NEW SOUTH WALES GOVERNMENT
Department of Natural Resources

State Wide Needs and Uses for Land Management Practice Information (LMPI)

Documentation of the Drivers for LMPI by Natural Resource Management Groups

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Background

A need for a wide suite of natural resource data sets has been recognised as being essential to the planning, management and reporting of land and water degradation problems in New South Wales. The land management decisions of agricultural producers can have a profound impact on the sustainability of natural resources and agricultural productivity. Land management practices information is needed to help monitor and report upon trends in natural resource condition and develop effective land management responses. An important step in this regard is a consistent approach to the condition of land management practices information across Australia.

The national workshop *"Land management practices: information priorities, classification and mapping – towards an agreed national approach"* held in May 2004 identified the need for pilot studies to assist in developing and testing a national framework for reporting on land management practices information. The Bureau of Rural Sciences (BRS) within the Australian Department of Agriculture, Fisheries and Forestry has taken forward this concept and obtained funding from the National Heritage Trust (NHT) to document drivers and requirements for land management practices information at the state and regional levels.

The NSW Department of Natural Resources (DNR) is sponsored by the Bureau of Rural Sciences to undertake the documentation of the needs and uses for land management practice information by state and local agencies, peak industry groups and community groups in NSW.

DNR currently has two major data collection programs under way across parts of NSW. They are:

- Mapping of land use
- Mapping of dryland salinity outbreaks.

In both data sets, some land management practice information has been collected because it relates directly to land use or features of land use. For example, some land management practices for salinity, biodiversity, erosion control or riparian management involve permanent fencing and the exclusion of all agricultural production activities.

These activities have been recorded and a dedicated database has been established to record specific details of these management activities. This process has formed a logical base upon which to build a broader project to record land management practices across a variety of landscapes and agricultural industries.

While working with the NSW catchment management authorities in the central west of NSW, their needs for spatial information have been highlighted, particularly the needs to bench-mark on-ground works and have a standardised process for the collection of land management activities funded by public monies.

This project provides a means to document not only this demand, but also the needs of other government organisations. The project has already highlighted the importance of having the land management practice information recorded in a spatial format to ensure that statistical information is correct and the impacts on resources or catchment condition can be evaluated more easily.

1. Project Objectives

The land management practice information project is primarily a documentation project about spatial information needs to determine the uses for land management practice information. The objectives of the project are set out in the Project Brief to the Bureau of Rural Sciences and require the NSW Department of Natural Resources to:

1. Identify agencies currently collecting land management practice information and describe the attribute data being collected;
2. Identify additional agencies, regional Catchment Management Authorities (CMA), peak irrigation groups, peak industry groups and major regional councils with needs for land management data;
3. From workshops with representatives of agencies, regional catchment management authorities, peak irrigation groups, peak industry groups and major regional councils;
4. Retrieve any available spatial data sets and store in a central location;
5. Summarise results;
6. Confirm and circulate conclusions with agencies, regional CMAs, peak irrigation groups, peak industry groups and major regional councils;

The project will focus on land management practice information that is needed and used for planning, benchmarking, reporting and evaluating catchment management programs, state of the environment reporting and monitoring of natural resources. Through workshops with agencies, private and community groups and various other agricultural industries the project delivers:

- A report on NSW state and regional drivers and needs for land management practices information, forming a 'wish' list, generated from all groups that are interested in natural resources and their management;

- A report providing a fully developed proposal to complete a pilot study or pilot studies in NSW for the mapping of land management practice information.

For more detailed information about the outputs and products that this project provides, Schedules 2 and 3 of the Deed of Grant can be viewed in the Appendices.

2. Project Methodology

A series of workshops have been held with a cross section of groups interested in natural resource management, agricultural production and environmental management. Groups include government organisations, commercial and private organisations such as peak industry and irrigation groups, and community groups. It is important to ensure that the information gained is of the widest possible latitude, considering the various management directions upon which each group is focused.

While some groups are strategic and process oriented in their approach to natural resource issues and the demands for land management practice information, other groups are reactive and extension orientated. These differences in approach reflect the responses by the various groups.

2.1 GOVERNMENT ORGANISATIONS

Government agencies in NSW focus on the social, economic, political and environmental drivers in natural resources management issues, expressed most strongly through the planning and reporting roles of catchment management authorities, and the agencies that support them. The agencies focus at the state level and provide a uniform approach across the state, ensuring common standards within the catchment management authorities, industry groups and other government agencies.

2.2 INDUSTRY GROUPS

The various private and commercial organisations provide a focus on the current economical drivers that concern the farming community about natural resource management. They are mostly restricted to particular industries (eg dairy, sugar cane, tropical fruits) or industries that involve a common form of production (eg irrigation).

Where groups are responsible for irrigation activities, the organisations can operate at the local level (eg Macquarie River Food & Fibre within the Macquarie River Catchment) or at the state level (NSW Irrigators' Council). Principal concerns of both groups are the need for the industry as a whole to adopt best management practices and to be able to report these to the general community.

2.3 COMMUNITY GROUPS

Landcare and other community groups are major players within the natural resources management arena and give insight at the local level into the production, economic and environmental concerns of the farming community.

2.4 WORKSHOP PROCESS

The workshop process is greatly reliant on the support from district officers within the Department of Natural Resources, to provide contact names of the relevant personnel to attend each workshop. In some cases, agencies staff arranged all aspects of the meetings.

Meetings were held on an informal basis. When working with staff that are not fully acquainted with the work done by a particular organisation or group, it's important to involve a second officer from one of the agencies who is familiar with the industry or activity and has particular knowledge of current land management practices. This allows for deeper insights into the work of organisations or groups resulting in more thorough and detailed representation of responses.

Information about each person attending the workshops is recorded (see Table 1, below) to provide the context of the responses and to allow questions to be directed to specific individuals. It also becomes an important piece of information when staff changes occur and the successor in a particular position may hold different opinions.

Table 1. Summary of contacts that attended workshops – organisation, staff name and position.

Organisation	Staff Name	Staff Position
Catchment Management Authority	Allan Nicholson	Implementations Manager
	Alan McGufficke	Planning Unit Manager
Central West	Kieran Hawker	Catchment Coordinator
Hawkesbury Nepean	Dom Nowlan	Project Officer
Hunter and Central Rivers	Kelvin Langfield	Project Officer
Lachlan	Ian Packer	Senior Project Officer
Murrumbidgee	Sian McGee	Implementations Manager
Namoi	John Hutchinson-Smith	Catchment Coordinator
Northern Rivers	Aaron Smith	Catchment Coordinator
Southern Rivers	Steve Watts	Project Officer
	Liz De Vries	Monitoring and Evaluation Officer
	Simon Proust	Catchment Coordinator
	Peter Roberts	Catchment Officer
	Greg Bugden	Implementations Manager
	Daryl Green	General Manager
Macquarie River Food and Fibre	Jessica Brown	Executive Officer
Border Rivers Food and Fibre	Bruce McCollum	Executive Officer
Irrigation Districts	Andrew Glasson	Coordinator
Jemalong Irrigation	Sally Duff	GIS Officer
Murray Irrigation Limited	Michael Pisasale	Land and Water Management Supervisor
	Peter King	GIS Administrator
	Demelza Brand	Environmental Officer
Porktech and Frork Enterprises	David Cooke	Pork Industry Consultant
Department of Planning	Alison McGaffin	Team Leader Planning
Barwon Region	Tim Deverell	Regional Planning
Central West Region	Alison Holloway	Manager, Assessments and Approvals
Murrumbidgee Region		Assessments and Approvals
North Coasts Region	Peter Adrian	Manager, Policy & Strategic Assessment
South Coast Region		Assessments and Approvals
Far West Region	Michael Moore	Assessments and Approvals
	Nathan Wort	Planning Officer
	Claire Aman	Planning Officer
	Paul Pendlebury	Planning Officer
	Dugald Black	Manager Resource Processes
	Ross Garsden	Integrated Planning
	Lois Gray	Sustainable Developments
	Mark Lodder	Planning Officer
Department of Natural Resources	Natasha Herron	Natural Resource Officer
	Mark Littleboy	Senior Natural Resource Officer
Barwon Region	Greg Raisin	Manager Resource Access
Central West Region	Madhwan Keshwan	Team Leader Groundwater
Murray and Murrumbidgee Region	Geoff Fishburn	Executive Director, Coastal, Rural and Regional
North Coasts Region	Jeff Bradley	Implementation
South Coast Region	Robert Gibson	Regional Compliance
Far West Region	Tony Roper	Manager Science and Information
	Fred De Closey	Manager Resource Information
	Chris Presland	Coasts and Estuaries
	Raquel LaRosa	Hydrologist
	Richard Green	Hydrogeologist
	Sue Rea	GIS Coordinator
	Greg Lollback	Resource Access
	Dave McPherson	Resource Analysis
	Katrina O'Reilly	Manager Compliance
	Stephen Raft	Natural Resource Officers
	Peter Flaskis	Natural Resource Officers
	Tom Grosskopf	Manager Sustainable Farming Systems
	Terry Brill	Senior Natural Resource Officer
	Craig Wood	Natual Resource Project Officer
	Kerryn Stephens	Senior Natural Resource Officer, Coastal Management
Department of Primary Industries	Jan Edwards	District Agronomist
	Michael Micklemore	Weed Control Coordinator
Central West Region	Rik Whitehead	Agricultural Environment Officer
Murrumbidgee Region	John Francis	District Agronomist
Southern Tablelands Region	Luke Beange	Sustainable Grazing of Saline Land (SGSL) Coordinator
North Coast Region	Justin Hughes	SGSL Research Officer

Organisation	Staff Name	Staff Position
	Warren King	SGSL Program Manager
	John Lacy	Management Practice Coordinator
Department of Environment and Conservation	Sonja Ardill	Conservation Planning Coordinator
	Gary Saunders	Crown Lands Assessment Officer
Central West Region	Miranda Kerr	GIS Officer and Botanist
Sydney Catchment Authority	Alan Benson	Manager – Coordination and Technical Services
	Nick Sharp	Spatial Database Analyst
NSW Irrigators' Council	Doug Miell	Chief Executive
Greening Australia ACT and South East NSW	Susie Wilson	Environmental Services Manager
Cowra Woodland Birds Program	John Rankin	Committee Chair
Rural Fire Services	Graham Douglas	Community Hazards Management
	Katie Collins	Senior Planning Officer
	Simon Heemstra	Natural Environmental Services
Landcare Australia	Jenny Quealy	National Manager
	David Hehir	Landcare Partnerships
Department of Lands	Jim Thompson	Crown Lands Assessment Officer
Regional Landcare Committees	Dick Walker	Chairman
Gwydir and Macintyre	Jessica Harrison	Landcare Coordinator
Coffs Harbour	Vicki Higgins	Office Administration
	Jenny Malchrone	Landcare Coordinator
Cotton Research and Development Corporation	Dallas Gibb	Research Program Manager
Resource Consulting Service	Richard Groom	Senior Consultant
	Sean Martyn	Director
Tamworth Regional Council	David Lewis	Development and Regulatory Services
	Genevieve Harrison	Planning Policy

2.5 RECORDING OF WORKSHOP RESULTS

Workshop results were recoded within a structured format (see Appendices – Workshop Notes) clearly summarising the responses from an organisation or work groups within an organisation.

In small organisations, only one or two people were interviewed. In larger organisations, particularly government agencies where there are a range of statutory responsibilities, a number of groups were interviewed. The interview sheets recorded the following information:

Contact Information:	Organisation and contact details (name(s) of individual(s) interviewed, address of organisation, telephone and fax numbers)
Date of Interview	## - Month - Year
Details on Land Management Drivers	The drivers for land management practice information, information issues and information needs. This also included the types of natural resource management questions that where asked.
Existing Information	Details on existing data sets
Preferred Area(s) for Pilot Study	Any correlations with other investigations already being conducted.
General Notes	Additional information supplied that could not be covered in any other section.
Project Contacts	Contact details of Project Officers

3. Land Management Practice Information

The workshop process generated a large amount of information based on particular activities that can be carried out under the general term of "land management practices".

It became apparent that many of the people interviewed confused or blurred three separate terms: land use, land management practice and land condition. Responses to questions showed that in some cases the information required is more about land condition rather than land management practice or it is about land use and not land management practice. Information on weed infestations is a prime example because it can be a stated information need under any of the three categories.

The project correlated some of the similarities between land management activities and arranged them into a hierarchical format. This organised them into a logical format to help standardise the description of land management practices. The format has three levels and can be used in the same manner as an identification key.

The levels identified are broadly based on the attribute process used by the Department of Natural Resources in the development of a Land Management Database to record existing and proposed land management activities across New South Wales. The format consists of a category, sub-type and activity to form the three levels.

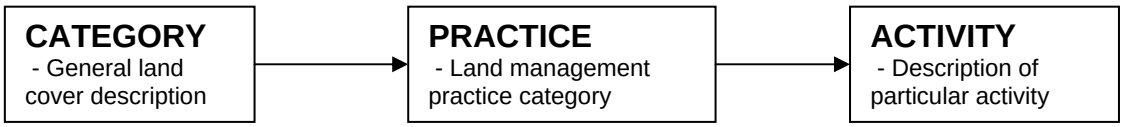

Figure 1. Example of the hierarchy used for the Land Management Practice attribute list.

This format would provide a means in which a one-to-many relationship could be linked between parcels of land, linear infrastructure or point sampling features to the various activities within each land management practice category. Below are examples of detailed descriptions for CROPPING, GRAZING or FORESTRY practices:

Photograph 1: Example of a cropping practice in the Grenfell district, Central West NSW.

Land Use Description

Time controlled grazing to retain 100% ground cover and 70% perennial species.

2500 sheep grazed for wool production in a 8 hectare paddock for 12 grazing hours.

Pasture mixture of perennial and annual species comprising naturalised, native and exotic species.

Species list includes phalaris, tall fescue, chicory, redgrass, *Microlaena* sp., wallaby grass, balancia clover and white clover.

Photograph 2: Example of a grazing practice in the Boorowa district, Central West NSW.

No tillage is maintained between sowing rows with a single pass of machinery, general herbicide is applied five days before sowing in this 134 Ha paddock.

Land Use Description

Controlled traffic with direct drill machine with cropping rotations to maintain soil health and structure, by increasing organic matter.

Cropping rotation includes four years of pasture and seven years of crop with wheat, canola, wheat, wheat, lupins, canola then wheat**.**

Stubble is retained and only mechanically controlled by knocking over with a metal bar.

Photograph 3: Example of "white box" woodland in the Cowra district, Central West NSW

Land Use Description

Existing native vegetation managed to preserve and enhance the condition of White Box woodland in a 43 hectare paddock.

Occasional grazing with sheep (240 dry sheep equivalents) for meat and wool production is used to control fire hazard and to generally reduce other hazards.

The woodland is of moderate condition with 2 native tree species, 2 native shrub species and native groundcover species.

Photograph 4: Example of established vegetation north of Cowra, Central West NSW

Land Use Description

Planted vegetation for the control and interception of saline groundwater. It forms part of an alley farming system with alternate rows of trees and pasture or opportunity cropping.

Single native tree species (Blakely's Red Gum) not endemic to the area planted on five-meter spacings during autumn of 1999 with an understorey of naturalised annuals.

The hierarchy can be expanded to more levels depending on the ease of attribution of spatial references. The intention is to link the land uses and their particular management practices with a

spatial reference. The use of a multiple attribution process would make this relationship as flexible as possible.

4. Workshop Results

While conducting workshops, common interest areas and issues started to arise, some of these where only important to certain types of contact groups. Some groups where found to have more interest in state wide issues where other groups were more concerned with regional or locally focused issues.

Although not all groups expressed common information needs within these drivers. Information needs for each group were collated into broad activity descriptions (Appendix 7.4) and found that Management of Vegetation (65%) had the most groups interested, with Water Testing (63%), Nature Conservation (61%), Benchmarking (61%), Establish Vegetation (59%) and Riparian Management have many of the groups interested also.

There were several activities that were of little interest to the group of organisations, but these were activities which are particular to that region or organisation. For example Rangeland Rehabilitation (4%) was of interest to organisations from the Western part of New South Wales.

The commonalities of drivers amongst the various groups was recorded (Table 2) and showed that similar drivers were identified across all the workshops.

Table 2. Organisations involved in workshops and a summary of their relevant drivers.

Drivers	Organisation
Policy Development	Clarence River Fisherman's Cooperative
Media and Promotion	Macquarie River Food and Fibre
Water Sharing	Border Rivers Food and Fibre
Development of Programs	Cowra Woodland Birds Program
Benchmarking	Landcare Australia
Crown Lands Management	Porktech and Frork Enterprises
Native Vegetation	Department of Natural Resources[2]
Carbon Trading	Department of Planning[3]
Planning – State Wide	
Statutory Planning	Department of Natural Resources[2]
Strategic Planning	Department of Planning[3]
Crown Lands Management	Department of Primary Industries[4]
Native Vegetation Management	Local Government[5]
Development of Models	Landcare Australia
Carbon Trading	
Risk and Hazard Assessments	
Planning – Regional and Industry	
Land and Water Management Plan	Department of Natural Resources[2]
Water Sharing Plans	Department of Planning[3]
Local Environmental Plans	Department of Primary Industries[4]
Native Vegetation Management	Local Government[5]
Environmental Management Systems	Jemalong Irrigation
Best Management Practices	Murray Irrigation Limited
Property Management Plans	Cotton Research and Development Corporation
Crown Lands Management	Department of Environment and Conservation
Benchmarking	Greening Australia
Targeted Investment	Clarence River Fisherman's Cooperative
Disease and Pests	John Sykes Rural and Tim Paramore Agronomic Consultants
Planning – Local	
Project Planning	Department of Natural Resources[2]
Best Management Practice	Department of Planning[3]
Capacity Building	Department of Primary Industries[4]
Crown Lands Management	Local Government[5]
Native Vegetation Management	Department of Environment and Conservation
Property Management Plans	Regional Landcare Committees[6]
Environmental Management Systems	Cotton Research and Development Corporation
Local Environment Plans	John Sykes Rural and Tim Paramore Agronomic Consultants
Weeds, Pests and Diseases	
BASIX	

Drivers	Organisation
Monitoring and Evaluation – State Wide	
Service Level Agreements between DNR and CMA's	Jemalong Irrigation
Benchmarking	Murray Irrigation Limited
Statutory Evaluation	Department of Primary Industries[4]
Crown Lands Management	Greening Australia
Native Vegetation Management	Landcare Australia
Monitoring and Evaluation – Regional	
Water Sharing Plans	Jemalong Irrigation
General District Knowledge	Murray Irrigation Limited
Weeds Mapping Program	Catchment Management Authorities[1]
Benchmarking	Department of Primary Industries[4]
Crown Lands Management	Department of Natural Resources[2]
Native Vegetation Management	Clarence River Fisherman's Cooperative
Risk and Hazard Assessments	
Monitoring and Evaluation – Local	
Land and Water Management Plans	Catchment Management Authorities[1]
Benchmarking	Department of Natural Resources[2]
Capacity Building	NSW Natural Resources Commission
Crown Lands Management	Jemalong Irrigation
Environmental Management Systems	Murray Irrigation Limited
Native Vegetation Management	Greening Australia
Trend Analysis	
Auditing and Compliance	
Reporting – State Wide	Department of Natural Resources[2]
Reporting on Incentive Program Activities	Department of Planning[3]
Native Vegetation Extent	Department of Primary Industries[4]
Statutory Reporting	Local Government[5]
Water Quality	Department of Environment and Conservation
Land and Water Audit	Landcare Australia
Plantations and Floristries	Catchment Management Authorities[1]
Reporting – Regional	
State of the Environment Reporting	Rural Fire Services
Rural Fires Act 1997 **-** Sections 52, 63 and 66	Regional Landcare Committees[6]
Water Quality	Department of Natural Resources[2]
Capacity Building	Catchment Management Authorities[1]
Native Vegetation Extent	Department of Primary Industries[4]
District Knowledge	
Reporting – Local	Department of Natural Resources[2]
Water Sharing Plans	Department of Planning[3]
Capacity Building	Department of Primary Industries[4]
Native Vegetation Extent	Local Government[5]
Past Projects	Department of Environment and Conservation
Water Quality	Catchment Management Authorities[1]
Funded CMA Activities	Greening Australia
Land and Water Management Plans	Regional Landcare Committees[6]
Landcare Activities	
Public Image and Promotion	
Lobbying	Macquarie River Food and Fibre
Promotion of Best Management Practice	Border Rivers Food and Fibre
Information Delivery	Landcare Australia
Public Relations	Porktech and Frork Enterprises
Carbon Abatement	
Trace Back	Department of Natural Resources[2]
Occupational Health and Safety	Cotton Research and Development Corporation
Best Management Practices	Porktech and Frork Enterprises
Habitat Security	Catchment Management Authorities[1]
Environmental Management Systems	Landcare Australia
	Clarence River Fisherman's Cooperative
Capacity Building – Training	Department of Environment and Conservation
Natural Resource Management	Sydney Catchment Authority
Vegetation Management	Greening Australia - ACT and South East NSW
Local Environmental Plans	NSW Irrigators' Council
Community Capacity	Porktech and Frork Enterprises
Occupational Health and Safety	Catchment Management Authorities[1]
Psycho-Social Mapping	Department of Natural Resources[2]

Drivers	Organisation
Capacity Building – Education	John Sykes Rural and Tim Paramore Agronomic Consultants
Crown Lands Management	Catchment Management Authorities[1]
Best Management Practices	Regional Landcare Committees[6]
Water Quality Management	Cotton Research and Development Corporation
Native Vegetation Management	Greening Australia
Social Characterisation	Department of Natural Resources[2]
Capacity Building – Awareness	
Best Management Practice	Regional Landcare Committees[6]
Capacity Building	Catchment Management Authorities[1]
Information Provision	Greening Australia
Native Vegetation Management	Clarence River Fisherman's Cooperative
Landholder Networks and Attitudes	Cowra Woodland Birds Program

1. Participating regions included the Central West, Barwon, North Coast, Sydney South Coast, Murrumbidgee, Head Office North Coast and Far West.
2. Participating CMA's included the Lachlan, Central West, Western, Murrumbidgee, Namoi, Northern Rivers and the Hawkesbury Nepean.
3. Participating regions included the Central West, North Coast, Barwon, Sydney South Coast, Head Office and the Murrumbidgee.
4. Participating regions included the North Coast, Cowra and Murray.
5. Tamworth and Byron Bay Regional Councils.
6. The regional Landcare committees included Coffs Harbour regional and the Gwydir McIntyre catchments.

