

# Murray-Darling Basin – water quality and dissolved oxygen results

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Multiple agencies are undertaking water quality monitoring to review dissolved oxygen conditions across NSW and identify potential risks to ecological communities. This update provides an assessment of information collected up to 14 December 2022.

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As 2022 draws towards a close, the Bureau of Meteorology are forecasting rainfall figures in early 2023 will be similar to historical averages for January through to March. There is always the possibility of isolated summer thunderstorms, but a lower chance of above average rainfall will provide an opportunity for saturated catchments to dry out and the flooding in many inland catchments to subside. Major flood warnings are continuing for parts of the Lachlan, Murrumbidgee, Kolety/Edward, Murray and Darling rivers.

Flooding has washed organic material such as sticks, leaves, bark, grass and crop residue into the river systems. The breakdown of this organic material by bacteria is using up the oxygen in the water and releasing tannins, turning the water black in colour in some areas. This is often called a hypoxic (low oxygen) blackwater event and whilst it is a natural occurrence in Australian river systems, the risk and severity of these events is increased in regulated systems where the frequency of overbank flows has been reduced. Over time, as the organic material is broken down, dissolved oxygen returns back to normal levels.

The Murray, Wakool and Kolety/Edward rivers are experiencing low dissolved oxygen, which can be detrimental to fish health. In addition to these critical areas, dissolved oxygen levels in the Darling River from Wilcannia to Menindee Lakes, the lower Murrumbidgee River and Merran, Barbers and Thule creeks could impact fish health.

There have been reports of fish deaths, fish struggling or dying and Murray Crayfish and shrimp exiting the water in the Murray-Darling Basin over recent months, including the Murray, Kolety/Edward and Wakool rivers, lower Gwydir River (Big Leather area) and Merran and Yanco-Billabong creek systems.

To report dead fish, fish struggling or starting to gasp at the water surface, or crayfish exiting the water please call the New South Wales Department of Primary Industries Fisheries Fishers Watch Phonenumber 1800 043 536 or fill in a fish kill protocol and report form at:  
[www.dpi.nsw.gov.au/fishing/habitat/threats/fish-kills-2019-2020/info-sheet](http://www.dpi.nsw.gov.au/fishing/habitat/threats/fish-kills-2019-2020/info-sheet)

## Where are the main areas of concern?

There are three main areas of concern where dissolved oxygen is at critical levels for fish health. These are:

- Murray River from Tocumwal downstream to the NSW-South Australian border
- Wakool River
- Koley/Edward River

The Bureau of Meteorology has forecast air temperatures will be cooler this week, slowly increasing up towards 30°C in these critical areas by the weekend. As air temperature increases, so does the water temperature. The process of bacteria breaking down organic material speeds up as water temperature increases, which uses up the oxygen in the water even faster. The cooler temperatures during the week will provide an opportunity for dissolved oxygen levels to recover slightly before warmer weather returns.

## Dissolved oxygen levels – Murray River catchment

Major flooding is continuing at Barham, the Murray-Wakool River Junction, Boundary Bend (Murray-Murrumbidgee River junction) and at Wentworth. The Bureau of Meteorology is predicting major flooding at Wentworth could persist through until January 2023. A flood emergency warning has been issued for Renmark in South Australia.

In the Murray River at Tocumwal, dissolved oxygen is at levels that are safe for fish health. Further downstream at both Barham and Boundary Bend (Murray-Murrumbidgee River junction), dissolved oxygen levels are less than 1 mg/L (Figure 1). Fish may be seen gasping at the water surface when dissolved oxygen falls to this low level. Fish and other aquatic animals have difficulty surviving under low oxygen conditions. The critical minimum level for dissolved oxygen varies between fish species, their size and physical condition. The larger the fish, the more oxygen they require. As a general guide, native fish and other large aquatic organisms require at least 2 mg/L of dissolved oxygen to survive, but may begin to suffer if levels are below 4 to 5 mg/L for prolonged periods.

Downstream of Robinvale, the monitoring site at Wemen is showing oxygen levels have been remaining between 2 and 4 mg/L.

