

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

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 10 October 2022.

## Hypoxic blackwater

Hypoxic, or low oxygen blackwater is a feature of Australian lowland river systems and occurs when organic material, such as sticks, leaves, bark, grass or crops are broken down in floodwater or washed off the floodplain into the river. Organic carbon can also be released from inundated soil. The breakdown of this material by bacteria can rapidly use up all the oxygen in the water. The dark appearance of the water is due to the release of tannins as the organic matter decays.

This breaking down and recycling of organic material is an essential natural process of rivers. It provides food for the river ecosystem. However, a sudden drop or prolonged exposure to low oxygen can have adverse impacts. 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 at levels below 4 to 5 mg/L.

The risk of hypoxic blackwater becomes greater with increasing water temperatures. La Niña is increasing the chance of above average rainfall for northern and eastern Australia during spring and summer. Due to the high chance of ongoing flooding and high flow conditions across the Murray-Darling Basin, NSW and Commonwealth water agencies will continue to monitor and assess dissolved oxygen conditions as summer approaches.

## Where are the main areas of concern?

Dissolved oxygen levels at most measurement sites across the Murray-Darling Basin are above ecological thresholds. However, there are some locations where oxygen levels have been declining as air and water temperatures increase and large areas of floodplain are being inundated by floodwater.

Current areas of concern are:

- Wakool and Neimur rivers
- Koley/Edward River

- Mid-Murray River catchment downstream of Koondrook-Perricoota Forest
- Murrumbidgee River at Balranald
- Barwon River between Walgett and Brewarrina

### Dissolved oxygen levels – mid Murray catchment

Dissolved oxygen levels have been slowly declining in the Wakool and Neimur systems (Figure 1). As flows in the Wakool River continue to rise, the dissolved oxygen level has just dropped below the critical threshold of 4 mg/L. Depending on their size and health, some fish may begin to suffer when oxygen levels drop below this threshold.

In the Kolety/Edward River, oxygen levels have been declining, but remain above critical thresholds for fish health. With large volumes of water inundating the Barmah/Millewa Forests there is an increased risk of a hypoxic blackwater event. Agencies will continue to monitor oxygen levels in this area.

Environmental water holders have commenced some releases through Murray Irrigation Limited escape channels to provide potential oxygenated refuge areas for native aquatic fauna. Water quality monitoring is being carried out to assess the effectiveness of this approach and to guide further actions.

These deliveries will provide some fish refuge, but complete mitigation of hypoxic blackwater is not possible with large volumes of floodwater water currently moving across the floodplain.

You can find out more about the Commonwealth’s current environmental water releases in the mid-Murray at: [www.dcceew.gov.au/water/cewo/catchment/mid-murray/water-use#providing-21](http://www.dcceew.gov.au/water/cewo/catchment/mid-murray/water-use#providing-21)

