

Australian Collaborative Land Use Mapping Program

**Tasmanian requirements for land management
practices information**

**A project facilitated by the Department of Primary Industries, Water and
Environment.**

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Executive Summary

The Australian Collaborative Land Use Mapping Program (ACLUMP) through the Bureau of Rural Sciences, commissioned a consultative process to determine Tasmania's requirements for land management practices information.

Land management practices describe how the land is managed and include on ground works, plans and landholder training. Land management practices information can be used to monitor and report on natural resource condition and trends, target and guide investment in high priority areas and indicate performance in the agricultural sector.

ACLUMP proposes to map land management practices across Australia and is currently developing a system to do so. In Tasmania, forty-three stakeholders from government, natural resource management bodies, industry groups, companies and consultants were consulted on a one-on-one basis. Stakeholders identified thirty-seven drivers for land management practices information of which the top nine drivers were:

- Water quality
- Native vegetation integrity
- Weed management
- Irrigation management
- Agricultural productivity
- Market access for products
- Salinity
- Property planning
- Natural resource management in general

Land management practices have been divided into 2 different levels in this report of practices and sub-practices Stakeholders identified 148 individual land management practices and a total of 336 land management sub-practices. The twelve most commonly mentioned practices were:

- Formal protection of native vegetation
- Property management plan
- Soil conservation methods
- Fenced riparian management zones
- Irrigation scheduling method
- Informal protection of native vegetation
- Irrigation water application method
- Environmental management system in place
- Off-stream watering points
- Water storage facility type
- Controlling specific weed species
- Crop rotation system

A pilot project proposal has been developed and costed. This pilot will test the feasibility of collecting land management practices information, how this information can be recorded and mapped, and the usefulness of such information to stakeholders.

1. Introduction

The Australian Collaborative Land Use Mapping Program (ACLUMP), which is a program of the Bureau of Rural Sciences (BRS), is establishing a national framework for the collation of land management practices information (LMP) across Australia.

Land management practices describe how the land is managed. There are many types of land management practices, not just on ground works or actions, but also land management regulations, guidelines, plans and training. For example, tillage practices in cropping enterprises, the type of irrigation practice, the degree of planning such as property management plans, how remnant vegetation is managed, and the methods used to conserve soil.

Before land management practices can be mapped, a framework for mapping and a classification scheme need to be determined. Each state has been asked to provide their key requirements for land management practices information to address legislative, catchment and government priorities in managing natural resources and ensuring sustainable agricultural production.

Land management practices information can be used to:

- Monitor and report on natural resource condition and trends.
- Target and guide investment in high priority areas.
- Indicate performance in the agricultural sector.
- As inputs into models that model farming systems and landscape processes.

This project undertook a consultative process with 43 stakeholders (see Appendix 1) from government, natural resource management bodies, industry groups, companies and consultants to determine what their land management information needs (drivers) are and what the key land management practices information needs are for Tasmania.

This report documents the consultative process undertaken, the drivers for land management practices information in Tasmania, and the key state and regional land management practices information required. The report also includes a fully costed proposal to undertake mapping in three pilot areas in Tasmania.

The Australian Collaborative Land Use Mapping Program (ACLUMP) has also been responsible for coordinating the mapping of *Land Cover* and *Land Use*. Recently, *Land Use* mapping for Tasmania was enhanced (2001-2003) for the whole state at a catchment (1:25000 to 1: 100 000) scale and is freely available from the Australian Natural Resource Data Library website http://data.brs.gov.au/asdd/php/basic_search.php.

2. Consultation with Stakeholders

Forty three stakeholders from state and local government, natural resource management associations, agricultural industry, associations, consultants and research organisations were contacted and invited to a consultative meeting on a one-on-one basis (Appendix 1).

Prior to the meeting, stakeholders were sent a questionnaire that was to be used during the interview. This helped stakeholders determine the relevant drivers and land management practices for their organisation when they reviewed their regional NRM strategies and best practice management information (Appendix 2).

During the interview, the relevant drivers for information and associated land management practices were identified, as well as sources of existing or related data, custodianship and privacy issues, storage and currency of data, and collection and mapping methodology.

The relevant drivers for information and land management practices for each stakeholder have been recorded in a database against each stakeholder and can be readily and efficiently queried.

At the end of the consultation phase, each stakeholder was sent a list of the drivers and land management practices for their organisation, to enable them to review, correct and add to them.

3. Land Management Practices Information

3.1 Drivers for Land Management Practices Information

The state government is responsible for land management via legislation, state policies and partnership agreements with other governments. Some of the land management specific frameworks, policies, plans and agreements, include:

- Resource Management and Planning System (RMPS) (1994)
- Forest Practices System
- Tasmania Together plan (2001)
- Tasmanian Natural Resource Management (NRM) Framework (2002)
- Natural Heritage Trust 2 bilateral agreement (2003)
- National Action Plan on Salinity and Water Quality bilateral agreement
- State of the Environment (SOE) reporting
- State policy on the protection of agricultural land (2000)
- State policy on water quality management (1997)
- State coastal policy (1996)

Under the Tasmanian Natural Resource Management Act 2002, the Tasmanian NRM framework was developed and a state-wide Tasmanian NRM council and three regional NRM committees were established. The six key priority issues of the framework are management of water, vegetation, soil, weeds, pests and diseases and the coastal/marine environment. Each regional committee has developed a regional NRM strategy that incorporates the key priorities identified above. The regional strategies also incorporate nationally agreed outcomes and targets. These include outcomes on salinity, biodiversity, ecosystems, water quality, threatening processes, and sustainable production systems. Ten matters for target are associated with these outcomes and include salinity, soil condition, native vegetation integrity, estuarine, coastal and marine habitat integrity, water quality, significant species and communities, and weed, pest and diseases.

There are three levels of NRM targets:

- Aspirational targets, to be achieved over 50+ years
- Resource condition targets, to be achieved over 10 to 20 years
- Management action targets, to be achieved within 1 to 5 years

The aspirational targets are not necessarily measurable, but provide guidance in long-term planning. Resource condition targets are measurable and used to evaluate the success of the strategy. Management action targets are short-term targets that contribute to achieving the resource condition targets.

Land management practices information may be of limited help in determining resource condition and trends, but may be more about the contextual evidence that would enable an NRM region or state government to judge if their programs have been effective in changing behaviour. Thus, land management practices information relates more to management action targets than resource condition targets. Meeting management action targets should lead to improved resource condition, but land management practices information will not measure resource condition directly.

The state government and regional NRM committees and their organisational associations (Cradle Coast NRM, NRM North and NRM South) have a major need for land management information due to their responsibilities to report against targets. As a result, the Department of Primary Industries, Water and Environment and the regional NRM associations were the major stakeholders for this consultative process.

Each government, regional agency or body interviewed was asked to identify their drivers for land management practices information. Their primary drivers for land management practices information are the various acts of parliament, policies, partnership agreements and strategies. Stakeholders' responses were allocated to a specific resource target or asset rather than the primary driver, such as "NRM strategy". This enables the reader to immediately associate the land management practice with a natural resource management issue and means the drivers are relevant for more than one organisation. This allowed for the determination of the most common drivers for land management practices information and helps with prioritising the land management practices information that should be collected.

For example, each NRM region identified that they would like information on practices within the riparian zone in order to monitor, evaluate and review their strategy in the future. The driver for this practice is the natural resource condition "water quality" rather than the higher level driver "NRM strategy".

Tasmanian stakeholders identified 32 drivers for land management practices information. These include, maintaining and protecting the state's native vegetation and water quality, maintaining and enhancing agricultural productivity, maintaining and gaining access to markets for agricultural products, managing irrigation and weeds, conducting research, rural property planning, protecting and rescuing threatened populations of fauna and flora, and managing salinity and land.

Table 1 shows all the drivers for land management information that were identified by stakeholders. The ranking score shows the number of times the driver was identified by stakeholders. The top nine drivers are shown in bold. The ranking of drivers for information may reflect the stakeholders involved in this project, rather than the ultimate importance of the driver to all stakeholders, or which drivers are critical for particular functions.

Table 1. Drivers for land management information in Tasmania.

Driver	Ranking
Water quality	19
Native vegetation integrity	15
Weed management	12
Irrigation management	11
Agricultural productivity	10
Market access for products	10
Salinity	10
Property planning	8
Natural resource management in general	7
Pest/disease management	6
Soil erosion	6
Threatened populations and communities	6
Monitoring, evaluation and review	5
Soil management	5
Land management	4
Natural systems / agricultural research	4
Wetland management	4
Land use planning	3
Raising publicity and awareness	3
Residential land management	3
Aboriginal values	2
Aquatic ecosystem integrity	2
Benchmarking	2
Browsing animal management	2
Financial sustainability of enterprise	2
Grazing management	2
Rural tree decline	2
Soil contamination	2
Agricultural commodity processors	1
Drought management	1
Estuarine water quality	1
Family values	1
Karst area management	1
Riparian zone management	1
Targeting on ground works	1
Timber production	1
Water supply	1

3.2 Key Land Management Practices Information required by stakeholders

Land management practices have been divided into 2 different levels in this report of practices and sub-practices. Tasmanian stakeholders identified 148 land management practices they would like to know about. Many of these practices comprise several different sub-practices that give rise to a total of 336 different land management practices. For example, there are 12 different salinity management sub-practices for the practice of ‘managing salinity’.

The twenty-one most commonly identified land management practices are shown in Table 2 in order from most to least commonly identified. The ranking score shows the number of times the practice was identified by stakeholders. A complete list of land management practices identified by stakeholders is shown in Appendix 4 and a complete list of sub-practices in Appendix 5.

Table 2. Key land management practices identified by stakeholders

Land management practices	Ranking
Formal protection of native vegetation	18
Property management plan	17
Soil conservation methods	16
Fenced riparian management zones	14
Irrigation scheduling method	12
Informal protection of native vegetation	11
Irrigation water application method	11
Environmental management system in place	10
Off-stream watering points	10
Water storage facility type	9
Controlling specific weed species	8
Crop rotation system	8
Fenced remanent vegetation	7
Game management plan	7
Nutrient input	7
Riparian management zone revegetation	7
Vegetation management plan	7
Accessing technical support, training and skill development	6
Monitoring irrigation water quality	6
Quality assurance system in place	6
Water source	6

Most of the key land management practices can be associated with more than one of the nine most identified drivers for information. By associating practices with drivers for information, the relevance of some of the less commonly known practices becomes clear.

The intent of each of the nine main drivers and their associated land management practices is explained below.

Water quality

The “water quality” driver for land management practices information is about practices that affect stream water quality and includes management activities in riparian zones as well as practices outside of this zone. It also includes protecting or maintaining vegetation in the riparian zone.

Stakeholders identified 36 land management practices which specifically related to stream water quality. Ten of the practices are in the top twenty-one land management practices identified.

The practice of fencing riparian zones implies stock and machinery are prevented from entering the riparian zone. However, it does not mean it is actively managed for weeds, fire, and succession, or that it is vegetated or cleared.

Off stream water points are stock watering points located away from the actual stream, where as “controlled access points for stock” are hardened narrow laneways to the actual stream.

Formal protection includes any protection guaranteed by legislation or agreement between the landholder and a government agency. Informal protection is where a landholder puts aside native riparian vegetation without any formal agreement or covenant with the government and does so of their own free will

The practice of fenced remnant native vegetation implies it is protected from grazing pressure, but opportunity grazing may occur occasionally. However, it does not mean it is actively managed for weeds, fire, and succession. Table 3 shows the most identified practices associated with stream water quality, their sub-practices and ranking.

