VICTORIAN DEPARTMENT OF
PRIMARY INDUSTRIES

DRAFT NORTH EAST SALINITY ACTION PLAN
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NORTH EAST CATCHMENT MANAGEMENT AUTHORITY

CONTENTS

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1 Executive Summary

Dryland salinity is a relatively new phenomenon in the North East Region, with most sites manifesting in the last 50 or so years. Rising ground water trends through the 1990's led to an increase in sites being identified and in community and agency interest in salinity in the region.

A community reference group was established by the NE CMA Board to provide direction in the development of the plan. New challenges include the incorporation of salinity management into a local government framework. The plan also highlights the potential for changing climate scenarios to impact on the action plan.

Salinity management to date has been delivered using the North East Salinity Strategy Implementation (NESSI) program. There has been a significant increase in community understanding and acceptance of dryland salinity as an issue affecting the community in the region. A review of the NESS in 2002 and the Charles Sturt University survey of landholders highlighted the need for continued community education on this issue.

Asset based approach
An asset based approach has been used in the development of this plan. The focus is on protecting the things of value in the region rather focusing on the issues that impact on them. This approach aligns it with the Regional Catchment Strategy. The plan retains the concept of Salinity Priority Areas from the original NESS. The program aligns threat to assets and management options that lead to target achievement. The key Government policies from the Murray Darling Basin Commission, Victoria's Salinity Management Framework and the Regional Catchment Strategy are used to link salinity management planning and other relevant policy documents.

The region is diverse covering 1.9 million hectares. Public land accounts for 61% of the area. This is unique in the MDB area and the region produces high quality and quantity water. Most of the agriculture is associated with the river valleys; it is diverse in nature with numerous enterprise mixes. This plan uses the same triple bottom line approach to asset management as the RCS. The two major threats of soil and water salinity are the key elements.

Salinity in the region
Across the region there are 240 mapped saline discharge sites covering 1,311 hectares, of which 121 hectares are on public land (10%) and 1,190 hectares on private land. This is a reduction in area from the original NESS estimate (2,100ha) partly due to more accurate mapping techniques and partly due to the long-term decline in groundwater levels associated with the current drought period. The National Land and Water Audit (2000) predicted a worse case scenario of 48,000ha of land with shallow watertables across the region. The implications of this prediction in the current climate of low rainfall will need to be further investigated.

Urban salinity is a potential issue associated with the conversion from agricultural landuse to residential and industrial landuse, and with infrastructure development. For example, the Wodonga Baranduda growth areas. Infrastructure impacts are likely in the low parts of the landscapes of groundwater flow systems in fractured rock. The management of urban salinity risk involves not only improved surface and drainage water management in discharge areas, but more importantly, reducing those factors that lead to increased groundwater accessions.

Salinity hazard
It is uncertain whether equilibrium has been reached between groundwater recharge and discharge, under the current pattern of land use, and under the climatic conditions prevailing prior to the onset of the current drought. Evidence from the bore networks indicates that salinity has developed later than in other parts of Victoria. The reason for the rising trend in bores on the riverine plains remains uncertain, and more research is required to explain this. The hazard of potential increases in salinity across the region is governed by future climate change impacts. The onset of salinity at Everton Upper for example has followed a similar pattern to other areas in the region, increasing from less than one hectare in the early 1980s to more than 20 hectares today.

Impact on assets
The degree to which individual assets are threatened varies according to their location in the landscape. In particular, the asset classes of land, biodiversity and inland waters are of particular concern. The potential impact on built infrastructure is a new emerging threat identified since the original North East Salinity Strategy (NESS 1997). This action plan takes the asset-threat approach as the main focus, to the point of identifying future actions across the Salinity Priority Areas.

The annual cost to the Land Asset for agricultural producers across the region is approximately $760,000. The overall cost to the land asset is $1.85 million annually.