Since conducting these workshops there have been administrative changes within NSW. The former Department of Infrastructure Planning and Natural Resources has been split into the Department of Planning and the Department of Natural Resources with the infrastructure functions being absorbed into the Premiers Department. All workshop sheets and results reflect these new administrative arrangements.

4.1 EXISTING DATASETS AVAILABLE

In NSW, data sets on land management practices are patchy. Agencies or groups have collected information relevant to individual management decision needs, focusing on particular areas of interest. However most datasets may only cover a narrow range of Land Management Practice Information related to particular themes and may be incorporated into some land use data sets. The principal datasets are held by:

Department of Natural Resources

- Component elements of land use and salinity outbreak datasets
- Land condition mapping (North Coast region)
- Range land assessment program (Far West region)

Department of Primary Industries

- Cropping, irrigation and grazing practices (mainly textual with no spatial information)
- Fisheries, Mining and Forestry management practices for particular areas
- Contaminated livestock dip sites (North Coast)

Catchment Management Authorities

- Funded works and on ground activities
- Historical inventory of on ground activities and funded works (HNCMA)
- Cropping practices and grazing management (Liverpool Plains, Central West CMA region)

Irrigation Authorities (Murray, Jemalong, Coleambally, Murrumbidgee)

- Water use and crop type for paddocks (irrigation districts and SUNRISE dataset)
- Funded water use efficiency works and on ground activities (districts)

Department of Environment and Conservation

- Voluntary Conservation Agreements (Range Lands and Macquarie Marshes)

Because of the varied nature to which these datasets where collected, there are parts of each dataset that are for public access and other parts that are not available within the public domain. The publicly accessible parts of datasets are readily available, but all other data will need to have individual data access agreements attached. These data sets may also have limited access at this stage for a number of reasons:

- The data are held on individual systems and in some of the organizations it is held on individual personal computers and not on a central system
- The data may be a component of other data sets and will need to be retrieved and stored separately
- Some organizations place a cost on the supply of their data sets to outside groups, particularly if they have paid for the original collection of the data
- Privacy concerns by individual organizations particularly if the data are collected at the property level.

For more information about data access to individual datasets please refer to the Appendices (Appendix - Data Access Requirements)

4.2 THE QUESTIONS ASKED

There is substantial commonality between the needs of government organisations and private groups for land management practice information. In some cases, the information required overlapped directly whilst in other circumstances the information required is very specific to an individual user. This is evident when the questions driving the demand for land management practice information are organised according the type of agricultural activity. For each type of activity the questions asked are:

Cropping Activities:
- "Which farmers have taken on conservation farming?"
- "What enterprises are farmers involved in currently?"
- "Which farmers are using chemical fallows?"

Irrigation Activities:
- "What is the water quality into and out of irrigation districts?"
- "How much priority river water is needed to keep native habitats viable?"

Intensive Animal Production:
- "How can we identify where the best places are for intensive poultry enterprises?"

Funded On-ground Works
- "What on-ground works have occurred prior to the implementation of CMA projects?"
- "What activities are occurring without CMA funding?"
- "Why aren't farmers interested or not applying for incentive funding?"

Capacity for Change:
- "What are the motivations or drivers for change within farmer communities?"
- "What indicators can be used to report on condition analysis?"
- "What psycho-social information can be related to farm enterprise decisions?"

Conservation Activities:
- "Can erosion potential be defined by using LMPI?"
- "What are the effects of litter and ground cover on soil health?"

Forestry and Plantations
- "What type of forestry is occurring, how much and from where?"
- "What forestry activity is occurring under the clearing exemptions laws?"
- "What types of products are produced from the timber and the destination of the timber products?"
- "Where and how are the forest estates is being expanded?"

Product Tacking
- "What sorts of information do we provide to the consumer so they buy our products?"

These questions highlight the various ways that agencies or groups would like to use land management practice data for monitoring, evaluation or reporting.

4.3 SUMMARY OF RESULTS

With such a large demand for a variety of land management practice information it is important to show the correlation between these demands and how it is arranged into some type of systematic format. The set of tables below assembles some of this information and presents it in a hierarchical sequence using **PRACTICE** as the first level and **ACTIVITY** as the second level of organisation.

Conservation Practices – Land used primarily for conservation purposes, based on the maintenance of the essential natural ecosystems present.

PRACTICE	ACTIVITY
Heritage Areas	Aboriginal Heritage Site
	Torres Straight Islander Heritage Site
	Post European Heritage Site
Nature Conservation	Strict nature reserve
	Wilderness area
	National park
	Voluntary conservation agreement
	Registered property agreement
	Cultural significant vegetation
	Wildlife protection
	Site fenced
	Site not fenced
	Natural Feature Protection
	Section 10 project area
	Heritage agreement
Managed Resource Protection	Biodiversity Surface water supply Groundwater Landscapes

Cropping Practices – Land used for primary production, based on dryland farming systems.

PRACTICE	ACTIVITY
Application of Ameliorants	Phosphorus based fertilisers
	Trace Nutrients
	Gypsum
	Sulphur
	Mulch (with straw, hay, wattle branches or other vegetation)
	Bio-solids
	Organic fertilisers including green material
	Lime
	Nitrogen based fertilisers
Benchmarking or Monitoring	Soil Testing – complex
	Soil Testing - pH, EC and texture
Conversion and Purchase	No tillage Convert machinery Purchase machinery Direct drill
Cropping Machinery	Prickle Chain Press Wheel Straight Disc Roller Tyre Roller Offset Disc K-Line Screw Scarifier Knife Edge Winged Knife Edge
Crop Rotation Activities	Under sow pasture into a crop Opportunistic

	Includes pasture phase No particular rotation Rotational Continuous Stubble Burn Chemical fallow Knock over Spraying Stubble retention Intercropping - cropping with Lucerne Mechanical (disc plough) Grazing of stubble Leave alone Days before sowing
Chemical Usage	Glyphosate Post emergent Pre emergent
Crop Tillage Activities	Reduced tillage No tillage (knife edge) Precision Agriculture Direct Drill Controlled traffic Minimum tillage Raised Beds Zero Tillage (straight disk)
Crop Type (Broad Acre)	Wheat – dual purpose Wheat Canola Lupins Oats – fodder grain Oats Triticale High density Clover Fibre Sorghum Rice Beverage crop Irrigated Hay and silage Cotton Tobacco Spice crop Sugar Cane Cereal Seed Oil Legume

Farm Planning – Land management practices that support farm management decisions

PRACTICE	ACTIVITY
Adjacent Lands	Alley farming
	Organic
	Contour band farming
	Other accreditation
	Biodynamic
Benchmarking or Monitoring	Soil Testing – complex
	Soil Testing - pH, EC and texture
Farm Infrastructure	Machinery shed and surrounds
	House and homesteads
	Lane way – stock movements Permanent Fence - boundary Fence - internal

	Electric Gate Cattle grid
Farm Water Supply	Water trough Dam Plastic (trough or tank) Concrete (trough or tank) Pump (electric) Pump (other) Pipe – low pressure Pipe – high pressure Tank (size in ML) Drilling for bore (deep) Drilling for well (shallow) Alternative water supply Upgrade to current system
Farm Labour	Full Time
	Part Time
	Milkers
	Pickers (fruit, veggies, grapes etc.)
	Seasonal
	Permanent
	Shearers
	Shed hands
	Spraying
	Harvesting
Remainder of Property	No further treatment needed Further treatment required

Fencing – Land management activities that support the management of other on-ground activities

PRACTICE	ACTIVITY
Fence	Temporary Permanent Boundary Barbed wire Plain wire Ring-lock (Waratah) Chicken wire (generic) Metal Wood Posts Strainer posts Concrete Internal Existing Electric Removal of fence

Grazing Practices – Land used for primary production, based on dryland grazing systems

PRACTICE	ACTIVITY
Application of Ameliorants	Phosphorus based fertilisers
	Lime
	Trace Nutrients
	Gypsum
	Sulphur
Benchmarking or Monitoring	Soil Testing – complex
	Soil Testing – pH, EC and texture
Grazing Type	Grazing days
	Set Stocking
	Irrigated
	Spraying

	Mechanical (disc plough) Grazing of stubble Occasional Grazing Cell Grazing Rotational No Grazing
Chemical Use	Glyphosate
	Herbicide
	Pesticide
	Post sowing
Pasture Component	Naturalised pasture (not sown)
	Annual species
	C4 – winter dominant
	C3 – summer dominant
	Shrub – grazing
	Number of perennial species
	Sowed
	Crop stubble
	Clover based pasture
	Salt Tolerant
	Acid Tolerant
	Exotic pasture species
	Native species (percentage cover)
	Perennial species (percentage cover)
Stock Type	Goat – Meat
	Goat – Dairy
	Sheep – Dairy
	Sheep – Wool
	Sheep – Meat (inc. fat lambs)
	Cattle – Dairy
	Cattle – Meat
	Pig
	Self Replacing
	Alpacas – Fibre
	Cattle
	Sheep
	Goat – meat
	Stud enterprise
	Horse
	Goat – Wool
	Alpacas
	Other

Horticulture – Land used for primary production, using intensive agricultural systems

PRACTICE	ACTIVITY
Annual	Flowers
	Bulbs
	Vegetables
	Shrubs
	Irrigated
	Herbs
	Nuts
	Fruits
	Herbs
	Vines
Intensive Activities	Shade house
	Glass house
	Irrigation
	Water stressing
	Glass house - hydroponic

	Netting
Perennial	Bananas
	Macadamias
	Almonds
	Cherries
	Vines
	Tree
	Nuts
	Fruits
	Shrub
	Coffee
	Berries
	Grapes – wine
	Grapes – table
	Flowers
	Bulbs
	Vegetables
	Aloe Vera
	Jojoba
	Herbs
	Pine Nuts
	Irrigated

Infrastructure – Land used primarily to support commercial and urban environments

PRACTICE	ACTIVITY
Commercial and Manufacturing	Mechanical repairs Skin processing Metal fabrication Furniture manufacturing Fuel depot Service station Abattoir Pet food production Cannery
Recreational	Park or playground Swimming pool Community areas
Residential	Urban Rural
Power Distribution	Sub Station Power lines
Power Generation	Coal-fired Power Station and surrounds Gas-fired Solar powered Hydroelectric powered Storage Wind powered Gas treatment
Transport	Main Road Connector Road Highway Airports Ports or Docks Stock Route Tar Concrete Gravel Bush Track Wharfs and Jetties Railway

	Airstrips Aerodrome Navigation Station or Tower Motorway Free Way 4WD Track
Water	Water storages - drinking Water treatment Size (ML) Supply aqueduct Water quality Fluorine added Water mains pipe Water metres Chlorine added
Waste and Sewage	Solid waste Tertiary Treatment Primary treatment Secondary Treatment Land fill Onsite septic tanks Unlicensed Sewer pipes Pipe (diameter) Concrete Plastic Aerated Composting Effluent Pond Hazardous waste Incinerator Sewerage Plant Grey Water Recycling Liquid waste

Intensive Animal Practices – Land used for primary production, using intensive systems that require high inputs of nutrients

PRACTICE	ACTIVITY
Accommodation	Sheds
	Free Range
	Kennel
	Feed Lot
	Deep litter Shed
	Flushing System
	Yards
	Outdoor System
	Cooling System
	Sale Yards
	Conventional shed
Feed Type and Storage	Barley
	Oats
	Organic additives
	Biodynamic additives
	Wheat
	Fodder grain Silo
	Synthetic additives
Stock Composition	Pigs – breeders
	Pigs – meat
	Pigs – piglets
	Poultry – eggs
	Poultry – breeders

	Poultry – meat
	Goats – meat
	Dog – breeding
	Dog
	Horse – training
	Horse – breeding
	Sheep – meat
	Aquaculture
	Cattle – meat
	Dairy – Goats
	Dairy – Sheep
	Dairy – Cows
Waste Storage and Treatment	Off-site Spreading
	On Farm Spreading
	Anaerobic Treatment Ponds
	Turkey Nest
	Liquid
	Solid
	Effluent dam
	Waste Mounding

Irrigation Practices – Land used for primary production, using irrigation management systems that underpin grazing, cropping, horticulture or other management practices.

PRACTICE	ACTIVITY
Tail Water Management	Recycle
	Evaporation Basin
	Irregular
Water Application	Spray
	Flood
	Low Level Spraying
	Subsurface
	Furrow
	Pivot
	Overhead
	Drip
	Travel
	Micro-sprinkler (micro-spray, micro-jet)
Water Distribution Infrastructure	Surface drain
	Channel sealing
	Pipping of Channel
Water Use Efficiency	Soil Moisture Probe
	Laser Levelling and land forming

Mining and Quarrying – Land used for extractive industries

PRACTICE	ACTIVITY
Lease Status	Closed
	Approved or Current
	Derelict
	Exploration and Survey
Extractive Process	Mine
	Quarry
	Under Ground
	Open Cut
	Over-burden dump
	Tailings

Monitoring and Research Activities – Land used for research and analysis

PRACTICE	ACTIVITY
Area of Interest	Acidity
	Water table height
	Investigation
	Monitoring and analysis
	Research
	Pasture establishment
	Soil characteristics
	Ground water monitoring
	Surface water
	Bed rock analysis
	Depth to bedrock
	Tree establishment
	Carbon sequestration
	Salinity
Drilling	Bore (deep) Monitoring Bore (piezometer – shallow) Relative recharge Probe (CSIRO) Soil sampling (deep) Capacitance probe Bed rock sampling
Site Specific Activities	Surface runoff simulation
	Water Quality Survey Point
	Soil testing - Soil moisture Probe
	Soil Testing – complex
	Soil Testing - pH, EC and texture
	Soil testing - Infiltration Rates
	Relative recharge Probe (CSIRO)
	Dry Matter – analysis
	Percentage groundcover

Paddock Management Practices – Land management activities that support paddock scale decisions.

PRACTICE	ACTIVITY
Management Type	Accredited Permaculture Alley farming Management of pastures, crops and vegetation in contour bands Organic Biodynamic
Paddock Specific Activities	Surface runoff simulation
	Water Quality Survey Point
	Soil testing - Soil moisture Probe
	Soil Testing - complex
	Soil Testing - pH, EC and texture
	Soil testing - Infiltration Rates
	Relative recharge Probe (CSIRO)
	Dry Matter - analysis
	Percentage groundcover

Pest and Weed Management – Land management activities that support the control of local pest and weeds.

PRACTICE	ACTIVITY
Pest Control	Low success rate
	Mechanical
	High success rate
	Poison bait
	Biological
Pest Type	Pig

	Cat
	Fox
	Rabbit
	Horse
	Goat
	Other
Weed Control	Fire
	Complete removal
	Chemical
	Removal of bitou bush
	Low success rate
	Stump to remain
	Tree to remain
	Heavy stocking rate
	Mechanical
	Biological
	High success rate
Weed Type	Camphor laurel Blackberry Hawthorne Bitou bush
	Coolatai grass
	Willow
	Privet
	Bracken Fern
	Carpet Grass
	Parramatta grass
	Bladey grass
	Other (weed
	Lantana

Drainage System and Water Bodies – Land associated with drainage systems or natural and man-made storages.

PRACTICE	ACTIVITY
Type	River
	Creek
	Estuary
	Dam
	Marsh or Wetland
	Reservoir
	Third-order Stream
	Lake

Soil Conservation Practices – Land management activities primarily used to protect against the degradation of soil resources.

PRACTICE	ACTIVITY
Conservation Works	Dredging
	Gully control structure
	Effluent trap
	Diversion bank
	Effluent dam
	Farm dam
	Gully shaping
	Irrigation dam
	Drainage and de-watering system
	Flume (concrete & rock)
In Stream Works	Fish ladder
	Board walk access
	Stock access Site
	Structural readjustment

	Bed or bank stabilisation (riparian improvements)
	Graded banks and waterways
	Re-snagging
	Stabilised water course crossing
	Realignment of watercourse
	Weir removal
	Boat ramp
Other Structural Works	Raise road access
	Removal of works
	Effluent management work
	Artificial wetland
	Storm water controls
	Levee
	Sewerage pump-out
Rangeland Rehabilitation	Contour furrowing
	Water ponding

Training and Education – Land management activities undertaken by one landholder specific to training and education.

PRACTICE	ACTIVITY
Focus Issue	Irrigation management
	Farm planning
	Soil health
	Permaculture
	Organics
	Native vegetation management
	Biodynamics
	Native pasture management
	Forestry (farm and agroforestry)
	Animal production
	Grazing management
	Cropping management
Provider	Private consultant
	Community group
	Government agency
	Private company
	University
	Farm planning
	TAFE
Background	Secondary certificate
	Tertiary qualifications
	Certificate IV
	Diploma
	Degree
	Masters
	Started but not completed
Type	Training Course
	Workshop
	Seminar
	Mentoring
	Bus Tour
	Field Day
	Conference

Vegetation (trees, shrubs etc.) – Land used and managed for vegetation re-establishment, conservation or regeneration.

PRACTICE	ACTIVITY
Establish Vegetation	Native spp., endemic to area Trees Salt bush

	Salt tolerant Tube stock Native spp., not endemic to area Pinus species Acid tolerant Includes understorey spp. No understorey Native species Single species Mixed species Salt tolerant Exotic species – other than Pinus Eucalyptus species Shrubs Acid tolerant Seedlings Sown Hydro-mulch Direct seeding Bitumen Long-stem tube stock Pasture Natural regeneration Mounding Hiko Cells (younger tube stock)
	Irrigated once at planting
	Herbs and groundcover
	Spread
Management of Vegetation	Occasional grazing
	Burn or fire (managed)
	Irrigated – Seasonal
	Hazard reduction
	Seed Production
	Exclusion of stock
	Vegetation community change
	Fuel reduction
	Thinning
	Species enhancement
Plantations and Forestry	Hardwood
	Softwood
	Furniture and cabinets
	Thinning
	Pulpwood
	Planted vegetation
	Native forest
	Regeneration
	Private
	State Forest
	Age
	Sawmill and surrounds
	Milling waste (dumps)
Vegetation Community	Subtropical rainforest
	Dry rainforest
	Warm temperate rainforest
	Cool temperate rainforest
	Scrub
	Mallee
	Heath
	Saltbush
	Grassland
	Swamp

	Herb field
	Grass tree
	Wet Sclerophyll Forest
	Dry sclerophyll forest
	Swamp sclerophyll forest
	Tall woodland
	Savannah woodland
	Shrub woodland
	Age of dominant species
	Sub alpine woodland
	Heath woodland
	Pine plantation (*Pinus radiata*)

4.4 RECOMMENDATIONS

The unique situation with Land Management Practices Information is that it can be used to develop surrogate data sets to infer Land Use, changes in management practice, soil condition mapping, vegetation and ground cover , vegetation health, vegetation type and vegetation condition just to name a few. For these reasons LMPI should be an integral spatial dataset to support any natural resource management decisions. State wide LMPI data need to be collected on a regular basis, much like Land Use mapping.

The New South Wales Department of Natural Resources would recommend the following to begin the process of collecting LMPI on district, regional or state wide scales:

1. This report be accepted as a preliminary view of the needs and drivers for land management practice information in New South Wales, recognising that over time additional users and their requirements will be identified.

2. The importance of continuing this work at both the state and national levels is recognised. In New South Wales, one of the more immediate drivers for further action is in the field of monitoring and evaluation. Pressures are being exerted from the state and national governments for on-going monitoring, evaluation and relevance of the effectiveness of catchment action plans and targets. Land management practice information has a critical role in these activities.

3. The development of a national classification system to record land management practice information at regional, state and national levels is of high priority.

4. The development of techniques to record land management practice information in spatial format for use at regional, state and national levels is also one issue of high priority. Such techniques would need to consider the current work being undertaken by the Australian Bureau of Statistics (ABS) in its census surveys of land management activities. More detailed work by state and regional agencies should ensure that there are procedures in place to link to the more broad-scaled assessments by ABS.

5. Promote the concept of additional funding for projects to collect information on land management activities.

6. Promote within the federal bureaucracy the concept that reporting on environmental projects requires a spatial component as well as a text component. Information needs to be collected in a spatial format so that it can serve the purposes of detailed reporting of outputs and high level modelling of outcomes.

In New South Wales the initiation of pilot projects within Catchment Management Authority regions have begun with the Hawkesbury Nepean, Central West and Hunter Central Rivers Catchment

Management Authorities, which involve a number of other government agencies, community groups and industry bodies which provide input to the collection of LMPI.

5. References

Bureau of Rural Sciences (2002) *Land Use Mapping at the Catchment Scale, Principles, Procedures and Definitions*, 13-25. February 2002, Bureau of Rural Sciences, Canberra.