Table 3. Water quality

Key land management practices	Land management sub-practices	Ranking
Fenced riparian management zones		8
Off-stream watering points		7
Riparian management zone revegetation		5
Soil conservation methods	Cover crop Windbreak Deep rip Grassed headlands Permanent waterways Fencing to exclude grazing Incorporate crop residue Cut-off drain Contour farming Stubble retention/cover Cultivation across slope Maintain surface roughness Perennial pasture phase Mulched-rip lines Contour drain Grassed lane and water ways Stormwater retention ponds	3
Nutrient input	Bio-solid Biodynamic preparations (Organic) Compost Inorganic fertiliser Manure Organic fertiliser	3
Formal protection of native vegetation	Conservation covenant Vegetation management agreement Private reserve Private sanctuaries Conservation covenant under Part 5 Agreement	1
Property management plan		1
Irrigation water application method	Flood/furrow Solid set drip/micro-spray Overhead sprinkler Centre pivot Traveller	1
Water storage facility type	Off-stream gully dam On-stream dam Turkey's nest Springfed dam Catchment dam	1
Fenced remnant vegetation		1

Native vegetation integrity

Native vegetation integrity, includes maintaining a comprehensive, adequate and representative reserve system of native vegetation, protecting threatened non-forest and forest vegetation communities and species, actively maintaining vegetation condition and maintaining habitat for threatened fauna.

Stakeholders identified 29 land management practices associated with the native vegetation integrity driver. Eight of the land management practices were in the top twenty-one practices. Stakeholders were interested in the practice of both formal and informal protection of existing native vegetation. Formal protection includes any protection guaranteed by legislation whereas informal protection is where a landholder puts aside native vegetation without any formal agreement or covenant with the government and does so of their own free will. The practice of protecting vegetation in easements such as road, railway and power line easements is captured as an option of the “informal protection of native vegetation” practice.

The practice of fenced remnant native vegetation implies it is protected from grazing pressure, but opportunity grazing may occur occasionally. However, it does not mean it is actively managed for weeds, fire, and succession.

Vegetation management plans can be a layer within a property management plan or whole farm plan, or a stand-alone plan and describe how vegetation is to be managed.

Game management plans are about controlling browsing animals and help to protect native non-forest vegetation from over grazing.

Crop rotation and nutrient input practices on land adjacent to remnant vegetation was identified by one stakeholder as relevant to the health of the remnant vegetation.

The practice of “accessing technical support, training and skill development” includes making use of industry and government programs that provide support and incentives to landholders, such as the “DPIWE Non-Forest Vegetation Program”, the support provided by Greening Australia, and the support provided by “Private Forests Tasmania”. Stakeholders were interested in knowing the degree to which their programs are adopted. Table 4 shows the most identified practices associated with native vegetation integrity.

Table 4. Native vegetation integrity

Key land management practices	Land management options	Ranking
Formal protection of native vegetation	See Table 3 for sub-practices	12
Informal protection of native vegetation	Conservation of a specific native vegetation type Easements being managed for vegetation conservation	6
Fenced remnant vegetation		6
Vegetation management plan		4
Off-stream watering points		2
Controlling specific weed species	Blackberry Boneseed Bridal Creeper Gorse Serrated Tussock Willows	1
Crop rotation system	See Table 7 for sub-practices	1
Game management plan		1
Nutrient input	See Table 3 for sub-practices	1
Accessing technical support, training and skill development		1

Weed management

Weed management was an important driver for land management practices information among government and regional natural resource management bodies. Thirteen land management practices were identified by stakeholders that were associated with the weed management driver. Three practices are in the overall top twenty-one practices. Table 5 shows these practices.

The practice of “controlling specific weed species” refers to weeds that are targeted in weed control strategies such as the “weeds of national significance (WONS)” and state and regional weed strategies. Stakeholders indicated that controlling targeted weeds is more indicative of active weed management than just controlling weeds in general, which most landholders do anyway to some extent.

Property management planning was also seen as an indicator of uptake of the weed management strategies. A weed map can easily be included in a property plan and by doing so, landholders have assessed, mapped and thought about strategies to control certain weeds.

The practice of “accessing technical support, training and skill development” is a measure of who is making use of regional weed officers and government incentive programs.

Table 5. Weed management

Key land management practices	Land management sub-practices	Ranking
Controlling target weed species	See Table 4 for sub-practices	6
Property management plan		2
Accessing technical support, training and skill development		1

Irrigation management

Stakeholders identified 19 land management practices that relate to the irrigation management driver, of which eight practices are in the overall top twenty-one. Table 6 shows the land management practices and sub-practices identified and their ranking.

Irrigation scheduling method refers to the method by which farmers schedule irrigation. For example, irrigation can be scheduled by using information from a soil moisture monitoring probe, by estimating soil water using pan evaporation and rainfall figures (water balance) or by using a calendar. Stakeholders are interested in where water application is carefully applied as this helps to assess the risk of salinity in a catchment or the demand on the water supply.

Water supply for irrigation is becoming critical in some catchments, even in Tasmania. Stakeholders would like to know what water source irrigators are using, to help with water supply management. The method of application of irrigation water is also of interest to stakeholders as water use effectiveness is closely associated with the application method and this in turn affects, water supply, ground water tables, soil conservation, crop growth and stream water quality.

Monitoring irrigation water refers to monitoring its quality/suitability for irrigation, particularly electrical conductivity (salinity).

Table 6. Irrigation management

Key land management practices	Land management sub-practices	Ranking
Irrigation scheduling method	Based on water balance Based on soil moisture monitoring Calendar	6
Irrigation water application method	See Table 3 for sub-practices	5
Water storage facility type	See Table 3 for sub-practices	4
Monitoring irrigation water quality		2
Water source	Recycled effluent water Ground water Flood flow harvested water Irrigation scheme Overland flow Town/country reticulated supply Recycled grey water Direct from river	2
Soil conservation methods	See Table 3 for sub-practices	1
Off-stream watering points		1
Riparian management zone revegetation		1

Agricultural productivity

Agricultural productivity refers to practices that affect the production of agricultural commodities directly and excludes financial and family aspects of the enterprise.

Stakeholders identified 30 land management practices associated with the agricultural productivity driver that they would like information about. Seven of these land management practices are in the overall top twenty-one practices.

Crop rotation systems are complex to describe but they are important to know about if productivity is to be sustained.

Conserving soils enhances agricultural productivity and thus is an indicator of productivity and was identified by a range of stakeholders. Comments about some of the other practices can be found in the preceding sections. Table 7 shows the top twenty land management practices that relate to agricultural productivity and their respective options from most to least identified.

Table 7. Agricultural productivity

Key land management practices	Land management sub-practices	Ranking
Crop rotation system	Cereal phase Cropping (cereals,peas,poppies)+no pasture Cropping (cereals,peas,poppies)+pasture+stock Legume phase Pasture phase Pasture+occasional cereals+crop Vegetables (brassicas,peas)/poppies+pasture+stock/no stock Vegetables(potatos,carrots,brassicas,peas,beans)+green manure + no stock Vegetables(potatos,carrots,brassicas,peas,beans)+green manure + stock Vegetables(potatos,carrots,brassicas,peas,beans)/poppies+no pasture	3
Property management plan		2
Water source	See Table 6 for sub-practices	2
Irrigation scheduling method	See Table 6 for sub-practices	2
Irrigation water application method	See Table 3 for sub-practices	1
Monitoring irrigation water quality		1
Soil conservation methods	See Table 3 for sub-practices	1

Market access for products

Market access for agricultural commodities has been identified by a range of stakeholders as an important driver for land management practices information in Tasmania. Market access includes access to international and domestic markets and is about image, brand, quality assurance and continuity of supply at a competitive price.

Stakeholders identified 30 land management practices they are interested in knowing about in relation to the market access for products driver. Ten of these practices are in the overall top twenty-one.

Stakeholders are particularly interested in knowing where Quality Assurance (QA) and Environmental Management Systems (EMS) are in place, even outside their immediate industry. QA systems ensure quality products through prescriptive measures and give producers access to larger markets as an incentive. EMS's provide a means by which a business can reduce their impact on the environment and can be a sub-set of a QA system and thus are relevant in catchment management and sustaining the agricultural industry. Both these systems imply that certain land management practices are being practiced.

Stakeholders also identified a further 28 land management practices, of which eight are shown in Table 8, that can be a specific practice within QA or EMS. Being an organic producer is a practice as well as a system with a range of sub-practices and this system gives the producer access to a particular market. Many of the 28 land management practices identified by stakeholders were related to organic production under this driver.

Table 8. Market access for products

Key land management practices	Land management sub-practices	Ranking
Environmental management system in place	EurepGAP Natures Choice	6
Quality assurance system in place	Cattlecare Freshcare Woolworths quality assurance standard SQF2000	5
Property management plan		1
Soil conservation methods	See Table 3 for sub-practices	1
Fenced riparian management zones		1
Irrigation scheduling method	See Table 6 for sub-practices	1
Informal protection of native vegetation	See Table 4 for sub-practices	1
Crop rotation system	See Table 7 for sub-practices	1
Nutrient input	See Table 3 for sub-practices	1
Monitoring irrigation water quality		1

Salinity

Stakeholders identified eleven land management practices associated with the salinity driver. Only the practices of “irrigation scheduling method” and “accessing technical support” are in the overall top twenty-one practices.

Table 9. Salinity and land management in general

Key land management practices	Land management options	Ranking
Irrigation scheduling method	See Table 6 for sub-practices	1
Accessing technical support, training and skill development		1

Property planning

Stakeholders interested in property planning have identified ten land management practices that they would be interested in knowing about. Of these, seven are in the overall top twenty-one. Table 10 shows these practices. Knowledge of where property planning is occurring was rated highly by stakeholders. Vegetation management plans or other specific purpose plans can be layers or maps within a property plan, or they can be a stand-alone plan or map.

Table 10. Property planning

Key land management practices	Land management sub-practices	Ranking
Property management plan		6
Environmental management system in place	See Table 8 for sub-practices	2
Formal protection of native vegetation	See Table 3 for sub-practices	1
Irrigation water application method	See Table 3 for sub-practices	1
Water storage facility type	See Table 3 for sub-practices	1
Vegetation management plan		1
Quality assurance system in place	See Table 8 for sub-practices	1

Natural resource management in general

This driver for land management practices information refers to good natural resource or environmental practice and applies to a diverse range of stakeholders and includes practices that affect the environment directly. Stakeholders identified nine land management practices associated with the natural resource management driver, of which two are in the overall top twenty-one practices (Table 11). Participating in a Landcare / NRM / discussion group did not make it into the top twenty one practices, but it rated the highest under this driver.

Table 11. Natural resource management in general

Key land management practices	Ranking
Accessing technical support, training and skill development	1
Monitoring irrigation water quality	1

3.2. State Government priorities

State government agencies identified 82 land management practices, of which 15 were also identified by all stakeholders in the overall top twenty-one practices. The land management practices are shown in Table 12 and relate to five drivers for practices information, they being, water quality, protection of flora, irrigation management, salinity, agricultural productivity, market access for commodities and weed management. This reflects the current state government priorities and to some extent who was asked.

Table 12. Top Twenty State Government identified land management practices

Land management practice	Ranking
Formal protection of native vegetation	9
Soil conservation methods	6
Controlling specific weed species	5
Property management plan	5
Environmental management system in place	4
Monitoring for new weeds	4
Irrigation scheduling methods	3
Informal protection of native vegetation	3
Irrigation water application method	3
Off-stream watering points	3
Fenced remanent vegetation	3
Quality assurance system in place	3
Water source	3
Water storage facility type	2
Crop rotation system	2
Game management plan	2
Farm hygiene practices	2
Machinery hygiene practices	2
Threatened species and community recovery plans	2
Fenced riparian management zones	2

3.4. Regional priorities

Regional natural resource management bodies identified 61 land management practices of interest in order to be able to monitor, evaluate and review their strategies and targets. Fifteen of these were also identified by all stakeholders in the overall top twenty practices. Practices related primarily to information needs in protection of flora and fauna, stream water quality and weed management. Table 13 shows the top twenty land management practices identified by regional bodies.

Table 13. Top twenty regional land management practices.

