



Looking south across the salt affected area near Rosedale

**FLOWTUBE modeling of salinity
management options for three dryland
salinity sites in West Gippsland.**

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Summary

This report describes the results of a study of three dryland salinity occurrences in the West Gippsland CMA region using a 2 dimensional modelling method called 'FLOWTUBE'. The work arose out a recommendation made in the West Gippsland groundwater flow system study (SKM, 2005) to 'model the flow paths between recharge and discharge areas and simulate the effects of various land-use changes'. The FLOWTUBE approach is a simple and legitimate method that provides a means to test different land management options. In developing each site model, the process has been beneficial in gathering available data, developing conceptual models of each site and also looking at rainfall trends, the other key driver of dryland salinity.

The three study areas are identified dryland salinity occurrences near the townships of Rosedale, Inverloch and Yarram. While predominantly affecting rural land at this time, the adjacent urban areas are also considered to be threatened.

Observation bores at the three sites provide some valuable data about the sites, but as they are predominantly located near discharge sites, they provide limited definition of upslope watertable depths. This limited the possible locations where the FLOWTUBE sections could be modelling and required some additional site data to be collected. However, some bores have data of sufficient frequency and duration to suggest a decline in groundwater levels is occurring at present.

Analysis of rainfall and evaporation data for each site has revealed a pronounced drying trend over the past 10 years at Rosedale and Yarram. This same clear trend has not been observed at Inverloch, perhaps reflecting its more exposed south coast setting. As a key driver of dryland salinity, this drying climate phase is beneficial in reducing the current salinity threat and limiting expansion of discharge areas.

Flowtube models for each location were developed and tested with different scenarios of perennial pasture, trees or combinations of each. In the 'do-nothing scenarios, both Rosedale and Yarram results suggest an expansion of discharge areas under the currently estimated recharge rates. At Inverloch, the model suggests the site may now be in equilibrium (with respect to discharge = current recharge).

With a change in land-use to perennial pasture, all sites responded favourably within 6 years with useful declines in watertable elevations beneath the discharge areas. Incorporation of trees into each scenario slightly increased watertable decline in accord with the slightly lower recharge rate assigned to trees. Of note was the equally favourable response at the Inverloch site to an 'alley farming/ shelter belt scenario (consisting of double tree rows at 100 metres spacing with annual pasture in between).

While the current climate trend may be causing a period of respite, treatment options all take a considerable time to implement. To achieve a scale of change sufficient to reverse watertable rise, steady implementation rates of pasture improvement and tree placement in the landscape are needed. This will contribute a net benefit that will accrue over time. Achieving the rate of change modelled is clearly not feasible in one year, so realistic timeframes of change will be slower than the model results.

Key recommendations from this study include:

- Manage discharge areas with changed grazing practices and through establishment of more suitable waterlogging and/or salt tolerant pasture species. A recently re-released publication from DPI about salt tolerant pastures may be of value here. (Called 'Greener Pastures for south west Victoria', edited by Zhongnan Nie and Geoffrey Saul.)

- Ongoing programs of extension to highlight productivity and environmental benefits of both perennial pasture establishment and placement of trees in suitable locations to reduce overall recharge rates should be rolled out for the affected areas.
- Urban areas at each locality appear to be at some risk from dryland salinity. Some draft guidelines recently completed for managing such areas around Bendigo would be a useful starting point for the CMA to engage with the relevant Local Government in each affected area.
- A small number of additional observation bore locations are proposed at each site to give some additional hydrogeological information away from the discharge area focussed bores.

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