Threats to biodiversity are often difficult to determine. It is possible however to consider the impacts that rising groundwater, saline water and discharge areas have on the structure and composition of vegetation within the catchment. Ecological vegetation classes (EVC's) identify structure and composition of vegetation; these have been used as a measure of biodiversity within this plan. The predicted effect requires further investigation within the region, although by considering the depth to watertable it is possible to understand the potential impact on assets if the watertable was to rise. Currently 1,398ha of endangered EVC has a Depth To Watertable (DTWT) of less than 3m, while 854ha occurs within saline discharge sites. Also 1,054ha of vulnerable has a DTWT of less than 3m, while 160ha occurs within saline discharge sites (Table 18). The true cost to biodiversity requires further investigation in the region. It has not been possible to assess this issue with the funding available to this stage.

The salinity threat to built infrastructure includes roads, railway lines, buildings and underground utilities. It is estimated that 1,045 urban households in the region are currently affected by slight or very slight saline and shallow watertables (Wilson 2004). It is estimated that 90 commercial, retail and industrial buildings are affected by saline and shallow watertables (Wilson 2004). Currently 22km of railway lines have watertables within 3m, while only 200m are currently within a saline discharge site (Table 21). Approximately 433km of roads have watertables within 3m, with 14.2km currently within saline discharge (Table 22). The potential impact of rising saline groundwater on assets such as railway lines and rail trails is not fully understood. It is estimated that high saline water tables cost households, industry, utilities companies, and state and local government in the North East Region $1.1million annually. This cost represents the additional repair and replacement costs of infrastructure. It is predicted with a 2% annual expansion that by 2050 this could increase to $1.7million annually (Wilson 2006).

The asset of inland waters is generally considered to be rivers, streams, wetlands, storages and groundwater. It includes not only the water, but the aquatic and terrestrial ecosystems that are part of them. Key indicators used to identify current and predicted area of inland water resources affected by salinity are based on discharge areas, rising groundwater, salt loads and concentrations (EC). Salinity can impact on the health of the riparian ecosystems (Figure 24). Flora and fauna species have tolerance levels, above which they will decline or cease to survive.

Approximately 180,000 tonnes of salt is exported annually from the North East in the river systems (NESWG 1997). The impact this has on streams and rivers is generally low, due to the high rainfall and flows that generally occur within the catchment. This is predicted to increase to approximately 240,000 tonnes of salt a year (Table 23).

The proximity of current salinity discharge sites to waterways is a key indicator. In the region 36% of salinity discharge sites are within 50m of a waterway, and 54% of salinity discharge sites are within 100m of a waterway.

Currently, 356ha of wetlands within the region occur where the watertable is less than 3m (Table 28). The wetlands listed within table 25 do not include wetlands outside salinity priority areas, particularly on the Riverine Plains such as the Black Swamp. Black Swamp is the most significant wetland within the region. It is listed on The Directory of Important Wetlands in Australia, and is located on the flood plain between the Murray and Ovens River (Environment Australia 2001).

Costs of saline water on urban households annually is $509,000. Costs to commercial and industrial water users is $704,000. These are predicted to rise in 2050 to $1.7million and $1million respectively (Wilson 2006).

The threats to the people asset are significant but difficult to quantify. There is a significant potential impact to people including the reduction of land value, aesthetic values, stigma of salinity, and additional expenditure on salinity management. There are approximately 180 landholders that have at least 1 area of land mapped as saline.

Salinity Drivers
A major driver for salinity in the region is climate variability associated with climate change. This plan does not investigate this issue in any detail, but highlights the potential for the implementation of this plan to be affected by climate variability.

Specific assets threatened by rising watertables and salinity have been identified in salinity priority areas (Table 29). Each of the catchment management units identified in the RCS has been linked to the salinity priority areas and the threat to each of the asset classes.

The ability to implement this plan depends largely on the community implementing a range of agricultural management options. Biological options of well-managed, deep-rooted perennial vegetation are the key to that process. The plan encourages revegetation and protection of existing native vegetation. The implication of revegetation in particular is influenced by climate change, this is considered further in the section on climate. Other engineering options are considered in part, especially the potential for groundwater pumping in less saline environments.

Groundwater Flow Systems
Groundwater Flow Systems (GFS) are used as a decision making tool for the placement of on-ground works in the landscape. By understanding the GFS it is possible to target works where they are considered to be the most effective to reduce and prevent salinity (or the GFS considered to be most responsive to the change in land management).