Land Management Practices	Ranking
Fenced riparian management zones	8
Off-stream watering points	7
Formal protection of native vegetation	7
Riparian management zone revegetation	6
Property management plan	5
Soil conservation methods	5
Game management plan	5
Vegetation management plan	5
Accessing technical support, training and skill development	5
Controlling specific weed species	4
Fenced remnant vegetation	4
Participate in a Landcare / NRM / discussion group	4
Actively managed riparian vegetation/management zones	4
Controlled access points for stock	4
Irrigation scheduling method	3
Informal protection of native vegetation	3
Water storage facility type	3
Accessing information and data, tools and models	3
Property planning course	3
Revegetation for bio-diversity and conservation	3

3.5. Sources of Land Management Practices information

Stakeholders were asked if their organisation was a custodian of existing land management practices information, both tabular and spatial. Table 14 shows which stakeholders currently hold land management practices information in Tasmania. Not all the information shown in Table 14 is publicly available and the list is provided only to give an indication of the extent of current land management data collections.

The Department of Primary Industries, Water and Environment (DPIWE) is Tasmania's major holder of land management practices information. Private Forests Tasmania (PFT) maintain a spatial database of forests that differentiates between plantation and native forest groups. This information is supplied by forestry companies and added to by PFT. Most processors of agricultural commodities hold some land management practices information about contracted growers. Some natural resources management groups hold information about funded land management works.

Table 14. Existing land management practices data sets in Tasmania.

Organisation	Data set	Land management practices or other data
DPIWE	Annual wine industry census	Irrigation water source Irrigation method
	Conservation of Freshwater Ecosystems Values project	Sub-catchment boundaries and stream sections
	Geo-conservation sites database	Conservation of geo-heritage sites
	Land resources assessment section	Soil condition / land use combinations
	Private Property Vegetation Management program (to be established by June 2006) will have an Integrated Private Conservation Registry (IPCR)	Vegetation management agreements Vegetation management plans Private reserves Private sanctuaries Land for wildlife
	Office of the Recorder of Titles	Conservation covenants
	NRM Support Unit	Data about various projects
	Non-forest vegetation program database to be integrated into the IPCR by June 2006	Weed control works Off-stream water points Remnant native vegetation fencing Ecological burning regime
	Property management planning course database	Property management plans
	River care section	River care works undertaken during NHT 1
	Water Assessment branch	Drainage districts Riverworks/sealed schemes Irrigation districts Water management plans Catchment management plans River care plans
	Water Management branch	Licensed irrigators
	Water Management – audit of irrigators	Irrigation equipment details Water use Crop areas Water storage facilities
Local government	Part 5 agreements under the LUPA Act	Conservation covenants Asset registers
Burnie City Council	Planning department GIS data bases	Asset registers Land values High res. aerial photo taken every five years
Certified organic producers	Australian Certified Organic (ACO) Nat. Ass. for Sustainable Ag. Aust. (NASAA) Organic Growers of Australia (OGA) Tas. Organic-dynamic producers (TOP)	Certified organic producer
Greening Australia	Databases from eight devolved grant projects	Fencing Off-stream water points Stream access points Management agreements Weed management agreements
Organic Coalition of Tasmania (OCT)	Survey of growers practices conducted in 2001 and 2002	Various practices recorded
Tamar NRM	Database of funded works in Tamar valley	Fenced remnant bush Fenced riparian land Off-stream water points
Glaxo-Smith Kine	Paddock records database of contract growers	Chemical applications Irrigation water use method Tillage operations
Tasmanian Alkaloids	Paddock records database of contract growers	Paddock and property boundaries Various management practices
Simplot	Paddock records database of contract growers from last 2 years	Chemical inputs Various management practices Yields

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McCains	Paddock records database of contract growers	Chemical inputs Water use practices Tillage practices
Private Forests Tasmania	Spatial database of six forest groups including plantation and non-plantation.	Forest groups
Rural Development Services	North facing slopes project database Property management planning project database Client database	Fencing Property management plans Participation in training Property size Main enterprise Intentions as a result of training
Agricultural Resource Management	Spatial database	Paddock and property boundaries

Australian Bureau of Statistics Agricultural census data

An examination of the agricultural census data collected in Tasmania in 1997 and 2001 was made. This data is aggregated into statistical local areas (SLA) and is only available for some of the SLA. When extracted from the AgStats disk, it can be tabulated into total area or percentage of the SLA. Data was extracted for the northwest of Tasmania and shown to the regional land management officer whose response was that the data under-reported what he knew of the area. SLA vary in size and seem to be based on population, ie. Smaller size in high population areas and very large in low population areas. In rural coastal areas with greater populations, the SLA appear to equate to 1:100 000 map scale, and thus any agricultural census data that can be mapped against a SLA would only be suitable for regional assessments of land management practice, if at all.

3.6. Other points and comments by stakeholders regarding mapping of land management practices

This section contains concepts and definitions about land management practices that might inform how land management practices could be mapped. Also, this section contains comments about mapping land management practices made by stakeholders. This section is NOT a mapping framework or system, it just contains some suggestions by Tasmanian stakeholders to be considered if a mapping system or framework is developed.

Concepts

Land management practices refer to the means by which the land management objective is achieved or the 'how' of land use (Lesslie R. 2004). The land management objective can be achieved using a variety of ways,

1. An actual practice can be performed (ie. tillage practice).
2. The implementation of a plan or system (ie. property management plan).
3. Or the landholder can build their capacity to change practices (ie. weed identification course).

Stakeholders surveyed for this report identified all three land management practice types.

The effect of a land management practice is geographic in most cases. For example it can be related to an actual area (Type 1 in the above list), applied somewhere on the property (Type two in the above list) or it is associated with the property manager (Type 3 in the above list).

The effect of a land management practice should determine how it is mapped cartographically. For example Type 1, an actual on ground practice can be mapped using paddock boundary polygons or actual map grid coordinates. Type 2, plans and systems, and Type 3, conceptual practices like “building the land managers capacity” can be mapped against property boundary polygons.

For example, if a progressive farmer, who actively updates his or her knowledge regularly, buys another property nearby, their management style and progressive influence will in most cases transfer to his new property. Thus mapping Type 2 and 3 practices against enterprise or property boundaries is appropriate.

Some land practices information (types 2 and 3) can be recorded in a database format and reported as aggregated data for large areas, such as NRM Regions. This information may satisfy requirements for reporting against regional NRM targets, but will not be able to be associated with any particular land areas. The effectiveness and value of this information needs to be tested in a pilot.

Points to consider in general

The following points about collecting land management practices information were made by stakeholders.

- Information needs to be relevant, systematic and detailed.
- What has caused the change in land management practices is often more important than the practice itself.
- Past and future intention of landholders in regard to land management practices is just as relevant as current practice.
- Information / mapping needs to be detailed and accurate enough to assist in making investment decisions for Natural Resource Management Regions and statewide.
- Information / mapping needs to add-value, have a long term time frame and have utility across a range of users.
- Information / mapping needs to be associated with, or a key indicator of, natural resources in the state.
- Information / mapping needs to be information rather than just data.
- Non-geographic information such as attitudes could be recorded on a sub-catchment basis.

Points to consider for the mapping/data collection methodology

The following points about mapping / data collection methodologies were made by stakeholders.

- Landholders ought to be involved; they then have ownership of the information and become committed partners and are more likely to contribute data.
- Mapping and data gathering should be consistent both in requirements and methodology.
- The cost of mapping should be modest, and proportionate to the overall Tasmanian NRM funding level (including NAPSWQ / NHT funding).
- More value may be had if detailed mapping occurs in key regions rather than mapping the whole state broadly.

-
- Grazing and agricultural systems in general, vary greatly between agro-climatic regions in Tasmania and what are key land management practices in one region are not necessarily key practices in other regions.
 - Time series mapping and data is very relevant and useful to Tasmanian stakeholders, thus mapping should occur regularly (at least every ten years, preferably five years) and should be a long-term commitment.
 - Some of the practices might be able to be mapped with just a desktop analysis using existing databases. A cost-benefit analysis of how the data is collected versus its utility needs to be considered.
 - Data can be considered public, if you can reasonably see it across a fence or from the air, whereas data which needs to be asked for, should be considered private.
 - Private data can be aggregated to protect privacy, but consideration needs to be given to how this is done. For example, practices data can be aggregated according to soils, sub-catchments and climatic regions. Table 15 shows the suggested aggregation basis for the top twenty land management practices.
 - Use multiple scales in mapping and information presentation rather than one scale fits all. Paddock scale (1:5 000 to 1:10 000) and property scale (1:25 000) are the most appropriate. Type 1 practices as defined above should/could be mapped at paddock scale whereas Type 2 and 3 practices should/could be mapped at property scale. Table 15 shows suggested mapping scales for the top twenty one practices.
 - Mapped practices need to be located and mapped geographically and attributed. Actual physical features such as fences or protected remnant vegetation (Type 1) should have Australian map grid coordinates (eastings and northings) assigned and mapped as a point (off-stream water point) or polygon (protected remnant vegetation). Attributes of the physical feature (such as water point or vegetation community) should be attached to the point or polygon.
 - Plans, systems, farm wide methods (Type 2) or practices relating to the manager (Type 3) should be assigned to an Australian map grid referenced property boundary polygon. For example “property management plans” (Type 2) or if the manager is a member of a land care group (Type 3). Attributes of the plan, system, method or manager should be attached to the property boundary polygon.
 - Alternatively, a property or parcel of land can be attributed with a percentage that a particular practice occupies that property or parcel.

Other stakeholder observations

The act of surveying a land management practice will encourage a change in practice if awareness is the barrier.

Land management practices could be being driven by drivers not normally directly associated with land management. For example, tax incentives and the associated investor schemes are driving the type of forestry and vineyard practices, and marketing image is driving the use or otherwise of recycled water rather than practicalities of using recycled water.

Table 15. Data type, aggregation basis and scale for the top twenty-one land management practices

Land management practice	Type of practice	Aggregation basis	Suggested scale
Formal protection of native vegetation	Type 1	Sub-catchment	Paddock
Property management plan	Type 2	Sub-catchment	Property
Soil conservation methods	Type 1	Sub-catchment	Paddock
Fenced riparian management zones	Type 1	Sub-catchment	Paddock
Irrigation scheduling method	Type 2	Sub-catchment	Property
Informal protection of native vegetation	Type 1	Sub-catchment	Paddock
Irrigation water application method	Type 1	Sub-catchment	Paddock
Environmental management system in place	Type 1	Sub-catchment	Paddock
Off-stream watering points	Type 1	Sub-catchment	Paddock
Water storage facility type	Type 1	Sub-catchment	Paddock
Controlling specific weed species	Type 2	Sub-catchment	Property
Crop rotation system	Type 2	Climatic sub-region	Property
Fenced remnant vegetation	Type 1	Sub-catchment	Paddock
Game management plan	Type 2	Sub-catchment	Property
Nutrient input	Type 2	Sub-catchment	Property
Riparian management zone revegetation	Type 1	Sub-catchment	Paddock
Vegetation management plan	Type 2	Sub-catchment	Paddock
Accessing technical support, training and skill development	Type 3	Climatic sub-region	Property
Monitoring irrigation water quality	Type 2	Sub-catchment	Property
Quality assurance system in place	Type 2	Sub-catchment	Property
Water source	Type 2	Sub-catchment	Property

3.7. Other land management information requirements

Stakeholders identified a number of other information requirements, that were not land management practices, that they required in order to meet their objectives. Table 16 shows the other information in order from most to least requested.

Local governments in particular require detailed geographic information about the agricultural, water, mineral and habitat resource of the area that they have to develop strategic plans for, in order to preserve the resource for future uses and generations and in order to manage conflict between landholders.

