TASMANIAN SALINITY STRATEGY

Department of
Primary Industries and Water

Tasmania
Explore the possibilities

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Introduction

The Tasmanian Salinity Strategy is a broad strategic directions document containing a Vision, Goals, Principles and Priority Strategic Actions for salinity management at state, regional and catchment levels. Appendix A provides background information on salinity and its impacts, and on the Groundwater Flows System in Tasmania.

The Strategy forms the basis of a plan of action for salinity management for the next 10 years. To ensure it maintains its relevance the strategic actions will be reviewed in five years.

Why have a Salinity Strategy for Tasmania?

Salinity has been recognised as a significant natural resource management issue in Tasmania that is impacting on our natural resources and on our economy, and hence needs to be addressed to ensure productive and sustainable land use. Salinity has the potential to cause increased economic, social and environmental impacts in the future if appropriate sustainable land management practices are not implemented.

The Tasmanian Salinity Audit in 2000 reported on the known extent, impact and trends in dryland salinity and made recommendations that included the preparation of an integrated State Salinity Management Strategy.

The Tasmanian Salinity Strategy has been developed so that future activities directed at assessing, monitoring and managing salinity in Tasmania are undertaken in the most effective way, directed at the most critical priorities and involve the most effective partnerships of people and resources.

The Strategy will provide guidance for the development of salinity management priorities and actions within the three Tasmanian Regional Natural Resource Management Strategies and associated Investment Proposals. The Strategy will therefore guide activities funding by the National Action Plan for Salinity and Water Quality (NAP), the Natural Heritage Trust (NHT) and the National Landcare Program (NLP), as they relate to salinity in Tasmania.

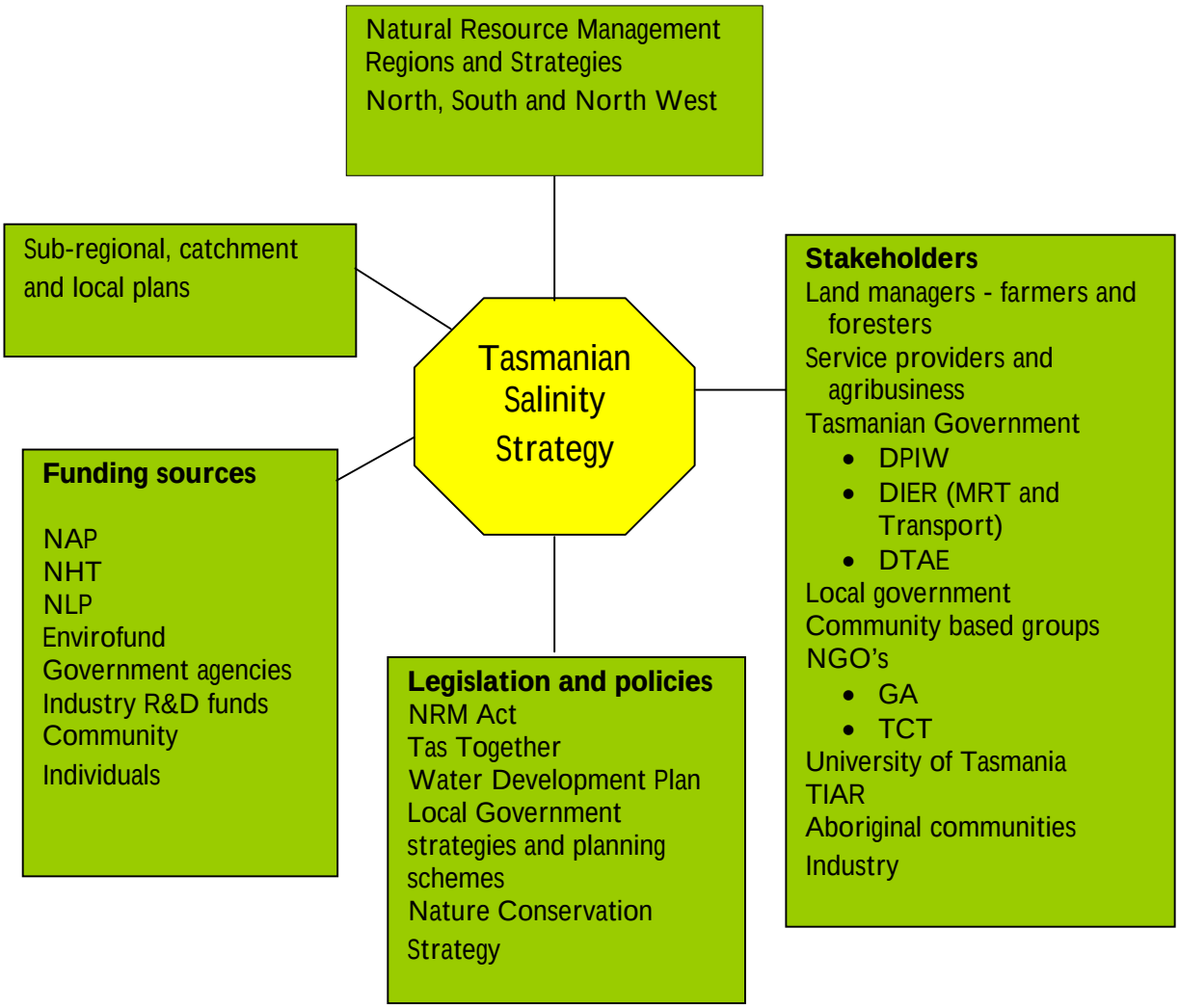
Salinity adversely affects the whole community and its better management is the responsibility of all stakeholders - all tiers of government, primary industries, interest groups, urban and rural landholders.