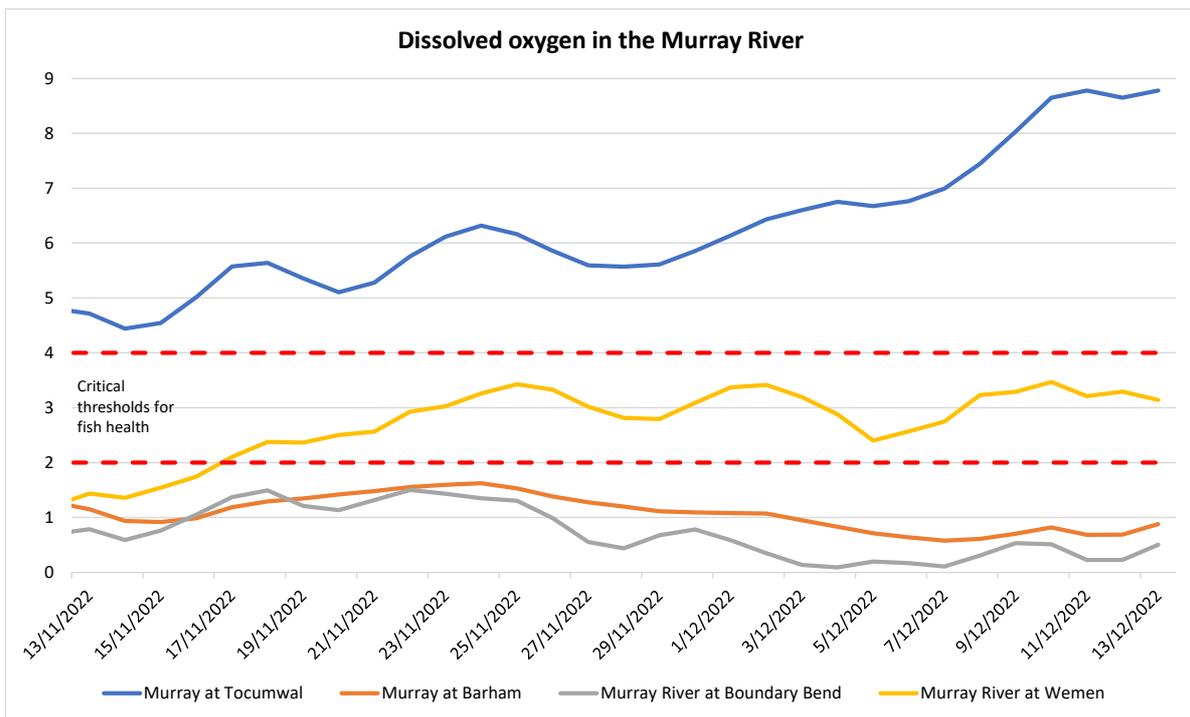


Figure 1: Dissolved oxygen (mg/L) in the Murray River at Tocumwal, Barham, Boundary Bend and Wemen

### Dissolved oxygen levels – Wakool River

The dissolved oxygen levels in the Wakool River are remaining at critical levels for fish health, but have been improving in response to the cooler weather over previous weeks (Figure 2). Dissolved oxygen levels at the lower end of the Wakool River at Stoney Crossing remain less than 2 mg/L. Waterways that feed into the Wakool River, such as Merran, Little Merran, Thule and Barbers creeks also have low dissolved oxygen. Dissolved oxygen levels in the Niemur River are slightly higher than the Wakool River and are fluctuating between 2.5 and 5 mg/L.

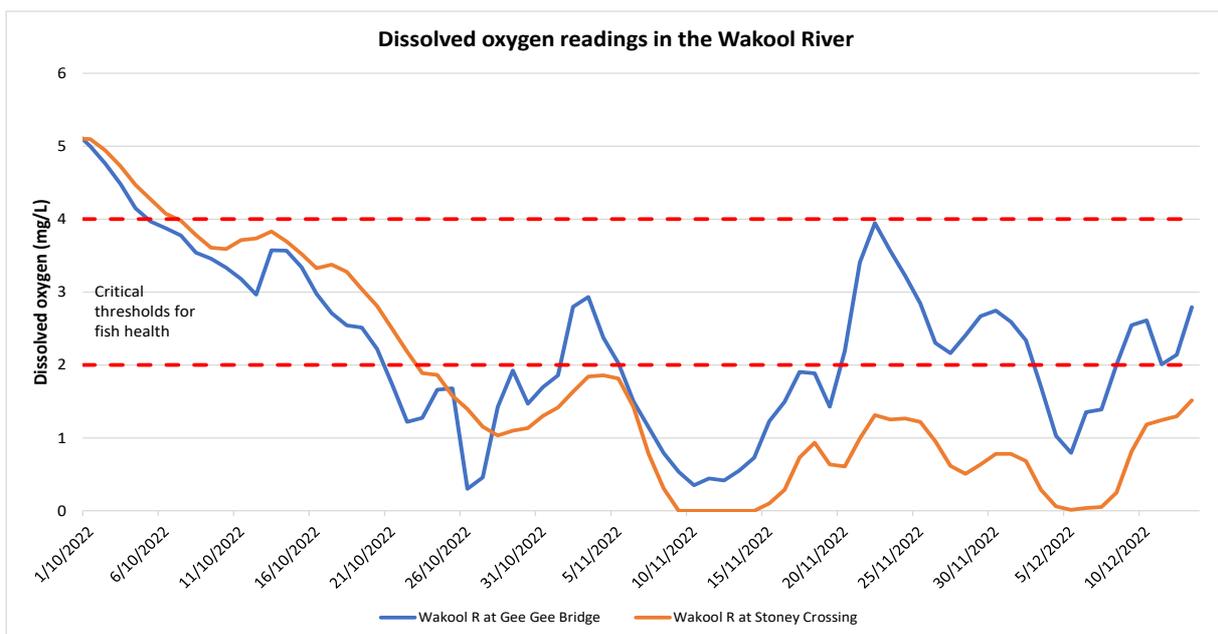


Figure 2: Dissolved oxygen (mg/L) in the Wakool River at Gee Gee Bridge and Stoney Crossing