Table 16. Other land management information stakeholders identified

Other land management information identified
Land use mapping
Vegetation mapping
Land capability mapping
Land tenure change (degree of)
Salinity drivers and extent
Soil condition information
Weed mapping
Catchment water yield
Land suitability mapping and information
Native vegetation condition
NRM project locations
Water quality monitoring
Change in vegetation
Climate data
Farmers' age
Groundwater information
NRM monitoring site locations
Soil mapping
Water management information
Annual sales of salt tolerant pasture seeds
Cultural heritage sites
Data on farm bankruptcy
Effect of different stocking rates on native vegetation
Herbicide residues
High resolution satellite imagery (<1X1m pixel size)
Is land being used within its capability
Landscapes of significance
Mapping of Phytophthora root rot fungus
Mineral resources
Number of FTE's servicing salinity related enquires
Number of plans mentioning salinity as an issue
Paddock boundaries
Property boundaries
Threatened species mapping
Water catchment areas

4. Alternative projects suggested by stakeholders

A simple recording system for land managers and farmers to record farm details and management actions which can be shown to a third party. For example, as part of an EMS. This system could be online and could include NRM project information and results, which would enable people to access and compare project results.

There may be opportunities arising from the project Regional Outcomes for On Farm Sustainability (ROOFS), currently being undertaken by Tamar NRM in northern Tasmania.

This is designed to be a system which has a user friendly, integrated one-stop-shop that achieves multiple objectives through the one process including demonstrating duty of care and contributions to public good, providing evidence of meeting compliance, providing tools to support sustainability and profitability, and providing a system for long term recording of resource condition changes.

5. Pilot mapping project of Land Management Practices

As part of this project, a follow on pilot study to test and determine methodology, costs and benefits of mapping land management practices was developed. See Appendix 6 for the complete description of this follow on project.

The pilot study aims to test the reporting and appropriate mapping of the top twenty land management practices identified in this report. Desktop and field mapping methodologies are to be tested. The utility of the mapping products to stakeholders is to be examined and a cost-benefit analysis of the different mapping methods and final products is to be conducted.

The pilot study will recommend which land management practices should be mapped in Tasmania, what mapping and reporting methodology should be used, what data resolution (scale) should be used and what time and budget would be required for state-wide mapping of land management practices.

The pilot study will focus on three key areas of Tasmania (North Motton-Gawler (north west), Back Creek (Midlands) and Hamilton-Bothwell (south)) that represent the diversity of land use and land management in the state.

6. Recommendations

There are a large number of land management practices (148) that were identified by the 49 stakeholders. There is clearly far too many to map all of them. The BRS should attempt to map at least twenty practices in a pilot project.

The twenty most commonly identified land management practices should be selected for the pilot project. Alternatively, the twenty most important to State Government or Regional NRM bodies could be chosen for the pilot project.

This project only identified the land management practices relevant to stakeholders. The project did not examine methodology or utility of the information. The BRS should conduct a pilot project in Tasmania to determine the mapping methodology and the utility of the resulting information to satisfy stakeholders needs. This methodology would need to be linked to the national framework that is being developed.

The pilot project should focus on a number of small areas throughout Tasmania that are representative of the landscape and landuse complexity that is found in Tasmania.

The pilot mapping project should test both a desktop and field approach. The resulting maps and databases should be tested for their usefulness and cost-benefit.

References

Lesslie, R (2004). Land use and land management practices: Concepts, terms and classification principals. Bureau of Rural Sciences, Canberra. Unpublished

Appendix 1 – Stakeholders consulted

Stakeholder	Contact person
Agricultural Resource Management	Mick Leaman/Rachel Walker
Armstrong Agricultural Services	David Armstrong
Burnie City Council	Patrick Earle
Complete Agricultural Consulting Services	Frank Walker
CSIRO Sustainable Landscapes	Shaun Lisson
Davey and Maynard	John Maynard
DPIWE EMS	Liz Bond
DPIWE Extensive agriculture	Robin Thompson
DPIWE Land management section	Bill Cotching/Colin Bastick/Jason
DPIWE Land resources assessment section	Chris Grose
DPIWE Monitoring and evaluation	John Harkin
DPIWE Non-forest vegetation program	Louise Gilfedder
DPIWE Rivercare section	Micheal Askey-Doran
DPIWE Rivercare section GIS unit	Mark Brown/Simon Lynch
DPIWE Strategic policy unit	Alan Haig
DPIWE Vegetable and Ass. Industries	Micheal Hart
DPIWE Vegetation management	Stephen Harris
DPIWE Water assessment branch	Martin Read
DPIWE Water management branch	Terry Leary
DPIWE Weed management	Christian Goninon
DPIWE Wine Industry	Duncan Farquhar
Glaxo Smith Kline	James Warner
Greening Australia	Sebastian Burgess
Local Government - Burnie Council	Patrick Earle
Local Government - Dorset Council	Jay Wilson
Local Government - Huon Valley Council	Nikki den Exter
Local Government - Meander Council	Stuart Brownlea
Local Government - Northern Midlands	Greg Geoghegan
McCains	Les Murdock
Northern Midlands Council	Graham Judge
NRM Cradle Coast	Lynne Robertson
NRM North	James McKee
NRM South	Alistair Kay/Don Thompson
Organic Coalition of Tasmania	Graeme Stevenson
Private Forests Tasmania	Andy Warner
Rural Development Services	Amabel Fulton
Simplot	Nick Tandon/Peter Hardman
Tamar NRM	Kay Bailey
Tasmanian Institute of Ag. Research	Leigh Sparrow
Tasmanian Alkaloids	Peter Jolly
Tasmanian Farmers and Graziers Ass.	Ashley Bastock
Total Quality Assured	Jane Lovell
University of Tasmania	Richard Doyle

Appendix 2 – Questionnaire

Requirements for land management practices information in Tasmania Questionnaire

DPIWE and the *Bureau of Rural Sciences* (BRS) in conjunction with stakeholders are determining what *land management practice* (LMP) information should be collected and/or mapped in Tasmania. In order to do this, I have developed the following questionnaire to help you determine what LMP are relevant for your organisation.

Questions you should ask yourself.

Q1. Do you have any strategies, guidelines, regulations, policies or by-laws related to natural resource management that you are required to implement? Please list them.

Q2. If you have a list from Q1, do any of these (Drivers) have targets and what are they? Please list the targets that relate to land management practice information

Q3. Do you need to regularly report, monitor or evaluate how you are meeting the targets? If so, how often?

Q4. What type of information do you require to report on these targets?

Types of information for measuring how you are performing with respect to NRM could include, natural resource indicators (for example water and air quality), land use or land cover change mapping, or degree to which certain land management practices have been adopted (for example conservation tillage or whole farm plans).

Q5. Can you isolate the information needs that are actual *land management practices* that a land manager would implement?

Remember types of LMP also include, implementation of land management regulations, guidelines, plans such as ‘whole farm plans’, and training, EMS, land manager training in NRM or land covenants.

Q6. At what scale of spatial mapping or recording do you think each LMP should be recorded at? For example, paddock, property, catchment or regional.

Q7. How would each LMP be measured? For example, by area, by length of watercourse protected or by the degree of implementation.

Q8. How would each LMP be spatially located ?

A property plan would relate to the whole property but an effluent management system may be located at a specific site. For example, do you need to record paddock coordinates, farm boundaries, or centre locations of pivot irrigators?

Q9. Do you have any strategies, benchmarks or guidelines for which you have not got any indicators, maps or LMP that could directly indicate how you are progressing? If you have, there may be a LMP that could act as a surrogate indicator. What are they?

I understand that for some, to work through the above questionnaire could be a large exercise due to the extent of their area of responsibility. Thus I have attached a list of LMP that I think may meet your reporting requirements. Please peruse the list and I plan to meet with you to discuss any recommended changes based on the above questions.

What happens next?

The LMP identified by stakeholders will be collated, categorised and linkages identified. Issues such as data custodianship and privacy, data collection and/or mapping methodology, alternate or existing data sources, data storage, and data currency will be considered.

A short list of the key LMP and associated issues, will be circulated to stakeholders for consideration.

A final report on Tasmanian state and regional drivers and needs for land management practices information will be available from December 2005.

To test the map-ability of the key LMP in Tasmania, a fully costed proposal to undertake mapping of LMP in a selected pilot area will be developed and submitted to the BRS as well.

Actual mapping of LMP will not begin at least until the second half of 2006. Useful LMP information for you to use in monitoring and evaluation will not become available until at least 2008.

On behalf of the *Bureau of Rural Sciences* and its *Australian Collaborative Land Use Mapping Program* and DPIWE, I thank you for your time and thoughts.

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DPIWE - Stoney Rise
Devonport.
Tel: 03 6421 7672.
Email: peter.zund@dpiwe.tas.gov.au

For further information, please see the attached project information sheet and have a look at the national LMP web site at

<http://www.affa.gov.au/content/output.cfm?ObjectID=88F4306A-07B9-4CBD-BF47430BC51F6D55>

Appendix 3 – Project background sheet supplied to stakeholders

Requirements for land management practices information in Tasmania

DPIWE and the Bureau of Rural Sciences (BRS) in conjunction with stakeholders, are determining what *land management practice information* (LMPI) should be collected and/or mapped in Tasmania.

Government, regional NRM bodies, the agricultural industry and scientists can use *land management practice information* (LMP) to

- Monitor and report on natural resource condition and trend.
- Target and guide investment in high priority NRM issues.
- Indicate performance in the agricultural sector.
- Model landscape processes for NRM issues like salinity and water quality.

Land management practices describe **HOW** the land is managed. For example, tillage practices in cropping enterprises, the type of irrigation practice, the degree of planning such as whole farm plans, how remanent vegetation is managed and the type of soil conservation works.

There are many types of *land management practices*, not just on ground works or actions, but also land management regulations, guidelines, plans and training.

This project aims to determine what are the **KEY** *land management practices* that ought to be recorded in a database for Tasmania. In order to determine these, we should first consider what are the NRM priorities that require reporting and monitoring on. For example, the management action targets for the NRM strategies currently being implemented, require monitoring and reporting, and *land management practice information* may be relevant for some of the management action targets.

Over the next six weeks I intend to consult stakeholders on a one-on-one basis to determine what the *drivers* and the *key LMP* are. A broad questionnaire has been developed to simulate appropriate responses and will be sent later.

The LMP from all stakeholders will be collated, categorised and linkages identified. The following issues will also be considered,

- Data custodianship and privacy.
- Data collection and/or mapping methodology.
- Alternate or existing data sources.
- Data storage
- Data currency

A short list of key *LMP* and associated issues will be circulated to key stakeholders for consideration. Thereafter, a fully costed proposal to undertake mapping of *LMP* in a selected pilot area will be developed and submitted to the BRS.