Regional and catchment communities play a lead role in salinity management, and they require constructive partnerships to achieve action on the ground.

By providing a strategic framework, this Strategy will assist in decisions regarding resourcing and activities by government, NRM regions and the wider community.

The Strategy is linked directly to a number of other initiatives and programs that create complex inter-relationships that have been developed at national, state and regional levels, involving governments, community groups, regional NRM committees and individuals.

Illustrated below are some of the significant elements surrounding salinity in Tasmania.



Salinity and its Management in Tasmania

Salinity is the increased accumulation of excess salts in land and water at sufficient levels to impact on human and natural assets (plants, animals, aquatic ecosystems, water supplies, agriculture, or infrastructure). Primary salinity is where salinity has occurred solely through natural processes. Secondary or induced salinity is where increases have occurred due to land use changes as a result of human activity.

Issues and Processes Causing Threats

The way we manage our land together with climatic change are the two primary factors which, acting alone or together, impact on salinity.

Approximately 30% of the State has an average rainfall below 850 mm with evaporation exceeding rainfall in most months. Under these conditions incoming salt in rainfall is often not washed out and accumulates in the soil, groundwater or bedrock below. It is therefore not surprising that salinity has always been a feature of the Tasmanian landscape in many of the drier areas.

Where there is a salt store in the soil, groundwater or bedrock, any process which increases the available water in the soil can increase the leakage of water to groundwater and mobilise such salt stores resulting in increased salinity in soils and/or surface waters.

If poorly managed, conversion of land from perennial vegetation to exotic pastures, cropping, irrigation, some forest clearing activities, recycling of effluent water, dam construction, drainage and urban development, can all increase salinity. This is because these land use changes can increase the amount of water passing through the root zone and therefore potentially mobilise salt or add additional salt.

As trees are major users of rainfall and soil moisture, the loss of trees, particularly through tree decline, may be responsible for an increase in the amount of water entering some groundwater systems and this may already be having a significant impact on salinity in some areas.

Assets potentially under threat from salinity

The following describes the assets potentially under threat from salinity and, where data is available, the best estimates of current impacts. This should be interpreted in the knowledge that the assessments were made from limited data and a developing understanding of the processes involved. For most assets the detailed assessments, mapping, monitoring and modelling needed to accurately identify threats, risk and future impacts, are still developing. It should be noted that, whilst a number of assets occur within land systems containing salinity, it does not mean that the asset is currently impacted upon.

Land

The area of salt-affected private land (rural and urban) in Tasmania is estimated to be about 74 000 ha or about 4% of Tasmania's private land (based on visible symptoms). No estimates have been made of salinity on public land.

Rivers and streams

Rivers and streams are a critical asset used for domestic, irrigation, stock, industrial and recreational uses, and environmental purposes. Run-off and drainage from saline land or discharge from saline groundwaters can impact on surface water quality and quantity.

