐
8. Lack of affordable housing	☐	☐	☐	☐	☐
9. Control of weeds/pests	☐	☐	☐	☐	☐
10. Access to important services (eg. Banks, schools, medical)	☐	☐	☐	☐	☐
11. Profitability of farming	☐	☐	☐	☐	☐
12. Lack of native plants and animals	☐	☐	☐	☐	☐
13. Lack of young people entering farming	☐	☐	☐	☐	☐
14. Poor commodity prices	☐	☐	☐	☐	☐
15. Dryland salinity	☐	☐	☐	☐	☐
16. Access to advice and support for natural resource management	☐	☐	☐	☐	☐
17. Lack of skilled farm labour	☐	☐	☐	☐	☐
18. Reduced water quality (eg. algal blooms and fish kills)	☐	☐	☐	☐	☐
19. Urban expansion impacting on the area	☐	☐	☐	☐	☐
20. Increasing climate variability	☐	☐	☐	☐	☐
21. Access to public transport	☐	☐	☐	☐	☐

What are the three **most important issues affecting your local community**? You can use the numbers for the issues above or write in your own. *[Use A as the most important issue].*

A. _____ B. _____ C. _____

4. GOALS FOR YOUR PROPERTY/BUSINESS

What priority do you give to each of the following **goals for the management of your property and/or farm business?** [Tick the box that best describes the priority you give to achieving each goal listed.]

	Not a Priority	Low priority	Medium priority	High Priority
Maintain the lifestyle I/we want	☐	☐	☐	☐
Provide most of the household income	☐	☐	☐	☐
Maintain/improve resource conditions on the property	☐	☐	☐	☐
Pass the property on to family	☐	☐	☐	☐
Build/maintain a financially viable business	☐	☐	☐	☐
Contribute to the environmental health of the region	☐	☐	☐	☐
Being able to work outdoors	☐	☐	☐	☐
Build/maintain an asset that can fund my/our retirement	☐	☐	☐	☐
Provide habitat for native animals	☐	☐	☐	☐
Being able to live in an attractive natural or rural environment	☐	☐	☐	☐
Maintain family tradition	☐	☐	☐	☐
Provides an opportunity to be innovative/creative	☐	☐	☐	☐
Build a sound long-term economic investment	☐	☐	☐	☐
Maintain/improve soil health	☐	☐	☐	☐
Be part of a close knit rural community	☐	☐	☐	☐
Increase on-property production / net income	☐	☐	☐	☐
Conserve water and improve water quality	☐	☐	☐	☐
Have the freedom to work for myself	☐	☐	☐	☐
Other goals [please specify]				

If you had an extra 6 hours a week **how would you spend that time?** [Please allocate the 6 hours across the activities listed below. Your total should equal 6 hours.]

	Extra hours
Spend extra time to improve profitability of my property	
Spend extra time to improve the environmental condition of my property	
Spend extra time with family/friends or on recreational activities	
Other _____	
Total	6 hours

5. PLANS FOR YOUR PROPERTY

Please indicate **your future plans for your property**. [For each option tick the box that best describes your plans for the future of your property.]

	No	Unlikely	Not sure	Likely	Yes
The property will be sold	☐	☐	☐	☐	☐
Part of the property will be sold	☐	☐	☐	☐	☐
I will continue to live on a rural property in the South West NRM region	☐	☐	☐	☐	☐
All of the property will be leased out	☐	☐	☐	☐	☐
Part of the property will be leased out	☐	☐	☐	☐	☐
Property will be passed on to family	☐	☐	☐	☐	☐
Expand by purchasing or leasing more land	☐	☐	☐	☐	☐
Intensify current enterprises	☐	☐	☐	☐	☐
Diversify enterprises	☐	☐	☐	☐	☐
Set part of the property aside (eg. covenant)	☐	☐	☐	☐	☐
Scale back operations	☐	☐	☐	☐	☐

Have you prepared a written property plan **that includes a map and/or other documents that addresses the existing property situation and includes future management and development plans?**

YES ☐	IN PROGRESS ☐	NO ☐
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<u>If YES:</u> How often does this plan influence the decisions made about your property or business?	<u>If NO:</u> Would you be interested in preparing a written property plan if there was advice and assistance available to you?
ALWAYS ☐ RARELY ☐ OFTEN ☐ NEVER ☐	YES ☐ NO ☐
SOMETIMES ☐	MAYBE ☐

What advice and assistance would you consider to be of most value to you when completing a written property plan?

Have you developed a succession plan to manage the transfer of your property to the next generation?

YES ☐	NO ☐	IN PROGRESS ☐	N/A ☐
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6. DECISION MAKING

Who is responsible for making decisions about your property/farm business? *[Please tick all those that apply for each type of decision.]*

	Self	Spouse	Sons and daughters	Brothers and sisters	Parents	Business partners
Routine decisions (eg. stocking rates, herbicide application)	☐	☐	☐	☐	☐	☐
Operational decisions (eg. equipment purchase, practice change)	☐	☐	☐	☐	☐	☐
Long-term decisions (eg. changing enterprises, buying or selling land)	☐	☐	☐	☐	☐	☐

What are the **main sources of information and/or advice** that you use to help make decisions about the management of **your property?** *[Please tick all that apply.]*

☐	1. Agri-business agents	☐	13. Department of Agriculture staff
☐	2. Private agricultural consultants	☐	14. Government Agencies (eg. Centrelink, CALM, Dept. of Environment, Dept. of Water etc.)
☐	3. Mass media (eg. newspapers, tv)	☐	15. Environmental groups
☐	4. Family	☐	16. Internet
☐	5. Other farmers	☐	17. WA Farmers Federation
☐	6. Local Landcare group	☐	18. Local government
☐	7. Books/magazines	☐	19. Industry group (eg. Lucerne Growers Assoc., Salt Land Pastures Assoc., Kondinin Group etc.)
☐	8. Accountant	☐	20. Benchmark or best practice groups (eg. Prograze, Topcrop)
☐	9. Market trends	☐	21. Wholesalers/purchasers/customers
☐	10. Field days, workshops and Agricultural shows	☐	22. Catchment/natural resource management groups
☐	11. Brochures/leaflets/newsletters	☐	23. Training courses
☐	12. Banks/financial institutions	☐	24. Phone hotlines (eg. Cropline, Pest & Disease Information Service, Small Landholders Information Service)

Of those you have used, which were the **most useful in providing the sort of information you required?** *[You can use the numbers from the list above or write in your own. Use A as the source that was most useful].*