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*. For further information on this project, please contact:

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Also please have a look at the national LMP web site at
<http://www.affa.gov.au/content/output.cfm?ObjectID=88F4306A-07B9-4CBD-BF47430BC51F6D55>

For further information see,

A project report by the BRS that developed methods to map farm level practices, such as stubble management methods, from the Australian Bureau of Statistics' Agricultural Census data and presented ways that do not compromise farmer confidentiality. This involved geocoding of the boundaries of farms in the census, which is now being planned for Australia. Geocoding enables the mapping of the results of questions on cropping practices asked in the June 2001 census. These questions concern fertiliser use (type and rate of application), tillage, stubble management, lime/gypsum use, pasture management and irrigation scheduling. Go to

<http://www.daff.gov.au/content/publications.cfm?category=Landscape%20Sciences&ObjectID=968AE19B-7A70-4FEB-86B8CC59329A0FDD>

Peter Zund,
Department of Primary Industry, Water and Environment
Stoney Rise, Devonport
Tel: 03 6421 7653

Appendix 4 – A complete list of Land Management Practices identified by Tasmanian stakeholders

Land Management Practices	Category	Scale	Measurement	Units	Data type	Georeference	Ranking
Land holder attitudes and behaviour	Attitude and behaviour	Property	Yes/No		Conceptual	Grid referenced enterprise polygon	3
Land holders intentions for next two to five years	Attitude and behaviour	Property	Details		Conceptual	Grid referenced enterprise polygon	2
Abatement plans for threatening processes	Bio-diversity maintenance	Regional	Degree of implementation		Plan	Grid referenced enterprise polygon	2
Actively managed remnant native vegetation	Bio-diversity maintenance	Paddock	Degree of implementation	Ha	Geographic	Map grid referenced polygon	1
Actively managed shelter belt	Bio-diversity maintenance	Property	Area	Ha	Geographic	Map grid referenced polygon	2
Actively managed wildlife corridor	Bio-diversity maintenance	Property	Area	Ha	Geographic	Map grid referenced polygon	3
Actively managed wildlife habitat	Bio-diversity maintenance	Paddock	Area	Ha	Geographic	Map grid referenced polygon	5
Assisted natural regeneration of vegetation	Bio-diversity maintenance	Paddock	Area	Ha	Geographic	Map grid referenced polygon	2
Ecological burning of vegetation (frequency and intensity)	Bio-diversity maintenance	Paddock	Degree of implementation		Geographic	Map grid referenced polygon	4
Fenced remanent vegetation	Bio-diversity maintenance	Paddock	Yes/No		Geographic	Map grid referenced polygon	7
Fenced wetland	Bio-diversity maintenance	Paddock	Yes/No		Geographic	Map grid referenced polygon	3
Fenced wetland buffer zone	Bio-diversity maintenance	Paddock	Yes/No		Geographic	Map grid referenced polygon	3
Formal protection of native vegetation	Bio-diversity maintenance	Paddock	Yes/No		Geographic	Map grid referenced polygon	18
Human habitat zone within a protected area	Bio-diversity maintenance	Property	Yes/No		Geographic	Map grid referenced point	1
Informal protection of native vegetation	Bio-diversity maintenance	Property	Yes/No	Ha	Geographic	Map grid referenced polygon	11
Revegetation for bio-diversity and conservation	Bio-diversity maintenance	Paddock	Yes/No		Geographic	Map grid referenced polygon	5
Threatened species and community recovery plans	Bio-diversity maintenance	Regional	Yes/No		Plan	Grid referenced enterprise polygon	3
Vegetation management plan	Bio-diversity maintenance	Property	Yes/No		Plan	Grid referenced enterprise polygon	7
Deterring browsing animals	Browsing animal management	Paddock	Length	Km	System	Grid referenced enterprise polygon	2
Game management plan	Browsing animal management	Property	Yes/No		Plan	Grid referenced enterprise polygon	7
Permitted removal of browsing animals	Browsing animal management	Property	Yes/No		System	Grid referenced enterprise polygon	1
Firebreaks	Bushfire management	Property	Yes/No		Geographic	Map grid referenced track/route	1
Fuel reduction burning	Bushfire management	Property	Yes/No		System	Grid referenced enterprise polygon	1
Accessing information and data, tools and models	Capacity building	Property	Degree of implementation		Conceptual	Grid referenced enterprise polygon	3
Accessing technical support, training and skill development	Capacity building	Property	Degree of implementation		Conceptual	Grid referenced enterprise polygon	6
Attend field days, workshops, seminars and conferences	Capacity building	Property	Yes/No		Conceptual	Grid referenced enterprise polygon	1
Participate in a Landcare / NRM / discussion group	Capacity building	Property	Yes/No		Conceptual	Grid referenced enterprise polygon	5
Participate in a NRM neighbourhood group	Capacity building	Regional	Yes/No		Conceptual	Grid referenced enterprise polygon	1
Participate in local government	Capacity building	Property	Yes/No		Conceptual	Grid referenced enterprise polygon	1
Property planning course	Capacity building	Property	Yes/No		Conceptual	Grid referenced enterprise polygon	4
Accredited farm chemical user	Cropping practices	Paddock	Area	Ha	Conceptual	Grid referenced enterprise polygon	1
Broadacre chemical application methods	Cropping practices	Property	Details		System	Grid referenced enterprise polygon	3
Chemical applications - historic and current	Cropping practices	Paddock	Details		Geographic	Grid referenced paddock polygon	3
Crop rotation system	Cropping practices	Property	Details		System	Grid referenced enterprise polygon	8

Cropping detail - seeding rate/density	Cropping practices	Paddock	Rate	Kg/Ha	System	Grid referenced enterprise polygon	1
Cropping detail - varieties	Cropping practices	Paddock	Details		System	Grid referenced enterprise polygon	1
Cropping details - sowing date	Cropping practices	Paddock	Time	Date	System	Grid referenced enterprise polygon	1
Incidences of harvesting on wet soils	Cropping practices	Paddock	Details		Geographic	Grid referenced paddock polygon	1
Length of fallow phase	Cropping practices	Paddock	Time	Days/months	System	Grid referenced enterprise polygon	2
Nutrient budgeting	Cropping practices	Property	Degree of implementation		Conceptual	Grid referenced enterprise polygon	4
Nutrient input	Cropping practices	Paddock	Details		System	Grid referenced paddock polygon	7
Nutrient input - application method	Cropping practices	Paddock	Details	Ha	System	Grid referenced enterprise polygon	2
Nutrient input - application rate	Cropping practices	Paddock	Amount	T/Ha	System	Grid referenced paddock polygon	2
Nutrient input - depth of application	Cropping practices	Paddock	Depth	m	System	Grid referenced paddock polygon	1
Nutrient input - timing of application	Cropping practices	Paddock	Season	Month	System	Grid referenced paddock polygon	2
Residue management - amount of residue export	Cropping practices	Property	Details	Tonnes	System	Grid referenced paddock polygon	1
Residue management - burn	Cropping practices	Property	Yes/No	Ha	System	Grid referenced paddock polygon	1
Residue management - degree of incorporation	Cropping practices	Property	Details		System	Grid referenced paddock polygon	1
Tillage method/implement used	Cropping practices	Paddock	Details		System	Grid referenced enterprise polygon	4
Tillage practice - frequency of tillage	Cropping practices	Property	Details		System	Grid referenced enterprise polygon	2
Bedding system to improve drainage	Drainage	Paddock	Details	Ha	Geographic	Grid referenced paddock polygon	3
Drain type	Drainage	Paddock	Yes/No		Geographic	Map grid referenced point	1
Certified organic producer	Farming system	Property	Degree of implementation		System	Grid referenced enterprise polygon	3
Controlled traffic vegetable cropping system	Farming system	Paddock	Area	Ha	System	Grid referenced enterprise polygon	1
Holistic farm management	Farming system	Property	Yes/No		System	Grid referenced enterprise polygon	1
Measure, monitor and review crop yields	Farming system	Property	Details		Conceptual	Grid referenced enterprise polygon	1
Prescription farming system	Farming system	Property	Yes/No		System	Grid referenced enterprise polygon	1
Robotically guided tractor operations	Farming system	Property	Yes/No		System	Grid referenced enterprise polygon	1
Sustainable rangeland management	Farming system	Property	Details	Ha	System	Grid referenced enterprise polygon	2
Tree lines (Organic)	Farming system	Paddock	Yes/No		System	Grid referenced enterprise polygon	1
Forest practices plan	Forestry practices	Paddock	Yes/No		Plan	Grid referenced enterprise polygon	1
Woodlot	Forestry practices	Paddock	Yes/No		Geographic	Map grid referenced polygon	1
Cropping and grazing system	Grazing practices	Property	Details		System	Grid referenced enterprise polygon	2
Faecal egg counts for worm control monitoring	Grazing practices	Property	Yes/No		System	Grid referenced enterprise polygon	1
Fencing to improve grazing options	Grazing practices	Paddock	Yes/No		Geographic	Grid referenced paddock polygon	1
Grazing animal type	Grazing practices	Property	Yes/No		System	Grid referenced enterprise polygon	1
Grazing driven by biological indicators	Grazing practices	Property	Yes/No		System	Grid referenced enterprise polygon	1
Grazing pasture type	Grazing practices	Paddock	Yes/No	Ha	Geographic	Grid referenced paddock polygon	2
Grazing system	Grazing practices	Property	Yes/No		System	Grid referenced enterprise polygon	4
Lambing dates	Grazing practices	Property	Yes/No	Days/months	System	Grid referenced enterprise polygon	1
Pasture management system	Grazing practices	Paddock	Details		System	Grid referenced enterprise polygon	2
Pasture resowing and with what	Grazing practices	Paddock	Details	Ha	System	Grid referenced paddock polygon	1
Shearing dates	Grazing practices	Property	Yes/No	Days/months	System	Grid referenced enterprise polygon	1
Silage/hay/feed grain production	Grazing practices	Property	Amount	T/Ha	System	Grid referenced enterprise polygon	1
Stocking rate	Grazing practices	Paddock	Rate	DSE/Ha	System	Grid referenced enterprise polygon	3
Area and frequency of irrigation	Irrigation practices	Paddock	Time	Events/season	System	Grid referenced enterprise polygon	2
Crop/pasture type irrigated	Irrigation practices	Paddock	Details	Ha	Geographic	Grid referenced paddock polygon	1

Farm water budgeting	Irrigation practices	Property	Details		Conceptual	Grid referenced enterprise polygon	1
Farm water management plan	Irrigation practices	Property	Yes/No		Plan	Grid referenced enterprise polygon	1
Groundwater management	Irrigation practices	Property	Details		System	Grid referenced enterprise polygon	1
Irrigation scheduling method	Irrigation practices	Property	Details		System	Grid referenced enterprise polygon	12
Irrigation water application method	Irrigation practices	Paddock	Yes/No		System	Grid referenced enterprise polygon	11
Metered water off-takes	Irrigation practices	Property	Yes/No		Geographic	Map grid referenced point	3
Monitoring irrigation water quality	Irrigation practices	Property	Yes/No		System	Grid referenced enterprise polygon	6
Net useable water storage capacity	Irrigation practices	Property	Volume	ML	System	Map grid referenced point	1
Timing of water take/harvest	Irrigation practices	Property	Time	Date	System	Grid referenced enterprise polygon	1
Total annual water use	Irrigation practices	Property	Volume	ML	Conceptual	Grid referenced enterprise polygon	1
Water budgeting	Irrigation practices	Property	Yes/No		System	Grid referenced enterprise polygon	2
Water source	Irrigation practices	Property	Details		System	Grid referenced enterprise polygon	6
Water storage facility type	Irrigation practices	Property	Volume	ML	Geographic	Map grid referenced point	9
Water use effectiveness analysis	Irrigation practices	Property	Rate	T/Ha	System	Grid referenced enterprise polygon	3
Water use per crop type	Irrigation practices	Property	Rate	ML/Ha	Conceptual	Grid referenced enterprise polygon	2
Actively managing special land management zones	Land management	Paddock	Area	Ha	Geographic	Map grid referenced polygon	2
Land provided by private landholders for community infrastructure/services	Land management	Property	Yes/No		Geographic	Map grid referenced point	1
Land rehabilitation	Land management	Paddock	Degree of implementation		Geographic	Map grid referenced polygon	2
Modified landscapes excluding riparian areas	Land management	Paddock	Yes/No		Geographic	Map grid referenced polygon	1
Stormwater management practices	Land management	Property	Details		System	Grid referenced enterprise polygon	3
Crop monitoring for pest management	Pest management	Property	Degree of implementation		Conceptual	Grid referenced enterprise polygon	1
Strip cropping	Pest management	Paddock	Yes/No		System	Grid referenced paddock polygon	1
Adherence to a Agricultural Code of Practice	Planning system	Property	Yes/No		System	Grid referenced enterprise polygon	3
Environmental management system in place	Planning system	Property	Degree of implementation		Plan	Grid referenced enterprise polygon	10
HACCP System	Planning system	Property	Degree of implementation		System	Grid referenced enterprise polygon	2
Management agreement	Planning system	Property	Details		Plan	Grid referenced enterprise polygon	2
Property management plan	Planning system	Property	Details		Plan	Grid referenced enterprise polygon	17
Quality assurance system in place	Planning system	Property	Degree of implementation		System	Grid referenced enterprise polygon	6
Actively managed riparian vegetation/management zones	Riparian land management	Paddock	Length	Km	Geographic	Map grid referenced polygon	5
Controlled access points for stock	Riparian land management	Paddock	Yes/No	Km	Geographic	Map grid referenced point	5
Fenced riparian management zones	Riparian land management	Paddock	Yes/No	Km	Geographic	Map grid reference of start/finish + stream name	14
In-stream works	Riparian land management	Paddock	Details		Geographic	Map grid referenced point	2
Modified stream channels and wet areas	Riparian land management	Paddock	Yes/No	Ha	Geographic	Map grid reference of start/finish + stream name	1
Off-stream watering points	Riparian land management	Paddock	Length	Km	Geographic	Map grid referenced point	10
Riparian buffer strip	Riparian land management	Paddock	Yes/No		Geographic	Map grid reference of start/finish + stream name	5
Riparian management zone revegetation	Riparian land management	Paddock	Length	Km	Geographic	Map grid reference of start/finish +	7