Currently most major rivers have not been impacted significantly by salinity but limited data indicates that some minor tributaries in drier areas of the State have elevated salinities.

Groundwater

Groundwater is an important resource in Tasmania particularly for domestic, irrigation, stock and industrial uses. Groundwater also provides the basal flow to our rivers and if impacted by salinity may cause increases in salinity of rivers. Salinisation processes occurring on the surface can impact on groundwater quality and quantity.

There are indications that some Groundwater Flow Systems (GFS) may have already been impacted by salinity and others could be under threat.

Significant wetlands

In 2000 a number of Ramsar sites and wetlands on the registrar of national significance were identified as being within land systems containing areas of salinity.

Threatened /endangered vegetation

Salinity could pose a significant threat to some threatened or endangered vegetation communities, fauna and habitats with those considered most threatened found on valley floors and lower slopes, including native grasslands, wetlands and woodlands.

In 2000 the Tasmanian Salinity Audit reported that a number of threatened or endangered species were found in land systems containing salinity.

Infrastructure assets

Some urban and surrounding areas are known to have saline groundwaters, saline seeps and scalds. Urban salinity has the potential to cause severe economic and social impacts as it can damage buildings, roads and underground services.

Cultural assets

Salinity can impact on the cultural assets and values of Aboriginal and European heritage.

Responses

A series of government, regional NRM and community activities have been undertaken over recent years to identify and address the salinity issues within the State:

- Tasmania has been a joint partner with the Australian Government in the National Action Plan for Salinity and Water Quality (NAP) and the Natural Heritage Trust (NHT).

- DPIW, as part of the National Land and Water Resources Audit, undertook the Tasmanian Salinity Audit in 2000 ("Extent and Impacts of Dryland Salinity in Tasmania"). The estimates made in the Audit were updated in 2003.

- The three Tasmanian NRM Regions are supporting a number of NAP/NHT funded salinity related activities across the State, including activities in the northern and southern midlands, the greater Launceston area and on King Island. These activities are aimed at gaining a better understanding of the processes causing salinity; the assessment, monitoring and evaluation of the impacts of salinity on natural resource and built assets; and the development and promotion of appropriate best management practices.

- Regional NRM Strategies and associated Investment Proposals developed by all three Tasmanian NRM Regions include salinity management priorities and activities, particularly for the NAP Region.

- Tasmania is a member of the National Co-ordinating Committee for Salinity Information. The task of this committee is to coordinate ongoing national salinity information collection at National, State and Regional scales for the National Land and Water Resources Audit.

- A number of farmers, non government organisations, Landcare and catchment management groups, and government agencies have recognised salinity as an issue and have implemented salinity management activities and projects, e.g. salt tolerant pasture-testing project; salt tolerant Eucalyptus hybrids trials; and other farm demonstrations.

- Many of the current responses have involved effective partnerships between government, NRM regions, local and mainland salinity expertise, and landowners.

Vision

To prevent, minimise and, where possible, reduce the extent and impacts of salinity on Tasmania's economic, social and natural resources.

Goals

To ensure:

- critical land resources and their productive capacity are protected from salinisation,
- sustainable production systems are developed and salinity management practices are put in place which prevent and manage salinity,
- the quality of key surface and groundwater resources are protected,
- the presence and condition of key natural environmental assets, (including priority flora, fauna and ecosystems) including those that are naturally salinity dependent, are not threatened by changes in salinity,
- the threat from salinity to infrastructure and cultural heritage is avoided or minimised,
- productive uses of natural resources degraded by salinity (where rehabilitation is not feasible) are developed and off-site impacts minimised.

Principles for Salinity Management

The following broad principles are based on those contained in the Tasmanian Natural Resource Management Framework 2002:

Ecosystem approach

Salinity cannot be dealt with in isolation. Its management should be based on an understanding of the relationship between natural resources and the ecosystems they support and upon careful monitoring over time. It is recognised that in some parts of Tasmania saline ecosystems are a natural feature.

Balanced decisions

Salinity management decisions should take proper account of the range of environmental, social and economic benefits, values and costs. In most cases 'prevention is better than cure', whilst in some situations 'living with salt' may be the only practical and economic option.

Integrated Management

Salinity management should be integrated where appropriate with other activities, at the farm level, within regions and catchments, as well as across industry sectors and government agencies.