A. _____ B. _____ C. _____

7. YOUR VIEWS

In this section we would like to know **how closely the statements presented below reflect your feelings or views**. There are no right or wrong answers and there is no need to think at great length about your responses. *[Examine the response options underneath this paragraph. For each statement in the table below, place the number of the best response option in the **Your view** column.]*

Response options

<i>Strongly disagree</i>	<i>Disagree</i>	<i>Neutral</i>	<i>Agree</i>	<i>Strongly agree</i>
1	2	3	4	5

<i>Statements</i>	<i>Your view</i>
It is important to consider how actions undertaken on my property may impact on my neighbours' properties	
Most of my neighbours would consider how actions undertaken on their property may impact on my property	
I would not be able to enjoy the same quality of life if I did not live on a rural property	
Increasing regulations leave less time to manage other aspects of my property/business	
Most landholders in my local area are prepared to undertake practices that may not have a direct benefit to them	
What I do on my property can have an important impact on other landholders in this region	
I am very attached to my property	
Landholders should receive incentives for providing environmental services (eg. clean air and water) that benefit the wider community	
Natural resources on my property are less degraded than many others in the local area	
Reduced production in the short-term can be justified where there are long-term benefits to natural resources	
Current activities carried out on our property will not compromise the use of the property by future generations	
Overall, I think my property is well suited to achieving the goals I have for my property or business	

Please indicate the **level of trust you have in other natural resource management stakeholders**. *[Tick the box that best describes your level of trust in each group.]*

	Low trust	Moderate trust	High trust	Don't know
Local government	☐	☐	☐	☐
State government	☐	☐	☐	☐
Federal government	☐	☐	☐	☐
Locally based state government officers	☐	☐	☐	☐
My neighbours	☐	☐	☐	☐
Landholders in this region	☐	☐	☐	☐
Industry groups	☐	☐	☐	☐
Environmental groups	☐	☐	☐	☐
Landcare groups	☐	☐	☐	☐

8. LAND USES - VEGETATION

Do you have any of the following land uses/enterprises on your property? *[Please tick the appropriate box and where relevant provide an estimate of the total area. Note that you can include the same area in more than one category.]*

Land uses	NO	YES	If YES hectares
Remnant (not planted) native vegetation (including trees, shrubs and grasses)	☐	☐	_____ ha
Plantings for farm forestry	☐	☐	_____ ha
Native vegetation managed for sustainable use (eg. selective logging or grazing)	☐	☐	_____ ha
Ecotourism/farm stays	☐	☐	

Have you undertaken any of the following practices on your property? *[Please tick the appropriate box and where relevant provide an estimate of the total area under that practice.]*

Management practices	NO	YES	If YES hectares
Planted native trees, shrubs or grasses	☐	☐	_____ ha
Encouraged regrowth of native vegetation	☐	☐	_____ ha
Established deep rooted perennial pasture (eg. lucerne or saltbush)	☐	☐	_____ ha

Estimate the number of days you have spent on work to control non-crop weeds and pest animals over the past year?

_____ days

What do you think are the main benefits of planting and/or retaining native vegetation on your property?

How do you feel about the following statements? *[Please tick the most appropriate box.]*

Evaluation of practices	Strongly disagree	Disagree	Unsure	Agree	Strongly agree
The overall benefits provided by native vegetation make retaining/planting vegetation worthwhile	☐	☐	☐	☐	☐
Native vegetation is important to the health of my property and region	☐	☐	☐	☐	☐
Native vegetation contributes to the natural beauty of the property	☐	☐	☐	☐	☐
Native vegetation can increase the fire risk	☐	☐	☐	☐	☐
Deep rooted vegetation is important to control rising ground water	☐	☐	☐	☐	☐
Native vegetation makes it harder to manage weeds and pests	☐	☐	☐	☐	☐

9. LAND USES - LIVESTOCK

Do you have any of the following land uses/enterprises on your property? [Please tick the appropriate box and where relevant provide an estimate of the total number.]

Land uses	NO	YES	If YES, number
Beef cattle	☐	☐	_____ number
Dairy cattle	☐	☐	_____ number
Sheep	☐	☐	_____ number
Intensive livestock (eg. chicken, pigs)	☐	☐	_____ number
Horses	☐	☐	_____ number
Other livestock [Please list]	☐	☐	_____ number

IF NO to all please go to Question 10

Have you undertaken any of the following practices on your property? [Please tick the appropriate box.]

Management practices	None	Some	Most	All
Fenced waterways to control stock access	☐	☐	☐	☐
Fenced native vegetation to control stock access	☐	☐	☐	☐
Quarantined new stock	☐	☐	☐	☐
Used controlled grazing (eg. rotational, management of pasture residuals etc.) to maintain surface cover in stocked paddocks	☐	☐	☐	☐
Used feedlots in times when paddock cover is too low	☐	☐	☐	☐
Recycled effluent	☐	☐	☐	☐

How do you feel about the following statements? [Please tick the most appropriate box.]

Evaluation of practices	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Fencing sensitive areas to control stock makes it harder to manage these areas (eg. Fire, flood, pests)	☐	☐	☐	☐	☐
Controlling stock traffic is critical to improve soil water health	☐	☐	☐	☐	☐
Installing off-stream watering points is not always viable	☐	☐	☐	☐	☐
The costs associated with fencing are outweighed by benefits to stock, soil and water conditions	☐	☐	☐	☐	☐
Fencing to allow controlled grazing interferes with other operations on my property	☐	☐	☐	☐	☐
Maintaining good surface cover will improve the long-term productive capacity of the land	☐	☐	☐	☐	☐

10. LAND USES – CROPPING & PASTURE

Do you have any of the following land uses/enterprises on your property? [Please tick the appropriate box and where relevant estimate the % of your property under the land use.]

Land uses	NO	YES	If YES, % of property
Cropping	☐	☐	_____ %
Dryland Pasture (in 2005)	☐	☐	_____ %
Irrigated pasture (in 2005) (If yes, please fill out question 11 on irrigation practices)	☐	☐	_____ %
Fodder (eg. Silage, hay)	☐	☐	_____ %
What % of your property is able to be cropped (including areas not currently cropped)?	_____ %		

IF NO to all please go to Question 11

Have you undertaken any of the following practices on your property? [Please tick the appropriate box.]