Tasmanian requirements for land management practices information-May 2006

						stream name	
Monitoring salinity	Salinity management	Paddock	Yes/No		System	Grid referenced enterprise polygon	4
Rehabilitation of saline areas	Salinity management	Paddock	Details	Ha	Geographic	Map grid referenced polygon	1
Salinity management plan or theme in a property plan	Salinity management	Property	Degree of implementation		Plan	Grid referenced enterprise polygon	4
Salinity prevention measures	Salinity management	Property	Yes/No		Geographic	Map grid referenced polygon	5
Salinity risk assessment	Salinity management	Property	Details		System	Grid referenced enterprise polygon	1
Amelioration of soil condition	Soil Management	Paddock	Area	Ha	Geographic	Grid referenced paddock polygon	2
Fencing according to land type	Soil Management	Paddock	Yes/No		System	Grid referenced enterprise polygon	1
Inter-planting (Organic)	Soil Management	Property	Yes/No		System	Grid referenced enterprise polygon	1
Microbiological testing	Soil Management	Paddock	Yes/No		System	Grid referenced enterprise polygon	1
Side dressing (Organic)	Soil Management	Paddock	Yes/No		System	Grid referenced paddock polygon	1
Soil conservation methods	Soil Management	Paddock	Details		Geographic	Grid referenced paddock polygon	16
Soil testing	Soil Management	Paddock	Details		System	Grid referenced paddock polygon	2
Tissue testing	Soil Management	Property	Yes/No		System	Grid referenced enterprise polygon	1
Undersowing/inter-planting (Organic)	Soil Management	Paddock	Yes/No		System	Grid referenced enterprise polygon	1
Animal effluent treatment system	Waste management	Paddock	Degree of implementation		System	Grid referenced enterprise polygon	1
Area irrigated with dairy effluent	Waste management	Paddock	Area	Ha	Geographic	Grid referenced paddock polygon	1
Dairy effluent application system	Waste management	Property	Details		System	Grid referenced enterprise polygon	3
Dairy effluent storage system	Waste management	Property	Volume	ML	System	Grid referenced enterprise polygon	5
Domestic effluent treatment system	Waste management	Paddock	Degree of implementation		System	Grid referenced enterprise polygon	1
Industrial effluent treatment system	Waste management	Property	Degree of implementation		System	Grid referenced enterprise polygon	1
Rate of application of dairy effluent	Waste management	Property	Volume	ML/Ha/cow	System	Grid referenced enterprise polygon	2
Actively involved with weed networks	Weed control	Property	Degree of implementation		Conceptual	Grid referenced enterprise polygon	2
Actively practicing integrated weed control methods	Weed control	Property	Degree of implementation		Conceptual	Grid referenced enterprise polygon	1
Actively preventing weed set	Weed control	Paddock	Degree of implementation		Conceptual	Grid referenced enterprise polygon	1
Biological control practices	Weed control	Property	Details		System	Grid referenced enterprise polygon	1
Controlling specific weed species	Weed control	Property	Degree of implementation		System	Grid referenced enterprise polygon	9
Farm hygiene practices	Weed control	Property	Yes/No	Ha	System	Grid referenced enterprise polygon	2
Herbicide and pesticide usage	Weed control	Paddock	Details		System	Grid referenced enterprise polygon	1
Machinery hygiene practices	Weed control	Property	Degree of implementation		System	Grid referenced enterprise polygon	4
Monitoring for new weeds	Weed control	Property	Yes/No		System	Grid referenced enterprise polygon	4
Weed buffer zones	Weed control	Paddock	Yes/No		System	Grid referenced enterprise polygon	1
Weed control method	Weed control	Property	Details		System	Grid referenced enterprise polygon	4
Weed control methods in easement	Weed control	Property	Details		System	Map grid referenced track/route	3
Weed layer in a property management plan	Weed control	Property	Yes/No		Plan	Grid referenced enterprise polygon	4

Appendix 5 – A complete list of land management sub-practices identified by Tasmanian stakeholders

Land Management Practices	Sub-practices
Actively managed wildlife habitat	specifically for Tasmanian Wedge-tailed Eagle
Actively managed wildlife habitat	specifically for Tasmanian devils
Actively managed wildlife habitat	specifically for threatened species
Actively managing special land management	Riparian management zone
Actively managing special land management	Karst management zone
Amelioration of soil condition	Application of lime
Amelioration of soil condition	Application of organic matter
Amelioration of soil condition	Slashing and mulching stubble
Amelioration of soil condition	Green manure crop
Amelioration of soil condition	Application of gypsum
Amelioration of soil condition	Application of mulch
Amelioration of soil condition	Stubble/residue retention
Bedding system to improve drainage	Mounding
Bedding system to improve drainage	Raised beds and furrow drains
Bedding system to improve drainage	Mouldboard bedding
Broadacre chemical application methods	Automated GPS guided aerial application
Broadacre chemical application methods	Manually guided aerial application
Certified organic producer	ACO
Certified organic producer	TOP
Certified organic producer	OGA
Certified organic producer	NASAA
Controlling specific weed species	Bridal Creeper
Controlling specific weed species	Gorse
Controlling specific weed species	Blackberry
Controlling specific weed species	Willows
Controlling specific weed species	Boneseed
Controlling specific weed species	Serrated Tussock
Crop rotation system	Vegetables(potatos,carrots,brassicas,peas,beans)+green manure+stock
Crop rotation system	Legume phase
Crop rotation system	Pasture phase
Crop rotation system	Pasture+occasional cereals+crop
Crop rotation system	Vegetables(potatos,carrots,brassicas,peas,beans)+green manure+no stock
Crop rotation system	Vegetables(potatos,carrots,brassicas,peas,beans)/poppies+no pasture
Crop rotation system	Cereal phase
Crop rotation system	Cropping (cereals,peas,poppies)+no pasture
Crop rotation system	Cropping (cereals,peas,poppies)+pasture+stock
Crop rotation system	Vegetables (brassicas,peas)/poppies+pasture+stock/no stock
Dairy effluent application system	with specific equipment
Dairy effluent application system	without an application system
Dairy effluent application system	conventional application system
Dairy effluent storage system	without storage
Dairy effluent storage system	with storage
Deterring browsing animals	Wallaby fencing
Deterring browsing animals	Using mixed species planting's

Deterring browsing animals	Using repellents
Deterring browsing animals	Tree guards
Drain type	Hump and hollow drains
Drain type	Grid subsurface drains
Drain type	Broad and shallow surface drains
Drain type	Sub-surface drains
Drain type	Reverse-bank interceptor drains
Drain type	Pipe drains
Drain type	Mole channels
Drain type	Mole drains
Drain type	Seepage intercept drains
Drain type	Strategic subsurface drains
Drain type	Strategic shallow surface drains
Drain type	Gravel mole drains
Drain type	Open arterial ditches
Drain type	French (stoned) drains
Drain type	Deep arterial drains
Drain type	Deep surface drains
Environmental management system in place	Natures Choice
Environmental management system in place	EurepGAP
Formal protection of native vegetation	Part 5 Agreement conservation covenant
Formal protection of native vegetation	Private reserve
Formal protection of native vegetation	Private sanctuary
Formal protection of native vegetation	Vegetation management agreement
Formal protection of native vegetation	Conservation covenant
Grazing animal type	Sheep only
Grazing animal type	Sheep and cattle
Grazing animal type	Cattle only
Grazing pasture type	Improved pastures
Grazing pasture type	Native pastures
Grazing system	Shifting grazing system to naturally ameliorate climate and soil nutrient
Grazing system	Rotational
Grazing system	Time based grazing system
Grazing system	Set stocking
Informal protection of native vegetation	Conservation of threatened vegetation
Informal protection of native vegetation	Easements being managed for vegetation conservation
Informal protection of native vegetation	Conservation of rare ecosystems
Informal protection of native vegetation	Conservation of grasslands
Informal protection of native vegetation	Conservation of woodlands and forests
Irrigation scheduling method	Calender
Irrigation scheduling method	Water balance
Irrigation scheduling method	Soil moisture monitoring
Irrigation water application method	Overhead sprinkler
Irrigation water application method	Solid set drip/micro-spray
Irrigation water application method	Traveller
Irrigation water application method	Flood/furrow
Irrigation water application method	Centre pivot
Monitoring salinity	Surface water monitoring for salinity
Monitoring salinity	Mapping and monitoring extent of salt effect land
Monitoring salinity	Groundwater depth and trend monitoring
Monitoring salinity	Groundwater quality monitoring for salinity

NRM monitoring site locations	DPIWE groundwater depth gauging bore
NRM monitoring site locations	Water watch groundwater depth gauging bore
NRM monitoring site locations	Industry groundwater monitoring bore
NRM monitoring site locations	Local government groundwater monitoring bore
NRM monitoring site locations	DPIWE groundwater physical water quality testing bore
NRM monitoring site locations	DPIWE surface physical water quality testing site
NRM monitoring site locations	Industry monitoring site
NRM monitoring site locations	DPIWE stream gauging site
NRM monitoring site locations	Water watch groundwater physical water quality bore
NRM monitoring site locations	Water watch surface physical water quality testing site
NRM monitoring site locations	Local government bacterial water quality testing site
NRM monitoring site locations	Water watch AUSRIVAS site
NRM monitoring site locations	DPIWE AUSRIVAS site
NRM monitoring site locations	Local government surface physical water quality testing site
Nutrient input	Inorganic fertiliser
Nutrient input	Compost
Nutrient input	Bio-solid
Nutrient input	Organic fertiliser
Nutrient input	Manure
Nutrient input	Biodynamic preparations (Organic)
Nutrient input - application method	Foliar
Pasture management system	without a pasture rest period
Pasture management system	with a pasture rest period
Permitted removal of browsing animals	Shooting
Permitted removal of browsing animals	Poisoning
Permitted removal of browsing animals	Live animal trapping
Quality assurance system in place	Cattlecare
Quality assurance system in place	Woolworths quality assurance standard
Quality assurance system in place	SQF2000
Quality assurance system in place	Freshcare
Rate of application of dairy effluent	
Rehabilitation of saline areas	Groundwater pumping
Rehabilitation of saline areas	Salt harvesting
Rehabilitation of saline areas	Planting salt tolerant trees and shrubs in discharge areas
Rehabilitation of saline areas	Planting salt tolerant pasture and crops in and adjacent to saline areas
Rehabilitation of saline areas	Saline water enterprises such as aquaculture
Salinity prevention measures	Revegetation of recharge areas with perennial pastures and lucerne
Salinity prevention measures	Maintain perennial vegetation
Salinity prevention measures	Permanent crops and pastures
Salinity prevention measures	Revegetation of recharge areas with trees and shrubs
Salinity prevention measures	Perennial pasture
Salinity prevention measures	Avoid developing salinity risk areas
Salinity prevention measures	Farm forestry
Salinity risk assessment	Water quality testing
Salinity risk assessment	Soil testing and/or survey
Salinity risk assessment	Look for salinity indicators
Salinity risk assessment	Monitor groundwater using bores
Salinity risk assessment	EM survey
Soil conservation methods	Cut-off drain
Soil conservation methods	Grassed lane and water ways
Soil conservation methods	Contour drain

