

# The importance of groundwater to the Blackwood and other iconic rivers of the south-west



Yarragadee and Leederville aquifers discharge into the Blackwood River near Darradup measurement station, not far from Nannup

The Blackwood, Margaret, Donnelly, Warren, and Capel rivers in the south-west of Western Australia play a major role in supporting local industry, agriculture, tourism and the environment. Given their importance to the region, the Government of Western Australia has made a \$1.6 million investment made possible by Royalties for Regions funding to better understand the rivers in the face of a drying climate and increasing groundwater use.

For the first time, the Department of Water's expert scientists have studied the connection between these five rivers and the major aquifers of the region. In doing so, we have discovered a number of unique attributes about the rivers and underlying aquifers.

## The discovery

We have quantified the influence that groundwater has on keeping parts of the Blackwood, Donnelly, Warren and Capel flowing all year round, and the

Margaret River's pools full, even during the long, dry summer months.

Our new findings show how the Blackwood, one of the region's most recognised rivers, is supported by natural groundwater flows. The Blackwood has the region's longest section of permanent groundwater-fed flow and it uniquely displays the reverse of typical river behaviour by being more saline during winter than in summer. This phenomenon is the result of salt in the catchment and the fresh groundwater feeding into the river. Throughout the year, freshwater from the Yarragadee and Leederville aquifers discharges into the Blackwood just downstream of Nannup. During winter, rainfall over the salt-affected headwaters of the Blackwood washes downstream and increases salinity of the flow. In summer, with less rainfall, the fresh groundwater has more influence on the quality of the river water.

Our studies also show how the ecology of

the Blackwood has changed in response to the different levels of salinity. During winter, freshwater fish species such as Balston's pygmy perch (listed as a 'Vulnerable' species under the federal *Environmental Protection and Biodiversity Conservation Act 1999*) seek refuge in the freshwater tributaries like Milleannup Brook or Poison Gully.

During summer when the river freshens they move back into the main channel. The groundwater discharge in summer is also important for the migration of freshwater cobbler, the largest freshwater fish species in the south west. Further decreases in water quality and groundwater volume will be detrimental to the rivers and the aquatic species they support. Careful management of groundwater around the rivers is important to looking after these systems.

### How did we do it?

A specialised water study, using rain gauges and targeted aquifer and river water sampling, tracked rainfall using chemical tracers or 'fingerprints' as it soaked into the ground and through aquifers and rivers. This has helped define recharge patterns and how the river's flow may be impacted by water use and fluctuations in rainfall linked to climate change.

In studying the Blackwood in particular, we determined the chemical tracers found in the rain and groundwater samples are only present downstream of where the Yarragadee and Leederville aquifers come to the surface, or outcrop. This tells us that the water that supports the rivers spends very little time underground before flowing back out again at different points.

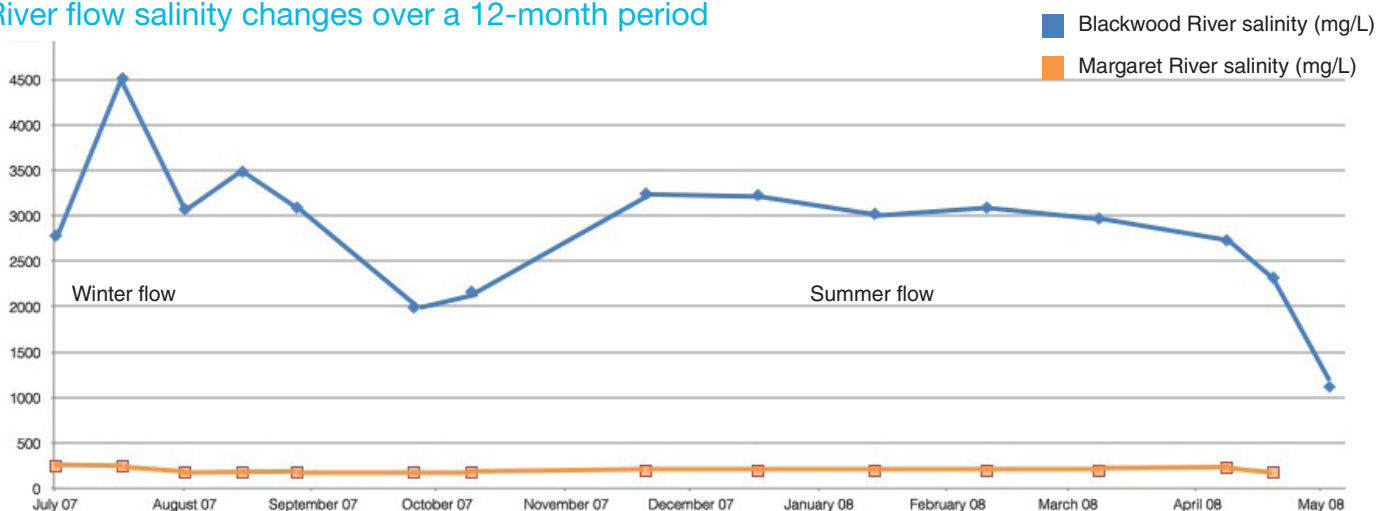
By measuring summer flow volumes upstream and downstream of these points, we have determined how much groundwater flows into the rivers and how it keeps water flowing or pools full year round.

### Why are these discoveries important?

Studying the rivers of the south-west provides an excellent indicator of how the region's groundwater systems are responding to reduced rainfall and groundwater use. This helps us predict the likely changes in groundwater-to-river outflow over the coming years.

Because so many businesses, communities, tourists and aquatic species rely on the rivers of the south-west, this sort of research gives us the knowledge we need to understand and manage the sustainability of the resource in the face of a drying climate.

### River flow salinity changes over a 12-month period



## Further information

### River health assessment in the lower catchment of the Blackwood River

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