Management practices	No paddocks	Some paddocks	Most paddocks	All paddocks
Used no till or reduced tillage practices (ie. 2 passes or less)	☐	☐	☐	☐
Used soil testing and/or nutrient budgeting to inform crop rotation or fertiliser application in the last 3 yrs	☐	☐	☐	☐
Used a rotation to maintain soil health	☐	☐	☐	☐
Used GPS or precision cropping techniques	☐	☐	☐	☐
Applied lime and/or gypsum in 2005	☐	☐	☐	☐
Applied lime and/or gypsum over past 5 yrs	☐	☐	☐	☐
Retained stubble or pasture residue	☐	☐	☐	☐
Earthworks for soil conservation and water management	☐	☐	☐	☐
Farming to soil type	☐	☐	☐	☐

How do you feel about the following statements? [Please tick the most appropriate box.]

Evaluation of practices	Strongly disagree	Disagree	Unsure	Agree	Strongly agree
Reduced tillage improves soil health and reduces erosion	☐	☐	☐	☐	☐
The cost of new machinery is a constraint in changing practices	☐	☐	☐	☐	☐
Conventional tillage is more effective at maintaining soil fertility and increasing yields	☐	☐	☐	☐	☐
The benefits of stubble retention outweigh problems with pests and diseases	☐	☐	☐	☐	☐
Reduced tillage increases the need for herbicides	☐	☐	☐	☐	☐
Overall, using herbicides is better than using mechanical cultivation	☐	☐	☐	☐	☐
Deep drainage is an acceptable practice to manage salinity	☐	☐	☐	☐	☐

11. LAND USES – HORTICULTURE & VITICULTURE

Do you have any of the following land uses/enterprises on your property? [Please tick the appropriate box and where relevant provide an estimate of the total area.]

Land uses	NO	YES	If YES hectares
Annual horticulture (eg. vegetable crops)	☐	☐	_____ ha
Annual horticulture irrigated in 2005	☐	☐	_____ ha
Perennial horticulture (eg. fruit crops)	☐	☐	_____ ha
Perennial horticulture irrigated in 2005	☐	☐	_____ ha
Viticulture	☐	☐	_____ ha
Viticulture irrigated in 2005	☐	☐	_____ ha

IF NO to all please go to Question 12

Have you undertaken any of the following practices on your property? [Please tick the appropriate box.]

Types of Irrigation	None	Some paddocks	Most paddocks	All paddocks
Drip Irrigation	☐	☐	☐	☐
Low pressure irrigation (eg. Centre pivot, Overhead, Fixed, Travelling)	☐	☐	☐	☐
High pressure (eg. travelling gun)	☐	☐	☐	☐
Flood Irrigation	☐	☐	☐	☐
Used an irrigation schedule to determine the timing/volume of water	☐	☐	☐	☐
Fertilised through irrigation system	☐	☐	☐	☐
Used mulch to help improve water use efficiency	☐	☐	☐	☐
Monitor soil moisture to schedule irrigation	☐	☐	☐	☐
Have an automated irrigation controller	☐	☐	☐	☐

How do you feel about the following statements? [Please tick the most appropriate box.]

Evaluation of practices	Strongly disagree	Disagree	Unsure	Agree	Strongly agree
Drip or low pressure irrigation is not appropriate for all soil types	☐	☐	☐	☐	☐
Drip or low pressure irrigation and irrigation scheduling improve water use efficiency	☐	☐	☐	☐	☐
The cost of changing irrigation practices outweighs water savings	☐	☐	☐	☐	☐
The water savings associated with using mulch outweigh the risk of frost damage	☐	☐	☐	☐	☐
Changing irrigation practices requires major alterations to the layout of my property	☐	☐	☐	☐	☐
Better irrigation practices are needed to improve water use efficiency	☐	☐	☐	☐	☐

12. BACKGROUND INFORMATION

Please indicate your level of involvement with the groups listed below in your local community.

[Please tick the most appropriate box.]

	None	Once a year or less	A few times a year	Every month or two	Weekly or fortnightly
Sporting groups/clubs	☐	☐	☐	☐	☐
Civic groups (eg. rotary, lions)	☐	☐	☐	☐	☐
Emergency services (eg. bush fire brigade, SES)	☐	☐	☐	☐	☐
School committee	☐	☐	☐	☐	☐
Neighbourhood/rural watch	☐	☐	☐	☐	☐
Local Landcare group	☐	☐	☐	☐	☐
Catchment/sub-regional NRM group (eg. LCDC etc.)	☐	☐	☐	☐	☐
Industry group	☐	☐	☐	☐	☐
Political/lobby group	☐	☐	☐	☐	☐
Special interest group	☐	☐	☐	☐	☐
Recreation group	☐	☐	☐	☐	☐
Church group	☐	☐	☐	☐	☐
Country Women's Association	☐	☐	☐	☐	☐
Other (please list) _____	☐	☐	☐	☐	☐

• Are you male or female? MALE ☐ FEMALE ☐

• What is your age? [Please indicate years.] _____ years

• In the past 5 years have you completed a short course relevant to property management? (eg. integrated pest management, grain marketing, property planning, chemical handling, irrigation management, small landholder workshop.)

YES ☐ NO ☐

If YES please list:

• What is your main occupation? (eg. farmer, accountant, teacher, retiree.)

• Estimate the average number of hours per week you worked on farming/property related activities over the past 12 months

_____ hrs per week

• Which of the following best describes your average level of paid off-property work over the past 12 months? [Please tick].

NONE ☐ PART TIME ☐ FULL TIME ☐ CASUAL ☐

Appendix B

- How long have you **lived in your local district**? _____ years

- How long have you **lived on your current property**? _____ years
- How many **people live on the property**? _____ people
- How many **people are at least partly supported by income from the property**? _____ people
- In the past 5 years has there been work on your property that has been at least **partially funded by federal or state government programs**. These programs would include Landcare, Natural Heritage Trust, National Action Plan for Salinity and Water Quality (NAP), Envirofund and Greening Australia's incentive programs.

YES ☐

NO ☐

We appreciate that people may be reluctant to divulge information about their incomes. However, some information about household income is important for this research. Your name will not be linked to your answers and no individual information will ever be made available.

- **Did your property return a net pre-tax profit** (income from your property exceeded all expenses before tax) in the 2004/2005 financial year?

YES ☐

NO ☐

If YES:

Indicate the **approximate figure for the on-property net pre-tax profit** (excluding subsidies or government allowances) from your property in the 2004/2005 financial year. *[Please tick the box beside the appropriate dollar range.]*

☐ up to \$10,000

☐ \$30,001-\$40,000

☐ \$60,001-\$100,000

☐ \$10,001-\$20,000

☐ \$40,001-\$50,000

☐ above \$100,000

☐ \$20,001-\$30,000

☐ \$50,001-\$60,000

- How does this compare to the **average on property income** over the past 5 years?