Priority based

Salinity management actions should be undertaken according to priorities that are based on the best available science, information and relevant experience, as well as an assessment of the relative cost-effectiveness of various options.

Adaptive management
It is recognised that, as new knowledge, experience and innovations become available and as our economic social and environmental systems change, salinity management priorities and activities undertaken will also need to change.

Partnerships
To be effective, salinity management requires the establishment of partnerships between all levels of government and the community, including the Aboriginal community, industry, land holders and individuals, with agreed roles and responsibilities. We all have a responsibility for working together to manage salinity and providing the economic resources necessary to do so.

Priority Strategic Actions

To achieve the goals listed above the following Priority Strategic Actions have been identified. They are grouped under three categories. However no one approach to salinity management will work in all cases and therefore an integrated management approach involving a number of these actions will be required.

1. Assessment, Monitoring and Evaluation

In order to understand and to evaluate the impact of changes in natural resource management and the effect of investments in NRM, a targeted assessment, monitoring and evaluation program is needed.

1.1 Identify the critical natural resources (critical assets) most at risk

Salinity can potentially impact on critical assets such as land, surface water, groundwater, flora, fauna and ecosystems, wetlands and freshwater systems, infrastructure, cultural assets and economic and social systems.

Currently there are large gaps in our knowledge in terms of the extent, location and rate of change in salinity and its impacts on these assets.

1.2 Identify groundwater flow systems posing a threat to critical assets

Tasmania has 13 groundwater flow systems (at 1:250 000 scale) based on the National Groundwater Flow systems (GFS) Framework, 11 with some associated salinity. Investigations are under way to improve understanding of which groundwater flow systems pose salinity threats. Following on from these investigations, further work will focus on:

- our current capacity to influence each system.
- the timeframe needed for management options to have measurable impact.
- the scale of land-use change needed.

1.3 Assess the effects of current management practices on salinity

In order to ensure that appropriate management practices are being implemented, it is important to identify these practices affecting salinity (positively and negatively). This will include the use of cost : benefit analyses of current systems.

1.4 Establish baseline data and reference sites for on-going assessment monitoring and evaluation.

Currently there is a shortage of data, which can be used to establish resource condition trends and targets, or to monitor and evaluate the effectiveness of current and future practices on salinity. It will be necessary to:

- link monitoring activities to groundwater flow systems.
- identify what baseline data should be collected where critical gaps exist.
- identify key reference sites for assessment and monitoring.

1.5 Establish a Monitoring and Evaluation Program to measure progress

A cost effective monitoring and evaluation program is required to measure the effectiveness of strategic investments and activities in salinity management.

2 Research and Development

In 2000, The National Land and Water Resources Audit acknowledged the considerable body of information provided by national research and development projects. However, there remain significant gaps in the information required to provide feasible solutions to salinity, and to ensure cost effective investments are made.

2.1 Undertake Priority Research and Development Projects

Research and Development is required in the following priority areas:

- improving the information base and understanding of salinity and salt generation processes.
- identifying the most appropriate land, water and vegetation salinity management systems for critical catchments and groundwater flow systems.
- proving the applicability and viability of engineering options to manage salinity and to develop standards and protocols for their use.
- developing productive use and / or rehabilitation options for irreversibly saline land and water.
- undertaking social research to determine impediments to adoption of land, water and vegetation salinity mitigating practices and to determine capacity building options for improved salinity outcomes.
- assessing, mapping and targeting the most suitable and productive locations for expanding our primary industries without causing salinity.

2.2 Develop Research and Development Partnerships

Because of the limited number of R and D personnel in Tasmania it is critical that R and D partnerships are formed with relevant industry, NRM bodies and national Research and Development organisations to maximise the use of available resources.

2.3 Link Research and Development to Extension Activities

Linking research and development programs to active farmer-centred extension is an effective way to engage stakeholders. Participatory action research involves stakeholders in formulating research questions and greatly improves uptake and adoption of improved management practices.

3 Action to Create Change

There is a need to raise awareness of salinity, its potential impacts and what is currently known of options for management. There is also a need to publicise current activities and funding options.

3.1 Determine impediments to improved salinity management

Land managers' and service providers' perceptions of salinity and their training and knowledge needs requires research to ensure appropriate extension and training programs are developed and implemented.

Existing policies, institutional arrangements, partnerships and incentives need to be reviewed to ensure they are conducive to better salinity management.