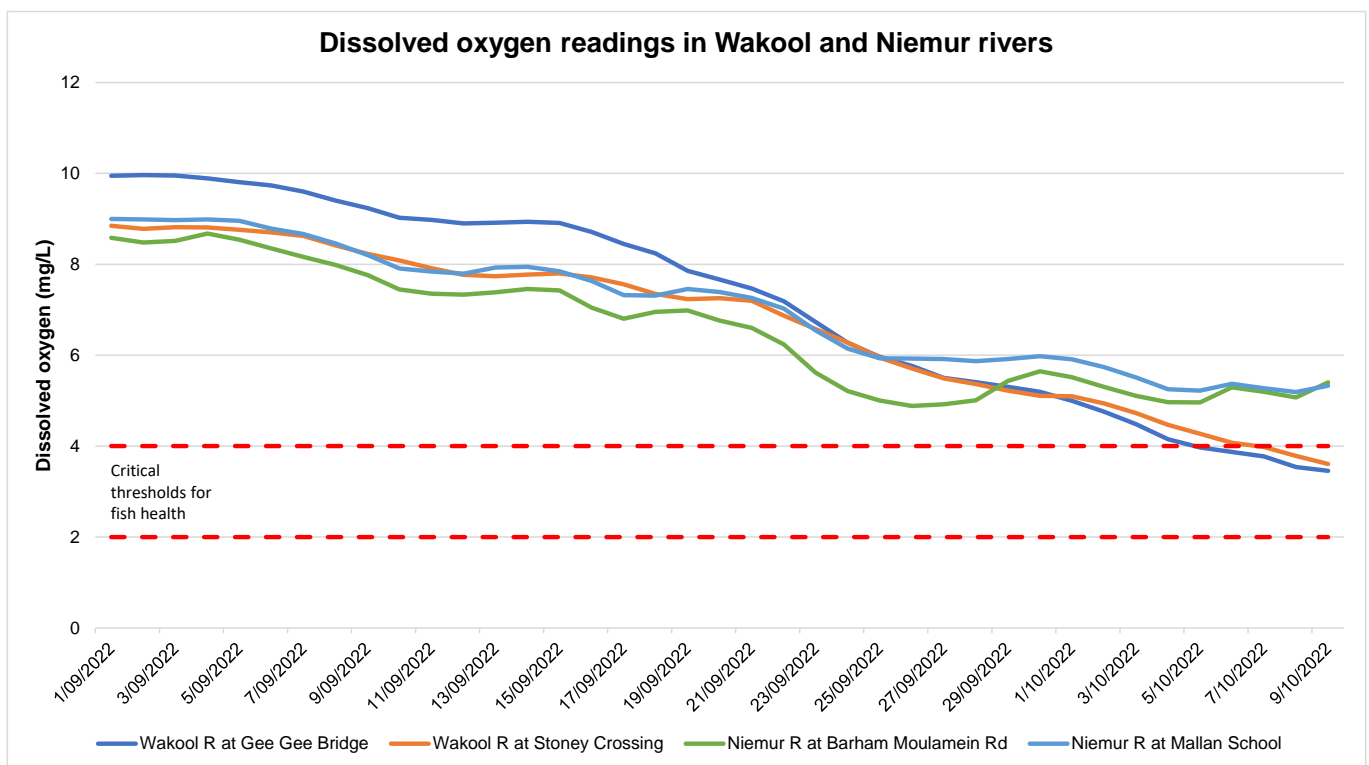


Figure 1. Mean daily dissolved oxygen (mg/L) in the Wakool and Niemur Rivers

The Koondrook-Perricoota Forest is an extensive forest of river red gums and woodlands along the Murray River. When inundated, the breakdown of the high volume of organic material on the forest floor can result in hypoxic blackwater events. Water with low dissolved oxygen is currently flowing out of Koondrook-Perricoota Forest and into Little Merran, Thule and Barber Creeks (Figure 2). This has caused the dissolved oxygen levels in these waterways to decline to below safe ecological thresholds.