N/A ☐

HIGHER ☐

SIMILAR ☐

LOWER ☐

- Did your household receive a **net income from any source other than the property** (eg. work, pension, investments etc.) in the 2004/2005 financial year?

YES ☐

NO ☐

If YES:

Indicate an **approximate figure for the total income from all other sources** (before tax) for you and your partner in the 2004/2005 financial year. *[Please tick the box beside the appropriate dollar range.]*

☐ up to \$10,000

☐ \$30,001-\$40,000

☐ \$60,001-\$100,000

☐ \$10,001-\$20,000

☐ \$40,001-\$50,000

☐ above \$100,000

☐ \$20,001-\$30,000

☐ \$50,001-\$60,000

OTHER COMMENTS

Are there any other natural resource management changes or activities that you have undertaken or would like to undertake on your property that you would like to tell us about? Please use the space provided below to make any other comments.

THANK YOU FOR YOUR TIME

We appreciate the time you have spent answering the questions. Please return the completed survey in the envelope provided. A summary of survey findings will be available late in 2006 and will be mailed to all survey respondents.

If you need assistance with the survey or wish to make specific comments about it, please use the toll free number 1800 723 777 to contact a member of the research team at the Bureau of Rural Sciences.
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Appendix B



Survey Area

Appendix C – Timeframes and cost

Timing of survey projects

Generic survey timelines are provided to give a basic idea of how long it takes to perform the components of different surveys.

Mail survey

For an organisation putting a survey contract to tender, steps one through three ideally occur during the tendering process. How long it takes the organisation to create the tender documents depends in large part on how well they know what results they want and how experienced they are at the process. The successful contractor will then spend time preparing their bid to further refine these steps on route to winning the contract. This whole process may take anywhere from one to several months, but as it is not part of the contract details, greater specificity is unnecessary.

Taking a survey proposal through to becoming a polished survey instrument takes about 12 weeks for a comprehensive NRM survey. Establishing a steering committee, giving everyone an opportunity to comment on the drafts and ultimately leading to the final questionnaire takes time. The more people that are involved, the more time it will take. A project with a tightly focussed survey might not need a steering committee process, greatly speeding up the delivery of a final product. This could be as short as two to three weeks.

Regardless, the product has to be tested. Testing workshops are preferable to pilot mail-outs. That is, taking the questionnaire to the survey area and recruiting several people from the population while they work through the questions in front of the researcher maximises the feedback obtained on ambiguities, misleading statements and confusion contained in the instrument. For the landholder surveys, BRS typically ran four workshops for around six people each to test the near-final version of the questionnaire. This takes one to two days and greatly improves the quality of the survey. Physically mailing the surveys out to a small group of participants (preferably briefed about the process beforehand) is easier, but less informative because the only feedback the researcher obtains is what respondents write down. Mailing could take about one week.

Obtaining cadastral data from the state or local government is always a slow process and should be done simultaneously with the development of the survey instrument. It depends on which and how many government agencies need to be contacted to release these data. It has taken from four to 40 weeks for BRS to negotiate this step in the recent past.

The mailing process involves sending out the surveys and waiting for them to come back. Reminders are sent at regular intervals. The return flow typically ends after about seven weeks from the initial mailout.

Data entry is a large and important task. One skilled input person can enter approximately 300 BRS landholder surveys per work week. Thus, how long this task requires depends on how many surveys and how many people, as well as their skill level. Smaller surveys will

obviously take less time, and more open-ended questions will slow the process down considerably.

Analysis of the results will also depend on the size of the survey. For example, the BRS landholder surveys each contain around 260 questions, and requires approximately a one-month process to analyse these data.

Finally, it takes approximately one month to write an 80-page final report. With an additional two weeks to have copies of the report printed professionally.

Internet survey

There are two significant differences between mailed surveys and internet surveys. The first is the distribution of the survey instrument. Rather than relying on mail, invitations to participate are distributed electronically at the speed of light. Replies are returned the same way, and the entire response process is compressed from seven weeks to three.

The second major difference is data entry. The respondent does it for the researcher, and thus this step is eliminated.

Telephone survey

There are at least two approaches to telephone surveying. The first is often used in marketing research where phone lists are used until such time as the minimum number of respondents in each demographic grouping has been interviewed. These are probably not relevant to social and economic research. The second type is targeted telephone calls. Using lists of association memberships, Landcare members, or intra-group referrals (see *Snowball sampling* under *Sampling strategy*) specific persons are phoned until preset numbers are reached in each subgroup. This is the sort of telephone surveying that is most relevant to social and economic research.

Similar to a mail survey, steps one through three are taken care of during the tendering process. Design of the survey instrument is slightly less critical than for a mail survey because the respondents can ask questions of the interviewer and a skilled interviewer will pick up on difficulties as they arise. However, it is still important to have a well-developed survey instrument, and again it must be tested. Two to three weeks should suffice for typical phone surveys.

Despite the lower numbers contacted in a typical phone survey (compared to a mailed survey) the duration for the administration of the survey itself often works out remarkably similar to that for a mailed survey – perhaps two months for 50 interviews. If any individual researcher is able to accomplish more than one hour per day, on average, they are doing well. Many phone calls are required to schedule a one-hour interview, and there are associated time costs before and after the interview to make notes, etc. It is exhausting, too.

Recorded qualitative interviews need to be transcribed. This process takes about four times as long as the actual interview, that is, about four hours of typing per one hour of talking. If

completed as the interview process proceeds, it does not add any additional time to the survey contract. For quantitative interviews, the responses may be computer coded during or after the interview.

Analysis of qualitative data can be time consuming. A few tens of interviews produces as much data to process as hundreds of quantitative mailed surveys. Use of analytical software, such as NVivo, can be used to analyse these data.

The final report can be as large as for a mailed survey. It will contain fewer graphs and charts, but often includes direct quotes from participants to illustrate key themes in the data.

In-person survey

The main difference between a telephone interview and one conducted face-to-face is that the latter usually requires travel to the location of the respondent. This may, or may not, affect the time frame for planning and interviewing. Typically these surveys would rely on collecting more data from fewer individuals thereby shortening the data collecting phase and not affecting the time required for the other phases.

Costing survey projects

There are certain expenses inherent in surveying. Knowing some of these may facilitate the survey tendering or planning process. Labour costs will vary by organisation, so these will not be considered here. Remember that these figures quoted are based on surveys conducted by BRS in 2006.