6. Abbreviations Used

BMP – Best Management Practice

BRS – Bureau of Rural Sciences

CMA – Catchment Management Authority

DEM – Digital Elevation Model

DNR – Department of Natural Resources

DPI – Department of Primary Industries

DEC – Department of Environment and Conservation

EC – Electrical Conductivity

ESS – Environmental Services Scheme

EMS – Environmental Management System

GIS – Geographic Information System

IDMP – Irrigation Development Management Plan

LMPI – Land Management Practice Information

MIL – Murray Irrigation Limited

ML – Mega litre

NHT – Natural Heritage Trust

PMP – Property Management Plan

PVP – Property Vegetation Plan

RIRDC – Rural Industries Research and Development Corporation

SGSL – Sustainable Grazing of Saline Lands

SGS – Sustainable Grazing Systems

7. Appendices

7.1 WORKSHOP NOTES

Table 3: List of all workshop note documents

DOCUMENT No.	ORGANISATION	ATTENDEES
1	Department of Planning – Head Office	Peter Adrian, Alison Holloway, Lois Gary and Michael Moore and Nathan Wort
2	Byron Bay Shire Council	Hank Bower
3	Department of Planning - Namoi	Alison McGaffin
4	Department of Natural Resources – Head Office	Dugald Black
5	Border Rivers Food and Fibre	Bruce McCollum
6	Department of Natural Resources – Murrumbidgee	Callan Pearson and Gregory Summerell
7	Coffs Harbour Regional Landcare	Jenny Malcrone
8	Cotton Research and Development Corporation	Dallas Gibb
9	Clarence River Fisherman's Cooperative	Barry Casson
10	Cowra Woodland Birds Committee	John Rankin
11	Catchment Management Authority – Central West	Allan Nicholson
12	Department of Natural Resources – Central West	Greg Raisin and Geoff Bradley
13	Department of Natural Resources – Central West	Madhwan Keshwahn, Tim Deverell and Robert Gibson
14	Department of Primary Industries - Agriculture	Jan Edwards
15	Department of Environment Conservation - Dubbo	Sonja Ardill, Gary Saunders and Miranda Kerr
16	Department of Natural Resources – Head Office	Ross Garsden
17	Department of Primary Industries - Fisheries	Adam Vey and Nicole McKeardy
18	Department of Natural Resources - Western	Richard Hicks, Sharon Hawke, Aaron Colbran
19	Greening Australia – Southern Tablelands	Susie Wilson
20	Gwydir and Macintyre Regional Landcare	Dick Walker, Jessica Harrison and Vicki Higgins
21	Department of Natural Resources - Murrumbidgee	Natasha Herron and Mark Littleboy
22	Catchment Management Authority – Hunter and Central Rivers	Anna Ferguson
23	Department of Natural Resources – Goulburn	Jim Armstrong
24	Catchment Management Authority – Hawkesbury and Nepean	Aaron Smith and Steve Watts
25	Jemalong Irrigation	Andrew Glasson and Sally Duff
26	Landcare Australia	Jenny Quealy and David Hehir
27	Catchment Management Authority - Lachlan	Dom Nowlan, Keiran Hawker and Kelvin Langfield
28	Catchment Management Authority - Lachlan	Alan McGufficke and Ian Packer
29	Murray Irrigation Limited	Michael Pisasale, Peter King and Demelza Brand
30	Catchment Management Authority - Murrumbidgee	John Searson, Greg Bugden, John Francis and
31	Macquarie River Food and Fibre	Jessica Brown
32	Catchment Management Authority - Namoi	Sheila Donaldson and John Hutchinson-Smith
33	Catchment Management Authority – Northern Rivers	Simon Proust and Peter Roberts
34	Department of Natural Resources – North Coast	Sue Rea, Breg Lollback, Dave McPherson, Claire Aman and Katrina O'Reilly
35	Department of Natural Resources – North Coast	Racquel La Rosa and Richard Green
36	New South Wales Irrigators Council	Doug Miell
37	Department of Natural Resources – Head Office	Paul Pendlebury
38	Porktech Consultancies	David Cooke
39	Department of Natural Resources – Head Office	Stephen Raft and Peter Flaskis
40	Resource Consulting Services	Sean Martyn and Richard Groom
41	Department of Primary Industries - Agriculture	Rik Whithead
42	Rural Fire Service	Grahame Douglas, Katie Collins and Simon Heemstra
43	Sydney Catchment Authority	Nick Sharp and Alan Benson
44	Department of Natural Resources – South Coast	Tony Roper, Fred De Closey, Kerryn Stevens and Chris Presland
45	Department of Natural Resources – Central West	Bill Semple, Brian Murphy and Ian Cole
46	Sustainable Grazing of Saline Lands Project	Andrew Wooldridge, Justin Hughes and Warren Mason
47	John Sykes and Tim Parramore Agricultural Consultancies	John Sykes, Tim Paramore, John Francis and Peter Banes
48	Tamworth Regional Council	David Lewis and Genevieve Harrison
49	Department of Natural Resources – Sustainable Farming Systems	Tom Grosskopf, Terry Brill and Craig Wood
50	Catchment Management Authority - Western	Daryl Green
51	Department of Primary Industries	John Lacy
52	New South Wales Irrigators Council	Doug Miell

Land Management Practice Information

ACTIVITY SHEET FOR WORKSHOPS

Contact Information

Contact Organisation:	Department of Planning 23-33 Bridge Street, SYDNEY NSW 2000 Tel: 02 9228 6313 Fax: 02 9228 6311
Contact Name:	Mr Peter Adrian, Ms Lois Gray, Ms Alison Holloway, Mr Michael Moore and Mr Nathan Wort
Contact Position:	Sustainable Developments and Assessments and Approvals
Date of Interview:	1st August 2005

Drivers	Information Issues	Information Needs
Development – regional constraints try for smallest size within cadastre	Mining and Extraction	Lease status Type of extraction Size of operation
	Coastal	Acid-sulphate soils Native vegetation (SEP 26 and 14) Biodiversity certificates Flooding Parcel/lot size and ownership
	Rural - property scale	Capacity for development Subdivision applications (current) Title status Lot size and ownership Land use and salinity Property boundaries Rural industries or enterprises
BASIX	Internet based development application	Development type Location for climate Occupation certificates Urban areas up to standard
Urban Development and Expansion	Crown Lands	Old parish definitions Under lease (who, how long) Native title claims Corporation owned lots
	Risks, Hazards and Issues	Build height (up to 13.5m and above 16m) Building form and shape Flooding capabilities Acid-sulphate soils Servicing status (electrical, sewerage, water) Size of utilities (capacity) Responsible authorities and relevant contacts Employment lands (industrial and commercial)

Existing Information and Datasets

Other layers and datasets	
Cadastre	Supplied by NSW Department of Lands

General Notes

The main issue regarding planning is the consolidation of data sets and data sources. There needs to be a standard frame-work or structure for the distribution of these data.

Land Management Practice Information

ACTIVITY SHEET FOR WORKSHOPS

Contact Information

Contact Organisation:	Byron Bay Shire Council PO Box 219, MULLUMBIMBI NSW 2482 Tel: 02 6626 7000 Fax: 02 6684 3081
Contact Name:	Mr Hank Bower
Contact Position:	Environmental Services Officer
Date of Interview:	27th July 2005

Drivers	Information Issues	Information Needs
Environmental Planning	Agricultural Practice	General land use ▪ Cropping (sugar cane) ▪ Grazing Horticulture (detail the main industries) ▪ Orchids ▪ Apples and pears ▪ Coffee ▪ Macadamias ▪ Stone Fruit Vegetation mapping Weed mapping (matrix) Camphor Laurel Lantana Soils and soil landscapes Flood mapping (needs to be upgraded) Acid sulphate soils
	Future Resource Planning NB: focus on the growing industries and their availability	Farm Forestry Private or commercial Road and bridge carrying capacities Location and size of resources ▪ Road material ▪ Timber (cabinet and pulp) Water (drinking storages) Extraction status (available or exhausted)
	Other	Aboriginal boundaries and contacts Land council areas
Landcare	General information	Landcare group boundaries Catchments and boundaries Regional councils and agency boundaries Aboriginal groups and boundaries
State of the Environment Reporting	Biodiversity Mapping	What species (planted or natural) Area and age or year when planted Species present Vegetation complexity

	Horticulture	Macadamias Integrated pest Management Bug scouts (people looking for bugs) Reduced chemical usage

Existing Information and Datasets

Data sources	Aerial photos (digital and hard copy) Satellite imagery
Data sets	Vegetation mapping for Byron Shire Biodiversity mapping Cadastre (property boundaries, roads etc.) Creeks and Rivers Agricultural classes mapping

General Notes

Mr Bower and a group of natural resources officers from the North Coast developed the “Farm Land Protection Scheme” that helped support some parts of the new Local Environment Plan for the shire.

Land Management Practice Information

ACTIVITY SHEET FOR WORKSHOPS

Contact Information

Contact Organisation:	Department of Natural Resources Tel: 02 9895 7421 Fax: 02 9895 7756
Contact Name:	Dr Dugald Black
Contact Position:	Senior Scientist, Model Development & Implementation
Date of Interview:	30th March 2005

Drivers	Information Issues	Information Needs
❑ Development, refinement and validation of ground water, surface water and salinity models: ▪ LUOS (Land Use Options Simulator) ▪ CATSALT ▪ 2C (salinity monthly semi-distributed model) ▪ CLASS Many existing models work on modelled data from land use and land management practices if real data are not available.	Models may be 'node-linked' (IQQM) or 'spatially-linked' or a combination of both. Data required include land use and land management practices in a temporal and spatial context. Both component data sets to incorporate: ▪ Current status ▪ What existed previously to determine changes in water use efficiency ▪ New developments including information on sources of water and water trading. Other important data sets are: ▪ Soil types (particularly soils that leak) ▪ Soil moisture profiles ▪ Water ordering systems ▪ Potential salt stores ▪ Policy and regulatory frameworks. A better handle is required on the impacts of land management on the delivery of salts, water quality and the movement of pollutants and soil health parameters.	Information required forms part of the inputs to models, including the modelling of seasonal water demands: Irrigation Farming: ▪ Land use ▪ Crop types ▪ Planting times ▪ Land forming ▪ Irrigation practices and areas ▪ Drainage practices ▪ Changes in management practices over time Dryland Farming: ▪ Fallow, cultivation and rotational practices ▪ Grazing practices ▪ Farm forestry and commercial forestry activities.

Existing Information and Datasets

Land Management Practice Information	See response from Paul Pendlebury.

Preferred Area for Trial

None specifically identified. However, Dr Black requested that any such trials cover representative samples of dryland and irrigation practices of regulated and unregulated streams, cotton, horticulture and rice production districts.

General Notes

Discussions again highlighted an urgent need to respond to an inquiry from the Murray Darling Basin Commission regarding the expansion of irrigated lands in the Lower Murray catchment. There's a reported increase in production of some 6000 ha apparently in breach of the Murray Darling Cap.

The value of the SUNRISE data set was discussed including the additional information held within the data set on land management practices. It is feasible that the increased level of production may have been achieved through improved irrigation practices. Thus information on land management practice, as well as land use is critical.

Land Management Practice Information

ACTIVITY SHEET FOR WORKSHOPS

Contact Information

Contact Organisation:	Department of Planning Barwon Region Level 3 Noel Park House, 15-157 Marius Street TAMWORTH NSW 2340 Tel: 02 67645926 Fax: 02 67645982
Contact Name:	Ms Alison McGaffin
Contact Position:	Team Leader Planning
Date of Interview:	15th June 2005

Drivers	Information Issues	Information Needs
Regional Planning	Intensive Agriculture The question "How can we identify where the best places are for intensive chook enterprises?"	Land use mapping ▪ Poultry farming (3km buffer) ▪ Residential developments Farm infrastructure Residence or homesteads Sheds and surrounding areas Distance from Tamworth (abators) Availability to water (GW or surface) Electricity (Phase 5) Roads Minimal slope (2.5 degrees) Dwelling densities (nearest neighbour) Development area (>300m)
	Rural Lands Planning NB: need Agricultural future Casting	Holding information (Lot and DP) Minimal lot size for production Land use (past and present)
	Infrastructure	Telecommunications Transport (roads, rail etc.) Water bodies (dams, reservoirs etc.) Electricity Piping (water and sewer)
	Resources Strategy – regional economic strategy	Extractive resources ▪ Coal and minerals ▪ Agriculture ▪ Forests for forestry Conservation Areas Infrastructure Mining and quarrying
	Hazard Land Uses – sediment contribution to water storages	Set stocking Soil conservation practices

Existing Information and Datasets

Data sources - digital	Aerial photos (also in hard copy) Satellite imagery
Data sets – digital	Urban Salinity Preliminary soils Cadastral Infrastructure Flooding zones European Heritage

Preferred Area for Trial

Anywhere within the Barwon region.

General Notes

Ms McGaffin mentioned some use for forecasting information about agricultural land use. Mrs. Sue Jacobs could be good contact to get further information about this subject.

There is also a large effort to help councils come up to speed with the new planning reforms. These are called planning reform projects and are for all councils that want to participate.

Land Management Practice Information

ACTIVITY SHEET FOR WORKSHOPS

Contact Information

Contact Organisation:	Border Rivers Food and Fibre. PO Box 507 GOONDIWINDI 4390 Ph 07 4671 3888, fax 07 4671 1039
Contact Name:	Mr Bruce McCollum
Contact Position:	Executive Officer
Date:	8th June 2005

Drivers	Information Issues	Information Needs
Public Relations and Lobbying	Media Releases	How much water is used per Hectare Type of irrigation and areas covered Total amount of water used per district
	Irrigation Development Management Plans (IDMP) - part of Cotton Australia's BMP modules	Irrigation management Water wise training and workshops Water allocations to IDMP areas What properties have IDMPs
	Cropping of cotton	Change in cotton copping ▪ Used to be 7/10 years to cotton now showing 5/10 years to cotton
	Scheme Planning	Macro datasets for LMPI Riparian protected areas Private conservation areas
Trend Analysis and Decision Making	Time Series Data – real time information at the farm/paddock scale This is probably too big an ask, given logistical, confidentiality and other considerations	▪ The area developed for cropping ▪ How the developed area is subdivided into parcels ▪ The production system(s) used on each parcel: water application, farming techniques, fallow management, cropping cycles etc ▪ Volumes of on allocation, off allocation and overland flow water diverted ▪ The on farm storage history of the water, including evaporation losses ▪ The volume of water from rainfall when crops are in the ground ▪ The volume collected from on farm runoff ▪ The volume of water applied to different parcels of land for different crops, and the resultant water use efficiencies ▪ Gross profit on a crop/parcel basis: Income – expenditure

General Notes

Mr McCollum also mentioned aspects of their cross-border planning. This is carried out in a framework the elements of which are:

- A Memorandum of Understanding between the NSW and Queensland governments
- A decision-making structure comprising:

1. A Ministerial Forum whose members are the Ministers for Natural Resources and Environment from each state
2. A Standing Committee of senior officers from the four departments headed by the ministers, with the role of advising and making recommendations to the ministers
3. A Standing Committee Working Group of departmental officers who do the detailed work fro the Standing Committee
4. An Interstate Water Management Working Group with a chair and three members from each state drawn from the community. It is set up by the Ministerial Forum to liaise with the Standing Committee Working Group and provide community advice to the Standing Committee and Ministerial Forum

The product for the ultimate endorsement of the Ministerial Forum is the Border Rivers Inter-Governmental Agreement (IGA), which is in the final stages of development. The IGA covers:

- Bulk water sharing between the states
- Environmental flow rules
- Trading rules
- Access and accounting
- Monitoring and reporting.

The provisions of the IGA will be reflected in the NSW Border Rivers Regulated Water Sharing Plan and the Queensland Resource Operations Plan. This is how an integrated, coordinated approach to water allocation and management in the Border Rivers is being achieved.

Land Management Practice Information

ACTIVITY SHEET FOR WORKSHOPS

Contact Information

Contact Organisation:	Department of Natural Resources. P. O. Box 5224, WAGGA WAGGA NSW 2650 Tel: 02 6043 6777 Fax: 02 6043 5600
Contact Name:	Mr Callan Pearson and Mr Gregory Summerell
Contact Position:	GIS Coordinator and Natural Resource Officer – Modelling respectively
Date of Interview:	23rd March 2005

Drivers	Information Issues	Information Needs
Reporting on CMA Activities to State Government	Targeting areas for change and land cover	Pastures - native pastures and introduced Replace current pasture practices Specify management units Crops to pasture and pastures to trees
	Trees for carbon Credits	Tube stock plantings Age of plantings (less than 5 years)
	Whole farm planning using the Murrumbidgee blue print tool	Fencing activities Planted trees Pasture work Crop activities
Modelling for Salinity and Groundwater • NSW Salinity Audit	LUOS (Land Use Options Simulator) ▪ based on defined land management units	▪ Landform mapping ▪ Location of vegetation ▪ Land use
	CATSALT Version 2 ▪ Salt and Water daily semi-distributed model ▪ changes in water quality at end of catchments	Information required forms part of the inputs to models, including the modelling of seasonal water use: ▪ Pastures composition summer/winter ▪ Growth generally for trees, pastures and crop ▪ Root depth for pasture species ▪ Water use parameters
	CLASS ▪ Fully distributed daily unsaturated zone surface water and salt model ▪ Able to represent paddock scale data, fully distributed throughout the catchment. (ie not lumped responses)	Paddock level data: ▪ Fallow, seasonal occurrence and length in months ▪ Grazing practices ▪ Farm forestry and commercial forestry activities. ▪ Rotation practices, seasonal ▪ Common planting months in regions
Water Sharing	Irrigation Authorities and other surface water issues	▪ Existing dams ▪ Groundwater extraction ▪ Channels and channel leakage ▪ Sand or paleo-channels

Land Management Practice Information

ACTIVITY SHEET FOR WORKSHOPS

Contact Information

Contact Organisation:	Coffs Harbour Regional Landcare. P. O. Box 356, COFFS HARBOUR NSW 2450 Tel: 02 9228 6313 Fax: 02 9228 6311
Contact Name:	Ms Jenny Malchrone
Contact Position:	Landcare Coordinator
Date of Interview:	29th July 2005

Drivers	Information Issues	Information Needs
North Coast Blue Print Reporting System	Site Conditions	River style Geomorphic condition ▪ Bed material ▪ Erosion and sedimentation Vegetation condition ▪ Weeds and natives ▪ Stock impact ▪ Canopy cover Wetland type and condition Soil types (ASCO and GSG) Acid sulphate soil potential
	Vegetation Attributes	Dominant species ▪ Maturity and disturbance ▪ Corridor type and connectivity Micro Habitat rating ▪ Hollows and logs ▪ Trees and shrubs ▪ Outcrops and springs ▪ Caves and overhangs Weeds ▪ Abundance and species
	Other	Risks ▪ Level ▪ Source (rezoning, subdivision etc.) ▪ Land use
Landcare	General information	Landcare group boundaries Catchments and boundaries Regional councils and agency boundaries Aboriginal groups and boundaries
Reporting on Activity and record keeping	Tree planting	What species Area of plantings Success rates (percentage survival)
	Community Capacity	Extension staff skills and training Land scan (DPI – Ag) Pro-graze (SGS) PMP – DNR Grazing for Profit – (RCS)

Existing Information and Datasets

Data sources	Aerial photos in hard copies Satellite imagery (hard copies and patchy)
Data sets – hard copy	Property plans

General Notes

The main issue regarding planning is the consolidation of data sets and data sources. There needs to be a standard frame-work or structure for the distribution of these data.

Land Management Practice Information

ACTIVITY SHEET FOR WORKSHOPS

Contact Information

Contact Organisation:	Cotton Research and Development Corporation (CRDC) 2 Lloyd Street, NARRABRI NSW 2390 Tel: 02 6792 4088 Fax: 02 6792 4400
Contact Name:	Mr Dallas Gibb
Contact Position:	Research Program Manager
Date of Interview:	16th June 2005

Drivers	Information Issues	Information Needs
Land and Water Management	Irrigation Management	Application Efficiencies ▪ Furrow and drip ▪ Centre pivot and lateral move ▪ Application according to crop use ▪ Soil moisture monitoring Storage and distribution of water Monitoring water use (for paddocks)
	Native Vegetation Management	Habitat features (connectivity, etc.) Vegetation type (communities, condition etc.) Management practices (exclusion etc.) Vegetation Areas set aside as offsets
	Riparian Management – native vegetation	Vegetation Management Practices ▪ Dead trees and hollows ▪ Retained and protected ▪ Pest and weed control plans Stocking practices ▪ Exclusion or limited access ▪ Ground cover percentages Water quality ▪ Stream bank stability ▪ Filter strips and width
Cotton Industry	General information – Catchment scale The question “What is the water quality into and out of districts?” also “How much water do we need to keep habitats viable?”	Wetland Security ▪ Pumping of water ▪ Overland flows (linking) Water leakage and storage (irrigation) Water use for irrigation district (ML) Waste water out of irrigation district (ML) Cropping areas Amount of irrigation Existing Vegetation Cotton cropping boundaries Property boundaries Property specific soil data and information ▪ EMI surveys ▪ Leakage analysis

Hazard Assessments	Risks	Salinity assessments (Sydney University) ▪ Saline outbreaks ▪ Level of salinity in soil Importing of salts (irrigation) ▪ Salt load and EC ▪ Water use (ML) real time ▪ Storage of salts
Best Management Practice	Decision Support The question "Which paddocks are capable of giving highest yields?"	Query tools for Farmers ▪ Salinity ▪ Acidity ▪ Crop type suitability Land use Existing native vegetation Flood events ▪ How much water ▪ How much area ▪ How long was the area flooded (days) ▪ Extent of flooding (satellite imagery)

Existing Information and Datasets

Data sources	Satellite imagery
Data sets	Irrigation use statistics

Preferred Area for Trial

Anywhere that includes an irrigation district

General Notes

Dallas Gibb mentioned that they have been developing this **Best Management Practices** document for some time and are looking at applying it not only to Irrigation Management Practices, but trying to apply to the whole farm and other enterprises (eg: grazing, cropping etc.).

Other responses from the CRDC not only mentioned Land management practice information needs, but needs for other natural resources data. These included data needed to assess farm resources, soil health management:

- Regional soil information (salinity, erosion etc.)
- Vegetation information and mapping (regional ecosystems)
- Aerial and satellite imagery
- District EMI survey information
- Water quality
- District water use (ML)
- Standing water levels (for water table changes)
- Climate information (rainfall, transpiration)
- Funding sources
- Soil structure
- Soil nutrition
- Salinity and sodicity
- Erosion
- Storm water flows (flooding etc.

Land Management Practice Information

ACTIVITY SHEET FOR WORKSHOPS

Contact Information

Contact Organisation:	Clarence River Fisherman's Cooperative. Grafton NSW 2860 Tel: 02 9228 6313 Fax: 02 9228 6311
Contact Name:	Mr Barry Casson
Contact Position:	Director
Date of Interview:	27th July 2005

Drivers	Information Issues	Information Needs
Habitat Security	Flood Mitigation The "Clarence Floodplain Mitigation Project" – assessing the requirements of channels and flood gates to regulate water table height under cropping lands	Flood gates Channels and drains Acid Sulphate Soils Drainage systems Type of gates Water table height River Water quality and invertebrate health ▪ Acidity ▪ Oxygen (DO) ▪ Red Spot in fish populations Land use (sugar cane or grazing) ▪ Bare earth
	Habitat Mapping NB: life cycle of prawns is 3 years, with the larvae living in estuaries with cold fresh water	Sea Grass Salt Marsh Deep holes Reed beds Mangroves Swamps Soft sediment at river mouth
	Protection of Habitat	Vegetation type Riparian improvements
Hazards	Fishing Industry Hazards	Land use (highlight poor land use) ▪ Bare earth Urban development and Expansion Privet (can poison creeks) Sewerage Outfalls Restructuring activities Sedimentation and erosion Landscape mapping (Flood plains)
Prawns	Turtle Free Trawling	Nets with approved Turtle exits
	Intensive	Antibiotics Flexibility Changeable enclosures

Existing Information and Datasets

Data sources	Aerial photos in hard copies Satellite imagery (hard copies and patchy)
Data sets – hard copy	Property plans

General Notes

The Clarence River has the biggest fishing port for the state. Mr Casson worked with the Clarence Catchment Water Committee for five years to develop the Management Plans for the sub catchments, targeting water quality and river flows.