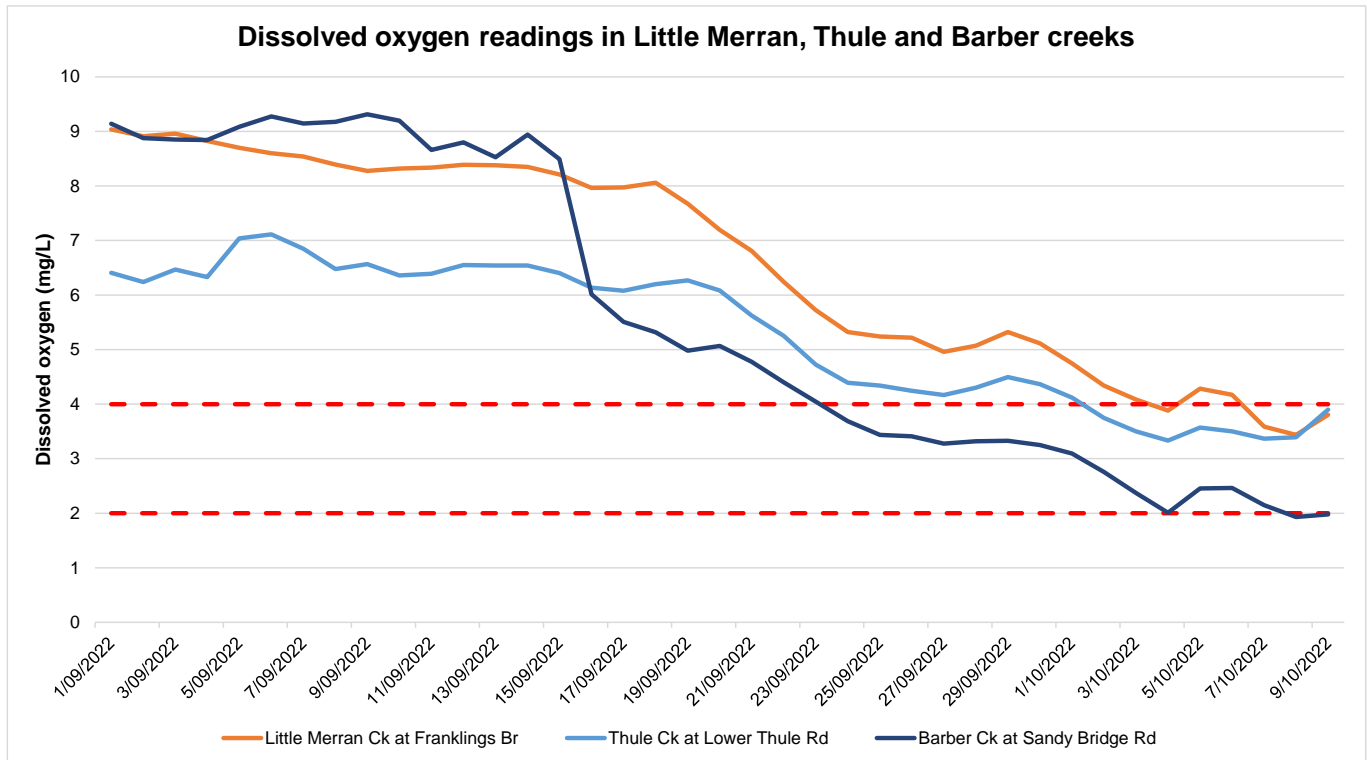


Figure 2. Mean daily dissolved oxygen (mg/L) in Little Merran, Thule and Barber creeks

### Dissolved oxygen levels – Murrumbidgee River

Dissolved oxygen levels have been slowly declining in the Murrumbidgee River at Balranald since the start of September (Figure 3). As heavy rain and flooding continues, more of the lower Murrumbidgee floodplain will be inundated. As air and water temperatures increase and accumulated organic material from the floodplain is transported back into rivers with return flows, the risk of a hypoxic blackwater event occurring increases.

Dissolved oxygen at Balranald is likely to decrease when the flood peak passes and the water sitting out on the floodplain is able to flow back into the main river channel. NSW and Commonwealth agencies will continue to monitor dissolved oxygen levels and may release environmental water to maintain the discharge in the Murrumbidgee River to provide an oxygenated refuge for fish if hypoxic floodwater is returning to the main channel from the floodplain.