Mail survey

Ideally the researcher will travel to the location of the project steering committee for the initial discussion about the survey instrument. The expense involved in this depends on where the two are located. Once the instrument is ready for testing, the volunteers who attend the workshops are typically paid a \$150 sitting fee. The total cost for testing the questionnaire will be between \$3 000 and \$5 000 (plus researcher travel costs). The costs for cadastre data vary widely. For BRS, costs were between \$200 and \$5 000 for the delivered product on disc.

The first mailing of the survey (which includes the survey booklet, a personalised letter to the selected respondent and a stamped return envelope) costs about \$3 per person. The survey questionnaire itself (with a glossy cover and 12 pages) costs about \$2 per person. Reminder cards (sent out after the questionnaire to increase response rates) in total (there are three) cost about \$2 per person. The second mailing of the survey (all non-responses are sent a new package with a different, more insistent, letter) depends on the early response rate, but is about \$2 per person. Altogether this is about \$9 per person selected in the sampling process. For surveys with a smaller sample than 2 000, the per person cost would be expected to increase somewhat. Surveys with larger samples would also see these costs decrease per person.

A summary of the results is sent to each respondent. These brief (one A3 page printed both sides) reports cost around \$2 per person (of the initial sample size, not the response list).

The large reports which are usually provided to key stakeholders cost about \$2 per person. This will vary depending on stakeholder to sample size ratio (for BRS this was 1:20). Total labour for a 2 000 sample survey is around 125 days of work, but this is usually spread across several individuals at different rates of pay.

Internet survey

Initial costs for an internet survey are likely to be similar to those for a mail survey. Major differences can occur in the delivery expenses. It is highly unlikely that the sampling process will be based on property cadastre, because email address is not a component in land tenure lists. More likely an internet survey will exploit association lists or even be self-nominating. Email is essentially free, so sending participation invitations and reminder messages have no effect on costs.

If the survey is hosted on a website (as opposed to be sent in an email message), the costs for this vary widely. BRS paid around \$3 000 for the provider to turn the survey instrument into a series of web pages, to collect the data from respondents, and return the compiled data to BRS. There are no data entry costs, as the data arrives in tabular format ready to be analysed.

Analysis and reporting costs will not differ from a similar mail survey. Total labour for a 2 000 sample survey is around 90 days of work.

Telephone survey

The cost structure for a telephone survey is quite different from the two surveys above. This discussion focuses on targeted phone surveys and not random phone book calling. Slightly less time is needed to develop the survey instrument, but similar to mail surveys, an in-person testing session will reveal different feedback than a trial session conducted by telephone (testing both ways is advocated).

Time investment for a qualitative surveying process works out to about one work day per interview. A typical 50-interview project would take two people around 25 days (50 total) to complete the interviewing phase. Transcription costs (if these are out-sourced) are about \$100 per interview hour, or about \$5 000 for 50 interviews of roughly one hour duration each. Completed in-house, it requires about half a work day to do one interview. This brings the total time investment up to about 1.5 days work per surveyed person.

Phone surveys can have responses entered into a computer database as the interview proceeds, removing the transcription costs completely. The overhead per interview is also slightly reduced, such that three interviews may be possible for each two work days. Short and simple telephone surveys may collect around one response per hour of work.

As noted above under timelines, the duration of the analysis process for a typical qualitative survey is similar to that for a much larger quantitative survey. For the quantitative survey, the number of questions will be fewer than for a mailed survey, so the analysis will be somewhat shorter also.

Total labour required to run a 50-sample qualitative survey over the telephone is 90-100 days. A quantitative telephone survey of the same size would require 75-85 days. No mention of phone charges was made for good reason – there are a variety of unlimited/unlimited STD phone plans available these days so the phone charge is not a major cost even for hundreds of calls totalling tens of hours to the far side of the country.

In-person survey

ABARE conducts their annual Farm Survey in-person. A figure of just under \$1 000 per farm has been mentioned as the data collection costs of the Farm Survey (sampling approximately 2 000 farms each year). This is due in no small part to the long distances involved in reaching farms all over Australia in a short period of time with a large number of researchers. It is also likely to be a 'best case' scenario as ABARE has been conducting these surveys for decades and have refined their data collection methods. They also take more than six months to analyse the data and release the final report. This is a big job involving hundreds of days of labour across teams of specialists.

BRS frequently conducts in-person surveys on a much smaller scale than the ABARE survey. Often these are in the fisheries sector (we can select a day when the fleet is expected to be in port and there is a high chance of contacting around three-quarters of the fishers) but also in agriculture (field days are a good location to find respondents). Travel can be a large expense depending, of course, on how many people need to be visited to accomplish the project. Time is the other large expense.

Total labour investment in an in-person survey is approximately the same, or slightly less than, a telephone survey of the same number of respondents.

Appendix D – An example contract

This sample contract tender document displays how the steps discussed in the main body of the text and the considerations discussed in Appendix C come together in a contract.

**SOCIAL SCIENCES PROGRAMME
BUREAU OF RURAL SCIENCES**

- REQUEST FOR TENDER -

IRRIGATION BMPS

IMPLEMENTATION SURVEY

**TARGET: WARAMANNA RIVERS CATCHMENT MANAGEMENT
AUTHORITY**

CONTRACT NO: BRS11.97

IRRIGATION BMPS IMPLEMENTATION SURVEY TARGET: WARAMANNA RIVERS CATCHMENT MANAGEMENT AUTHORITY

THE PROPOSAL

Implementation of on-farm Irrigation Best Management Practices (BMPs) improves irrigation practices which lead to increased Water Use Efficiency (WUE). Improved WUE yields water savings and minimises irrigation drainage volumes resulting in reductions in groundwater levels and salinity inputs to floodplains, wetlands and rivers.

A survey of irrigators is required to measure and benchmark current implementation of on-farm Irrigation BMPs and determine progress toward the Waramanna Rivers Catchment Management Authority (WRCMA) Salinity Management Target S3 – 'Implement effective on-farm irrigation management practices 85% of farms by year 2013 to minimise drainage and groundwater accessions'.

BACKGROUND

The WRCMA currently provides incentives to irrigators within the Waramanna Rivers (CMA) catchment, funded by the National Action Plan for Salinity and Water Quality (NAP) and facilitated through the NSW Department of Primary Industries (NSW DPI).

Incentives offered are for:

- Irrigation scheduling,
- Irrigation system upgrades,
- Irrigation drainage management plans, and
- Irrigation management training.

Irrigators in the Waramanna Rivers Catchment grow a range of crops including citrus, pasture, vegetables, nuts and orchard crops, each of which have specific BMPs.