Mr Casson is now the Director of the Co-operative with 230 members. Most projects are aimed at educational outcomes looking at wetlands and their use also river water quality.

Mr Casson also mentioned about some examples of where the habitat of the river had changed over the last decade. One of these was the “Everlasting Swamp” and how it has been reducing in size since the introduction of floodgates. Other parts of the river have been affected too, these being the deep holes that can provide refuge for fauna, but are now being filled up with sediment from the upper catchment.

Land Management Practice Information

ACTIVITY SHEET FOR WORKSHOPS

Contact Information

Contact Organisation:	Cowra Woodland Bird Program BASNA P.O. Box 1322, CROWS NEST NSW 1585 Tel: (02) 9436 0388 Fax: (02) 9436 0466
Contact Name:	Mr John Rankin
Contact Position:	Chair Person
Date of Interview:	6th April 2005

Drivers	Information Issues	Information Needs
Stop Decline of Woodland birds in the Cowra Region NB: bring back the birds	Twitch-a-thons	Native bird species (district and regional) Vegetation assessments
	Habitat	▪ Declining bird species ▪ Threatened bird species ▪ Native Vegetation ▪ Vegetation community (dominant tree spp.) ▪ White Box Woodland ▪ Tree species ▪ Mixed species ▪ Open or closed canopy ▪ Bird usage ▪ Population density ▪ Land cover and surrounding land use ▪ Land capability
	Education and Awareness NB: to restore white box woodland habitats	Bird routes (cowra district) Threatened species Declining species
	Ground Litter – "what are the effects of litter?"	Ground cover Pasture and herb species

Existing Information and Datasets

Woodland Bird Survey	60 permanent sites chosen and referenced using a global positioning system 2 hectare minimum area of native vegetation (planted or remnant), Surveyed for 20 minutes every three months All bird species surveyed for the last 2 years
List of birds	Prime data Site specific data (need permission of land holder)
Structured Vegetation Assessment	All sites assessed Vegetation community – based on dominant tree Tree species (open or closed canopy)

Preferred Area for Trial

Any area that has had bird surveys carried out.

General Notes

Mr Rankin mentioned that Mr Jack Backer (02 4284 5740) would be good for more definitive information, as he is the convenor for Birds Australia (BASNA). Mr Julian Reed (scientific advisor) with 'State Ecosystems' at CSIRO, Black Mountain would be able to provide details of habitat information.

Land Management Practice Information

ACTIVITY SHEET FOR WORKSHOPS

Contact Information

Contact Organisation:	Central West Catchment Management Authority P.O. Box 227, WELLINGTON NSW 2820 Tel: 02 6840 7800 Fax: 6840 7801
Contact Name:	Mr Alan Nicholson
Contact Position:	Implementations Manager
Date of Interview:	24th March 2005

Drivers	Information Issues	Information Needs
Capacity Building for Change	Succession Planning Issues: The question - "Why do landholders make the decision to change their management practices?"	▪ Farm ownership change ▪ Change in land use ▪ Social surveys to identify the drivers for change
	Cropping practices: measuring the shift to conservation technologies:	Information concerning fallow, sowing & rotation practices
Reporting on CMA Activities to State Government	Riparian Management – reporting on outputs:	▪ Instream works ▪ Fish weirs ▪ Fencing and exclusion of land use activities along streams ▪ Re-establishment of riparian vegetation
	Benchmarking: The question – "What works have occurred prior to the implementation of CMA projects?"	Baseline data
	Soil monitoring and management (soil erosion, soil structural decline, soil sodicity, soil acidity): The question – "How to monitor and evaluate best management practices and their take-up?" The question - "What activities are being funded?"	▪ Indication on soil health – using subset areas or representative sites ▪ Modelling to expand information into data holes ▪ Preferred surrogate data sets ▪ Soil type boundaries ▪ Paddock boundaries and names ▪ Conservation machinery conversions and purchases ▪ Seed and fertiliser use ▪ Fencing – electric, permanent, boundary etc. ▪ Innovative fencing ▪ Closer fencing for smaller paddocks ▪ Watering points ▪ Soil testing ▪ Soil type boundaries
	Pasture management The question – "How to monitor or evaluate pasture cropping?"	Cropping cereals into native pastures for feed Biodiversity of paddocks to check for increases
Assigning of Appropriate	Highly contentious Issues	Clearing near Nyngan Flooding and water use at Macquarie Marshes

Land Use	Current land use needs to be assigned to the appropriate land capability. Arising from the Oberon district, NSW.	Identify areas that are under pressure from rising land values Hobby farming encroaching on large-scale farming practices Rise in land value reducing Forestry's ability to operate.
Reporting on CMA Activity to State Government Developing Best Management Practice	Dryland Salinity	▪ Treatments of discharge sites ▪ Treatments or practices implemented for recharge management
	Wetlands	Treatments or managements within existing wetland sites New wetland sites constructed
	Irrigation	▪ Areas irrigated ▪ Sources of water, ▪ On-farm storage, ▪ Methods of application, ▪ Land forming ▪ Management of waste water including recycling
	Water quality	Soil erosion control schemes implemented Riparian management practices implemented (see also Riparian Management as an Issue)

Preferred Area for Trial

Upper Cudgegong near Rylstone
- Willow Containment, Section 10 and Water Shed Committee

General Notes

From previous conversations with Allan Nicholson, Tim Ferraro (General Manager) and John Lawrie (Program Manager), some LMPI data was highlighted.

These included discussions on the monitoring, evaluation and reporting of implemented incentive program activities. They particularly wanted to know information about:

CAPACITY BUILDING
- What training programs (GFP, Holistic Management, TOPCROP etc.) are attracting landholders
- How people attend these programs
- What activities are undertaken at these training programs

SOILS MANAGEMENT

Data sets for targeting Incentive programs
- Property Vegetation Plans
- Acid Soils and the various works (demonstration sites etc.)
- West 2000 or the equivalent extended project
- Environmental Management Systems and Environmental Services Scheme information
- Property Management Plans

LAND MANAGEMENT DATABASE
- Need an effective way to record all incentive activities
- Need an easy way to report on recorded activities

Land Management Practice Information

ACTIVITY SHEET FOR WORKSHOPS

Contact Information

Contact Organisation:	Department of Natural Resources. P.O. Box 53, ORANGE NSW 2800 Tel: 02 6393 4300 Fax: 02 6361 3839
Contact Name:	Mr Greg Raisin and Mr Jeff Bradley
Contact Position:	Manager Resource Analysis and Team Leader respectively
Date of Interview:	21st March 2005

Drivers	Information Issues	Information Needs
Benchmarking ▪ Environmental Services Scheme ▪ Macquarie Marshes ▪ Catchment Blue Prints	Change in LMPI The question – "how has the LMPI changed?" The question - "what information is needed to make water use based discissions?" Information gaps west of Dubbo	LMPI for properties and paddocks detailing: ▪ Cropping and grazing practices ▪ Land use for the Marshes ▪ Land cover ▪ Water use – irrigation ▪ Soil condition (acidity, sodicity etc.) ▪ Vegetation health ▪ Percentage perenniality ▪ Current land use
Resource Audits - MDBC	Sustainable Rivers Audit	Site specific health indicators Long-term history of land use change Current land use
	Salinity Audit - Rivers	Stream EC
Identify applicable pressure responses for LMPI change	Community Values The question - "what drivers enable or force farmers to change?"	▪ Drought affected areas ▪ Price of Diesel per district area ▪ Community perceptions ▪ Social and economic pressures
Development	Urban – The question "what information do we need to reject applications?"	▪ Saline outbreaks ▪ Soil condition (acidity, sodicity etc.) ▪ Current land use
Modelling ▪ LUOS ▪ CATSALT	Need more site specific and detailed information	▪ Soil characteristics (EC, pH, text etc.) ▪ Land use ▪ Land cover ▪ Percentage of perennial species

Preferred Area for Trial

Central West Region – Macquarie Marshes and west of Dubbo

General Notes

Both officers mentioned the need to incorporate agricultural census data in a usable format. There is also an urgent need for detailed property (paddocks, fences etc.) information.

Land Management Practice Information

ACTIVITY SHEET FOR WORKSHOPS

Contact Information

Contact Organisation:	Department of Infrastructure and Natural Resources. P. O. Box 717, DUBBO NSW 2830 Tel: 02 6841 7444 Fax: 02 6884 0095
Contact Name:	Mr Madhwan Keshwan, Mr Robert Gibson and Mr Tim Deverell
Contact Position:	Groundwater Resources, Regional Compliance and Regional Planning respectively
Date of Interview:	22nd March 2005

Drivers	Information Issues	Information Needs
Auditing	Agreements and on ground activities	▪ DNR conservation agreements ▪ PVP developer activities
Compliance	Rivers and Foreshores	▪ Boat ramps ▪ Weirs and river crossings ▪ Excavations or extractions
	Historic land management data. The question – "What was the structure and condition of vegetation before clearing?" Benchmarking	▪ Land cover ▪ Land use ▪ Vegetation structure (multi story) ▪ Dominant species (mixed species) ▪ Age of vegetation ▪ Flood water movement history ▪ Stock exclusion areas
	Mapped areas of Vegetation	▪ Including historic land management data ▪ Regrowth species and age ▪ Size of clearing ▪ Soil type (erosion potential) ▪ Woody vegetation (species and age) ▪ Grasslands and cropping
	Ground and Surface Water – the need to check on construction details Soil Conservation Works	▪ Harvestable rights for dams ▪ Storages - construction date and size of dams ▪ Current water levels in storages ▪ Licensing conditions ▪ Contour banks
Planning	Land Use – broad scale	▪ Cropping, grazing etc ▪ Forestry ▪ Transport routes ▪ Riparian and water ways ▪ Native Vegetation
	Fragmentation of Lots and Portions	▪ Cadastre blocks ▪ Housing and urban centres

Groundwater Modelling	Lachlan – down stream from Lake Cargelligo Macquarie – down stream from Narromine	Develop macro plans and vulnerability mapping for groundwater (500m pixels/sample size): ▪ Irrigation application rates (ML) ▪ Irrigation application type ▪ Farm storages for licensing ▪ Size of dam (ML) ▪ Water distribution infrastructure ▪ Current development restriction

Existing Information and Datasets

Regional Groundwater database and monitoring	▪ Bore (shallow and deep) locations ▪ Regular standing-water-levels (SWL) recorded ▪ Water bearing layers for each bore ▪ Construction type of bore casings ▪ Rock or material type for each layer and thickness.

Preferred Area for Trial

Central West Region – Belubula River Catchment. This area's groundwater capability and current use are virtually unknown. It would be useful to record LMPI in this area to gauge potential groundwater pressures.

General Notes

Mr Deverell mentioned that some concerns about the increase in rural subdivisions where there is no restriction on stock and domestic bores. This can lead to over-allocation of a groundwater for a particular aquifer. Mr Deverell stated the need for the following data to be made available:

- Groundwater vulnerability mapping
- Areas of proposed subdivisions.

He also mentioned the need for more coordination between NSW Departments of Primary Industries and Natural Resources for regional planning needs.

Mr Keshwan mentioned the need for key site monitoring, measuring surface water and runoff. Mr Keshwan also mentioned that there is a data gap in ground water monitoring from 1992 to 96, which makes it difficult to carry out modelling. Ms Catherine Hams (she has since retired form the department) was working on a program to map all distribution infrastructures throughout the state, but it may not have been completed.

Mr Gibson mentioned the needs for up-to-date aerial photos to complete prosecution procedures. Mr Gibson also mentioned that some information about water investment might be available through NSW State Water.

Land Management Practice Information

ACTIVITY SHEET FOR WORKSHOPS

Contact Information

Contact Organisation:	Department of Primary Industries Cowra Agricultural Research and Advisory Station Binni Creek Road, COWRA NSW 2794 Tel: 02 6349 9720 Fax: 02 6342 4543
Contact Name:	Ms. Jan Edwards
Contact Position:	District Agronomist
Date of Interview:	16th June 2005

Drivers	Information Issues	Information Needs
District Knowledge ▪ Cowra Shire ▪ Blayney ▪ Cabonne ▪ Weddin Shire 50% NB: gained from media releases, talking to farmers and grower discussions visual observations	Grower Groups The question – "How farmers agricultural practices are changing?" NB: the possible use of other sources including publications, catchment reports and ABARE data	General land use ▪ Mixed farming ▪ Permanent pastures ▪ Cropping ▪ Arable lands ▪ Landscape characteristics ▪ Irrigated areas ▪ Horticulture Local knowledge Current practices Land management practice change ▪ New technologies ▪ Organic matter ▪ Tillage type ▪ Stubble burn and when ▪ Feeding gaps Seasonal need for grain ▪ Feed capacity for summer ▪ Pasture tracking (monthly) Landscape hazards (soils, climate and veg)
	Cropping Protocols The question – "What is the best management practice for particular crops?"	Tillage requirements Row spacing Stubble treatments Sowing time Growth rates Inoculation rates Crop vegetative vigour
	Cropping Surveys The questions – "How many landholders are using No-Till?" also "What farmers intend to sow and why?"	Red legged earth mite Rust Seasonal intensions and actually sown Area harvested Cropping species and area (current) Seed sales and when Existing native vegetation

	Field Trials NB: measure when things happen and use standard sowing protocols	Phenology trial ▪ Sowing time (band width months) ▪ Seeding rate Pulse crop demonstration ▪ Growth rates ▪ Different crop species ▪ Seeding rate
	Programs and Projects	CROP Check ▪ Farmer cropping practices ▪ Rice, wheat, field peas etc. TOP Crop ▪ Herbicide use and rate ▪ Percentage groundcover and stubble ▪ Water use efficiency APSIM ▪ Rainfall ▪ Paddock soils data ▪ Time stepped data Land Scan (soil and landscape knowledge) ▪ Landscape interpretation ▪ Soil test interpretation ▪ Slope orientation Exceptional Circumstances ▪ RLPB districts ▪ Temperature (climate) ▪ Economic and social standing ▪ General land use
Capacity for Change	Community Surveys	Advisory source Memberships (groups, professional etc.) Machinery type Tillage practices Precision agriculture
	Western Lands Farming Systems	Paddock soil information Sodicity No Till cropping practices

General Notes

Ms. Edwards mentioned that there were some good contacts for the various programs that are run in this district. The people to contact for more detailed information about these programs are:

- Messrs Bruce Clements and Mike Keys for Land Scan information
- Mr John Lacy for Crop Check (DPI in Finley)
- Mr Howard Cox for the APSIM (agricultural production simulator)
- Mr Ian Daniels for soil information (Tamworth)
- Mr Bob Martin for information about the Western Farming Systems
- Mr Allan Bell at Tamworth for Pro Graze
- Mr Ron Hacker and Ms Margaret Winn for Grain and Graze information

Ms. Edwards also mentioned the need for broad natural resources data for background information, these included:

- General land use
- Soil landscape information
- Land capability
- District climate information

Land Management Practice Information

ACTIVITY SHEET FOR WORKSHOPS

Contact Information

Contact Organisation:	Department of Environment and Conservation North West Branch 52 Wingewarra Street, DUBBO NSW 2830 Tel: 02 6883 5329 Fax: 02 6884 9382
Contact Name:	Ms Sonya Ardill, Mr Gary Saunders and Ms Miranda Kerr
Contact Position:	Conservation Planning Co-ordinator, Crown Land Assessments and Botanist
Date of Interview:	12th April 2005

Drivers	Information Issues	Information Needs
Planning	Benchmarking	Land use Land cover Grazing management Biodiversity or salinity Pasture composition Water licences and delivery areas
	Tenure	Urban expansion ▪ Fragmentation pressures ▪ Public utilities ▪ Easements ▪ Lease hold Volunteer conservation agreements Tourism pressures ▪ Shooting and fishing ▪ Ecological Mining and Quarrying ▪ Exploration ▪ Gas, coal ▪ Status of lease Forestry Management ▪ Plantations and native forestry ▪ Profit-à-prendre (red gums, cypress etc) ▪ Western land leases
	Conservation Assessment NB: these are carried out at the local government catchment level – bio regional	Reserve systems (Voluntary Conservation Agreements) Formal or informal Defined outcomes ▪ Integration with productivity ▪ Biodiversity conservation ▪ Occasional grazing Biodiversity Cultural heritage Soils and geology Drainage Timber resources Forest agreements

	Clearing	Clearing patterns and trends Hot spots Behaviour patterns Grazing – under native vegetation BMPs for biodiversity benefits Formal conservation reserves Grazing leases
Management for Conservation	RAMSAR	Macquarie Marshes Conservation activities and area ▪ Occasional grazing ▪ Management plans Wetland birds
Crown Lands	Acquisition Assessments NB: need site specific information for blocks (4Ha)	Natural heritage values ▪ Significant flora and fauna ▪ Aboriginal heritage Land for wildlife Land management information

Existing Information and Datasets

Data sources	Aerial photos in hard copies Satellite imagery
Data sets	Conservation Assessments ▪ Brigalow ▪ Moree Shire ▪ Central West and Lachlan catchments ▪ Lower Macquarie ▪ Riverina

Preferred Area for Trial

Narran Opal Mines
Moree Shire or South West Slopes
▪ Change in land use

General Notes

The group mentioned that there is a need for more comprehensive information about regional assessments backed up by consistent data layers across the state. The DEC spatial information unit is based in Armidale. For more information about datasets and sources the contact is Mr Simon Ferrier.

If more information was needed about Voluntary Conservation Agreements, the best contact is Mr Todd Duffy in their Dubbo office.

Land Management Practice Information

ACTIVITY SHEET FOR WORKSHOPS

Contact Information

Contact Organisation:	NSW Department of Infrastructure, Planning & Natural Resource 30 Warne Street WELLINGTON NSW Tel: 02 6840 0907 Fax: 02 6840 0940
Contact Name:	Mr Ross Garsden
Contact Position:	Natural Resource Project Officer, Integrated Planning, WELLINGTON
Date of Interview:	18th April 2005

Drivers	Information Issues	Information Needs
Reporting on the forest estate in NSW.	▪ Changes to the forest estate. ▪ Capability of land for expansion of timber plantations. ▪ Timber products generated from the forests. ▪ Reporting needs under the NSW Plantations and Reafforestation Act and the Timber Plantation Harvest Guarantee Act.	▪ What native vegetation cover exists and what is its tenure. Also need information on ownership patterns, the commercial value of the vegetation and the likelihood of changes over time. ▪ Expansion of plantations: where and how the forest estate is being expanded and whether it is publicly or privately funded softwoods or hardwoods. ▪ Approvals issued for plantation approvals and their spatial location. ▪ "What types of products are produced from the timber and the destination of the timber products?". At the present time, no such information is available.

Existing Information and Datasets

None available	Data sets are available for all plantation activities on public land. The main problem relates to information regarding activities on private lands. Some data sets exist but they are held by individual officers on local computers: ▪ Hardwood and softwood plantations approved under the Plantations and Reafforestation Act on private land have been spatially recorded but there may be some problems with data integrity because it is all carried out at a local level; ▪ Hardwood and softwood plantations established under the Timber Plantation Harvest Guarantee Act would only be recorded spatially for those that required a clearing consent under the Native Vegetation Conservation Act; ▪ For the Hume Project, there has been some spatial mapping of softwood plantations, but the status of mapping of hardwood plantations is unknown.

General Notes

Mr Garsden spoke about what are the potential needs for data on land management practices and how such data sets may be used. At this stage there is no demand or use of such information, but the demand should develop over the next couple of years. Mr Garsden has since left the department and now has joined the Victorian Public Service.

Land Management Practice Information

ACTIVITY SHEET FOR WORKSHOPS

Contact Information

Contact Organisation:	Department of Primary Industries (DPI) - Fisheries. 3/556 Macauley Street, ALBURY NSW 2640 Tel: 02 6042 4208 Fax: 02 6021 0113
Contact Name:	Mr Adam Vey and Ms. Nicole McKerdy
Contact Position:	GIS Coordinator and Conservation Officer respectively
Date of Interview:	16th May 2005

Drivers	Information Issues	Information Needs
Protection of the Aquatic Habitat	Fish Stocking	▪ Appropriate stocking sites ▪ Fish movement ▪ Site descriptions and maps ▪ Access through land leases ▪ Fish weirs ▪ Threatened species ▪ Spatial data (fish per snag)
	Development Applications	▪ Designated public roads ▪ General roads and transport routes ▪ Rivers and creeks ▪ Townships and designated townships ▪ Riparian zones
Tourism and Recreation	Angler Access	▪ Site specific description for fishing ▪ Land use and land tenure change ▪ Crown lands ▪ Travelling stock routes ▪ Specific reserves close to water ▪ Status of reserves ▪ Inland commercial fishery access ▪ Public reserves
	Threatened species "Need decision support tools"	▪ Fish weirs ▪ Levees ▪ Road access over creeks ▪ Habitat mapping ▪ Habitat condition ▪ Aquatic vegetation ▪ Land use ▪ Creeks and streams status (intermittent) ▪ Land zonings

Existing Information and Datasets

Habitat Mapping	Limited to specific area throughout the state Location of snags along stretches of creeks Number of fish per snag on a given day Bank condition Hazards
Cadastre	Supplied by NSW Department of Lands

Preferred Area for Trial

Around Albury

General Notes

Mr Vey and Ms McKeardy also mentioned that there was a directive within the DPI to consolidate all spatial information held within all sections (agriculture, fisheries, minerals and forests). At the moment a couple of their officers are involved. In Port Stephens it is Ms Kylie Russel (02 4916 3817) and Mr Paul Benton in Orange. Mr Benton is involved with modelling and Ms Russel is involved with the auditing of GIS for state wide aquatic habitats.