Some sixteen GFS have been identified within the North East region. These, however, exist as subsets of some four main systems that include:

- Large regional and sub-regional GFS comprising alluvial aquifers in the floodplains of major river systems in both Riverine Plains and the upland alluvium.
- Local and intermediate (sub-regional) scale groundwater systems comprising fractured rock aquifers.
- Local GFS perched in granites and granite-like rocks.
- Local perched GFS in glacial sediments.

The Action Plan

The vision for this plan is:

To manage salinity in the North East Region for the benefit of the environment, local communities and down stream users.

The foundations of this plan are the 1997 NESS, the NESS review, the need to align with government objectives (RCS and state salinity framework), the need to protect and enhance assets, and the direction provided by the community and technical staff.

To achieve the objectives of this plan, targets have been developed. It is also necessary to take into account targets that are outlined in other government policy, which this plan must comply with. The MDBC Basin Salinity Management Strategy outlines targets for salt loads in the North East. These End of Valley targets are:

- Ovens River at Peechelba East – salinity to be maintained within 100% and salt loads within 101% of current levels.
- Kiewa River at Bandiana – salinity and salt load to be maintained within 100% of current levels.

These targets imply that the salt loads in the Ovens and Kiewa Rivers must not increase from the 2001 levels identified in the MDBC Basin Salinity Management Strategy.

To achieve a reduction in the groundwater table and saline discharge areas, and to ultimately protect assets, targets for increased perennial vegetation have been developed. These targets are

based on current estimates of what is required in each GFS. It is recognised throughout South Eastern Australia, that to achieve any change in the equilibrium between land use, groundwater discharge and general climatic conditions, there needs to be a shift towards a more perennial land use system. Current dependence on annual based systems in cleared agriculture land will not achieve this equilibrium.

Implementation
This section of the plan has assumed a 5-10% shift to perennial systems is necessary to achieve the targets. The assumption made here is taken from other regions across south eastern Australia that an adoption rate of 5-10% will create sufficient change to reduce recharge. To be effective, these activities need to be undertaken in nominated higher recharge areas based on the GFS. These targets represent the level of increased perennial vegetation across the priority areas and GFS required to achieve the recommendations in the plan (MAT's).

Perennial vegetation can be defined as new plantings, regeneration of natural areas, enhancement of native grasses (particularly in hill country), and establishment of perennial pastures. The targets are in addition to remnant vegetation that exists within the catchment. A target has not been developed for the regional GFS in Riverine Plains, as it is uncertain of the long- term benefit of additional perennials in the regional system. The thirty year targets for the priority areas amounts to increasing perennial vegetation levels by 14,493ha. If taken over an annual basis, this is 483ha per year. Encouraging perennials will lead to recharge reduction. The ability to achieve this target will be compounded by potential climate change implications. The delivery of the program by agency, community and individuals will rely on clear communication and cooperation. The implementation of this plan will occur through a targeted approach, using priority areas, integrated programs, current best knowledge, and activities which are accepted by the community.

The implementation takes into account the need for programs that deliver:
- On-ground works
- Extension and community engagement, and whole farm planning
- Monitoring
- Research
- Evaluation

The on-ground works undertaken to implement this plan will occur within salinity priority areas. The types of on-ground works that are recommended for salinity management within the region are based on:
- Current best knowledge: A range of documents were reviewed in the development of this plan to identify management options that are considered suitable for the region as well as effective. A number of these were research reports written specifically on the North East, while others were state or national documents.
- Groundwater Flow Systems: The type of management option and where it is used in the landscape is based on how effective it would be in reducing recharge within specific GFS.
- Adoption by the community: A number of management options have been used in the region successfully during the implementation of the previous NESS, these were also given consideration.
- Cost Benefit Analysis: Was undertaken to look at the cost benefit of some commonly used management options.

The dominant on-ground works to be promoted in the region includes those that involve tree establishment, remnant vegetation protection, and perennial pasture establishment (Lucerne). These options have incentives associated with them.