This 'Irrigation BMPs – implementation survey' project will involve conducting, analysing and reporting results of a survey, identified Waramanna Rivers Catchment Action Plan (CAP).

PROJECT PURPOSE

The purpose of the survey is to measure the current implementation of irrigation BMPs amongst irrigators in the Waramanna Rivers Catchment (within and outside of the Waramanna Rivers Irrigation Area Land and Water Management Plan area). This is necessary to:

- Determine the progress toward achieving the WRCMA Salinity Management Target– 'Implement effective on-farm irrigation management practices 85% of farms by year 2013 to minimise drainage and groundwater accessions' (WRCMA Catchment Action Plan).
- Identify variations in irrigation BMP implementation rates for different irrigation districts to improve understanding of the relative influence incentives have on the uptake of irrigation BMPs.
- Develop an up-to-date benchmark for assessment of any improvements required in the incentive programme, future investment decisions or the development of new targets.

TERMS OF REFERENCE

The successful contractor will be expected to conduct a statistically viable survey, of irrigators within the Waramanna Rivers Catchment (Approximately 950), to measure the:

- Degree of implementation of irrigation Best Management Practices (BMPs);
- Influence of irrigator demographics on irrigation BMP implementation;
- Drivers and barriers to irrigation BMP implementation; and
- Success of the incentive programme.

The contractor will be required to conduct a survey; collate, analyse and evaluate data; and report on the results.

Note: The reliability of the survey data is to be improved by checks and verification against data available from other sources, including incentive records from NSW DPI; irrigation records from State Water; and other WRCMA projects.

Phase One: Pre-implementation

1. Investigation and confirmation of irrigation BMPs for the Waramanna Rivers Catchment.
2. Collation of contact details for irrigators and irrigation representation bodies within the Waramanna Rivers Catchment.
3. Make contact with irrigation representation bodies to discuss the details of the survey and to seek their support to encourage participation in the survey.

Phase Two: Implementation

4. Design an easy-to-complete survey for the purpose of presenting information at district and catchment levels on:
 - a. Proportion of area (per crop type, irrigation type and implementation of irrigation BMPs);
 - b. Irrigator demographics (including number of irrigators, percentage of age group, number of years farming, percentage of education level, information sources and involvement in industry groups);
 - c. Irrigator attitudes (including type of drivers or barriers to irrigation BMP implementation and intention to implement irrigation BMPs); and
 - d. Irrigation incentives grants (including types of incentive implemented, number of irrigators granted incentives, reasons why irrigators have not participated in the incentive programme, level of interest in irrigation incentives and suggested ways to improve the incentive programme).
5. Development of a database/spreadsheet to record survey responses.
6. Delivery of the survey questionnaire to the irrigators (*note: contractor to propose best method*).
7. Acquisition of data from other sources including incentive records from other WRCMA projects.

Phase Three: Post-Implementation

8. Data collation, analysis and evaluation.
9. Preparation of draft and final reports for presentation and approval of the Social Sciences Programme.
10. Presentation of final results to the Social Sciences Programme.

Information collected during the survey relating to personal details and identification will be strictly confidential as required under the Privacy Act.

Outcomes:

- Knowledge of the degree of implementation of irrigation BMPs in the Waramanna Rivers Catchment and associated drivers and barriers;
- A benchmark of the uptake of irrigation BMPs amongst irrigator in the Waramanna Rivers Catchment;
- Measurement of the level of progress toward achieving the Salinity Management Target S3 – ‘Implement effective on-farm irrigation management practices 85% of farms by year 2013 to minimise drainage and groundwater accessions’;
- Identification of the irrigation district areas within the Waramanna Rivers Catchment to focus incentives;
- Identifications of opportunities to amend or add incentives;
- Knowledge of strengths and weaknesses of aspects of this method of assessment; and
- Recommendation for improved methods of assessment of the rate of irrigation BMP implementation.

PROJECT TIMETABLE AND MILESTONES

The following project timetable has been developed as a starting point for refinement in the development of a detailed project workplan. Project milestones will be negotiated as part of the work-planning process.

Tasks	Months											
	1	2	3	4	5	6	7	8	9	10	11	12
Phase 1.1												
Phase 1.2												
Phase 1.3												
Phase 2.4												
Phase 2.5												
Phase 2.6												
Phase 2.7												
Phase 3.8												
Phase 3.9												
Phase 3.10												

SUBMISSIONS

Detailed proposals are sought for this work and should cover the following format:

- 1. Understanding of issues and response to the identified tasks**
- 2. Proposed team including:**
 - a. Capability to undertake the project
 - b. Project management structure
 - c. Principal contact person and their contact details
- 3. Proposed methodology including:**
 - a. Addressing each of the Terms of Reference
 - b. Timetable of activities and achievements, including major stages and milestones
 - c. Reporting procedures
- 4. Experience and roles of the team, including:**
 - a. Roles and responsibilities of team members
 - b. Relevant skills and experience of team members
 - c. Previous experience with related or similar projects
 - d. Names and contact details for two referees
- 5. A description of outcomes of the contract**
- 6. An evaluation of any major risks in undertaking and completing the contract**
- 7. Proposed budget for undertaking the project as described in the project timetable including:**
 - a. Contracting fees (no. of days and daily rates)
 - b. Operating expenses (itemised)
- 8. Annexures that might assist the selection panel in its deliberations**

FEES & CONDITIONS

A set fee will be paid for the project. Payments will be in accord with a payment schedule linked to milestone reporting.

A budget of up to \$200,000 is available for this project, inclusive of all costs associated with Phase 1 through 3.

The payment schedule will be:

On execution of contract: 15%

On acceptance of the workplan: 35%

On submission and presentation of a draft final report: 30%

On submission and presentation of a final report: 20%

The contract for the project will be managed by the Social Sciences Programme.

REPORTING ARRANGEMENTS

The contractor will report to the Programme Leader (Social Sciences Programme) on a regular basis and in accordance with milestone dates, and be available for ad-hoc enquiries by telephone or email.

Milestone reports will be submitted to the Social Sciences Programme as per the agreed milestone schedule.

EVALUATION CRITERIA

Submissions will be evaluated against the following criteria:

- Experience in designing and conducting projects of this nature.
- Experience in analysing and presenting information from projects of this nature.
- Understanding of this project (and the issues to be dealt with).
- Budget
- Capacity to perform on time.
- Value for money.

Contractors will be required to carry professional indemnity insurance and public liability insurance.

The Social Sciences Programme reserves the right to not proceed with the tender process.