Land Management Practice Information

ACTIVITY SHEET FOR WORKSHOPS

Contact Information

Contact Organisation:	Department of Infrastructure and Natural Resources. Far West Region 45 Wingewarra St, Dubbo NSW 2830 Tel: 02 68843000 Fax: 02 6883 3099
Contact Name:	Mr Richard Hicks, Ms Sharon Hawke, Mr Aaron Colbran and Mr Tim Deverell
Contact Position:	Regional Director, Manager Assessment, GIS and Panning respectively
Date of Interview:	22nd March 2005

Drivers	Information Issues	Information Needs
Strategic Planning ▪ Regional ▪ Local Government Councils	Need to record information about resource management issues.	▪ Land use type (broad scale) ▪ Salinity outbreaks ▪ Soils information ▪ Herbicide use (aerial spraying)
Southern Mallee Management	Wind erosion management. The question "how can erosion potential be easily defined by using LMPI?"	▪ Length of fallowing and when applied ▪ Conservation Areas gazetted on Title ▪ Erosion potential
CMA support	Benchmarking of past practice or LMPI	▪ Trees, shrub areas
Government Policy	Recording of change in land practice. The question – "which farmers have taken on conservation farming or using chemical fallows?"	▪ Stubble retention and stubble burn ▪ Chemical fallow (when and who long) ▪ Conservation farming practice or Best Management Practices (BMP)
Compliance	Need to record cropping practices.	▪ Crop frequency ▪ Cropping inputs
Community and Social Capacity	Capacity for change. Socio-economic status	▪ Change of property ownership ▪ Education or training undertaken ▪ Implementation of programs

Existing Information and Datasets

Western Lands Rental	▪ Rental charged as per land use type (mixed farming, grazing. conservation) ▪ Rents based on total consented area not on area developed ▪ Update information for intensive agriculture and conservation areas every year
Rangeland Assessment Program (RAP)	▪ Recorded at fixed sites each year ▪ Grazing density applied to paddock collected ▪ Rainfall information collected ▪ Collection of standing dead grass and vegetation for Australian Grass Assessment

Historical Photos	▪ Rangelands Management Officers take photos ▪ Record keeping at property file ▪ Regularly taken from fixed photo points ▪ Used to check rangeland condition and blue bush death
Enterprise based Conservation (WEST2000)	▪ 10% of property managed for conservation ▪ Payed activities for 5 years ▪ Monitoring land cover
Northern Irrigation (IQQM)	▪ Matching with LMPI ▪ Similar to SUNRISE (Murray catchment) ▪ Focusing on the Bowen and Darling catchments ▪ Collecting information about rotations, water usage and irrigation style ▪ Need approval to access data, existing privacy act
Rangelands Assessment and Management System (RAMS)	▪ Accurate on ground assessments ▪ Basic land use information ▪ Irrigation information may include practice ▪ Unique to paddock observations (drop type, cultivations) ▪ Combination of Landsat and site visits ▪ Point calibration for Landsat TM image areas collected

Preferred Area for Trial

West of Hillston
- Collection of information for the Southern Mallee program could benefit
- The LMPI could support the planning based around wind erosion management

General Notes

Ms Hawke mentioned that Messrs Peter Worsley and Graeme Tupper (now temporarily employed with DNR) used to be involved with State of the Environment Reporting for the Rangelands, which monitored:
- Crop conditions for each paddock
- Sulphur percentage in soil

Mr Colbran mentioned that we should check with Mr Greg Chapman (DNR, Parramatta) and the Victorian Department of Natural Resources about LUIM.

Land Management Practice Information

ACTIVITY SHEET FOR WORKSHOPS

Contact Information

Contact Organisation:	Greening Australia – South East and ACT P.O. Box 538, JAMISON CENTRE ACT 2830 Tel: 02 6253 3035 Fax: 02 6253 3145
Contact Name:	Ms Susie Wilson
Contact Position:	Environmental Services Manager (GIS)
Date of Interview:	24th March 2005

Drivers	Information Issues	Information Needs
Native Vegetation Management ▪ Re-vegetation Program ▪ Remnant Vegetation Program	Project Application	Data needed to complete site activity and project application: ▪ Tube stock - number of ▪ Direct seeding and species list ▪ Fencing costs
	Vegetation Community	Data required to assess current status of vegetation area to fenced off should include forest community, condition and possible threats: ▪ Open forest ▪ Tall woodland ▪ Closed wood land ▪ Wood land ▪ Grassland ▪ Riparian ▪ Closed forest
	Condition status would include:	▪ Poor ▪ Moderate ▪ Good ▪ Excellent
	Threats identified should include:	▪ Isolation ▪ Weeds ▪ Pests ▪ Urban development ▪ Stock ▪ Erosion ▪ Die Back ▪ Salinity Outbreaks
Salt Shaker	Based in the Boorowa Catchment, ranked based application for funding.	

Existing Information and Datasets

Project Event Manager database ▪ Detailed description of activities for vegetation planting	▪ Tube stock numbers and species ▪ Area of planting ▪ Direct seed species and kg/Ha applied ▪ Fencing length and construction ▪ Farmer contribution (tractor, wages and materials) ▪ Threat identification ▪ Vegetation condition and community
Monitoring and Evaluation database ▪ Included detailed site description The question "how have past projects failed or succeeded, can this be a basis for BMP development?"	▪ Photo points ▪ Species present and ground cover percentage ▪ Habitat complexity ▪ Existing presence or absence (failure rates) ▪ Direct seeded or planted and species ▪ Distance between rows ▪ Number of rows within fenced off area ▪ Slope/landscape position or aspect ▪ Shape of planting ▪ Direction of main axis of planting

Preferred Area for Trial

BOOROWA DISTRICT AREA
- Area had many project sites over the last few years

General Notes

Ms Wilson mentioned that Greening Australia was particularly interested in old NHT projects that involved tree planting. This could help develop or highlight BMPs for native vegetation establishment.

Land Management Practice Information

ACTIVITY SHEET FOR WORKSHOPS

Contact Information

Contact Organisation:	Gwydir Macintyre Regional Landcare Inverell NSW Tel: 02 9228 6313 Fax: 02 9228 6311
Contact Name:	Mr Dick Walker, Ms Jessica Harrison and Ms Vicki Higgins
Contact Position:	Chairman, Coordinator and Office Administration respectively
Date of Interview:	15th June 2005

Drivers	Information Issues	Information Needs
National Heritage Trust Funding	Devolved Grants	Eroding stream banks Rivercare Soil Erosion Land degradation issues ▪ Whole of community ▪ Salinity ▪ Biodiversity
	Property Planning	Farming for the Future FARMplan (Terry Brill, DNR, Wellington)
	Other	Sub Catchment Plan Natural Resources Project
Landcare	General information	Landcare group boundaries Catchments and boundaries Regional councils and agency boundaries Aboriginal groups and boundaries
Reporting on Activity and record keeping	Past Project	Fencing Re-vegetation Erosion Control Salinity works Biodiversity Weed Control Methods (chemical) Grazing pressure Pasture establishment
	Community Capacity	Training courses ▪ Soil Health ▪ Farming for the future ▪ Pro Graze ▪ Pasture Technology course ▪ Sustainable Grazing Systems ▪ Farm walks or field days

Existing Information and Datasets

Data sets – hard copy	Salinity Investigation (5 year study) – Richard Porter ▪ Groundwater and Surface water

General Notes

They mentioned some trials that were going on in the area to do with cropping practices and are being conducted by Ms Shauna Dewhurst and Mr Bob McGufficke from Department of Primary Industries. The trial is comparing “till” vs. “no till” tillage practices.

Land Management Practice Information

ACTIVITY SHEET FOR WORKSHOPS

Contact Information

Contact Organisation:	Hunter and Central Rivers Catchment Management Authority. Private Bag 2010, PATTERSON NSW 2421 Tel: 02 6884 9577 Fax: 02 6882 8838
Contact Name:	Ms Anna Ferguson
Contact Position:	Catchment Officer
Date of Interview:	5th March 2005

Drivers	Information Issues	Information Needs
Prioritise Resources Broad scale, whole of catchment approach.	Private land	Disused mine sites Rehabilitation works Tree planting and species structure
	Regionally significant Vegetation	Native vegetation observations and community mapping
Reporting on Targets	Linkages to spatial information ▪ Water Quality ▪ Vegetation extent and condition ▪ Capacity Building ▪ Investment Strategy	▪ Soil erosion control schemes implemented ▪ Riparian management practices implemented ▪ Farm ownership change ▪ Change in land use ▪ Social surveys to identify the drivers for change
Planning	Benchmarking for Investment Strategy expenditure Linkages to PAMS	Vegetation mapping

Preferred Area for Trial

Hunter Region – sub catchment within

General Notes

Ms Anna Ferguson is one of the catchment officers that has had training in the use of database to attribute on-ground activities designed to spatial record the CMA's incentive activities.

Land Management Practice Information

ACTIVITY SHEET FOR WORKSHOPS

Contact Information

Contact Organisation:	Department of Infrastructure, Planning & Natural Resources P. O. Box 189, QUEANBEYAN NSW 2620 Tel: 02 6298 4022 Fax: 02 6299 6619
Contact Name:	Dr Mark Littleboy and Ms Natasha Herron
Contact Position:	Senior Natural Resource Officers - OKSI
Date of Interview:	22nd April 2005

Drivers	Information Issues	Information Needs
Development, Refinement and validation of ground water, surface water and salinity models: ▪ LUOS (Land Use Options Simulator) ▪ CATSALT ▪ 2C (salinity monthly semi-distributed model)	Data required include land use and land management practices in a temporal and spatial context: ▪ Tracking the uptake of new practices and technology ▪ What existed previously to determine changes in water use efficiency ▪ Where the perceptions of land management is changing Better knowledge of the water use of significant management practices that cover the majority of the landscape.	Information required forms part of the inputs to models, including the modelling of seasonal water use: Dryland Farming: ▪ Fallow, seasonal occurrence and length in months ▪ Grazing practices ▪ Farm forestry and commercial forestry activities. ▪ Rotation practices, seasonal ▪ Common planting months in regions Could get some information from the DPI Agriculture common practice documentation.
	Other important data sets are: ▪ Soil types (particularly soils that leak) Need to understand pasture systems – the question “how much green matter is covering the landscape”	Pastures and Grazing systems ▪ Grouping of pastures into water use ▪ Percentage ground cover (green matter) ▪ Growth and length of activity for pastures ▪ Grouping pastures according to seasonal growths (C3 and C4)

Existing Information and Datasets

Recharge Validation Project – DNR, DPI and DEC?	▪ Ground water movement. ▪ Relative recharge rates ▪ Land cover (vegetation) ▪ Climate (rainfall etc..) ▪ Local geology (structure) and soils ▪ Electro-magnetic Induction surveys (EM31 and EM38)

Preferred Area for Trial

Baldry study area (60 Ha tree plantation) – In the Little River catchment of the Central West and has a lot of landscape descriptive information collected continuously for the last 2 years.

General Notes

Ms Natasha Herron and Dr Mark Littleboy work closely with Dr Dugald Black on collaborative projects throughout the state.

Land Management Practice Information

ACTIVITY SHEET FOR WORKSHOPS

Contact Information

Contact Organisation:	Department of Infrastructure Planning and Natural Resources 159 Auburn Street, GOULBURN NSW 2580 Tel: 02 4828 6715 Fax: 4821 9413
Contact Name:	Mr Jim Armstrong
Contact Position:	Investigations Officer
Date of Interview:	19th April 2005

Drivers	Information Issues	Information Needs
Monitoring and Evaluation Trials	Significant indicators (MEWG)	▪ Estuarine, Coastal and Marine Habitat Condition, Extent and Distribution. ▪ Wetland Ecosystem Condition, Extent and Distribution. ▪ River Condition. ▪ Native Vegetation Condition, Extent and Distribution. ▪ Soil Condition. ▪ Land Threatened By Shallow or Rising Water Tables. ▪ Extent and Impact of Invasive Vegetation Species. ▪ Extent and Impact of Vertebrate Invasive Species. ▪ Extent and Conservation Status of Ecological Communities. ▪ Native Species Extent and Conservation Status. ▪ In-Stream Salinity. ▪ Turbidity/Suspended Solids. ▪ Phosphorus and Nitrogen in Aquatic Environments. ▪ Estuarine, Coastal And Marine Habitat Condition.
Land and Water Audit	Reporting on Resource Condition – need to identify information gaps	▪ Needs very detailed and standardised list of attributes. ▪ Riparian corridors (width and gaps). ▪ Success of tree planting (tree death).
	Effectiveness of Investment	Need a standardised baseline product for vegetation establishment: ▪ How much has been fenced out ▪ What and where are new vegetation planting

General Notes

Mr Jim Armstrong (DNR) has been documenting the existing data sets that are available to support natural resource management decisions as part of a state-wide project.

They are also preparing 'information product definition' templates, which give the specs for existing products. Trying to identify data/info product needs, survey has recently been circulated to CMAs.

Land Management Practice Information

ACTIVITY SHEET FOR WORKSHOPS

Contact Information

Contact Organisation:	Landcare Australia Ltd Level 1, 6 Help Street, CHATSWOOD NSW P.O. Box 5666 WEST CHATSWOOD NSW 1515 Tel: 02 9412 1040 Fax: 02 9412 1060
Contact Name:	Ms Jenny Quealy and Mr David Hehir
Contact Position:	National Manager, Landcare Partnerships & Support & National Projects Coordinator (respectively)
Date of Interview:	14th April 2005

Drivers	Information Issues	Information Needs
Landcare Australia undertakes a series of major activities at the national level: ▪ Marketing of Landcare activities to the community ▪ Media Promotion ▪ Corporate Sponsorship ▪ Reporting ▪ Program Planning	▪ Demonstrate to the community what farmers are achieving in environmental matters to continue public funding of activities ▪ Encourage landholders into Landcare or to maintain participation by demonstrating what has been achieved ▪ Promote best management practices in all rural industries ▪ Statistical reporting to governments, community groups and corporate sponsors	▪ Numbers of farmers participating in Landcare activities and their distribution ▪ Numbers of farmers not involved with formal Landcare groups but receiving peripheral influences ▪ Works and land management changes implemented with public, private and corporate funds ▪ Capacity building projects ▪ Farm plans prepared ▪ Case studies of successful practices implemented and sustained

Existing Information and Datasets

Land Management Practice Information	Landcare Australia does not hold any spatial information on land management activities implemented by Landcare Groups. There is statistical information at the state level on financial support given to projects, but is based upon the project name only.

Preferred Area for Trial

Upper Murray River Catchment where Landcare involvement is strong and activities impact upon other states.

General Notes

Discussions highlighted the difficulties to Landcare Australia of having no spatial record of where land use and management changes were implemented using community and corporate funds. This has limited Landcare Australia's ability to report in detail to its various sponsors. In the case of corporate sponsors, this inability to demonstrate particular benefits from the sponsorship monies can lead to problems.

Detailed information on land management practices is essential in the preparation of capacity building projects. Landcare Australia requires this information to determine the number of people implementing or not implementing specific land management practices. If changes are to be promoted, the extent of the issue needs to be determined. From this information a sponsor or sponsors may be sought, media responses prepared, funds offered for training and possibly a media personality engaged to promote the issue.

Information on best management practices and case studies is used to seek sponsorship from the corporate sector.

Major supermarkets such as Coles-Myer are working with Landcare Australia and want to use their logo for endorsements on products that provide particular environmental benefits. The company is insisting that it can identify the source of certain commodities as coming from properties or systems that use sustainable farming techniques and do not damage the environment. The process is being driven by customer demand.

Land Management Practice Information

ACTIVITY SHEET FOR WORKSHOPS

Contact Information

Contact Organisation:	Lachlan Catchment Management Authority P.O. Box 227, FORBES NSW 2871 Tel: 02 6840 7800 Fax: 6840 7801
Contact Name:	Mr Alan McGufficke and Mr Ian Packer
Contact Position:	Program Manager (Planning) and Catchment Officer respectively
Date of Interview:	24th March 2005

Drivers	Information Issues	Information Needs
Capacity Building for Change	Land Holder Attitudes – The question "Why aren't farmers interested?" "Why aren't they applying for incentive funding?"	▪ Attitude towards government agencies ▪ Social and economic issues ▪ Farm ownership
	Networks – "Who provides farmers with advice?"	Productivity information Accredited activities (biodynamic, organic etc.)
Reporting on CMA Activities to State Government	Incentive Program Agreements - The question "How effective have we been and what areas have we affected using the incentives?"	▪ Instream works ▪ Fish weirs ▪ Fencing and exclusion of land use activities along streams ▪ Re-establishment of riparian vegetation
	Benchmarking: The question – "What works have occurred prior to the implementation of CMA projects?"	Baseline data
	Pasture management The question – "How to monitor or evaluate pasture cropping?"	Cropping cereals into native pastures for feed Biodiversity of paddocks to check for increases Benchmark current agreements with past to assess outcomes
Planning	Dryland Salinity	▪ Treatments of discharge sites ▪ Treatments or practices implemented for recharge management
	Wetlands	▪ Treatments or managements within existing wetland sites ▪ New wetland sites constructed
	Irrigation	Areas irrigated, sources of water, on-farm storage, methods of application, land forming and management of waste water including recycling
	Water quality	Soil erosion control schemes implemented Riparian management practices implemented (see also Riparian Management as an Issue)

Preferred Area for Trial

Upper Cudgegong near Rylstone
- Willow Containment, Section 10 and Water Shed Committee

General Notes

From previous conversations with Mr Packer some LMPI data was highlighted.

These included discussions on the monitoring, evaluation and reporting of implemented incentive program activities. They particularly wanted to know information about:

CAPACITY BUILDING
- What training programs (GFP, Holistic Management, TOPCROP etc.) are attracting landholders
- How people attend these programs
- What activities are undertaken at these training programs

SOILS MANAGEMENT
Data sets for targeting Incentive programs
- Property Vegetation Plans
- Acid Soils and the various works (demonstration sites etc.)
- Environmental Management Systems and Environmental Services Scheme information
- Property Management Plans

LAND MANAGEMENT DATABASE
- Need an effective way to record all incentive activities
- Need an easy way to report on recorded activities

Land Management Practice Information

ACTIVITY SHEET FOR WORKSHOPS

Contact Information

Contact Organisation:	Lachlan Catchment Management Authority P.O. Box 510, COWRA NSW 2974 Tel: 02 6341 1600 Fax: 02 6342 2565
Contact Name:	Mr Kieran Hawker, Mr Mark Leary, Mr Dom Nowlan and Mr Kelvin Langfield
Contact Position:	Catchment Coordinators and Catchment Officer
Date of Interview:	15th February 2005

Drivers	Information Issues	Information Needs
Reporting on CMA Activities to State Government	Benchmarking: The question – "What works have occurred prior to the implementation of CMA projects?"	Baseline data
	Recording of Incentive Program activities Pasture management The question – "How to monitor or evaluate pasture establishment?"	▪ Tree planting (direct seed or tube stock) ▪ Soil type boundaries ▪ Paddock boundaries and names ▪ Conservation machinery conversions and purchases ▪ Seed and fertiliser use ▪ Fencing – electric, permanent, boundary etc. ▪ Innovative fencing ▪ Vegetation establishment (pastures, shrubs) ▪ Watering points ▪ Soil testing ▪ Soil type boundaries ▪ Training and education activities ▪ Irrigation practices and methods ▪ Land Use ▪ Ground Cover and Native Vegetation

Existing Datasets

On-ground works and land management practice information has been recorded in:
- Boorowa Catchment (comprehensive data set dating back to 1995)
- Weddin Catchment (patchy dataset dating back to 1997)

Preferred Area for Trial

Weddin Shire and catchment area:
- Already have some on-ground works recorded
- Has some GIS capability and support for the area

General Notes

From previous conversations with Mr Nowlan and Mr David Hilhorst of the Lachlan CMA, it was mentioned that there was a great need for a tool to record and report on incentive project outputs. This would help with reporting and targeting for future incentive programs:
- Property Vegetation Plans
- On ground works
- Land Management Activities
- Property Management Plans

Land Management Practice Information

ACTIVITY SHEET FOR WORKSHOPS

Contact Information

Contact Organisation:	Murrumbidgee Catchment Management Authority Level 2 84 Crown Street, WAGGA WAGGA NSW 2500 Tel: 02 4224 9679 Fax: 02 4224 9689
Contact Name:	Mr John Searson, Mr Greg Bugden, Mr John Francis and Ms Sally Keane
Contact Position:	General Manager, Business Manager, Program Manager, and PVP Officer
Date of Interview:	22nd March 2005

Drivers	Information Issues	Information Needs
Monitoring, Evaluation and Reporting	Perennial Pastures	Demonstration sites ▪ Model farms ▪ Native pasture management activates ▪ Number of native grass species Native grass pastures ▪ Grazing practices (grazing days etc.) ▪ Stock composition and numbers ▪ Paddock boundaries ▪ Percentage perennial species ▪ Percentage native grass
	Community Education	▪ Current management practice ▪ Change in practices Native vegetation management ▪ Protection and enhancement practices ▪ Status of adjacent lands (hazards)
	Mosaic Farm Forestry	Plantations (private and commercial) ▪ Native forestry ▪ Exotic forestry ▪ Demonstration sites ▪ Machinery conversations ▪ Current management practice
	Benchmarking	Land management practice information ▪ Grazing type ▪ Pasture component ▪ Property boundaries
	Carbon Abatement NB: develop surrogate indicators for ease of measurement	Existing vegetation ▪ Species ▪ Understorey ▪ Height and age ▪ Vegetation regeneration
Benchmarking	Social Characterisation	Management of native pastures ▪ Perenniality in pastures ▪ Carbon sequestration Land management reactions ▪ Soil condition ▪ Degradation ▪ Landholder attitudes ▪ Research activities

Existing Information and Datasets

Data sets	Native vegetation conservation activities (digital and hard copy)

General Notes

The staff from the Murrumbidgee CMA mentioned the need and access to general natural resource information to underpin some important programs, this information included:

- General land use
- Land capability
- Soil landscapes
- Native Vegetation extent
- Climate data

The Land Use Options Simulator (LUOS) and carbon abatement program will need a broad set of natural resource data encompassing the whole state.

