5. Conclusions

- Priority West Gippsland salinity discharge sites were selected by officers of the Catchment Management Authority and Department of Primary Industries at Rosedale, Inverloch and Yarram.
- Field investigation revealed that whilst each site had similar geology (young and unconsolidated) and topographic settings, subtly different groundwater processes were driving groundwater discharge, waterlogging and salinity.
- Analysis of rainfall and evaporation records from 1950 to the present indicates a drying trend that is reducing (on average) recharge to groundwater across the three areas. This is more pronounced at Yarram and Rosedale, where groundwater levels support this trend.
- Expression of salinity is largely controlled by topography. At Rosedale, low parts of the Latrobe river floodplain at the foot of gently rising hills predispose the area to a high watertable. At the Yarram site, mapped salinity areas at the lower landscape positions (close to the coast) are more likely to be primary salinity features. At the Inverloch site, naturally poor drainage / former swampy areas may be playing a significant part in why salinity is seen where it is.
- Conceptual groundwater models were developed to represent the groundwater/salinity processes and provide inputs for FLOWTUBE models in the three study areas.
- The "do nothing" scenario would result in increased discharge zone extent for the Rosedale and Yarram sites, but little further change will result at Inverloch. The available historical records for observation bores in these areas support these findings.
- The assumed hydrologic characteristics of all three study areas indicate they are relatively responsive to changes in the water balance brought about by the impact of perennial pasture and tree establishment.
- Perennial pasture appears to be the most successful salinity management option at the Rosedale and Inverloch sites.
- Trees in combination with perennial pasture are likely to be the most successful salinity management option for Yarram.
- Alley farming was less successful than the other options at Inverloch, but still offered some improvement.
- In all cases, the modelling predicted that groundwater levels would fall with implementation of higher water use plants.

Study Methodology appraisal and Data limitations

- The existing data from the catchment was barely sufficient to develop basic hydrogeological conceptual models of the broad processes contributing to dryland salinity. It was insufficient to provide any independent validation of the conceptual models.
- The limited amount of watertable monitoring data for the sites limited choice of location for the *FLOWTUBE* modelled sections.
- The hydrogeological conceptual models were sufficient to carry out basic numerical modelling of the catchment scale processes contributing to dryland salinity.
- The simple, one dimensional numerical *FLOWTUBE* modelling of catchment scale groundwater processes used in this study predicted groundwater levels under present recharge regimes that were consistent with historical and current occurrences of salinity, and future groundwater levels under various recharge regimes. This approach predicted salinity in the catchment at the very broad scale represented by the model and along the main groundwater flow lines.

- The study broadly identified areas of the catchment where changes in recharge will have beneficial impact on catchment salinity. It estimated the magnitude of recharge reduction required in those areas to produce a given level of salinity management.
- While the FLOWTUBE approach is useful in conceptualising and testing the impact of changed land management practices, the limited site specific data required that the models be based upon a number of significant assumptions. Key among these is that current land-use is predominantly annual pastures and crops, with higher annual recharge rates than perennial pastures or trees. It is therefore unsurprising that the modelling predicts falls in watertable following conversion from annual to perennial systems.

Table 7. Recommended Management Actions

AREA	Preferred Management Option
Rosedale	Upslope areas should implement pasture improvement programs to achieve perennial pasture over as much area as possible. Discharge /waterlogged area should be fenced and managed with the introduction of suitable pasture species and modified grazing practices.
Inverloch	Confirm either poor drainage or salinity due to discharge status of areas of concern. Fence these areas and introduce more suitable plants and grazing management. Feasibility of wetland re-establishment could also be investigated. If upslope pasture areas already now improved to perennial pasture, monitor lower area groundwater levels to confirm falling groundwater trends over next 5 – 10 years. If still rising, instigate program to incorporate suitable forestry and biodiversity plantings into upper slope areas.
Yarram	Confirm waterlogging or salinity due to groundwater discharge is occurring in areas of concern. Fence these areas and implement programs with landholders to introduce suitable pasture species and grazing management. Provide advice and encouragement for upper slope pasture improvement and incorporation of tree areas in available locations. Monitor groundwater levels to see if rainfall decline is resulting in longer term decline in groundwater levels.