3.2 Promote adoption and implementation of appropriate salinity prevention and management options

Appropriate practices need to be demonstrated and land managers encouraged to implement them. This includes salinity risk assessment, salinity management and salinity avoidance practices.

Particular focus needs to be placed on encouraging the adoption and implementation of the following:

- salinity risk assessment practices
- water use efficiency
- sustainable crop and pasture management practices including crop rotations
- use of salt tolerant pastures and other vegetation
- productive use of saline lands.

3.3 Build a core of expertise on salinity and its management as a resource for NRM regions, trainers, service providers and landowners

It is important that landowners and managers, and those who provide advice and assistance to them are well skilled in salinity risk assessment and management options.

3.4 Provide appropriate financial arrangements to encourage adoption of salinity management practices

Because many of the options to prevent, rehabilitate and live with salt are not as profitable as current land management practices, it has been recognised that incentive mechanisms will have to be developed to ensure adoption of changed practices at a sufficiently broad scale to have significant impact on salinity.

3.5 Encourage Local Government to develop appropriate planning and development protocols for the effective management and prevention of salinity

Salinity can impact significantly on infrastructure assets such as buildings, roads and underground services, particularly in urban areas. It is important that appropriate protocols are in place to ensure future salinity impacts on these assets are avoided.

APPENDIX

1. Overview of Salinity in Tasmania

1.1 Introduction

Salinity is the increased accumulation of excess salts in land and water at sufficient levels to impact on human and natural assets (eg plants, animals, aquatic ecosystems, water supplies, agriculture, or infrastructure). Primary salinity is where increases in salinity have occurred solely through natural processes, and secondary or induced salinity is where increases have occurred due to land use changes made by human activity. Because salinity can be produced by a variety of distinctly different land management and ground water flow systems, no one approach to managing salinity will work in all cases.

Salinity can only result if a groundwater system receives extra water, a salt store (eg in the soil, groundwater or geology) is mobilised, or a new source of salt is adding salt to soil or water. Where there is a salt store or saline groundwater, any process that increases the available water in the soil can increase the leakage of water to groundwater, and flush salt out into surface waters or soil systems.

If poorly managed, conversion of land from perennial vegetation to exotic pastures, cropping, irrigation, some forest clearing activities, recycling of effluent water, dam construction, drainage and urban development can all increase salinity. This is because these land use changes can increase the amount of water passing through the root zone and therefore potentially mobilise salt.

Any practice that increases the use of water or removes water (eg drainage and extensive tree planting) may reduce salinity. However, many mitigation and rehabilitation options are currently not economic or viable because they do not match our present farming systems.

Approximately 30% of the State has an average annual rainfall below 850 mm and in these areas rainfall is spread fairly evenly over the whole year. Salinity has always been a feature of the Tasmanian landscape in many of these drier areas of the state. Some surface waters and groundwaters have been known anecdotally to be saline for as long as European settlement.

Of the total area of Tasmania (6.8 million hectares), approximately 2 million hectares (~30 %) has been converted for agricultural and urban uses since European settlement in 1804. About 1.4 million hectares is cleared agricultural land with the majority of this used for dryland grazing and about 75,000 hectares used for cropping. Some 100,000 hectares (7%) is irrigated annually.

1.2 Extent of Salinity

The Tasmanian Salinity Audit 2000 (Bastick and Walker), undertaken as part of the National Land and Water Resources Audit, reported that approximately 53,500 hectares of private land was affected by salinity (based on visible symptoms) and that

this could rise to 93,600 hectares by 2050. Estimated production losses were in the order of $5.35 million per annum. These estimates were based on initial work undertaken by Grice 1992, using Land Systems as the basis for assessment.

In late 2003 DPIW updated the 2000 Salinity Audit figures based on information provided by NRM and Landcare groups and individuals. These figures indicate that some 73,800 ha of private land are affected by salinity (based on visible symptoms). It appears that this simply reflects the fact that people are now more aware of salinity and hence are reporting areas affected by salinity that were not reported in 2000, rather than any actual increase in the area of salinity.

The salt-affected land occurs mainly in the Northern Natural Resource Management (NRM) Region with the Southern Region having the second largest area followed by the Cradle Coast Region (see Table 1).