Land Management Practice Information

ACTIVITY SHEET FOR WORKSHOPS

Contact Information

Contact Organisation:	Murray Irrigation Limited 443 Charlotte Street, DENILIQUIN NSW 2710 Tel: 02 5881 9324 Fax: 02 5881 9317
Contact Name:	Michael Pisasale, Peter King and Demelza Brand
Contact Position:	LWMP On farm Supervisor, GIS Administrator and Environment Officer
Date of Interview:	20th April 2005

Drivers	Information Issues	Information Needs
Landholder Surveys	Land use and Areas	Summer or winter paddock activities ▪ Irrigated or not irrigated ▪ Rice and rice stubble ▪ Fodder crops (maize, millet and sorghum) ▪ Grain crops (soybean, corn etc.) ▪ Oil seeds (canola) ▪ Forage crops (oats and vetch) ▪ Cereal crops (wheat, barley, triticale) ▪ Grain legumes (peas, lupins, faba beans) ▪ Lucerne and perennial pasture ▪ Annual pasture ▪ Fallow (stubbles > 6 months old) Forestry plantation Horticulture (vines, vegetables etc.) Planted saltbush Infrastructure (buildings, roads, dams etc.) Stock type and numbers Dairy cows milked (max) Cattle – meat Sheep (meat, wool or self replacing)
	On Ground Activities	Farm planning Supply channel maintenance Drainage reuse and storage Tree and shrub plantings Regeneration of native vegetation Planting along irrigation channels Farm diversification Pastures Irrigation management Waterlogging and salinity Management practices Groundwater pumping Chemical use
	Farm Labour	Number of employees • Full time or part time • Seasonal labour • Milkers • Shearers and shed hands • Spraying • Harvesting

Media and Reporting	Public Image NB: communication officers, website and glossy publications.	Government compliance ▪ Environmental protection licence ▪ Water management (vegetation targets) Number of share holders (irrigators) Area developed for efficient irrigation Environmental indicators ▪ Benchmarking ▪ Wildlife surveys (every 18 months)
Land and Water Management Plans	Monitoring NB: aim to have vegetation to 50,000 Ha by 2012	Water table surveys Quality (salinity every tree years) Height (SWL every year) Vegetation density ▪ Vegetation types (red gum, boree etc.) ▪ TARGET activities
	Water Use and Reporting NB: enhanced by environmental programs and incentives	Land use ▪ Cropping ▪ Grazing ▪ Horticulture Paddock cover type ▪ Rice ▪ Perennial or annual pasture ▪ Cereal ▪ Wheat Storage (dams and reservoir) Stock and domestic Wetland watering Mixed broad acre areas Recycling of water ▪ Perennial vegetation ▪ Storage type and capacity ▪ Funding capped to 80%
	Vegetation Conservation	Protect and enhance Actively manage Restore and regenerate Broad vegetation types (MIL district)

Existing Information and Datasets

Data sets	Land use (farm scale and main enterprise) Rice growing areas EM31 surveys (sodicity and soil type) Flood contour ponds and border checks (0.08% slope) Recycling systems Mixed broad acre areas Storages, channels, irrigation piping
Data sources	Landsat Spot 5 Panchromatic DEM (15 cm) for watershed analysis and drainage (LIDR)

Land Management Practice Information

ACTIVITY SHEET FOR WORKSHOPS

Contact Information

Contact Organisation:	Macquarie River Food and Fibre. Cnr Macquarie and Bultje Streets, DUBBO NSW 2830 Tel: 02 6884 9577 Fax: 02 6882 8838
Contact Name:	Ms Jessica Brown
Contact Position:	Executive Officer
Date of Interview:	24th March 2005

Drivers	Information Issues	Information Needs
Public Relations and Lobbying	Media Releases	How much water is used per Hectare Type of irrigation and areas covered Total amount of water used per district
	Irrigation Development Management Plans (IDMP) - part of Cotton Australia's BMP modules.	Irrigation management Water wise training and workshops Water allocations to IDMP areas What properties have IDMPs
	Cropping of cotton	Change in cotton copping ▪ Used to be 7/10 years to cotton now showing 5/10 years to cotton
	Scheme Planning	Macro datasets for LMPI Riparian protected areas Private conservation areas
Preservation and Enhancement	Macquarie Marshes	Existing Vegetation Change in vegetation community
CMA Incentive Funding Process	Water Sharing Plans	Irrigation type and distribution method New irrigation technologies Whole farm planning and management
	Property Management Plans	Link between use and planning Farm planning Staged implementation planning

Existing Information and Datasets

Irrigator Surveys	Property details (name and property name) Irrigation practice (flood, spray, subterranean etc.) Area for each irrigation practice.
Macquarie Marshes Vegetation Survey	IKONOS satellite imagery coverage for the marshes Change in areas of vegetation type over the last 50 years Change in bird populations (size and position) for the last 50 years

Preferred Area for Trial

NARROMINE IRRIGATION DISTRICT

- GIS has been used to track water use.

General Notes

Discussions about the membership of the Macquarie River Food and Fibre group showed approximately 550 members spread between the Burrendong dam and down to the Macquarie Marshes.

The are four (4) water sharing schemes represented by the MRFF with only one so far using GIS software to record water use and irrigation practice.

Land Management Practice Information

ACTIVITY SHEET FOR WORKSHOPS

Contact Information

Contact Organisation:	Namoi Catchment Management Authority P.O. Box 550, TAMWORTH NSW 2340 Tel: 02 6764 5970 Fax: 02 6764 5995
Contact Name:	Ms Sheila Donaldson and Mr John Hutchinson-Smith
Contact Position:	Manager Strategy and Planning, Catchment Coordinator
Date of Interview:	14th June 2005

Drivers	Information Issues	Information Needs
Environmental Management Systems	Property Plans The question – "What activities are occurring without CMA funding?" also "What enterprises are farmers involved in?"	On ground activities • Fencing • Vegetation establishment • Soil conservation works Land use • Grazing type (rotational, set stock etc.) • Stock type (wool, meat, stud etc.) • Cropping practices • Farm forestry Funding sources
	Benchmarking	Land use Management practices On ground works Native vegetation cover and type
	Land holder Information	Grazing practice ▪ Area of improved pastures (managed) ▪ Improved grazing practices Cropping practice ▪ Agricultural tools used ▪ Tillage practice ▪ Stubble management Area of management Sustainable or Conservation farming Pasture component ▪ Percentage of perennials ▪ Number of perennial species ▪ Percentage C4 and C3 grasses
Native Vegetation Funding	Management	Stock exclusion Period of exclusion Occasional grazing Grazing days
Targeted investment	Landcare Groups	Landcare group areas and boundaries Active members Information and advice networks Past works information (benchmarking)

	Community Capacity	Land management practices Attitudinal change Existing survey results Financial and social standing

Existing Information and Datasets

Data sources	Aerial photos in hard copies Satellite imagery (patchy)
Data sets – hard copy	Benchmarked management practices ▪ From 1992 to 1998 ▪ Liverpool plains area only

Preferred Area for Trial

Anywhere within the Namoi CMA

General Notes

The current focus of Strategy and Planning group is on macro management, mainly because of limited number of staff and resources. They would be looking as the possibility of contracting out the collection of LMPI data for their region. It was also mentioned that Messrs Tony Gleeson and Jock Douglas where conducting and developing the Landcare Environmental Management Systems for the district.

Land Management Practice Information

ACTIVITY SHEET FOR WORKSHOPS

Contact Information

Contact Organisation:	Northern Rivers Catchment Management Authority. P.O. Box 618, Grafton NSW 2460 Tel: 02 9228 6313 Fax: 02 9228 6311
Contact Name:	Mr Peter Roberts and Mr Simon Proust
Contact Position:	Catchment Officer and Catchment Coordinator respectively
Date of Interview:	29th July 2005

Drivers	Information Issues	Information Needs
CMA requirements for Reporting and Monitoring	Define Landscape	Topography Land Use Land Capability Critical indicators ▪ Organic carbon ▪ Ground cover
	Community Social and Economic Profile The TARGET project carried out an extensive evaluation of farmers and could be used to help focus profiling	Property owners Number of farm businesses per Local Government Area Active membership of Landcare Succession Plans and Property Management Plans Religion and agency trust (TARGET) Internet use Level of service from agencies Funded Projects and Awareness of funding Members to other community groups Number of full time workers or equivalents on Farm ▪ Mum and the Kids ▪ Farmer and farm hand
	Vegetation Mapping NB: Apparently councils carry out their own mapping	Dominant species Maturity and disturbance Corridor type and connectivity Micro Habitat rating ▪ Hollows and logs ▪ Trees and shrubs ▪ Outcrops and springs ▪ Caves and overhangs Weeds (mistletoe), abundance and species
Landcare	General information	Landcare group boundaries Catchments and boundaries Regional councils and agency boundaries Aboriginal groups and boundaries

Existing Information and Datasets

Data sources	Aerial photos in hard copies Satellite imagery
Data sets – hard copy	Property plans

General Notes

The main issue regarding planning is the consolidation of data sets and data sources. There needs to be a standard frame-work or structure for the distribution of these data.

Land Management Practice Information

ACTIVITY SHEET FOR WORKSHOPS

Contact Information

Contact Organisation:	Department of Natural Resources North Coast Region Tel: 02 6640 2128 Fax: 02 6640 2175
Contact Name:	Ms Racquel La Rosa and Mr Richard Green
Contact Position:	Hydrologist and Hydrogeologist respectively
Date of Interview:	22nd June 2005

Drivers	Information Issues	Information Needs
Groundwater Management Areas	Availability and the sustainable management of ground waters.	Nearest bore (min 200m) Water quality Water depth (SWL) Water use Stock and domestic ▪ Commercial ▪ Access
	Vulnerability	Nearest bore (min 200m) Rural subdivision
	Geology	Alluvial Coastal sands Surface features – landscape and soil Fractured rock
Water Sharing Plans	Hydrological Modelling NB: "what if" scenarios coupled with economic analysis	Water use demands ▪ Environmental flows (eastern cod) ▪ Industry (real time and telemetered) Water balance ▪ Stream flow ▪ Runoff ▪ Rainfall ▪ Evaporation ▪ Flow duration curves Soil landscape and type ▪ Slope and ground cover ▪ Infiltration and percolation Land use ▪ Cropping types and water demands ▪ Grazing of perennials and annuals ▪ Costing analysis
	Industries	Fisheries ▪ Breeding habits ▪ Endangered species ▪ Indigenous species
	Climate Information	Rainfall (average based on five years gaps)

Land Management Practice Information

ACTIVITY SHEET FOR WORKSHOPS

Contact Information

Contact Organisation:	Department of Natural Resources North Coast Region Tel: 02 6792 4088 Fax: 02 6792 4400
Contact Name:	Ms Sue Rea, Mr Greg Lollback, Mr Dave McPherson, Ms Claire Aman and Ms Katrina O'Reilly
Contact Position:	GIS Coordinator, Resource Access, Resource Analysis, Planning and Compliance respectively
Date of Interview:	22nd June 2005

Drivers	Information Issues	Information Needs
Resource Information	Forestry and Native Vegetation and Comprehensive Resource Assessments The questions -"What type of forestry is occurring, how much and where from?" "What forestry activity is occurring under the exemptions provisions of the Native Vegetation Conservation Act?"	Plantation forestry ▪ Authorisations (type?) ▪ Species used (native or exotic) ▪ Property agreements Forestry benchmarking ▪ Type (private, commercial or joint) ▪ Species used ▪ Condition ▪ History ▪ Covenants Uses ▪ Materials for fencing ▪ Fire wood (local or transported) ▪ Quantity harvested ▪ Harvesting areas Exempt activities (clearing) ▪ How much is occurring ▪ Is the product being used ▪ Location Old Growth Forests ▪ Under management (what type) ▪ Descriptions (groups, leagues and type) ▪ Broad forest type (11)
	Extractive Industries	Dredging ▪ Coastal extractions ▪ Flood zone Uses of Dredged Material ▪ Residential development ▪ Land form drainage change ▪ Land fill for commercial ▪ Maintenance of port entrances Tracking of extractions ▪ Source (port maintenance, sand mining etc.) ▪ Use (landfill, etc.) ▪ Amount (volume, weight etc.) ▪ Type (sand, gravel, clay, rock etc.)

	State of the Environment Reporting NB: use standard indicators set by the local councils to help with their LEPs and coordinate funded activities	Baseline or benchmarking Sugar cane ▪ Self regulated or not ▪ Laser levelling ▪ Channel and drain modifications Acid Sulphate soils ▪ Drainage management ▪ Flood gate management ▪ Best management practices Permanent stream flow (current or real time) Mass movement and vegetation cover Groundwater usage
	Riparian Management	Weed invasion Water based weeds and diseases Urban development Number of lots per stream length Flood plain usage ▪ Wet pasture grazing ▪ Wetland cropping practices ▪ Back swamps and management Constructed drains
Planning	Social Interaction (Councils record complaint information)	Complaints between residents ▪ Noise ▪ Chemicals (farmer usage) ▪ Dust Conflict resolution
	Local Environment Plans Farm Land Protection Scheme	Base line information Changes in zoning (sales, development etc.) ▪ Rural to residential ▪ Rural to industrial ▪ Rural to recreation Housing density (subdivisions etc.) ▪ Where people are ▪ Sacrifices and gains Drainage patterns Flood plain type and extent (current)
Compliance	Property Information Also compliance needs under the Water Act	Property history (satellite and other sources) Previous vegetative cover Dams on 3rd order streams Number of dams per property General structural works
	Environmental Harm	Acid sulphate soils Land use activities Under exempt conditions How much area

General Notes

Ms Katrina O'Reilly mentioned the issue of copyrights to the various land management practice information and what can be done to protect the rights of individuals who provide detailed information. She also talked about the need to ensure that all data is collected using the same systems.

Land Management Practice Information

ACTIVITY SHEET FOR WORKSHOPS

Contact Information

Contact Organisation:	Department of Infrastructure, Planning & Natural Resources Tel: 02 9895 7403 Fax: 02 9895 7756
Contact Name:	Paul Pendlebury
Contact Position:	Acting Manager, Water Systems Performance
Date of Interview:	30th March 2005

Drivers	Information Issues	Information Needs
▪ Developing models for surface and groundwater management. ▪ Implement compliance of water use with relation to water use models. ▪ Audit of water use under the Murray Darling Basin Cap. ▪ Responding to enquires from Murray Darling Basin Commission regarding Cap issues ▪ Accreditation and acceptance of models and predictions. ▪ Identify and negotiate E_c credits for changes in land use. ▪ Informing policy or regulatory frameworks.	Models may be 'node-linked' (IQQM) or 'spatially-linked' or a combination of both. Data required include land use and land management practices in a temporal and spatial context. Both component data sets to incorporate: ▪ Current status ▪ What existed previously to determine changes in water use efficiency ▪ New developments including information on sources of water and water trading. Other important data sets are: ▪ Soil types (particularly soils that leak) ▪ Soil moisture profiles ▪ Water ordering systems ▪ Potential salt stores ▪ Policy and regulatory frameworks.	Information required forms part of the inputs to models, including the modelling of seasonal water demands: ▪ Land use ▪ Crop types ▪ Planting times ▪ Irrigation practices and areas ▪ Drainage practices ▪ Changes in management practices over time.

Existing Information and Datasets

Land Management Practice Information	Information supplied by Paul Simpson. DNR's Licence Administration System (LAS) holds all the information on water licences. These comprise the Access Record (to owner) Water Usage Approval (to land parcel) and the Works Approval (location site of pump etc). There are records of variable age and quality of crop area and crop type that is collected by licensing officers or in the case of the Lachlan Valley by mail-based questionnaire. Although the information is attached to a land parcel, no attempt has been made to represent or fit the information in a spatial sense. Logically, however, the representation of the information in a spatial sense is feasible. Most of this information is used in the preparation of the Integrated Quantity & Quality Models (IQQM) for each of the valley systems.

General Notes

Discussions highlighted an urgent need to respond to an inquiry from the Murray Darling Basin Commission regarding the expansion of irrigated lands in the Lower Murray catchment. There's a reported increase in production of some 6000 Ha apparently in breach of the Murray Darling Cap.

The value of the SUNRISE data set was discussed including the additional information held within the data set on land management practices. It is feasible that the increased level of production may have been achieved through improved irrigation practices. Thus information on land management practice, as well as land use is critical.

Land Management Practice Information

ACTIVITY SHEET FOR WORKSHOPS

Contact Information

Contact Organisation:	Porktech Consultancies P. O. Box 1245, YOUNG NSW 2594 Tel and Fax: 02 6382 3076
Contact Name:	Mr David Cooke
Contact Position:	Director and Industry Consultant
Date of Interview:	9th May 2005

Drivers	Information Issues	Information Needs
Australian Pork Industry Quality Assurance Program (APIQ)	Traceability and Product Development: The question – "What information do we provide to the consumer so that they will buy our products?" Better to talk about it as 'track-ability' or 'trace-back' when talking to farmers	▪ Biological assessments ▪ Chemical additions ▪ Physical assessments ▪ Meat Quality ▪ Facility Management ▪ Bio-security ▪ Animal Welfare ▪ Environmental assessments ▪ Occupational Health and Safety
	Environmental Guidelines for "natural and social resources"	▪ Climate and Topography ▪ Community Amenity (Noise, Dust, Pest and Diseases, Visual Amenity and Road Use) ▪ Cultural Heritage (Farming, Aboriginal and European) ▪ Vegetation Clearing ▪ Increased Nutrients ▪ Weed Invasion ▪ Feral Animals and Rodents ▪ Surface Water Effects (quality and quantity) ▪ Ground Water Effects (quality and quantity) ▪ Soil Properties and Land Use

	HACCP, Risk and Vulnerability Assessment for "piggery facilities and their management"	▪ Herd Composition (sows, piglets, breeders) ▪ Conventional shed accommodation ▪ Deep Litter shed accommodation ▪ Outdoor accommodation systems ▪ Feed milling, storage and distribution ▪ Water source, storage and reticulation ▪ Water supply mechanisms ▪ Housing, Flushing and Cooling systems ▪ Cleaning methods for sheds ▪ Drainage systems for sheds ▪ Effluent treatment and storage ▪ Liquid and solid effluent systems ▪ Anaerobic treatment ponds ▪ Effluent irrigation (on-farm or off-site) ▪ Treatment and storage of Solid By-Products ▪ Spreading of solid by-products

General Notes

Mr Cooke also runs a company (Frork Enterprises) that produces and designs specific feeds for different stock types. The demand for this feed is in the piggery market. He and his partners are also working with sheep and beef producers and also with cropping enterprises to produce cereals and grains that have the required nutrients for intensive animal production.

Land Management Practice Information

ACTIVITY SHEET FOR WORKSHOPS

Contact Information

Contact Organisation:	Department of Natural Resources Tel: 02 9895 7295 & 9895 7788 Fax: 02 9895 7090
Contact Name:	Mr Stephen Raft and Mr Peter Flaskis
Contact Position:	Natural Resource Officers
Date of Interview:	4th April 2005

Drivers	Information Issues	Information Needs
Audit of Land & Water Management Plans. Plans exist for: ▪ Jemalong ▪ Murrumbidgee ▪ Coleambally ▪ Lower Murray ▪ Murray (4 separate plans). The purposes of the audits are to verify expenditure and achievements against the respective plan.	A Land & Water Management Plan is a table of agreed works and expenditure over time. Any spatial information or records are prepared and held by the individual irrigation authorities Part of the data required for auditing purposes include land use and land management changes funded under the respective Land & Water Management Plans.	Land management practice Information forms part of the inputs to audits. Auditing is essentially a desk-based process from the records of irrigation authorities. A specified number of random site inspections are undertaken to verify that nominated works have been implemented. Land management data required include: ▪ Recycling systems ▪ Land forming ▪ On farm storages ▪ Fencing and vegetation features.

General Notes

The responsibility for auditing of Land & Water Management Plans has been transferred to the respective Catchment Management Authorities.

Auditing was originally the responsibility of DNR. DNR staff undertook the work for Jemalong & Coleambally Land & Water Management Plans and by contractors for the Murray, Lower Murray and Murrumbidgee Land & Water Management Plans.

These functions have subsequently been devolved to the respective Catchment Management Authorities

Land Management Practice Information

ACTIVITY SHEET FOR WORKSHOPS

Contact Information

Contact Organisation:	Resource Consulting Services 6A Grassland Close, COFFS HARBOUR NSW 2450 Tel: 1800 631 695 Fax: 02 6658 0776
Contact Name:	Mr Richard Groom and Mr Sean Martyn
Contact Position:	Senior Consultant and Director respectively
Date of Interview:	21st July 2005

Drivers	Information Issues	Information Needs
Targeting People	Social Mapping NB: look at ABARE and ABS data for comparative analysis with RCS data The question – "What psychosocial information can be related to farm enterprises?"	▪ Off farm income ▪ Percentage farms with dual incomes ▪ Percentage of family income ▪ Demographics ▪ Behaviour ▪ Economic – financial performance ▪ Training ▪ Education background (high school) ▪ Personality type (HBDI, Myers Briggs etc.)

Existing Information and Datasets

Data sets NB: some privacy issues.	Family, social and economic goal setting Economic analysis of farm enterprises ▪ Farmer discission making processes, related to performance

Preferred Area for Trial

Anywhere that RCS members can have input – RCS farmers within the trial area

General Notes

Mr Martyn mentioned that there was study carried out by ms Sue Kilpatrick, looking at ABARE data that showed a link between educational background and profitability. There is some commercial advantage to carry out landscape assessments, but not as beneficial as grazing charts within land management monitoring can be to farmers.

Mr Martyn and Mr Groom believed we should focus just as much on the social (people) aspect as much as we focus on the land and on ground activities. In the end we are dealing with people and we are trying to change perceptions as much as we are trying to change the landscape.

Mr Martyn also mentioned the issues associated with human error with paddock scale or point related information, so catchment or district scaled information would be more beneficial with social or community data (smooth out the human error).

