



## Understanding Blackwater Events and Managed Flows in the Edward-Wakool River System

### What is the Project?

The Murray Catchment Management Authority (Murray CMA) has commissioned The Murray-Darling Freshwater Research Centre (MDFRC) to undertake a short-term study on blackwater in the Edward-Wakool River System. The study is in response to fish mortalities in the Wakool System early in 2009 following the release of managed flows. Funding has been provided under the NSW Catchment Action Program.

### What is Blackwater?

Blackwater events are a natural part of the ecology of lowland river systems. During a flood, carbon is leached from litter (leaves, twigs, bark etc) laying on the floodplain, in much the same way that tea is leached from tea leaves. The water darkens to the colour of black tea. The amount of carbon leached will depend on a number of factors such as the type and age of litter, the amount of litter that has accumulated on the floodplain or dry river channel and, whether or not the litter has been previously flooded.

Blackwater events markedly change the water quality. Microbes living in the sediment and water can immediately use about one-third of the carbon leached from litter. As the microorganisms consume the dissolved carbon they use up oxygen in the water - often at a rate faster than oxygen can be replenished. Therefore, blackwater plumes often have very low levels of dissolved oxygen. High temperatures lower the dissolved oxygen even further, meaning that severe blackwater events are more likely to occur in warm weather. Managed flows in summer when leaf fall and temperatures are high are more likely to result in blackwater events.

### Why is Blackwater important?

The lack of dissolved oxygen can cause the death of fish, crayfish and other aquatic animals in the plume of severe blackwater events. Native fish and other large aquatic organisms require at least 2 mg/l of oxygen in the water to survive, but may begin to suffer at levels below 4-5 mg O<sub>2</sub>/l. In addition, the carbon leached from native plants, especially red gum leaves can directly be toxic to native fish at elevated concentrations.

There were at least two fish kills in the Edward-Wakool River System in the summer of 2009 attributed to deoxygenation events following 'Stock and Domestic' releases down the Colligen and Merran Creek systems. The water quality was reported as being very poor, with the dissolved oxygen level less than 0.5 mg/l, and the water temperature approximately 30 °C (Baldwin and Whitworth 2009). Other factors may also have been involved.



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### How will the project help?

Many permanent and ephemeral creeks in the Wakool region have dried as a result of regulation and on-going drought conditions. Blackwater events may become more common due to increased pressure on available water resources, and disconnection of natural systems resulting in longer periods for litter to accumulate. In addition systems will be managed more tightly to reduce losses in times of reduced water availability.

Understanding blackwater events is important in order to reduce the potential for fish mortalities and other water quality impacts from both managed and natural flows.

This study will look at the most critical factors in determining whether or not a blackwater event will result in native fish and crustacean deaths. The outcomes of this project will help to inform managers about the factors that need to be considered before release of water in the Edward-Wakool system to minimise the potential for blackwater events.

### What will the project entail?

The project will determine the factors leading to blackwater events by:

- monitoring water quality in waterholes of the Colligen and Merran Creek systems where fish kills occurred in 2009
- measuring the amount of litter on the floodplain
- measuring rates of leaf fall from floodplain trees
- determining rates of leaching and microbial oxygen consumption of different types of litter and carbon (e.g. leaves, river red gum saplings, soil).

This work will be done over summer 2009-2010, with the project findings and preliminary management recommendations presented to the Murray CMA in June 2010.