Table 1: Estimated salinity in the Tasmanian NRM Regions (2003)

NRM Region	Ha	% of State Salinity
North	53,300	*72*
South	10,800	*15*
Cradle Coast	9,700	*13*
Total	73,800	

Currently about 90% of the dryland salinity occurs in areas used by the grazing industries (beef and sheep), with less than 3,000 hectares (<5%) of the salt-affected land being irrigation salinity.

On a catchment basis the five catchments with the greatest estimated extent of dryland salinity are Brumby-Lake, Macquarie, South Esk, King Island and Furneaux (see Table 2).

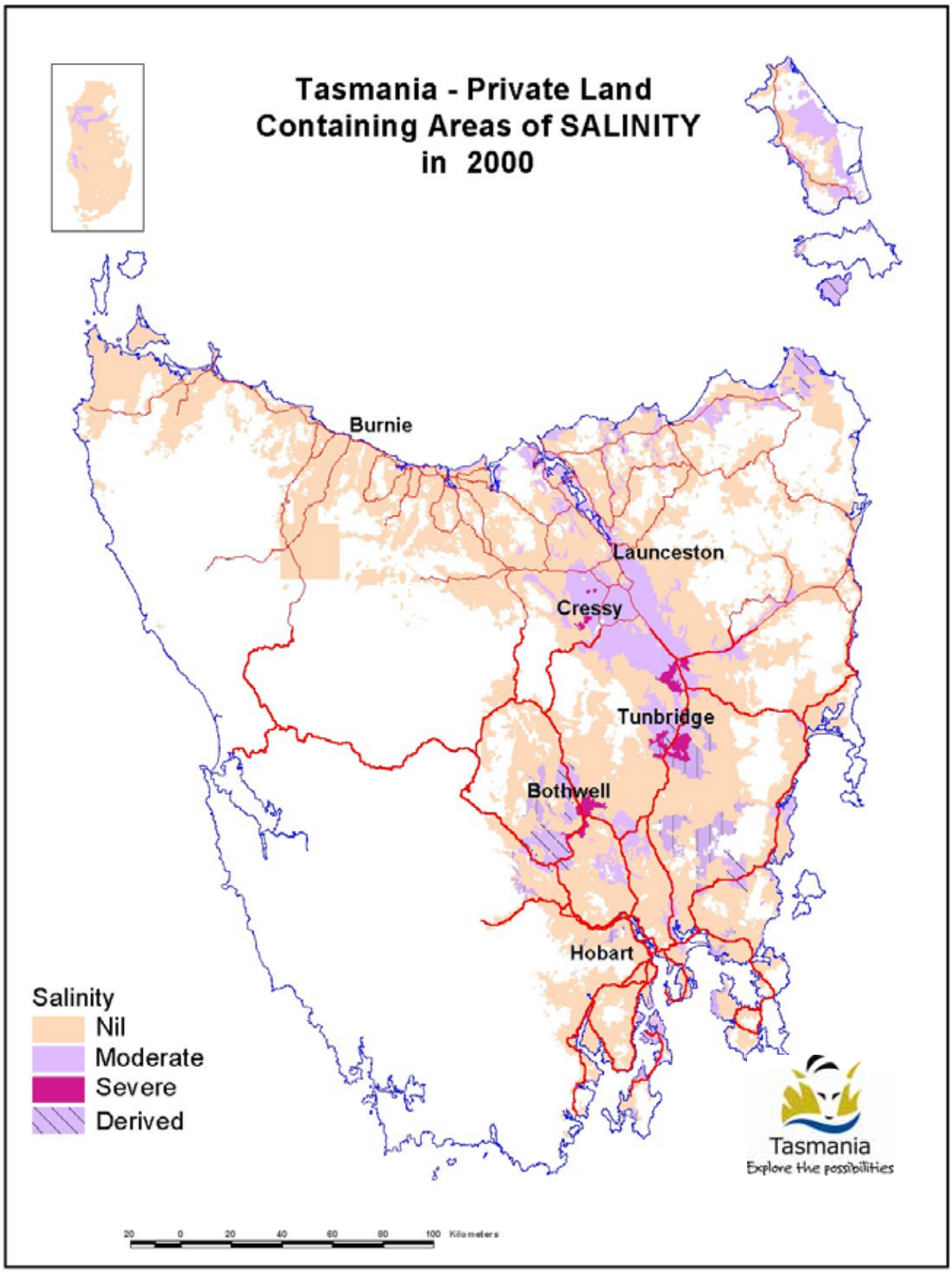
Table 2: Estimated salinity in Tasmania by Catchment within NRM Regions derived from Land Systems (2003).