## Dissolved oxygen levels – Kolety/Edward River

River levels in the Kolety/Edward River are slowly falling below the moderate flood level following a record major flood peak at Moulamein on 1 December. Dissolved oxygen measured at the bottom of the water column at three automated gauged monitoring sites in the Kolety/Edward River is remaining less than 2 mg/L. Measurements taken by scientists from Charles Sturt University using handheld equipment at the surface of the water recorded dissolved oxygen concentration between 2.3 and 2.9 mg/L at five sites in the Edward River near Deniliquin. As hypoxic blackwater events and fish deaths have occurred in this river system in the past, agencies will continue to monitor the situation. Floodwater from Billabong Creek is contributing to low dissolved oxygen in the Kolety/Edward River at Moulamein.

## Dissolved oxygen levels – Darling River

Major flooding in the Darling River continues at Bourke, Louth, Tilpa and Wilcannia. River levels are predicted to remain at the major flood level in Wilcannia into 2023.

Dissolved oxygen in the Darling River at Wilcannia has declined below 4 mg/L. Levels in the Darling River downstream of Menindee Lakes are remaining in the safe range for fish health. NSW and Commonwealth agencies will continue to assess the risks as floodwaters make their way past Wilcannia and into Menindee Lakes and to monitor dissolved oxygen levels as air temperatures increase over summer.

## Hypoxic blackwater fish death summary

In recent months NSW DPI Fisheries has received reports of fish deaths, fish struggling and crustaceans leaving the water across a broad area in the Murray-Darling Basin, including in the Murray, Kolety/Edward, Wakool, Murrumbidgee and Gwydir rivers and Yanco-Billabong Creek system. Warmer temperatures over summer will increase the risk of further reductions in dissolved oxygen in some areas and of the potential for further fish death events.

There have been no new confirmed fish death events related to hypoxic blackwater reported in the last week up to 14 December. There may be fish death incidents that have not yet been reported directly to NSW Department of Primary Industries Fisheries.

## What is being done?

The Bureau of Meteorology has forecast air temperatures will be cooler this week and then increasing up to around 30°C on the weekend. The cooler temperatures will provide an opportunity for dissolved oxygen levels to recover slightly before warmer weather returns.

The Commonwealth Environmental Water Office (CEWO), in collaboration with the NSW DPE Environment and Heritage Group, Murray Irrigation and the CEWOs community reference group, are continuing to divert small volumes of environmental water to the Wakool, Kolety/Edward and Niemur rivers and Thule, Murrain-Yarrein and Cockrans-Jimaringal creeks, to provide a refuge from declining water quality. Monitoring of water quality and fish responses to refuge flows from the Edward River Escape and Niemur Escape is being undertaken by scientists from Charles Sturt

University. You can find out more about the Commonwealth's current environmental water releases in the mid-Murray at: [Latest water use - Mid-Murray - DCCEEW](#)

Programs to benefit native fish such as improving fish passage and habitat restoration to provide conditions conducive to fish breeding and population growth are ongoing. These works are vital and provide an environment where fish populations can bounce back from hypoxic blackwater events.

NSW and Commonwealth agencies will continue to assess the risks of poor water quality and to monitor dissolved oxygen levels to identify areas that may require further action. Updates are being provided to the media and posted on agency web pages to ensure the community is informed of high-risk areas.

### Additional information

To notify the NSW Department of Planning and Environment – Water of potential blackwater events email: [waterqualitydata@dpie.nsw.gov.au](mailto:waterqualitydata@dpie.nsw.gov.au)

To report dead fish, fish struggling or gasping at the water surface, or crayfish leaving the water please call the NSW DPI Fisheries Phoneline 1800 043 536 or fill in a fish kill protocol and report form at: [www.dpi.nsw.gov.au/fishing/habitat/threats/fish-kills-2019-2020/info-sheet](http://www.dpi.nsw.gov.au/fishing/habitat/threats/fish-kills-2019-2020/info-sheet)

Information on recent fish deaths is available at: [Fish kills in NSW](#)

When reporting, please include the name of the river/waterbody, location and date of your observation. If possible, please also record what species are affected and an estimate of number of each species observed.

Further information on blackwater events can be found at the DPE Water website at: [www.industry.nsw.gov.au/water/allocations-availability/droughts-floods/drought-update/managing-drought-recovery/blackwater](http://www.industry.nsw.gov.au/water/allocations-availability/droughts-floods/drought-update/managing-drought-recovery/blackwater)

Additional information is also available on the Murray-Darling Basin Authority website at: [www.mdba.gov.au/publications/mdba-reports/water-management-101-factsheets](http://www.mdba.gov.au/publications/mdba-reports/water-management-101-factsheets)

Operational updates are available at: [WaterInsights - WaterNSW](#)

Flood updates can be found on the Environment Protection Authority web page at: [www.epa.nsw.gov.au/news/news/2022/nsw-storm-and-flood-updates-2022](http://www.epa.nsw.gov.au/news/news/2022/nsw-storm-and-flood-updates-2022)