CLOSING DATE FOR SUBMISSIONS

Project proposals (1 hard copy and one electronic copy) must be submitted by 4pm on **30 June 2007**.

Your proposal must be in sealed envelope and marked with the title of the tender (otherwise not accepted).

Late or faxed copies will not be accepted.

Social Sciences Programme - BRS
GPO Box 655
Canberra ACT 2609

ENQUIRIES

Initial enquiries can be directed to:

Michael Hanslip
Social Sciences Programme
Phone: (02) 62849561

Social and Economic Indicators and Projects to Support the National NRM Monitoring and Evaluation Framework

Purpose To identify socio-economic indicators to assess the: 1. capacity of landmanagers to change and adopt sustainable management practices 2. capacity of regional groups to make decisions on natural resource management (NRM) issues, including the impact of institutional change/responsiveness 3. interlinkages between the above and their relationship to the achievement of longer term changes to the: ◦ condition of the natural resource base ◦ capacity of regional communities to respond and manage for effective NRM outcomes ◦ economic viability of agriculture.		
I. Landmanagers (Nelson, Webb and Byron 2005) Landmanagers are responsible for managing approximately 60% of the Australian land area. The following indicators relate to their capacity to change and adopt sustainable management practices. Indicator status: Headings (in bold) and indicators have been recommended by SENCC. Aspirations of landmanagers Goals/priorities for property/business social/lifestyle environmental economic and production Long term plans for property/business expansion add new enterprises move out of enterprise sell or scale back pass property to family Capacity of landmanagers Human technical skills labour availability landholder’s health/age/life stage training history Social support network landcare involvement government program involvement industry involvement Physical property size current and potential enterprise mix Financial farm income non-farm income farm equity/debt levels income stability Natural soil health water quality and availability pest plants and animals native flora Attributes of NRM practices Extent to which the practice contributes to the goals for the property: social/lifestyle economic/production environmental Extent to which landmanagers have access to resources to implement the practice: human social financial physical natural Extent to which outcomes from the practice can be evaluated: observability trialability External influences Broader issues affecting region / industry isolation communication infrastructure age/gender/socio-economic status Generalised trust in NRM stakeholders neighbours local government state government Australian Government regional groups industry groups Reciprocity awareness of off-site impacts from actions on their property perceptions that others account for off-site impacts of their actions Outcomes of improved NRM Level of adoption of management practices soil conservation practices water conservation practices biodiversity conservation practices productivity improvement practices Post adoption success workload/lifestyle production/profitability environmental conditions	2. Regional NRM Groups (Fenton 2006) Members of regional NRM groups make important decisions on the planning and implementation of NRM initiatives, which can have profound impacts on the community and landmanagers. The following indicators relate to organisational performance and the social and institutional foundations of NRM programs. Indicator status: Indicator headings (in bold) and indicators have been recommended by SENCC. Capacity Regional organisations have the capacity to make decisions on regional NRM issues: Management Capacity: • appropriate decision making processes • appropriate mix of people in decision making • good decision making processes • organisational cohesion (shared vision of staff/board) • staff training and development • board member training and development • level of job satisfaction • job satisfaction (staff turnover) • adequacy of staffing levels • competency in human resource management • leadership competency (composite index) • competency in financial management • financial management performance Program capacity: • capacity to review the NRM plan/investment strategy • use of NRM advisory panels • effectiveness of NRM advisory panels • effective utilisation of NRM information • ability to access external sources of NRM information • effective local facilitator networks (composite) • knowledge of NRM (composite) • external leadership in NRM • capacity to prepare NRM funding submissions • ability to lever external NRM investment Engagement A shared NRM vision and ownership at the regional level: • adequate community engagement strategy (composite) • implementation of a community engagement strategy • evaluation of the community engagement strategy • community knowledge of the regional NRM process • scale of NRM engagement (composite) • level of NRM engagement • effectiveness of the engagement process • effectiveness of engagement with new community groups • opportunities for NRM engagement • diversity of NRM engagement • inclusiveness of NRM decision making • quality of NRM engagement process (composite) Partnerships NRM partnerships between government and regional organisations are underpinned with trust and confidence: • trust in institutional partnerships • transparency of decision making • flexibility in negotiation • effectiveness of the partnership • consistency of information Recognition Governments and regional organisations recognise the importance of the social foundations of NRM: • social foundations of NRM in policies, frameworks and guidelines (Australian Government and state government) • investment in the social foundations of NRM (Australian Government and state government) • opportunities for investment in social processes (composite) • social foundations of management action targets • funding the social foundations of NRM • use of social information • social expertise of board members • social expertise of advisory structures • social expertise of employees • use of external consultants or advisors with social expertise Contextual Information Key descriptive measures about each regional body: • town location of regional body • year commenced operations • years since current NRM plan (strategy) developed • years since last review of NRM plan (strategy) • years since last investment strategy developed • existence of independent chair • number of current board members • legal standing of the regional body • number of current full-time and part-time employees • existence of documented engagement strategy • year engagement strategy first developed • number of local NRM facilitators employed • level of state and Australian Government funding during the last financial year	3. Community (Burnside 2007) Broader community members shape the desired outcomes for the region, and can be impacted upon unintentionally through the flow on effects of land degradation or reduced resource access. Indicator status: SENCC have not identified indicators in this area as regional planning and regional trade-off analysis requires a sound understanding of the specific NRM issues and the socio-economic pressures operating in each region. Instead the focus has been on improving regional access to existing data that can be cut and tailored to service specific regional needs. In 2008 the ABS will provide data from the ABS Agricultural and Population and Housing Census, which has been cut to NRM Regional boundaries. SENCC will provide advice on standard outputs. A scoping study of indicators of community vitality, viability and health has been overseen by SENCC. The report will be used to identify future co-investment opportunities. Other work highlights the range of available indicators that can be used depending on the nature of regional NRM strategies and their relevant social and economic impacts: • Webb, T.J. and Curtis, A. (2002) • Cavaye, J. (2003).
Status of data to populate the indicators Font colour indicates current availability of indicators: Black = currently available Red = requires standardised methodology and data collection Blue = requires data collection		