Soil conservation methods	Mulched-rip lines
Soil conservation methods	Stormwater retention ponds
Soil conservation methods	Perennial pasture phase
Soil conservation methods	Maintain surface roughness
Soil conservation methods	Cultivation across slope
Soil conservation methods	Contour farming
Soil conservation methods	Deep rip
Soil conservation methods	Incorporate crop residue
Soil conservation methods	Fencing to exclude grazing
Soil conservation methods	Permanent waterways
Soil conservation methods	Cover crop
Soil conservation methods	Windbreak
Soil conservation methods	Grassed headlands
Soil conservation methods	Stubble retention/cover
Soil testing	How often
Soil testing	Location
Tillage method/implement used	Lower tyre pressure/reduced axle load/wider tyres
Tillage method/implement used	One-pass powered implement
Tillage method/implement used	Controlled traffic
Tillage method/implement used	Disc and rip preparation
Tillage method/implement used	Tined implement
Tillage method/implement used	Direct drill
Tillage method/implement used	Conservation tillage
Tillage method/implement used	Mouldboard plough
Tillage method/implement used	Topworking
Tillage method/implement used	No tillage
Tillage method/implement used	Powered implement
Tillage method/implement used	Permanent bed
Tillage method/implement used	Bed system
Tillage method/implement used	Minimum Tillage
Tillage method/implement used	Reduced tillage
Water management information	Rivercare plans
Water management information	Legislated water management plans
Water management information	Legislated sealed schemes
Water management information	Legislated irrigation districts
Water management information	Legislated riverworks district
Water management information	Legislated drainage district
Water management information	Catchment management plans
Water quality monitoring	Nitrate
Water quality monitoring	Turbidity
Water quality monitoring	Ortho phosphate
Water source	Overland flow
Water source	Town/country reticulated supply
Water source	Irrigation scheme
Water source	Flood flow harvested water
Water source	Groundwater
Water source	Direct from river
Water source	Recycled effluent water
Water source	Recycled grey water
Water storage facility type	Springfed dam
Water storage facility type	Off-stream gully dam

Water storage facility type	On-stream dam
Water storage facility type	Turkey's nest
Water storage facility type	Catchment dam
Weed control method	Brush weeding
Weed control method	Herbicide
Weed control method	Mechanical cultivation
Weed control method	Restricting access
Weed control method	Shading out by a native vegetation cover
Weed control method	Selective spraying
Weed control method	Crop rotation to control weeds
Weed control method	Timely stock grazing
Weed control method	Synthetic mulch
Weed control method	Flame weeding
Weed control method	Steam weeding
Weed control method	Hand weeding
Weed control method	Smother crops
Weed control method	Mowing
Weed control method	Slashing
Weed control method	Pre-emergent burn-off herbicide

Appendix 6

Australian Collaborative Land Use Mapping Program

Proposal for a pilot mapping project of Land Management Practices in Tasmanian

Applicant: Department of Primary Industries Water and Environment

Project Manager:

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Department of Primary Industries Water and Environment
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Other Organisations involved:

NRM North – Back creek salinity project service providers
Stakeholders canvassed in the initial scoping project for feedback

Background

The Australian Collaborative Land Use Mapping Program (ACLUMP), which is a program of the Bureau of Rural Sciences (BRS), is establishing a national framework for the collation of land management practices information (LMP) across Australia. A framework for mapping and a classification scheme needs to be developed and tested under a range of Australian conditions.

A scoping study was conducted in Tasmania, as in other States, to determine the drivers for land management practices information in Tasmania and the key State and regional land management practices required. This involved consultation with 49 stakeholders from state and local government, natural resource management associations and agricultural industry, associations, consultants and research organisations. Stakeholders identified thirty-seven drivers for land management practices information and 148 key land management practices. Some of these land management practices had a number of options and so a total of 326 land management practices were identified by stakeholders.

This pilot will test the recording and mapping of land management practices information to address legislative, catchment and government priorities in managing natural resources and ensuring sustainable agricultural production.

Objectives:

1. Test the reporting and appropriate mapping of the top twenty-one land management practices as identified by stakeholders in a recent consultative project.
2. Test both desktop and field methodologies
3. Determine the utility of the reporting and mapping product to stakeholders.
4. Perform a cost-benefit analysis of the different mapping methods and final products.

Outcomes

1. Recommended list of land management practices that should be mapped in Tasmania.
2. Recommended mapping and reporting methodology.
3. Recommended data resolution (scale) for state-wide mapping.
4. Time and budget estimate for state-wide mapping of land management practices.

Project Outputs

- Project report
- Four maps for each pilot area created using a desktop analysis. The four maps show
 1. practices related to native vegetation (A practices)
 2. practices related to property planning (B practices)
 3. practices related to riparian areas and irrigation (C & D practices)
 4. practices related to cropping (E, F, G & H practices)

Each map has a legend that details the sub-practices/categories and appropriate symbology. Each polygon/parcel boundary has a unique number that can be associated with an attribute in a database. The database records sub-practice information such as crop rotation system or specific weed being targeted.

- Another similar set of four maps for each of the field checked/mapped areas.

Project proposal to map land management practices statewide.

Methods

- a) Desktop mapping: Map and record land management practices in three key areas (North Motton-Gawler (north west), Back Creek (Midlands) and Hamilton-Bothwell (south)) using existing data sets and minimal fieldwork.
- b) Present mapping and database products from step (a) to stakeholders to determine their usefulness. This will be done either in a workshop or on a one-to-one basis.
- c) Develop a methodology that includes the use of rectified aerial photos with land parcel, drainage and map data from step (a) and questionnaire to gather land management practices information from landholders on a one-to-one basis.
- c) Field mapping: Field check one (option 1) or two (option 2) or three (option 3) of the pilot areas mapped in step (a), plus map missing data and determine how “true” the data is.
- d) Present findings on data accuracy determined in step (c) to stakeholders.
- e) Compare the cost of mapping and data collection using the desktop method preformed in step (a) to the field mapping method in step (c) and the degree of usefulness to stakeholders.
- f) Using information gained in steps a) to e), develop and gain feedback from stakeholders via a workshop on a list of appropriate land management practices to be recorded and mapped in Tasmania, appropriate scales of recording, and recommendations for a methodology for recording of land management practices information in Tasmania.
- g) Develop a costed proposal for statewide mapping of land management practices information.

Project study areas:

This proposal puts forward three potential options for funding. All options include a desktop analysis of current data sets in three test areas in Tasmania. Each of these areas has different landscape types, land use and land management practices as described below.

Options one, two and three test the desktop analysis with ground truthing at 1:25,000 scale applied to 1, 2 or 3 test areas respectively (see map).

Area 1 is considered to be the priority area for analysis as the area has a range of landuses from conservation to intensive horticulture and will allow for testing of many of the methodology details.

Area 1. North Motton -Abbotsham, Central Coast Municipality, Cradle Coast NRM Region.

Area: 11 000 ha for desktop analysis. Within this area, 2500 ha surrounding Gawler for field mapping & checking.

Land form: Rolling low hills of basalt and steep hills of Cambrian age greywacke, volcanic rocks and sediments.

Dominant land use: Small, mixed irrigated cropping and pasture and plantation forestry enterprises with some rural residential land use.

Justification: An area that is typical of north-west Tasmania with high relief, mixed land use, small farms and moist climate.

Area 2. Back Creek sub-catchment, Northern Midlands, Northern NRM Region (Between Longford and Cressy)

Area: 7500Ha

Land form: Gently sloping to a flat plain of deeply weathered Tertiary age sediments and reworked alluvial deposits within the Tamar graben.

Dominant land use: Grazing improved and native pastures, native woodland, plus irrigated cropping and pastures.

Justification: NAPSWQ is funding three major projects to study salinity processes and trial land management solutions in the Back Creek sub-catchment of the Tasmanian Midlands over the next three years. These projects include an examination of land management practices and the trialing of salinity management options. There are opportunities in this area to collect land management practices information and to determine the utility of such information for the NAPSWQ project.

Area 3. Hamilton-Bothwell area, Central Highlands municipality, South NRM Region

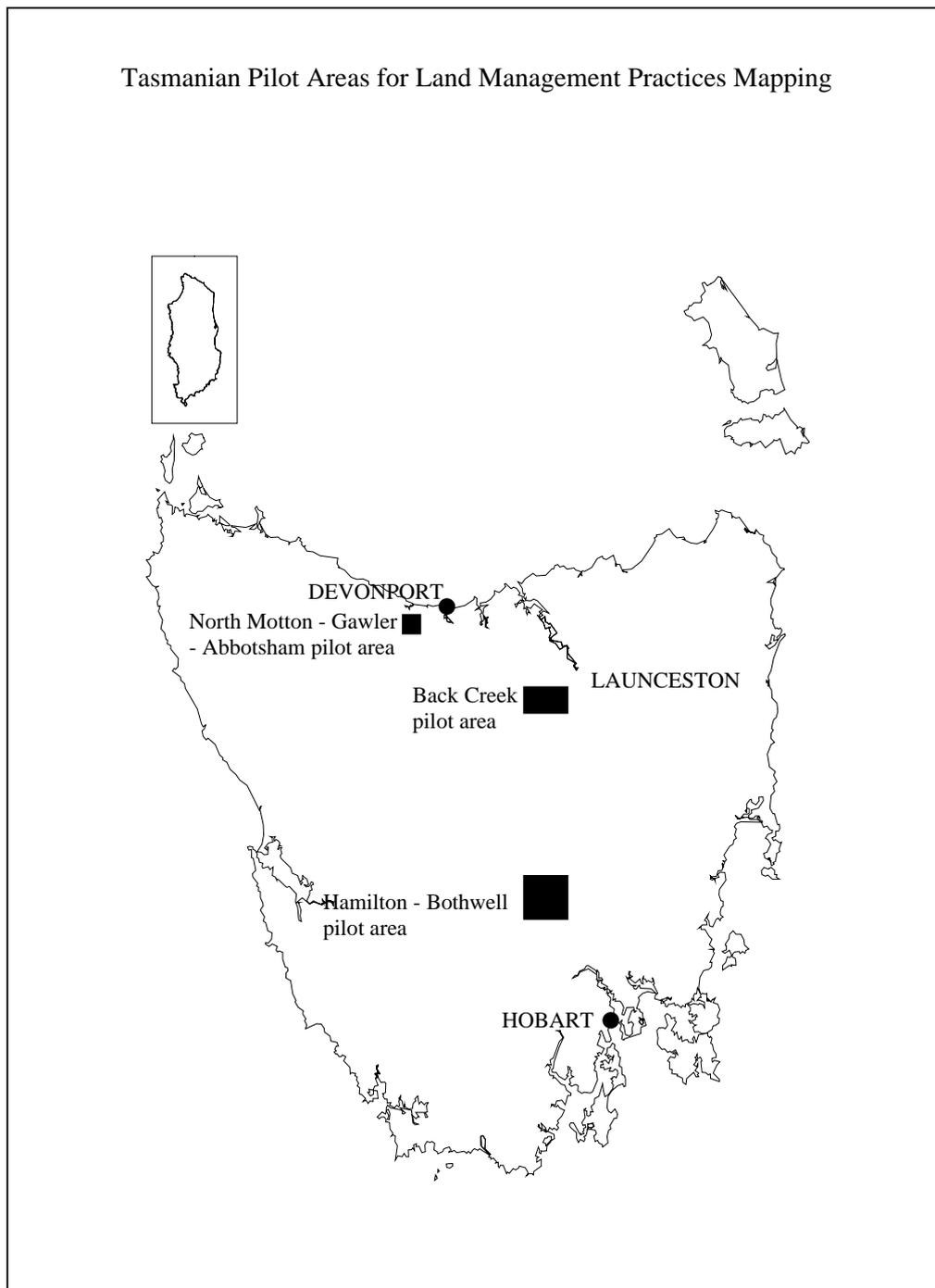
Area: 10 000 Ha

Land form: Moderate to steep hills of dolerite and basalt with intervening gently undulating to flat plains.