Land Management Practice Information

ACTIVITY SHEET FOR WORKSHOPS

Contact Information

Contact Organisation:	Department of Primary Industries. 124/3 Bruxner Highway, Wollongbar NSW 2477 Tel: 02 6626 1349 Fax: 02 6628 1744
Contact Name:	Mr Rik Whitehead
Contact Position:	Agricultural Environment Officer – NORTH COAST
Date of Interview:	28th July 2005

Drivers	Information Issues	Information Needs
Farm Land Protection Scheme	Sustainable and profitable size for productive farm enterprise	Agricultural enterprise and area Property sizes Urbanisation ▪ Houses ▪ Hospitals ▪ Caravan parks ▪ Service stations ▪ Schools Areas lost from Agriculture (real time data)
	Developing Industries	Macadamias ▪ Soil erosion/loss ▪ Land capability (flatter lands) ▪ Earth works (V-drains) ▪ Establishment of ground cover (low light) ▪ Management along contours ▪ Slope (up to 20%) Organic Agriculture ▪ Horticulture ▪ Cattle for meat and dairy ▪ Cropping Protected Horticulture ▪ Controlled environment ▪ Netted Intensive Animal Industries ▪ Dairies ▪ Piggeries ▪ Poultry ▪ Feedlots - cattle
State of the Environment Reporting - SOE	Revegetation or regeneration of native vegetation	Intensity of revegetation Fenced off areas Pockets of regeneration ▪ Riparian fencing and revegetation areas ▪ Regrowth species type (natives) ▪ Percentage exotics and weeds Plantations ▪ Private forests ▪ Hard woods ▪ Rainforest timbers (cabinet makers) ▪ State forests (radiator pine)

	Critical Indicators	Bare soil Land use change
	Distribution of noxious weeds and pests	Camphor Laurel (indicates degradation) Lantana Landscape factors (slope) Pest Management ▪ Chemical use ▪ Bug scouts for horticulture (counting before spraying – shows BMP) Wild dogs Soil loss Land use change
	Types of Agriculture Some horticulture should be easier to identify from aerial photographs when they have closed canopies.	Grazing, cropping and area used ▪ Sheep and Deer ▪ Beef (larger industry) Intensive Agriculture ▪ Feedlots and Dairies ▪ Piggeries and Poultry ▪ Meat Rabbits Total stock numbers for LGA's (RLPB) Horticulture ▪ Netting (best management practice) ▪ Stone fruit ▪ Bananas ▪ Bees (mobile) ▪ Coffee ▪ Vegetables ▪ Macadamias ▪ Tea Tree Cane Sugar Soybeans Water Supply ▪ Alternative supplies ▪ Water use efficiencies

Existing Information and Datasets

Cattle Tick Program	Contaminated sites – old cattle dips Movement of contaminants
Distribution of broad land use information	Bananas Bees
Dairying	Location of specific enterprises

Preferred Area for Trial

- Within the North Coast Region

General Notes

Mr Rik Whitehead has been working with other agencies and local governments to establish and agreed process to supply State of the Environment data for reporting. Mr Whitehead also supplied contacts for various agricultural enterprises:

- Tropical Fruit – Mr Kevin Quinlin and Mr Neil Treverrow (Centre for Tropical Horticulture, DPI)
- Cane Sugar – Mr Rick Beaty (Broadwater Sugar Mill)
- Tea Tree – Mr Bede Clark (District Agronomist Casino)

Land Management Practice Information

ACTIVITY SHEET FOR WORKSHOPS

Contact Information

Contact Organisation:	NSW Rural Fire Services 15 Carter Street, HOMEBUSH BAY Tel: 02 9412 1040 Fax: 02 9412 1060
Contact Name:	Mr Grahame Douglas, Ms Katie Collins & Mr Simon Heemstra
Contact Position:	Manager, Community Hazards Management, Senior Planning Officer & Acting Manager, Natural Environmental Services respectively
Date of Interview:	15th April 2005

Drivers	Information Issues	Information Needs
Sections 52, 63 and 66 of the Rural Fires Act 1997. NB: The requirements to undertake certain activities in relation to the Rural Fires Act.	▪ Data sets for inclusion in the preparation of Bush Fire Management Plans (Section 52). ▪ Data sets are recorded spatially in the Bushfire Risk Information System (BRIMS).	▪ Hazard reduction activities and the methods used by all agencies: slashing, bull-dozing, trittering (mulching-type activity) ▪ Hazard reduction burns by agencies ▪ Issuance of notices and certificates: location, types of hazards, methods and conditions for hazard reduction ▪ Weed Invasion: impacts of weed invasions on species modification and fire hazards caused by changes in fuel loads, temperature and scorch effects on native vegetation communities ▪ Maps of native vegetation: for assessment of fuel structure and fore histories ▪ Grazing intensities: particular interest in areas of low stocking rates and impacts on potential fuel loads ▪ Pine forests: locations, ownership and levels of management

Existing Information and Datasets

Land Management Practice Information	Relevant information is only starting to be compiled. Currently, they are approaching other agencies to obtain copies of related data sets.

Preferred Area for Trial

Preferred locations in areas where the following circumstances occur:

- Weed infestations in critical vegetation communities (eg Cumberland woodland with infestations of olive
- Pine plantations with different management practices based upon predicted financial returns and level of management
- Large patches of intact native forest adjoining other types of land uses
- Urban-rural interfaces.

One area containing many of these features is Tumut.

General Notes

Section 52 of the Rural Fires Act 1997 details the requirements for Bush Fire Management Committees to prepare Bush Fire Management Plans for rural fire districts or other parts of the State.

A Bush Fire Management Plan:

1) "is to set out schemes for the reduction of bush fire hazards in the rural fire district or other part of the State;
2) ….may restrict or prohibit the use of fire or other particular fore hazard reduction activities in all or specified circumstances or places to which the plan applies."

A plan might, for example, prohibit the use of fire because of its effects on fauna or flora in, or the cultural heritage of, a particular place.

Section 63 of the Act requires public authorities and owners and occupiers of land to prevent bush fires.

Section 66 of the Act deals with this requirement through the following mechanisms:

"(1) The local authority of an area may, by notice in writing, require the occupier or owner (not being a public authority) of any land within the area to carry out bush fire hazard reduction work specified in the native on the land.

(2) The local authority must serve a notice under this section if required to do so by a bush fire risk management plan applicable to the land that is in force.

(2A) The local authority must issue a bush fire hazard reduction certificate in respect of any bush fire hazard reduction work required by a notice issued in accordance with subsection (2).

(3) The notice may specify the circumstances in which, conditions under which, places at which and manner and time within which the bush fire hazard reduction work is to be carried out and is to specify means other than fire by which the bush fire hazard reduction work is to be carried out and alternative means other than fire by which the work should, if practicable, be carried out.

(6) A notice requiring the establishment of a fire break cannot require an occupier or owner to kill or remove trees that are reasonably necessary:

(a) for shade, shelter, windbreak or fodder purposes, or
(b) for the protection of threatened species, populations, communities or critical habitats within of the *Threatened Species Conservation Act 1995.*"

Land Management Practice Information

ACTIVITY SHEET FOR WORKSHOPS

Contact Information

Contact Organisation:	Sydney Catchment Authority. Level 2, 311 High Street PENRITH NSW 2750 Tel: 1300 722 468 Fax: 02 4732 3666
Contact Name:	Mr Nick Sharp and Mr Allan Benson
Contact Position:	Spatial Analyst and Manager respectively
Date of Interview:	29th July 2005

Drivers	Information Issues	Information Needs
Healthy Catchments Program	Land Management Strategy NB: is concerned with the Special Areas	O'Hares Creek catchment Dams and reservoirs (drinking) Catchment boundaries Ground cover Recreational activities (bush walking etc.) Vegetation health (complexity, age, type etc.) Ecosystem health Canals and pipelines (size and capacity)
	Stormwater Strategy NB: is concerned with pollutants in stormwater	Construction activities Garden and parks maintenance Rubbish dumps and surrounds ▪ Landfill areas ▪ Garbage processing ▪ Recycling areas ▪ Hazardous and noxious dumps Hard surfaces that feed into stormwater Roofs without tanks or gravel pits Parking lots Roads
	Catchment Information Strategy NB: responsible for 16,000 square km of catchment.	Indicators for Catchment health ▪ Agricultural dams ▪ Actual evaporation ▪ Salinity risk in Conservation Areas ▪ Fauna and Flora ▪ Horticulture ▪ Mean annual rainfall ▪ Mean and maximum temperature ▪ Native vegetation ▪ Riparian agriculture ▪ Riparian condition ▪ Riparian native vegetation ▪ Urban development ▪ Waste disposal ▪ Wetlands Vegetation change Wildfire impacts and extent Flora and fauna surveys of Special Area

	Riparian Strategy	Riparian condition ▪ Degradation (erosion, salinity etc.) ▪ Vegetation community and type ▪ Vegetation health ▪ Vegetation complexity Land use (grazing, cropping etc.) Chemical and fertiliser usage and rate
	Sewage Strategy	Sewage treatment plants ▪ Onsite (septics and aerated) ▪ Discharge ▪ Tertiary, secondary or primary Sewage pipes and age Pumping systems In line pipe storages Unlicensed sewage plants Domestic and commercials systems
	Compliance Strategy	Community education activities Special Areas boundaries
	Rural Land Strategy	Land use change (current) Education about sustainable land use Land Capability assessment Stream bank erosion Derelict mines Dairy effluent and movement Weed control and suppression Chemical waste storage and disposal

Existing Information and Datasets

Data sources and Layers	All relevant boundaries Water (drainage, creeks, bores, storages, weirs, wetlands etc.) Vegetation, mainly for Special Areas (type, swamp land form etc.) Utilities (buildings, electricity, pipes etc.) Transportation (fire trials, roads, highways etc.) Soil (soil landscapes, flood hazard, salinity, erosion, etc.) Land (land use, land cover, land capability, etc.) Human environment (Urban areas, heritage sites Fire history (1962, 1963, 1964 to 2004 etc.) Hazards (burn counts, fire management blocks etc.) Flora and fauna (NSW atlas) Forestry (fire trails)
Imagery	SPOT 5 - 2004 Landsat – 2000, 2005 Aerial Photography – 2001, 2002

Land Management Practice Information

ACTIVITY SHEET FOR WORKSHOPS

Contact Information

Contact Organisation:	Department of Natural Resources Level 2 84 Crown Street, WOOLLONGONG NSW 2500 Tel: 02 4224 9679 Fax: 02 4224 9689
Contact Name:	Mr Tony Roper, Mr Fred De Closey, Ms Kerryn Stevens and Mr Chris Presland
Contact Position:	Science and Information, Resource Information and Coasts & Estuaries respectively
Date of Interview:	20th April 2005

Drivers	Information Issues	Information Needs
CMA Support and Technical Advice for Programs ▪ Coastal Incentives for Public Lands ▪ ESS Investment ▪ PVP Developer	Best Management Practices NB: Victorians have done some work to gauge BMP level	Current LMPI Soil health impacts (acidity, structure, etc.) ▪ Off site ▪ On site Bare earth Above ground Biomass (OM) Land Capability (based on productivity) ▪ Landscape Soils ▪ Soil Productivity (derived map)
	Clearing	Property developments Selling through real estate
	Benchmarking	Acid sulphate soils CMA funded activities Biodiversity River and Wetlands Coastal and Estuaries Land use program (soils and weeds) Other groups activities ▪ Shires ▪ Community groups ▪ Landcare Past projects Basic soil information
	Catchment Condition The question – "What indicators can be used to report on condition analysis?"	Monitoring and evaluation ▪ Water quality ▪ Soil health, soil information ▪ Biodiversity Condition of catchment High priority risk areas Targeting actions and activities
	Status and Condition Assessments	Risk assessments Condition assessments ▪ Soils ▪ Vegetation ▪ Riparian

Water Sharing Plans NB: development of indicators for reporting catchment condition	Environmental Assessments	Water Quality Soil Health Biodiversity Vegetative Cover Property boundaries
	Trial Areas ▪ Kangaroo Valley	CMA Incentive program activities Intensive agriculture – dairy Other natural resource activity

Existing Information and Datasets

Data sets	P5MA (vegetation) ▪ Regional coverage ▪ MVMP native veg mapping SOILS ▪ Coastal strip (CCA 1:25k) ▪ Other CRA at broad scale LAND USE ▪ Native Vegetation (RIRDC – multi attribute mapping)
Data sources	Satellite imagery Aerial photos

General Notes

Mr Roper and Mr De Closey also mentioned that if there was more information needed about land use impacts. In addition, Mr Gordon Clarke is looking at hazard modelling for land use impacts based at the Shoalhaven Shire in Nowra.

Land Management Practice Information

ACTIVITY SHEET FOR WORKSHOPS

Contact Information

Contact Organisation:	Department of Natural Resources. Evans Street, COWRA NSW 2794 Tel: 02 6341 9100 Fax: 02 6342 4551
Contact Name:	Mr Ian Cole, Mr Brian Murphy and Mr Bill Semple
Contact Position:	Resource Officer, Research Scientist and Research Officer respectively
Date of Interview:	28th May 2005

Drivers	Information Issues	Information Needs
Native Grass Pastures	Native Grasses	Species identification Location and size of pasture Age of pasture stands
	Native Pastures	Percentage perennial Percentage native Native species (C3 and C4) present
Soil Health	Organic Matter retention	Number if tillages First tillage - days before sowing Amount of disturbance at sowing (percentage between rows) Power of tillage ▪ Tyne, full tillage ▪ Two way disc ▪ One way disc ▪ Rotary Hoe ▪ Tyne, partial tillage Stubble management ▪ Spray, burn, turn in, knock over etc. ▪ Retention and leave alone ▪ Timing - days before sowing
	Soil type distribution mapping	Digital elevation model ▪ Slope classes Soil Landscapes Land Capability Soil information and location of samples ▪ EC and pH profiles ▪ Texture and profile layers

Saline Lands	Saline outbreak Pasture trials	Application of ameliorants (gypsum, lime etc.) Mulch (kg/Ha and type) Seeding rates and species Success of plant emergence Site characterisation ▪ Soil tests ▪ EC and pH profiles ▪ EM38 survey ▪ Water sampling of seepages (EC) Pasture composition ▪ Percentage perenniality and species ▪ Native dominance and species Cropping ▪ Every ten years Clumps of Vegetation Species and dominance

Existing Information and Datasets

Corporate Datasets DNR	Soil landscapes Land capability Land degradation Vegetation mapping State soil data and information

Preferred Area for Trial

Within Central West Region

General Notes

There is a need for the visual representation of all available data for the whole state.

Land Management Practice Information

ACTIVITY SHEET FOR WORKSHOPS

Contact Information

Contact Organisation:	Department of Natural Resources Sustainable Farming Systems Unit 30 Warne Street, Wellington 2820 Tel: 02 6840 0920 Fax: 02 6840 0940
Contact Name:	Tom Grosskopf, Craig Wood and Terry Brill
Contact Position:	Manager Integrated Planning and Natural Resource Officers respectively
Date of Interview:	27th July 2005

Drivers	Information Issues	Information Needs
Property Management Planning	FARM Plan	People that have applied to undertake the FARM Plan program Number of farm plans completed and location Assessment of components of individual farm plans Measurement of outcomes from farm plans Assessment of changes in approach to land management issues as a result of farm planning. Capacity for change, tagged to property: ▪ Voluntary involvement ▪ Completed personal training ▪ Financial and business training ▪ Succession planning ▪ Pasture cropping ▪ Ground cover (surrogate for organic matter)
Native Vegetation Management	Monitoring and Assessment The question – "What are the motivations or drivers for change?"	Existing Vegetation Activities listed under the Native Vegetation Conservation Act. Spatial information needs: ▪ Clearing consents ▪ Clearing activities ▪ Breaches to the Act ▪ Plantations ▪ Areas of revegetation (to be included in gains or losses in native vegetation area)
Best Management Practice	Policy Issues	Federal drivers Time sequenced data sources Industry group Best Management Practices
	Development and Identification	▪ Industry standards for best Management practice ▪ National information about BMP for a range of industries and activities ▪ Forestry operations on private land

General Notes

Rob Garsden is involved with similar activities as the Sustainable Farming Systems Unit and their input has been recorded in (LMPI_Activity_Rgarsden.doc)

Land Management Practice Information

ACTIVITY SHEET FOR WORKSHOPS

Contact Information

Contact Organisation:	Department of Primary Industry. P. O. Box 51, DUBBO NSW 2830 Tel: 02 6884 9577 Fax: 02 6882 8838
Contact Name:	Messrs. Luke Beange, Andrew Wooldridge, Justin Hughes and Warren King
Contact Position:	Project Officer, Salinity Officer, Technical Support Officer and Project Manager respectively
Date of Interview:	18th March 2005

Drivers	Information Issues	Information Needs
Sustainable Grazing of Saline Land (SGSL) • Site Characterisation • Monitoring NB: all data were collected for just the saline outbreaks and the immediate surrounding area	Farmer research and investigation sites	Water balance calculations ▪ Infiltration rates ▪ Surface water runoff ▪ Climate data (rainfall etc.) Soil sampling and analysis ▪ Salinity (EC) and type of salt ▪ Acidity (pH), sodium and other cations ▪ Texture and clay percentage ▪ Soil moisture (neutron probe) Land use ▪ Stock numbers and duration on site ▪ Grazing date and season ▪ Seasonal photos ▪ Groundcover ▪ Pasture composition Shallow monitoring bores ▪ Standing water levels ▪ Salinity and acidity Electromagnetic Induction Surveys (EM38, EM31)
	Farmer study sites	Soil sampling and analysis ▪ Salinity (EC) ▪ Acidity (pH) and cations ▪ Soil texture Electromagnetic Induction Surveys (EM38, EM31) Pasture establishment success ▪ Percentage ground cover ▪ Pasture species ▪ Food on offer (dry matter)

Existing Information and Datasets

EMI Surveys – site specific	EM31 surveys of saline outbreak and immediate catchment – 25m transects EM38 surveys of saline outbreak – 10m grid (vertical and horizontal)
Ground cover information	Percentage perenniality Ground cover percentage Pasture species Food On Offer (FOO – dry matter)
Groundwater and Surface Water.	Standing water levels Surface waster runoff Climate data (hourly)
Soil information	EC, pH to a depth of 1.5m for farmer demonstration sites with some bulk detailed soil analysis for each site also. Infiltration rates (various levels) and detailed soil analysis to a depth of 6m only for research sites

Preferred Area for Trial

Map sheets that include some of the SGSL trial sites, they recommended that it should include one of the research and investigation sites from the Central West Region.

General Notes

DNR was commissioned by the national Sustainable Grazing of Saline Lands program to complete the site characterisations for the farmer demonstration sites within NSW and Agriculture DPI was commissioned to carry out the characterisation and monitoring of the research sites across NSW.

Land Management Practice Information

ACTIVITY SHEET FOR WORKSHOPS

Contact Information

Contact Organisation:	John Sykes Rural Consulting and Tim Paramore Agronomic 709 Stedman Crescent and 799 Frauenfelder Street respectively Albury NSW 2640 Tel: 02 6021 1351 and 02 6043 1666
Contact Name:	Messrs Tim Paramore, John Sykes, Peter Baines and John Francis
Contact Position:	Consulting Agronomists and District Agronomist (DPI-Agriculture)
Date of Interview:	16th May 2005

Drivers	Information Issues	Information Needs
Riverine Plains Precision Agriculture Project (RPPAP) ▪ Largely farmer driven and based on client demand	Computer literacy and record keeping was poor amongst most farmers involved.	Cropping practices Employment records (who and what activities) Cropping Machinery Lucerne Pastures Native Pastures Tree establishment and existing Annual Pastures Canola – varieties Wheat – varieties Direct Drill and stubble retention Stubble burn Triticale, Lupins and Barley Weeds (regionally significant)
	Zonal Management	EMI surveys Soil characteristic analysis Nitrogen application (kg/ha) and soil storage
Mosaic Farming Project	Coordinated by Hamish Cresswell – no extension skills or experience Undertaken in conjunction with Heartlands project.	Collected detailed LMPI for each property Land Classification (appropriate use) Fenced off areas Mixed farming area Tree, shrubs etc.
Environmental Management Systems ▪ GRDC funded	Provide education tools to help understand their farming systems.	Land Use Best management practices (ISO 14000) Working with Anna Ridley to develop: ▪ Leakage tool ▪ Acid Soils tool ▪ Bio-diversity tool ▪ Financial Tool

Existing Datasets

Have mainly crop type and landscape characteristics based on properties, developed and distributed using Paddock Action Manager (PAM) software.

Preferred Area for Trial

Within 100km of Albury, including Holbrook and Deniliquin, just south of Wagga. This area is where most of their clients are located and some properties have some spatial information

General Notes

Mr Sykes mentioned that he provides environmental consultation for various Development Applications. For example he consulted to the paper mill "Norske Skog" that has a requirement to spatially record all distribution of waste materials onto private farm paddocks. This has been carried out over the last 12 years and recorded into a GIS database. Records include:

- Spatial distribution of paddocks
- Tonnes of ameliorated waste (60-70% water) delivered per Hectare
- Waste content and analysis.

Mr Peter Baines is the spatial GIS consultant for Mr Paramore and Mr Sykes, providing technical support and advice. Mr Baines has been recording farm plans and activities for the RPPAP, developing products through Paddock Action Manager (PAM) software.

Paddock Action Manager has generally been used for geo-referencing and recording of farm practice activities, but Mr Sykes, Mr Paramore and Mr Baines mainly use the precision agriculture module with their clients. They are finding that the majority of farmers involved are more interested in GPS and guidance systems rather than the benefits from precision agriculture.

Land Management Practice Information

ACTIVITY SHEET FOR WORKSHOPS

Contact Information

Contact Organisation:	Tamworth Regional Council P.O. Box 555, TAMWORTH NSW 2340 Tel: 02 6755 4550 Fax: 02 6755 4464
Contact Name:	Mr David Lewis and Ms. Genevieve Harrison
Contact Position:	Development and Regulatory Services, Planning Policy respectively
Date of Interview:	14th June 2005

Drivers / Information Issues / Information Needs

Drivers	Information Issues	Information Needs
Regional Local Environment Plans (LEP)	Rural Residential	Lease or ownership status Vacant land Size of blocks (0.5 hectares) Areas on town water supply
	Development Applications NB: information usually sourced by applicant	Current land use Proposed land use Existing farm infrastructure Developments (irrigation etc.) Contaminated lands European Heritage
	Intensive Agriculture	Poultry farming Accommodation type (sheds, free range etc.)
	Sediment Hazards	Grazing type (set stocking, rotational etc.) ▪ Ground cover percentage ▪ Bare earth percentage
Native Vegetation	Remnant Vegetation	Existing native vegetation Areas managed for native vegetation Areas planted for native vegetation improvement

Existing Information and Datasets

Data sets – digital	Bushfire extents (sourced from NSW Bushfire Association) Agricultural data Suitability classification (based on soil classes) Productivity Salinity outbreaks Biodiversity

General Notes

Mr Lewis and Ms. Harrison mentioned that the shire has only recently combined with other shires in their region to form Tamworth Regional Council and that the shires where all at different levels of developing their LEP. The former Parry Shire was the most advanced.