Groundwater monitoring started in the Springhurst area during 1981and later at Everton Upper. During the late 1980"s and early 1990's the network expanded and now includes 330 bores that are monitored monthly for depth to watertable. The network covers a range of landscape situations, with the majority less than 30metres in depth. The monitoring network is critical to the region's ability to measure change in hydrogeological condition. They are also fundamental to our ability to account changes in resource condition targets and modelling proposals.

The region also has 4 continuous stream salinity monitoring stations, and 59 stream sites monitored for salinity levels monthly.

There are significant gaps in knowledge within the region. This is especially the case in areas outside of current salinity priority areas, for example there is limited knowledge of salinity in the Upper Murray/Omeo areas of the region. In addition, knowledge of the extent of regional stream salt loads and salinity with and without intervention is currently being investigated.

The dispersed nature of previous approaches to land management programs made it difficult to assess the extent to which "we are making a difference" in achieving the objectives of the Regional Catchment Strategy. There has been a progression to a "targeted area" approach to on-ground implementation for some time now. This has the risk of alienating some parts of the community by only working in selected areas, but it does provide real benefits for program delivery and for investors.

An implementation strategy that the community has expressed interest in using in this plan is a targeted and integrated approach to activities. In recent years this approach has been used in implementing salinity management in the region. It has been well received in the community and has had a high participation rate. The Heartlands project at Byawatha was the impetus for this targeted approach.

The implementation of this plan will involve a number of groups and individuals including North East CMA, Department of Primary Industries, Department of Sustainability and Environment, landholders, and local government.

The entire plan relies on the support of the community and landholders who manage the private land areas to implement the programs referred to in this Action Plan. A large component of the works requires significant community and landholder input. Farm planning will be an essential way that program staff can engage with the community.

A range of incentives currently exists within the region. Incentives are only available to landholders in a salinity priority area or if they have a saline discharge site on their property. The implementation processes across the region have evolved in the last few years, taking into account programs such as Heartlands established to achieve large-scale catchment change. Future programs will be based around an integrated catchment team across agencies. The approach of working only in salinity priority areas may evolve to wider areas as other models of community engagement come together such as Multiple Outcomes Projects (MOPs) and tender processes currently being developed across the region.

The cost share approach to implementing the plan will follow the basic framework already in existence across the region. To meet the proposed targets there will need to be an investment of at least $332,000 annually across all programs.

However there is an opportunity to link the program to other initiatives including:

- Market based instruments (eg. Bush Tender and EcoTender)
- Increasing the rate for incentives to encourage greater participation
- Multiple outcome projects that provide an increased rate of incentive and labour that demonstrates clear benefits to asset protection and enhancement.

Regional staff are already engaged in a process of Multiple Outcome initiatives to achieve these types of aims.

Down Stream Impacts

Estimation of the impact of dryland salinity on downstream water users is problematic within the North East Region of Victoria. Few stream-gauging stations with long-term records are available to estimate stream salt loads. Consequently, there is little opportunity to quantitatively assess the regional distribution of salinity issues through conventional hydrological means.

The lack of longer-term stream salinity information also lessens the opportunity to link salinity management activities to 'end of valley targets'. In the short to medium term, other approaches need to be explored to realise the goal of better understanding the distribution of the region's stream salt loads. The proposal is to 'synthetically' derive stream salt loads through numerical modelling approaches. In the short term, the proposal is to apply a model known as the 'Rapid

Appraisal Tool' and over the medium term the intention is to construct a landscape-groundwater modelling approach using both the '2C Salt' model and the 'Catchment Assessment Tool'. The outcome of this will work will greater definition to planning and also allow the region to consider links to climate change potential and influence of this on water catchment yield.

Economic
The economic benefits of this plan have been considered with estimated Benefit: Cost ratios of **1.2** (under a 4 per cent discount rate) and **0.9** (under an 8 per cent discount rate) being derived. This analysis suggests that the plan is economically viable (refer to Chapter 11). Given the increase in the B:C ratio that would result from environmental and tourism benefits, the plan would appear to be a worthwhile investment for all Victorians.

This plan is linked to a number of key government strategies and programs. It will continue to develop over time with evaluation being fundamental to achieving long term benefits for the regional community.