Dominant land use: Extensive grazing of native and improved pasture and a small amount of dryland cropping.

Justification: Area of extensive grazing and some dryland cropping in a low rainfall zone and cool climate.

Tasmanian Pilot Areas for Land Management Practices Mapping



Land management practices to be recorded and mapped

A. Practices about native vegetation

- A1. Formal protection of native vegetation
- A2. Informal protection of native vegetation
- A3. Fenced remanent vegetation
- A4. Vegetation management plan

B. Practices about property planning

- B1. Property management plan
- B2. Environmental management systems
- B3. Quality assurance systems

C. Practices about riparian areas

- C1. Fenced riparian management zones
- C2. Off-stream watering points
- C3. Riparian management zone revegetation

D. Practices about irrigation management

- D1. Irrigation scheduling method
- D2. Irrigation water application method
- D3. Water storage facility type
- D4. Water source
- D5. Monitoring irrigation water quality

E. Practices about soil conservation

- E1. Soil conservation methods

F. Practices about weed and game management

- F1. Controlling specific weed species
- F2. Game management plan

G. Practices about cropping

- G1. Crop rotation system
- G2. Nutrient Input

H. Practices in general

- H1. Accessing technical support, training and skill development

For the details of what is to be collected and tested in this project, see Schedule 1.

Project Officer requirements

A full time Project Officer will be employed to undertake most of the tasks listed below. Additional time will be required from GIS staff based in the DPIWE and this is costed separately in the budget.

	Option 1	Option 2	Option 3
Ground truthing of.....	One area	Two areas	Three areas
Project orientation	0.02FTE	0.02FTE	0.02FTE
Desktop analysis of three areas (27500 Ha)	0.23FTE	0.23FTE	0.23FTE
Present desktop mapping to stakeholders	0.02FTE	0.02FTE	0.02FTE
Field check and collect practice info	0.23FTE	0.46FTE	0.69FTE
Compare and present findings of field checking to stakeholders	0.02FTE	0.02FTE	0.02FTE
Cost-benefit analysis of desktop versus field gathered data	0.04FTE	0.06FTE	0.08FTE
Project report writing and conclusion	0.06FTE	0.06FTE	0.06FTE
Prepare project proposal to map land management practices statewide	0.02FTE	0.02FTE	0.02FTE
Downtime (Leave and Public holidays)	0.07FTE	0.10FTE	0.13FTE
Project Officer FTE's	0.71 FTE	0.98 FTE	1.27FTE

Budget

Funds required

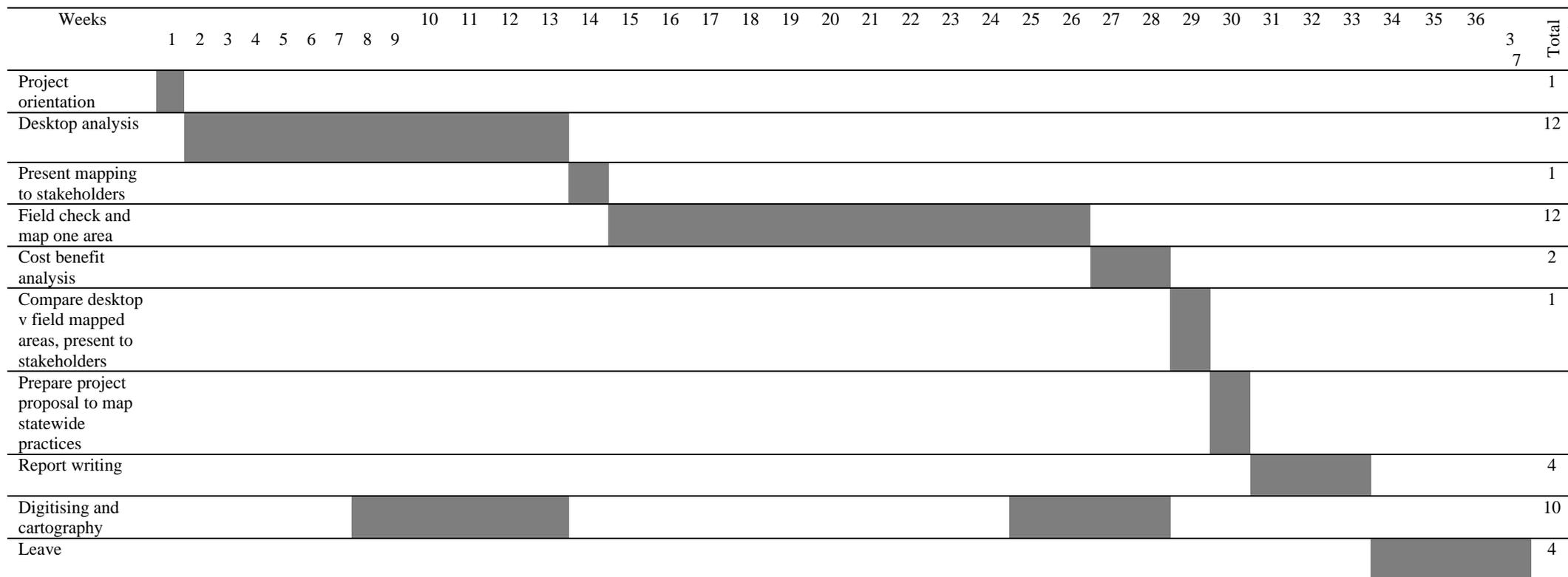
	Option 1	Option 2	Option 3
Labour (Project Officer) Level 1 Professional @ \$53217 pa + 20% on costs	\$44 700	\$62 600	\$81 100
Operating	\$2 000	\$2 500	\$4 000
Vehicle	\$5 000	\$7 500	\$11 000
Digitising and cartography	\$12 000	\$15 000	\$18 000
Recruitment	\$1 000	\$1 000	\$1 000
Mainland travel for reporting to national workshop	\$1 000	\$1 000	\$1 000
Tasmanian travel and accommodation	\$1 000	\$7 000	\$14 000
Total	\$66 700	\$96 600	\$130 100

State contribution (in kind)

	Option 1	Option 2	Option 3
Labour (Supervision by Principal Land Management Officer, 0.2 FTE)	\$13 300	\$18 200	\$23 600
Operating (Office accommodation)	\$3 500	\$4 500	\$6 000
Total	\$16 800	\$22 700	\$29 600

Project time lines

Option 1 – 37 weeks



Schedule One – Details about land management practices to be collected

Land Management Practices	Land Management sub-practices	Spatial information	Attribute information	Desktop data source
A. Practices about native vegetation				
A1. Formal protection of native vegetation	Conservation covenant	Polygon		DPIWE Office of the Recorder of Titles
	Conservation covenant under Part 5 Agreement	Polygon		DPIWE Office of the Recorder of Titles
	Vegetation management agreement	Polygon		DPIWE Integrated Private Conservation Registry
	Private reserve	Polygon	Reserve name	DPIWE Integrated Private Conservation Registry
	Private sanctuaries	Polygon	Reserve name	DPIWE Integrated Private Conservation Registry
A2. Informal protection of native vegetation	Public reserve	Polygon	Reserve name	DPIWE
	Conservation of native vegetation	Polygon		
A3. Fenced remanent vegetation	Easements being managed for vegetation conservation	Easement centreline and width		
		Polygon	Stock access?	DPIWE Integrated Private Conservation Registry; Tamar NRM; Rural Development Services Pty. Ltd.
A4. Vegetation management plan		Land parcel number	Stand-alone or part of a PMP.	DPIWE Integrated Private Conservation Registry
B. Practices about property planning				
B1. Property management plan		Land parcel number	Themes	Rural Development Services Pty. Ltd. Agricultural Resource Management Pty. Ltd.
B2. Environmental management systems	EurepGAP; Natures Choice	Land parcel number		
B3. Quality assurance systems	Cattlecare; Freshcare; Woolworths quality assurance standard; SQF2000	Land parcel number		
C. Practices about riparian areas				
C1. Fenced riparian management zones		Stream name; GPS start and finish of fence	Native veg; exotic veg; cleared;	DPIWE Rivercare section; Tamar NRM
C2. Off-stream watering points		GPS centre point		DPIWE Rivercare section; Tamar NRM
C3. Riparian management zone revegetation		Stream name; GPS start and finish of fence	Species planted	
D. Practices about irrigation management				
D1. Irrigation scheduling method	Water balance; Soil moisture monitoring; Calender; other	Land parcel number		McCains; Simplot; Tasmanian Alkiolds; Glaxo Smith Kine; DPIWE Water Management Audit of licensed irrigators; DPIWE Annual wine industry survey
D2. Irrigation water application method	Flood/furrow; Solid set drip/micro-spray; Overhead sprinkler; Centre pivot; Traveller	Land parcel number		McCains; Simplot; Tasmanian Alkiolds; Glaxo Smith Kine; DPIWE Water Management Audit of licensed irrigators; DPIWE Annual wine industry survey
D3. Water storage facility type	Off-stream gully dam; On-stream dam; Turkey's nest; Springfed dam; Catchment dam	GPS centre point	Storage volume (ML)	DPIWE Water Management Audit of licensed irrigators; DPIWE Annual wine industry survey; DPIWE ILS Topographic mapping

D4. Water source	Recycled effluent water; Groundwater; Flood flow harvested water; Irrigation scheme; Overland flow; Town/country reticulated supply; Recycled grey water; Direct from river	Land parcel number	Volume (ML)	DPIWE Water Management Audit of licensed irrigators; DPIWE Annual wine industry survey
D5. Monitoring irrigation water quality		Land parcel number	What for?	
E. Practices about soil conservation				
E1. Soil conservation methods	Cover crop; Windbreak; Deep rip; Grassed headlands; Permanent waterways; Fencing to exclude grazing; Incorporate crop residue; Cut-off drain; Contour farming; Stubble retention/cover; Cultivation across slope; Maintain surface roughness; Perennial pasture phase; Mulched-rip lines; Contour drain; Grassed lane and water ways; Stormwater retention ponds	Polygon		
F. Practices about weed and game management				
F1. Controlling target weed species	Grorse; Blackberry; Willows; Boneseed; Serrated Tussock; Bridal Creeper	Land parcel number		DPIWE Integrated Private Conservation Registry
F2. Game management plan		Land parcel number	Stand-alone or part of a PMP.	
G. Practices about cropping				
G1. Crop rotation system	Cereal phase; Cropping (cereals,peas,poppies) + no pasture; Cropping (cereals,peas,poppies) + pasture + stock; Legume phase; Pasture phase; Pasture + occasional cereals + crop; Vegetables (brassic,peas) / poppies + pasture + stock / no stock; Vegetables (potatos,carrots,brassic,peas,beans) + green manure + no stock; Vegetables (potatos,carrots,brassic,peas,beans) + green manure+stock; Vegetables (potatos,carrots,brassic,peas,beans) / poppies + no pasture	Land parcel number		Simplot
G2. Nutrient input	Bio-solid; bio-dynamic preparations; compost; inorganic fertiliser; manure; organic fertiliser	Land parcel number	Rate of application	Simplot; McCains; Tasmanian Alkaloids; Glaxo-Smith-Kine
H. Practices in general				
H1. Accessing technical support, training and skill development		Land parcel number	What type of info?	Rural Development Services Pty. Ltd.