Natural Resource Data Sets required:

- Cadastral information for block sizes
- Agricultural classification
- Soil type
- Soil and Land capability
- Water table heights for raise indication
- Groundwater salinity

Land Management Practice Information

ACTIVITY SHEET FOR WORKSHOPS

Contact Information

Contact Organisation:	Western Catchment Management Authority P. O. Box 1840, DUBBO NSW 2830 Tel: 02 6883 3046 Fax: 6836 2988
Contact Name:	Mr Daryl Green
Contact Position:	General Manager
Date of Interview:	26th October 2004

Drivers	Information Issues	Information Needs
Publicity and Lobbying	Community Perceptions No problems with publicly funded landholders	▪ Suspicions of Landholders about Government Departments
Reporting on CMA Activities to State Government	Benchmarking: The question – "What works have occurred prior to the implementation of CMA projects?"	▪ Trees and shrub areas ▪ Irrigation works ▪ Past management practice ▪ Remnant Vegetation
Community and Social Capacity	Capacity for change. Socio-economic status of landholders	▪ Change of property ownership ▪ Education or training undertaken ▪ Implementation of programs
Vegetation Management	Success of Activities Align with PVP vegetation assessment standards	▪ Establishment of vegetation ▪ Tree death ▪ Woody weed treatments

Preferred Area for Trial

With in the Far West, coordinate with DNR Far West region.

General Notes

Mr Green mentioned that as it had become increasingly harder to coordinate monitoring and evaluation activities with the limited staff allocated to this CMA. It would therefore become the responsibility of DNR and other government organisations to provide this role. Because the other CMAs received far more funding and personnel than the Far West CMA, they should be able to cope with increasing responsibilities.

Land Management Practice Information

ACTIVITY SHEET FOR WORKSHOPS

Contact Information

Contact Organisation:	Department of Primary Industries P. O. Box 1840, DUBBO NSW 2830 Tel: 02 046 Fax: 02 8
Contact Name:	Mr John Lacy
Contact Position:	Rice Farming Systems Leader
Date of Interview:	19th May 2005

Drivers	Information Issues	Information Needs
Surveying Landholders for management practices ▪ Cropping ▪ Irrigation ▪ Grazing	Crop-CHECK	▪ Pre sowing soil test (nutrients) ▪ Sowing date or month ▪ Sow rate ▪ Good weed control ▪ Good pest control ▪ Stubble retention
	Rice-CHECK NB: key indicators are assessed for adoption within farmer groups	▪ Bank height ▪ Sow date and rate (plant number) ▪ Good weed control ▪ Panicle initiation (PI) date ▪ Nitrogen application update at PI ▪ Nitrogen topdressing ▪ Early pollen microspore water depth

General Notes

Mr Lacy mentioned that the department was going to initiate the CHECK system into other enterprises to highlight which management practices are essential for increased profit and business sustainability.

Land Management Practice Information

ACTIVITY SHEET FOR WORKSHOPS

Contact Information

Contact Organisation:	NSW Irrigators' Council Level 6, 139 Macquarie Street, SYDNEY NSW 2000 Tel: 02 9251 8466 Fax: 02 9251 8477
Contact Name:	Mr Doug Miell
Email:	doug@nswirrigators.org.au
Contact Position:	Chief Executive
Date of Interview:	29th April 2005

Drivers	Information Issues	Information Needs
▪ Land & Water Management Plans. ▪ Water Sharing Plans. ▪ Water Trading.	The NSW Irrigators' Council seeks to improve land management practices in the irrigation industry through the following approaches ▪ Increased accountability and accuracy of water use. ▪ Need to know more about how much water is being used by irrigators. Data should reflect better on the amount of water that is being used on farm. ▪ Demonstrate to the irrigation community the efficiencies that can be achieved in water use by comparing the amount of water used in relation to commodity yields. ▪ Identify sites where improvements in irrigation practice can be achieved. ▪ Improvements in billing practices. ▪ Demonstrate to the irrigation industry how to use spatial and real-time data for planning and management purposes.	The NSW Irrigators' Council sees its immediate data needs as being real-time metering and monitoring of water use on individual properties. This will involve the installation of meters on all properties with some connection to a direct transmitting device. The Council believes that such practices should be compulsory to all irrigators. Real-time information would reflect more accurately the water being used by the industry at the "farm gate". Such information would allow the industry to respond to statements from other water-based interests (eg tourism, environmental) and make any necessary adjustments to Water Management & Water Sharing Plans. It would also allow the industry to be more accountable in its water use. Real-time information would also allow an improvement in billing practices, as current billing methods are 12 months in arrears. Other data sets of importance to the Council include: ▪ Land use (current irrigated lands) ▪ Irrigation practices – methods of application and methods of drainage ▪ Areas of land management that may off-set environmental effects of irrigation (eg vegetation blocks planted as off-set sites)

General Notes

NSW Irrigators' Council is the over-arching group representing the irrigation industry in NSW. The Council has 24 members representing ten major irrigation areas across NSW covering both regulated and unregulated catchments and ground water extractions. The ten irrigation areas are based at: Goondiwindi, Moree, Narrabri, Dubbo, Forbes, Bourke, Griffith, Deniliquin, Wentworth, Lismore (North Coast) and Singleton (Hunter Valley). Macquarie River Food & Fibre, which is covered by a separate interview in this project is the representative at Dubbo. The Council does not represent irrigation interests within the Bega Valley.

Commodity interests cover the cotton, rice and dairy industries. NSW Farmers' Association is also represented. Individual irrigators belong to local organisations and these organisations then sit on the NSW Irrigators' Council.

An additional comment refers to the commercial value of real-time data. Support industries such as fertiliser and pesticide suppliers could use data on water use and commodity types to adjust the delivery of their products, based upon real-time information.

7.2 SCHEDULE 2 OF THE DEED OF GRANT

Project Description

Requirements for Land Management Practices Information in NSW

The purpose of this project is to:

1. Consult with relevant NSW State agencies to determine drivers and needs for land management practices information. Agencies include Department of Infrastructure, Planning and Natural Resources (DIPNR), Department of Primary Industries (formerly NSW Agriculture, Fisheries and State Forests), and the Department of Environment and Conservation (formerly the Environment Protection Agency and the National Parks and Wildlife Service).
2. Consult with NSW regional catchment management authorities, peak irrigation groups, peak industry groups and major regional councils to determine their drivers and needs for land management practices information.
3. Identify opportunities for cooperation in the collection and analysis of land use and land management practices information within NSW.
4. Prepare a report documenting the consultative processes undertaken and the results of these consultations.
5. Identify and determine priorities for the collection of land management practices information for the state and regional sectors of NSW and the potential for cooperation between different groups.
6. Identify likely pilot study areas and reasons for selection in terms of addressing both NSW's state and regional objectives. Prepare detailed costings for any project proposals.

This work forms part of the land management practices component of the Australian Collaborative Land Use Mapping Program, which aims to establish a national framework for the collation of land management practices information.

Methods

4. Identify agencies currently collecting land management practices information. Describe the attribute data being collected.
5. Identify additional agencies, regional catchment management authorities, peak irrigation groups, peak industry groups and major regional councils with needs for land management data.
6. Meet with representatives of agencies, regional catchment management authorities, peak irrigation groups, peak industry groups and major regional councils to discuss:
    - uses for land management practices information (existing and potential)
    - existing data collected, held or available
    - additional information required
    - format in which data are required
    - potential linkages with other agencies already collecting similar information
    - external funding opportunities
7. Retrieve any available spatial data sets and store in a central location.
8. Summarise results.
9. Confirm and circulate conclusions with agencies, regional catchment management authorities, peak irrigation groups, peak industry groups and major regional councils.
10. Prepare report.

Project Outputs

1. A report on NSW's state and regional drivers and needs for land management practices information.
2. A report providing fully developed proposal to complete a pilot study or pilot studies in NSW in the mapping of land management practices information.

Project Management

Name, Qualification and Organisation	***Responsibilities within Project***	***Relevant Experience***
Mr. Nicholas Henry DIPNR, Cowra	Project Officer	Salinity Technical Officer, Central West Region (7 years) Natural Resource Mapping & Spatial Recording of Land Management Practices (3 years)
Mr. Keith Emery DIPNR, Parramatta	Project Manager	Natural Resource Mapping, Land Use Mapping, Recording of Land Management Practices (30 years)
Mr. Graeme Short DIPNR, Grafton	Project Officer	Natural Resource Mapping, Land Use Mapping, Recording of Land Management Practices (25 years)
Mr. Bruce Peasley DIPNR, Inverell	Project Officer	Natural Resource Mapping, Land Use Mapping, Recording of Land Management Practices (25 years)
Mr. David Thomas DIPNR, Newcastle	Project Officer	Natural Resource Mapping, Land Use Mapping, Recording of Land Management Practices (25 years)
Mr. Stuart Lucas DIPNR, Albury	Project Officer	Natural Resource Mapping, Land Use Mapping, Recording of Land Management Practices (25 years)
Mr. John Scown DIPNR, Yass	Project Officer	Natural Resource Mapping, Land Use Mapping, Recording of Land Management Practices in NSW & NT (20years)

7.3 SCHEDULE 3 OF THE DEED OF GRANT

Progress of the project will be measured against the following milestones:

Description of milestone	***Performance indicator***	***Final date of completion***
1. Draft report on NSW's state and regional drivers for land management practices information	Acceptance of draft report by BRS	31 August 2005
2. Final report on NSW's state and regional drivers for land management practices information	Acceptance of final report by BRS	31 October 2005
3. Draft proposal for completing land management practices data collation pilot study in NSW	Acceptance of draft proposal by BRS	28 February 2006
4. Fully developed proposal for completing land management practices data collation pilot study in NSW	Acceptance of final proposal by BRS	28 April 2006

7.4 DATA ACCESS REQUIREMENTS

ITEM	DATASET	ACCESS REQUIREMENTS
Department of Natural Resources		
1	Component elements of land use and salinity outbreak datasets	Readily available spatial dataset from DNR, also posted on the CANRI web site and NRDD.
2	Land condition mapping (North Coast region)	Readily available spatial dataset from North Coast Region DNR.
3	Range land assessment program (Far West region)	Data access restricted to Far West Region DNR users only. Can obtain access to a "cut-down" version of spatial dataset on request.
Department of Primary Industries		
4	Cropping, irrigation and grazing practices (mainly textual with no spatial information)	Restricted use, access to DPI staff only. Can obtain access to textual data, but complicated and no spatial context provided – limited use outside DPI.
5	Fisheries, Mining and Forestry management practices for particular areas	Readily available to the public through Best Management Practice documents released as per NSW State regulations.
6	Contaminated livestock dip sites (North Coast)	Readily available through North Coast, but spatial data set only for North Cost region of DPI.
Catchment Management Authorities		
7	Funded works and on ground activities	Readily available spatial and textual datasets to the public, as per State and National reporting requirements
8	Historical inventory of on ground activities and funded works (HNCMA)	Spatial dataset available with data access agreement with the HNCMA. Not all information is available to the public.
9	Cropping practices and grazing management (Liverpool Plains and Central West CMA region)	Data not consolidated in a recognised spatial or textual format at present, some investigative work needed to consolidate data. Then access agreement needed to obtain certain aspects of the data.
Irrigation Authorities (Murray, Jemalong, Coleambally, Murrumbidgee)		
10	Water use and crop type for paddocks (irrigation districts and SUNRISE dataset)	Highly restricted spatial dataset, access agreements needed to obtain sensitive landholder information.
11	Funded water use efficiency works and on ground activities (districts)	Highly restricted spatial dataset, access agreements needed to obtain sensitive landholder information.
Department of Environment and Conservation		
12	Voluntary Conservation Agreements (Range Lands and Macquarie Marshes)	Readily available within NSW state agencies, but access agreement needed for spatial dataset to public or National government agencies.

7.5 MATRIX OF ORGANISATION AGAINST BRAOD ACTIVITY DESCRIPTION

ORGANISATION	Accreditations	Adjacent Lands - management	Application of Ameliorants	Benchmarking	Chemical Use	Coastal Management Practices	Crop Tillage & rotation Practices	Crop Type (Broad Acre)	Cropping Machinery - conversion	Drilling - bores, wells, piezo etc.	Establish Vegetation	Farm Infrastructure	Farm Labour	Farm Water Suppl1	Fencing	Grazing Management	Horticultural Practices	Heritage Areas	In Stream Works	Intensive Animal Production	Irrigation Management	Extractive Industries	Management of Vegetation	Monitoring and Evaluation	Nature Conservation	Pasture Establishment	Pest Management	Plantations and Forestry	Rangeland Rehabilitation	Research and Investigation	Riparian Management	Soil Testing	Stock Type	Training and Extension	Vegetation Community	Water Testing	Waste Management	Water Distribution Infrastructure	Weed Control
B1ron Ba1 Shire Council	0	0	0	0	0	1	0	0	0	0	1	1	0	0	0	1	1	0	0	1	0	0	0	0	1	1	0	1	0	0	0	0	0	0	0	1	0	1
Catchment Management Authorities	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Central West	1	1	1	1	1	0	1	0	1	0	1	0	0	1	1	1	0	0	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	0	1	0	1	1
Hawkesbur1 Nepean	0	1	1	1	1	0	1	0	0	0	1	0	0	1	1	1	0	1	1	0	0	0	1	1	1	1	0	1	0	0	1	0	0	0	1	1	0	0	1
Hunter and Central Rivers	0	0	0	1	0	0	1	0	0	0	1	0	0	1	1	0	1	0	1	0	0	0	1	0	1	0	0	0	0	0	1	1	0	0	1	1	0	1	1
Lachlan	0	0	1	1	1	0	1	0	1	0	1	0	0	1	1	1	0	1	1	0	1	0	1	1	1	1	1	1	0	1	1	1	0	0	1	1	0	1	1
Murrumbidgee	0	0	1	1	0	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	1	0	1	0	1	1	0	1	0	0	1	0	0	0	0	1	0	1	0
Namoi	0	0	0	0	0	1	0	0	0	0	1	0	0	0	1	0	0	0	0	1	0	0	1	0	1	0	1	0	0	0	1	0	0	0	0	1	0	0	1
Northern Rivers	0	0	1	1	1	1	1	0	0	0	1	0	0	0	1	1	1	0	1	1	0	0	1	0	1	1	0	1	0	1	1	0	0	0	0	1	0	0	1
Southern Rivers	1	0	0	1	1	1	0	0	0	0	1	0	0	0	1	0	0	1	1	0	0	0	1	1	1	0	1	1	0	0	1	0	0	0	0	1	0	0	1
Western	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	1	1	0	0	1	1	1	1	0	0	0	1	0	0	1
Clarence River Fisherman's Cooperative	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	1	0	0	0	0	0	0	1	1	0	0	1	0	1	1	0	1
Cotton Research and Development Corporation	0	0	0	1	1	0	1	0	1	0	1	1	1	0	1	0	0	0	1	0	1	0	1	0	1	0	0	0	0	1	0	1	0	0	1	1	1	1	1
Cowra Woodland Birds Program	0	1	0	1	0	0	0	0	0	0	1	1	0	0	1	0	0	0	0	0	0	0	1	0	1	0	1	1	0	1	0	0	0	1	1	0	0	0	1
Department of Environment and Conservation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Central West Region	0	1	0	1	0	0	1	0	0	1	1	1	0	1	1	1	1	1	0	1	0	1	1	1	1	0	0	1	0	1	1	1	0	0	1	1	0	0	0
Department of Lands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Department of Natural Resources	0	0	0	1	0	1	1	0	0	1	1	0	0	1	1	1	1	1	1	0	1	0	1	1	1	0	0	1	0	1	1	1	0	0	1	1	0	1	0
Barwon Region	0	0	0	0	1	0	1	0	0	0	0	1	0	1	1	1	1	0	0	1	1	1	1	0	1	0	0	1	0	0	1	1	0	0	0	1	0	0	0
Central West Region	0	0	0	1	0	0	1	0	0	1	1	1	0	1	0	1	0	1	1	0	0	0	1	1	1	0	0	1	0	0	1	1	1	0	1	1	0	0	1
Murra1 and Murrumbidgee Region	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1	1	0	0	0	0	0	0	1	1	0	1	0	1	0	1	1	1	0	0	0	1	0	0	0
North Coasts Region	0	0	0	0	0	1	0	0	0	1	1	1	0	0	0	0	1	0	0	1	0	0	1	0	1	0	0	1	0	1	1	1	1	0	0	1	0	0	1
South Coast Region	0	1	0	1	0	1	1	0	0	0	1	0	0	1	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	1	0	0	0
Far West Region	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	1	0	0	0
Department of Planning	0	0	0	1	0	1	1	1	0	1	0	1	0	1	0	1	1	0	0	1	1	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	1	1
Barwon Region	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	1	0	1	0	1	0	1	1	1	1	0	0	1	0	0	1	1	0	0	0	0	1	0	1

ORGANISATION	Accreditations	Adjacent Lands - management	Application of Ameliorants	Benchmarking	Chemical Use	Coastal Management Practices	Crop Tillage & rotation Practices	Crop Type (Broad Acre)	Cropping Machinery - conversion	Drilling - bores, wells, piezo etc.	Establish Vegetation	Farm Infrastructure	Farm Labour	Farm Water Suppl1	Fencing	Grazing Management	Horticultural Practices	Heritage Areas	In Stream Works	Intensive Animal Production	Irrigation Management	Extractive Industries	Management of Vegetation	Monitoring and Evaluation	Nature Conservation	Pasture Establishment	Pest Management	Plantations and Forestry	Rangeland Rehabilitation	Research and Investigation	Riparian Management	Soil Testing	Stock Type	Training and Extension	Vegetation Community	Water Testing	Waste Management	Water Distribution Infrastructure	Weed Control
Central West Region	0	0	0	1	0	0	0	0	0	1	1	0	0	0	1	0	0	1	1	0	0	1	1	1	0	0	0	1	0	1	1	1	1	0	0	1	1	0	0
Murrumbidgee Region	0	0	0	1	0	0	0	0	0	1	0	1	0	0	0	0	0	1	0	1	0	1	0	0	1	0	0	1	0	0	0	1	0	0	1	0	1	0	0
North Coasts Region	0	0	0	1	0	1	0	0	0	1	0	1	0	1	0	0	1	0	0	0	0	1	1	0	1	0	0	1	0	0	0	0	0	0	0	1	0	0	0
Department of Primar1 Industries	1	0	1	1	1	0	1	1	0	0	0	0	0	0	0	1	1	0	0	1	1	0	0	1	0	1	0	0	0	1	0	1	1	0	0	1	0	0	0
Central West Region	0	0	1	1	1	0	1	1	1	0	0	0	0	0	1	1	1	0	0	1	1	0	0	1	0	1	0	0	0	1	0	1	1	1	0	1	1	0	1
Murrumbidgee Region	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	1	0	0	0	0	1	0	0	0	0	0	1	1	1	0	1	1	1	1	0	0
Southern Tablelands Region	0	0	0	0	0	0	0	0	0	0	1	1	0	0	1	1	0	0	1	0	0	0	1	0	1	0	1	0	0	0	1	1	0	0	0	1	1	0	1
North Coast Region	0	1	1	1	0	1	1	0	0	0	1	1	0	0	1	1	1	0	1	1	0	1	1	1	1	0	0	1	0	1	1	1	0	0	1	1	1	0	1
Greening Australia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ACT and South East NSW	0	0	0	1	0	0	0	0	0	0	1	0	0	0	1	0	0	1	0	0	0	0	1	1	1	0	0	0	0	1	0	1	0	1	1	0	0	0	1
Irrigation Districts	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Jemalong Irrigation	0	1	0	1	0	0	1	1	0	0	1	0	0	0	1	0	0	0	0	0	1	0	1	0	1	1	0	0	0	1	1	1	0	0	0	1	1	1	0
Murra1 Irrigation Limited	0	1	0	1	0	0	1	1	0	0	1	0	0	0	1	0	0	0	0	0	1	0	1	0	1	1	0	0	0	1	1	0	0	0	0	1	1	1	0
Landcare Australia	1	0	1	1	1	0	1	0	0	0	1	0	0	0	1	1	0	0	1	0	0	0	1	0	1	0	0	0	0	1	0	1	0	1	1	1	0	0	0
Macquarie River and Border Rivers Food and Fibre	1	0	0	1	0	0	1	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	1	0	1	0	0	0	0	1	1	0	0	1	1	0	1	1	0
NSW Irrigators' Council	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0
Porktech and Frork Enterprises	0	0	1	1	1	0	1	0	0	0	0	1	1	0	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	1	0	0
Rural Fire Services	0	0	0	0	0	0	1	0	0	0	0	1	0	1	0	1	0	0	0	0	0	0	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Regional Landcare Committees	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gw1dir and Macint1re	1	0	0	1	0	0	0	0	0	1	1	1	0	0	1	0	0	0	1	0	0	0	1	1	1	0	0	0	0	1	1	0	0	1	1	0	0	0	1
Coffs Harbour	0	0	0	1	0	1	0	0	0	0	1	0	0	0	1	1	0	0	1	0	0	0	1	0	1	1	0	1	0	0	0	0	0	1	1	0	0	0	1
Resource Consulting Service	1	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Sykes and Parramore Consulting Services	0	0	1	1	1	0	1	1	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	1	0	1	0	0	0	1	0	1	0	1	0	1	0	0	1
Sidney Catchment Authorit1	0	1	1	1	0	0	1	0	0	0	1	1	0	1	0	1	0	0	1	1	0	1	1	1	1	0	0	1	0	0	1	0	0	0	1	1	1	0	1
Tamworth Regional Council	0	0	0	0	1	0	1	0	0	0	1	1	0	0	1	1	0	0	1	1	1	1	1	1	0	0	0	1	0	1	1	1	0	0	1	1	1	0	1
INTEREST (%)	**14**	**18**	**29**	**61**	**27**	**24**	**49**	**12**	**10**	**18**	**59**	**37**	**6**	**27**	**57**	**47**	**24**	**24**	**41**	**35**	**29**	**22**	**65**	**37**	**61**	**27**	**12**	**47**	**4**	**47**	**59**	**53**	**14**	**25**	**35**	**63**	**37**	**22**	**51**