Catchment *	Area (Ha) per NRM Region			Total Area (Ha)
	North	South	Cradle Coast	
Brumby	8673			8673
Macquarie	8100	269		8370
Tamar Estuary **	7101			7101
South Esk	7019			7019
King Island			6909	6909
Furneaux	6086			6086
Meander	3614			3614
Pitt Water – Coal		3481		3481
Musselroe – Ansons	3003			3003
Boobyalla - Tomahawk	2936			2936
Jordan		2677		2677
North Esk	2385			2385
Montagu			1410	1410
Pipers	1344			1344
Clyde		1171		1171
Ringarooma	1164			1164
Great Forester - Brid	1023			1023
Prosser		911		911
Little Forester	854			854
Little Swanport		763		763
Rubicon			545	545
Derwent Estuary - Bruny		514		514
Upper Derwent		493		493
Mersey			425	425
Ouse		393		393
Leven			209	209
Forth – Wilmot			205	205
Swan – Apsley		67		67
Tasman		46		46
Blythe			35	35
Scamander - Douglas	12			12
George	9			9
Lower Derwent		7		7
Total (Ha)	53323	10793	9738	73853

***** Tasmanian Catchments – Land and Water Management (DPIW, 2000).

****** Contains a proportion of salinity caused by inundation by the sea.

Source: Bastick C.H, and Walker M.G. Extent and Impacts of Dryland Salinity in Tasmania DPIWE 2000 updated 2003



Source: Bastick C.H, and Walker M.G. Extent and Impacts of Dryland Salinity in Tasmania DPIWE 2000

1.3 Current assets impacted by or potentially at risk from Salinity

Salinity is a threatening process, which potentially impacts on economic, social and environmental assets and values. These resources include land, agriculture, surface water (eg streams, dams, wetlands), groundwater, biodiversity, flora and fauna and built infrastructure.

Land

- Salinity and waterlogging often occur together. The impact of waterlogging and salinisation will vary depending on soil type, climate and land use. Impacts can be barely noticeable to the untrained eye and can include reduced plant vigour or a change in the vegetation mix in a particular area. Economic losses due to the impact of marginal (barely visible) salinity may be highest as they occur over a greatest area.

- More dramatic effects include the death of native plants and crops that are not salt-tolerant, and the development of bare patches of earth known as salt scalds. These areas act as the focal point for erosion to develop and spread, and for washing salt loads into rivers through run-off.

- Because salinity generally occurs in low-lying areas in the landscape, the better land on the valley floors is more likely to be affected. Any salinity increases could therefore affect some of the more productive land.

- Based on 2003 figures, the area of salt-affected private land in Tasmania (based on visible symptoms) is estimated to be 73,800 hectares or 4% of Tasmania's agricultural land. The 2000 Salinity Audit predicted that, assuming a 1.5% increase per annum, and if nothing was done to prevent further salinity from occurring, the area of land affected could increase to almost 94,000 ha by 2050.

Surface water

- This is an important asset used for domestic, irrigation, stock, industrial and recreational use, and environmental purposes. Run-off and drainage from saline land or discharge from saline groundwaters can impact on surface water quality. Salinity can therefore affect domestic, irrigation, stock, aquacultural, industrial, recreational and environmental uses of the asset.

- Up to 90% of the known land with salinity occurs in areas with important municipal water supplies (eg the Derwent catchment and the South Esk catchment).

- Spot observations on some tributaries of major rivers by DPIW staff and members of Waterwatch groups indicate that some have salinities above the World Health Organisation (WHO) standard for drinking water supplies. While currently the percentage and location of tributaries affected is not known, river

water quality may be affected if in future enough tributaries increase in salt concentration.

Groundwater

- In 2003 Mineral Resources Tasmania reported that, based on assessment at the scale of 1:250,000, the State contains 13 Groundwater Flow Systems (GFS). Some of these may have already been impacted by salinity and some others could be under threat. For example, eleven of the GFSs are known to contain sub-components with salinities above 0.8 dS/m. However because all of the GFSs have not been studied in detail, the salinity threat to these GFSs and the threat they may pose to other assets are unknown.