The role of the National Land & Water Resources Audit (the Audit) The Natural Heritage Ministerial Board has tasked the Audit (2003-08) with coordinating the collation of data to support reporting on natural resource condition required under the National NRM Monitoring and Evaluation Framework (NM&EF). As described in the NM&EF “the health of the nation’s natural resources is being assessed to provide a continuing reference point against which the appropriateness and effectiveness of national policies, strategies and programs may be judged. This assessment assists Ministerial Council to identify areas of concern and to better target the use of resources”. The NM&EF aims to use nationally agreed outcomes and measures to report on the conservation, sustainable use and management of Australia’s land, water, vegetation and biological resources. The Framework identifies three requirements for monitoring natural resource condition: • a set of resource condition indicators to measure progress toward the agreed national outcomes on a medium and long term basis • a set of indicators for monitoring community and social processes relevant to or affected by NRM programs, as well as measures of the adoption of sustainable development and production techniques • contextual data pertinent to the indicator being considered. The Natural Resource Policies and Programs Committee (NRPPC) and Natural Resource Management Standing Committee (NRMSC) have endorsed national data coordination arrangements proposed by the NLWRA to underpin the natural resource condition monitoring under the NM&EF. The roles and responsibilities of sponsor agencies and National Coordination Committees (NCCs) have now been agreed. These arrangements have been established to support the development and consistent use of standards for the attribution, collection, management and on-going delivery of data and information. The role of the Socio-Economic National Coordination Committee (SENCC) The Social and Economic National Coordination Committee is tasked with reviewing and revising socio-economic indicators and is sponsored by the Department of Agriculture, Fisheries and Forestry. SENCC has representatives from the Australian Government and state jurisdictions and observers from major national socio-economic data providers/research institutions. The role of SENCC is to advise on national socio-economic indicators and: • provide advice on national needs relating to NRM socio-economic data and information products, data management and related applications • oversee implementation of the socio-economic workplan and ensure it is relevant to the design, delivery and monitoring of NRM polices and programs • identify and support opportunities for generating national efficiencies in socio-economic data collation, collection, integration, analysis and reporting • assist in the development of consistent standards, methods for the collection, management, documentation and sharing of socio-economic information • provide coordinated advice on socio-economic projects submitted to relevant national funding initiatives. Projects to date Projects commissioned under the Audit’s socio-economic workplan, Signposts for Australian Agriculture project, and other co-investors, which will progress indicator development and data collation/collection include:	
Author	Title
Nelson, R., Brown, P.R., Darbas, T., Kokic, P., Nicholls, A., Griffin-Warwicke, J. and Cody, K. (2007)	<i>Potential to map the adaptive capacity of Australian landmanagers for NRM policy using ABS data</i> , CSIRO, ABARE, ABS, NLWRA for NLWRA.
Hanslip, M. and Byron, I. (2007)	<i>Sourcebook for social and economic surveys: Assessing landmanagers’ capacity to change and adopt sustainable management practices</i> , BRS for NLWRA.
Hodges, A. (2007)	<i>Nationally Coordinated Industry Survey</i> , ABARE for NLWRA (under contract).
Burnside, D. (2007)	<i>The relationship between community vitality, viability and health and natural resources and their management – A brief review of the literature</i> , URS for NLWRA.
Burnside, D. (2007)	<i>The relationship between community vitality, viability and health and natural resources and their management – Final Report</i> , URS for NLWRA.
Byron, I., Nelson, R., Webb, T. and Cody, K. (2006)	<i>Socio-economic indicators and protocols for the national NRM monitoring and evaluation framework: Capacity of landmanagers to adopt sustainable management practices</i> , BRS, ABARE, NLWRA for NLWRA.
Fenton, D.M. (2006)	<i>Pre-implementation review of the methodology to assess the capacity of regional organisations and the social foundations of NRM</i> , EBC for NLWRA (under contract).
Fenton, D.M. (2006)	<i>Socio-economic indicators and protocols for the national NRM monitoring and evaluation framework. The social and institutional foundations of NRM</i> , EBC for NLWRA.
Fenton, D.M. and Rickert, A. (2006)	<i>Monitoring and evaluating the performance of NAPSWQ regional bodies in Queensland</i> (state summary report), Burdekin Dry Tropics NRM, EBC for NLWRA.
Fenton, D.M. and Rickert, A. (2006)	<i>Refining indicators for monitoring and evaluating the social and institutional foundations of regional NRM programs</i> , EBC for DEH/DAFF.
Hassall & Associates (2006)	<i>Signposts for Australian Agriculture – National data and information priorities on business management practices</i> , Hassalls & Associates for DAFF and NLWRA (under contract).
Webb, T. and Byron, I.A. (2006)	<i>The development and piloting of a set of indicators, survey methodology and tools to assess landmanagers’ capacity to change and adopt sustainable management practices</i> , BRS for NLWRA (under contract).
Nelson, R., Webb, T. and Byron, I. A. (2005)	<i>Socio-economic data: Prioritising collection to support Australian Government natural resource management programs: principles and priorities</i> , ABARE, BRS for NLWRA.
Cody, K. (2004)	<i>Socio-economic workplan</i> , NLWRA.
Day, P. (2004)	<i>Signposts for Australian agriculture – Research and development corporations’ data and reporting</i> , LWA for NLWRA.
Fenton, D.M. (2004)	<i>Socio-economic indicators for NRM: Indicators of capacity, performance and change in regional NRM bodies</i> , EBC for NLWRA.
Fenton, D.M. (2004)	<i>Monitoring and evaluating the social foundations of regional NRM programs</i> , EBC for LWA.
Nelson, R. (2004)	<i>Socio-economic indicators for natural resource management: Capacity to change and adopt sustainable management practices in Australian agriculture</i> , ABARE for NLWRA.
Sincock, A. and Smith, T. (2004)	<i>Social and economic data sources for natural resource management</i> , ABS for NLWRA.
Webb, T.J., Cody, K., Mues, C. and Harrison, B. (2004)	<i>Social and economic information for NRM: An initial discussion paper</i> , BRS, NLWRA, ABARE, ABS for NLWRA.
For more information on the Audit’s socio-economic theme see http://www.nlwra.gov.au/Natural_Resource_Topics/Socio-economic. For copies of reports see http://www.nlwra.gov.au/Publications_and_Tools/Project_Reports/index.aspx#Socioeconomic. Other references Cavaye, J. (2003) <i>Integrating economic and social issues in regional natural resource management planning – A framework for regional bodies</i>, Department of State Development, QLD Government. Haberkorn, G., MacGregor, C., Kelson, S. and Charalambou, C. (2001) <i>Compiling a database of socio-economic indicators for the rangelands</i>, for NLWRA 1 Rangelands Project. Webb, T.J. and Curtis, A. (2002) <i>Mapping regional capacity. A method to map regional capacity to adopt more sustainable NRM practices</i>. BRS for LWA (BRR20).	