



Australian Government



MURRAY-DARLING
BASIN AUTHORITY

Blackwater

Australia is known for having long droughts, often broken by flooding rain that can then trigger a 'blackwater' event.

Droughts result in organic matter building up on the floodplain and banks of rivers. When substantial rain finally occurs and water flows over river banks onto the floodplain, it collects leaves and other organic matter, which it carries back to the river.

As organic matter in the water is decomposed by bacteria, oxygen levels drop significantly, leading to a sudden and disastrous decrease in the oxygen available to fish and other organisms. Unfortunately, this can cause many fish to die.

A range of factors can affect the severity of blackwater, such as the type, quantity and age of the leaf litter, and whether the litter has previously been flooded.

The term blackwater comes from the discolouration of the water due to the release of dissolved carbon compounds, including tannins, as the organic matter decays.

Not all blackwater events will lead to the low dissolved oxygen or hypoxic conditions that can result in the death of fish and other organisms.

Blackwater events are a natural part of the Basin ecosystem and will continue to occur in the Murray-Darling Basin because of the variable nature of Australia's climate.

Increasing air and water temperatures also have the potential to lower dissolved oxygen levels in affected rivers.

Managing blackwater

Releasing more water from storages like dams and lakes, where available, can assist in the management of blackwater. The addition of oxygenated water provides an immediate boost to oxygen concentrations and can also provide localised relief for aquatic life.

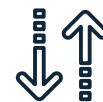
The logistics of delivering water to an event are complex and need to take into account travel times, the amount of oxygen in the water and the amount of water required.

Key facts

Low levels of dissolved oxygen can cause stress and ultimately death to fish and other aquatic animals which rely on oxygen in the water to breathe.



Blackwater is a **natural phenomenon** and will continue to occur.



Blackwater occurs when floodwaters transfer debris containing **elevated levels of organic carbon** from a floodplain to the river.



A range of factors affect the severity of blackwater events such as the water temperature, type, quantity and age of the organic material and leaf litter. The time between flooding events will also affect the accumulation of leaf litter and organic material on floodplains.



Options to mitigate blackwater events are limited and efforts can vary due to many factors.

Reduced dissolved oxygen and its effects on fish

Low levels of dissolved oxygen can cause stress and death to fish and other aquatic animals which rely on oxygen in the water to breathe.

Dissolved oxygen in water comes from both the atmosphere – mostly from wind and wave action, or turbulence during flows in streams and rivers – and is released by aquatic plants, via photosynthesis.

The normal range of dissolved oxygen for water is between 6–8 milligrams per litre (mg/L). However, this varies between coastal and inland rivers and estuarine and marine waters.

Most aquatic animals, including fish, extract the oxygen they need from the water through their gills. Very low levels of dissolved oxygen will cause suffocation and death of aquatic animals.

It is not necessary for the water to become completely deoxygenated for mass fish deaths to occur. The critical minimum level varies with different species and different physical conditions, but as a general guide, few fish species will tolerate prolonged exposure to levels below 4 mg/L.

Larger fish species, such as Murray cod, tend to become stressed and die first due to their greater oxygen requirements.

Water for human consumption

Communities can be affected by blackwater. Water quality is affected through the discolouration of the water, and bacteria and sediment may require the additional treatment of water for human consumption.

Advice for recreational river users

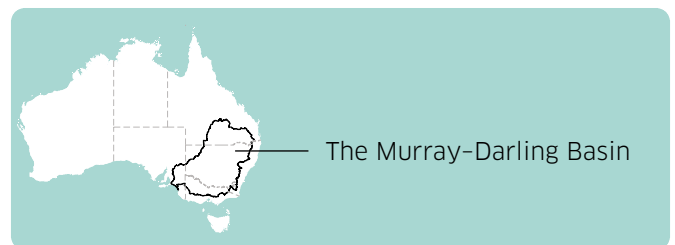
If you are planning activities on or around rivers that have recently been flooded remember to:

- check water quality
- be aware there may be submerged hazards
- be especially careful of fast flowing water
- treat water before consumption – treatment techniques include boiling (at a rolling boil for at least 3 minutes) or using a carbon water filter.

Reporting fish deaths

If you witness a mass fish death we encourage you to report this to the relevant local authority:

- **New South Wales**
New South Wales Fishers Watch
dpi.nsw.gov.au/fishing
1800 043 536
- **Victoria**
Victoria EPA Pollution Hotline
epa.vic.gov.au
1300 372 842
- **Queensland**
Queensland Department of Environment and Science
des.qld.gov.au
1300 130 372
- **South Australia**
South Australia Fishwatch Hotline
pir.sa.gov.au/fishing/fishwatch
1800 065 522
- **Australian Capital Territory**
Australian Capital Territory Access Canberra
accesscanberra.act.gov.au
13 22 81



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