

Healthy Rivers, Healthy Communities
Presenting current research in the Goulburn Broken Catchment

Research Case Study: Groundwater and salinity in the Goulburn Region

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Abstract:

This paper presents key findings of our current groundwater research in the Goulburn-Broken catchment. Several years of research, involving researchers at Monash University and the University of Melbourne in conjunction with DPI has culminated in two publications: one on the controls on long-term regional groundwater quality in the Shepparton and Calivil-Renmark (deep lead) formations; and one on controls on dryland salinity in the Honeysuckle Creek region. Findings from the regional scale groundwater study are presented here. These approaches have since been extended to other parts of the southeast Murray Basin, and to our new project (Centre for Water and Landscape Management) on salt loads to the upper Goulburn River.

Key Findings:

Key findings from the regional study are that groundwater flow is predominantly lateral in the Calivil-Renmark Formation with only limited recharge from the overlying Shepparton Formation. Most of the recharge to the deep lead occurs in the southern part of the Goulburn Valley. However, groundwater in the deep lead is also old, up to 25,000 years towards the north, so this aquifer is vulnerable to overpumping. Additionally, there are some areas where recent, larger scale leakage from the overlying Shepparton Formation is apparent. This is identified by higher nitrate concentrations and higher Cl/Br ratios.

We will now extend this work to the shallower system to determine the composition and timing of salt loads to the upper Goulburn Valley, south of Seymour. This will include stream and storm monitoring during storm events over a 1 year period and groundwater sampling over the same period.

Implications:

- There has been long-term minor leakage from the Shepparton Formation into the underlying Calivil-Renmark Formation.
- In some regions, there is larger scale modern leakage to the Calivil-Renmark Formation, contributing nitrate, salinity etc.
- Future management of the entire groundwater system is critical in determining sustainable yield and maintaining quality from the Calivil Renmark Formation, which contains groundwater that is up to 25000 years old.

Summary:

- The Shepparton Formation and underlying Calivil-Renmark Formation need to be considered as a related groundwater system since, although leakage is minor, there are places where modern leakage has occurred from the Shepparton Formation to the underlying Calivil Renmark.
- Groundwater chemistry is essential for determining actual leakage and the timing of leakage rather than just the potential for leakage.
- Old groundwater in the Calivil Renmark indicates that this resource is potentially vulnerable to overpumping. Additionally overpumping could increase leakage from the poorer quality Shepparton Formation.

Further Reading:

- Cartwright I., Weaver, T.R., Fulton, S., Nichol, C., Reid, M., Cheng, X., 2004. Hydrogeochemical and isotopic constraints on the origins of dryland salinity, Murray Basin, Victoria, Australia. *Applied Geochemistry*, 19, 1233-1254.
- Cartwright, I., Weaver, T.R., 2004. Hydrogeochemistry of the Goulburn Valley region of the Murray Basin, Australia: implications for flow paths and resource vulnerability. *Hydrogeology Journal*, in press and available online 2004.