Native vegetation, threatened species, flora and fauna

- Salinity can pose a threat to some vegetation communities and habitats, with those considered most at risk found on valley floors and lower slopes, including native grassland remnants, wetlands and woodlands.

- In 2000 it was estimated that 14 forest types and 15 non-forest vegetation types in Tasmania are found in Land Systems containing areas of salinity. Forty-four flora species and 17 fauna species were also found in Land Systems containing areas of salinity. However because current mapping of salinity is not detailed, it is not known if the areas covered by these vegetation types and flora and fauna species coincides with the current saline land or with land which could be at risk in the future.

- The potential salinity threats are greatest in the low rainfall areas where there has been considerable impact following European settlement. These areas have little remaining native vegetation and have the highest record of locally extinct or threatened plant and animal species. The Tasmanian Bioregions at greatest risk from salinity are the Flinders and Northern bioregions.

Wetlands and freshwater ecosystems

- In 2000 it was estimated that there were six Ramsar sites and 44 wetlands on the registrar of national significance in Land Systems containing areas of salinity. The level of risk or impact to these wetlands is not known.

2. Groundwater Flow Systems as a Priority Setting Framework

The use of Groundwater Flow Systems (GFS) as a priority setting framework is a tool used Australia-wide by natural resource management planners to identify the most appropriate actions and prioritise responses to salinity risk based on:

- the assets at risk;
- the timescale for salinity to increase;
- the landscape locations most suited to targeted remedial actions;

- the timescale for effects of remediation to be realised;
- social and economic cost of mitigation; and
- how and where to effectively monitor environmental change.

2.1 What are groundwater flow systems?

A GFS is a landscape entity that includes all aspects of a single groundwater flow path. It is a fundamental unit that needs to be considered when management options for dryland salinity control are being selected. GFSs characterise similar landscapes in which similar groundwater processes contribute to similar salinity issues, and where similar management options apply. The GFS classification approach is used as the analytical framework for salinity and water management strategies to determine the location, type and priority for investment in management of land, water, vegetation and infrastructure assets.

At the broadest level groundwater flow systems are defined according to scale. If a salinity problem occurs through discharge from a groundwater flow system functioning entirely within a small catchment local to the affected area, then the province is referred to as **'local'**.

In most local systems groundwater flow from the slopes of a catchment cause groundwater discharge within or near the adjacent valley floor. The passage of groundwater seldom exceeds 3-5 kilometres.

In general terms local GFSs have a low storage capacity and respond rapidly to any land use change, which can include increased groundwater intake. Water tables can rise rapidly and new discharges can occur between 5 and 50 years after the increase in groundwater intake.

In other systems groundwater flow within aquifers transcends local catchment boundaries. Several sub-catchments may share a common groundwater system operating over 10–20 kilometres or more. Since these systems do not comprise the entire region of a river basin, yet operate at a scale larger than sub-catchments, they are termed **'intermediate'**. In these situations, local land management activities within a single catchment often fail to address the problems of salinity expression.

Intermediate systems have greater storage capacity and take longer to fill following increased groundwater intakes. Increased discharges typically occur within 50–100 years of disturbance to recharge rate.

Where salinity issues are associated with large groundwater aquifers operating on a large scale (comparable with that of major river or groundwater basins), then the processes are said to be **'regional'**. Regional groundwater flows typically range from 50 to several hundred kilometres.

These systems have a high storage capacity and take more than 100 years to produce increased discharges following disturbance.

Mineral Resources Tasmania has characterised 13 groundwater flow systems at 1:250,000 scale.

2.2 Implications for management

It follows that salinity issues associated with local, intermediate and regional systems will have different management requirements. Local groundwater systems may offer opportunities for managing salinity on a catchment basis through changes in vegetation, although the difficulty in achieving this should not be underestimated. Intermediate and regional salinity management must focus more on regional land use change, protection of major assets, engineering options and / or saline industry development (living with salt options).

Regional groundwater flow systems are the most difficult to manage using conventional solutions. It is unlikely that they can ever be managed effectively by recharge reduction designed around adaptations of contemporary dryland agriculture. The scale of land use changes required to reduce recharge substantially is enormous, and the processes already set in train through increases in recharge following European settlement buffer against any immediate gains in water use efficiency.