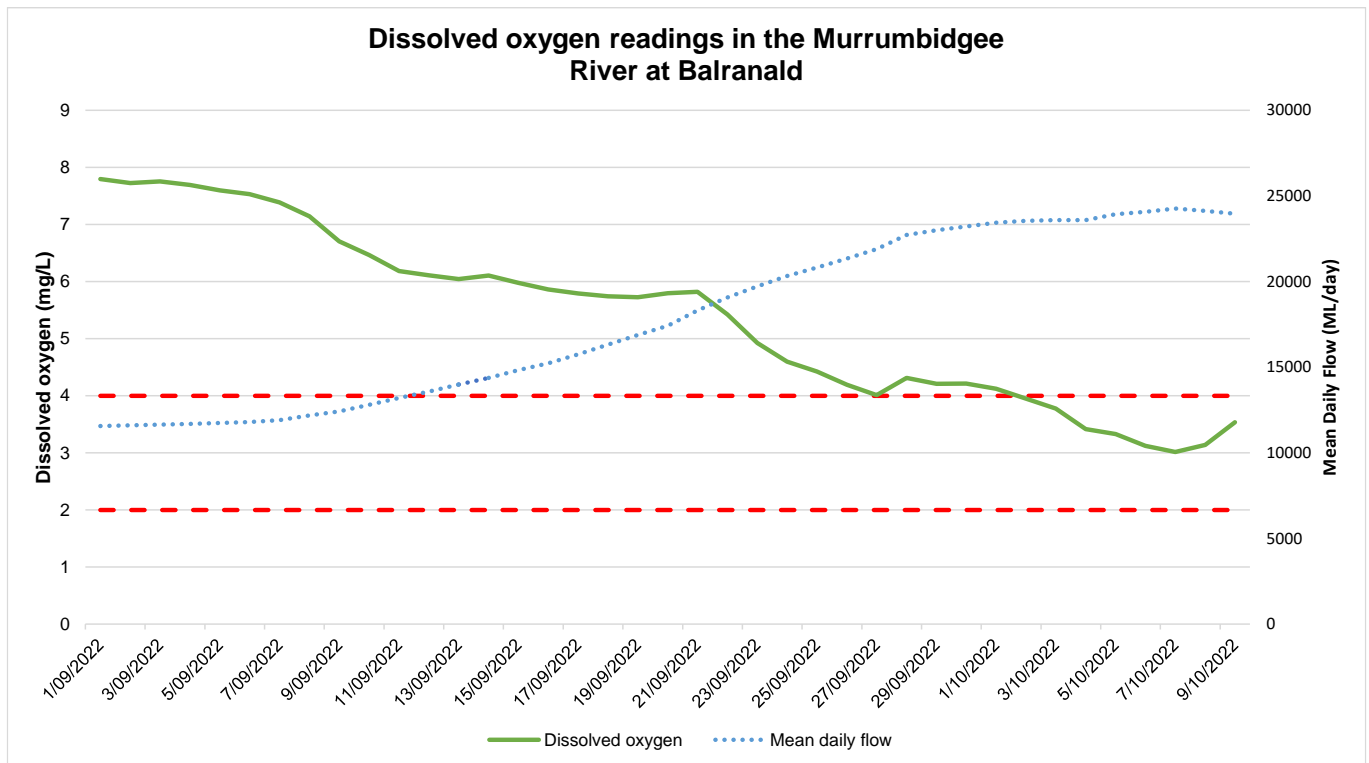


Figure 3. Mean daily dissolved oxygen (mg/L) and mean daily flow in the Murrumbidgee River downstream of Balranald Weir

### Dissolved oxygen levels – Barwon River

Heavy rainfall and flooding in the Namoi catchment inundated large areas of the lower Namoi Valley. This has resulted large volumes of water with low dissolved oxygen flowing into the Barwon River at Walgett. As flooding continued, dissolved oxygen levels at Walgett decreased below the critical threshold for fish health of 2 mg/L. This hypoxic floodwater has continued down the Barwon River where it now impacting on oxygen levels at Geera (junction of the Barwon and Macquarie rivers) and Brewarrina (Figure 4). At this stage there have been no reports of fish deaths or of fish gasping at the water surface. It is expected that these flows will impact dissolved oxygen levels in the Darling River downstream at Bourke and Wilcannia over the coming weeks.

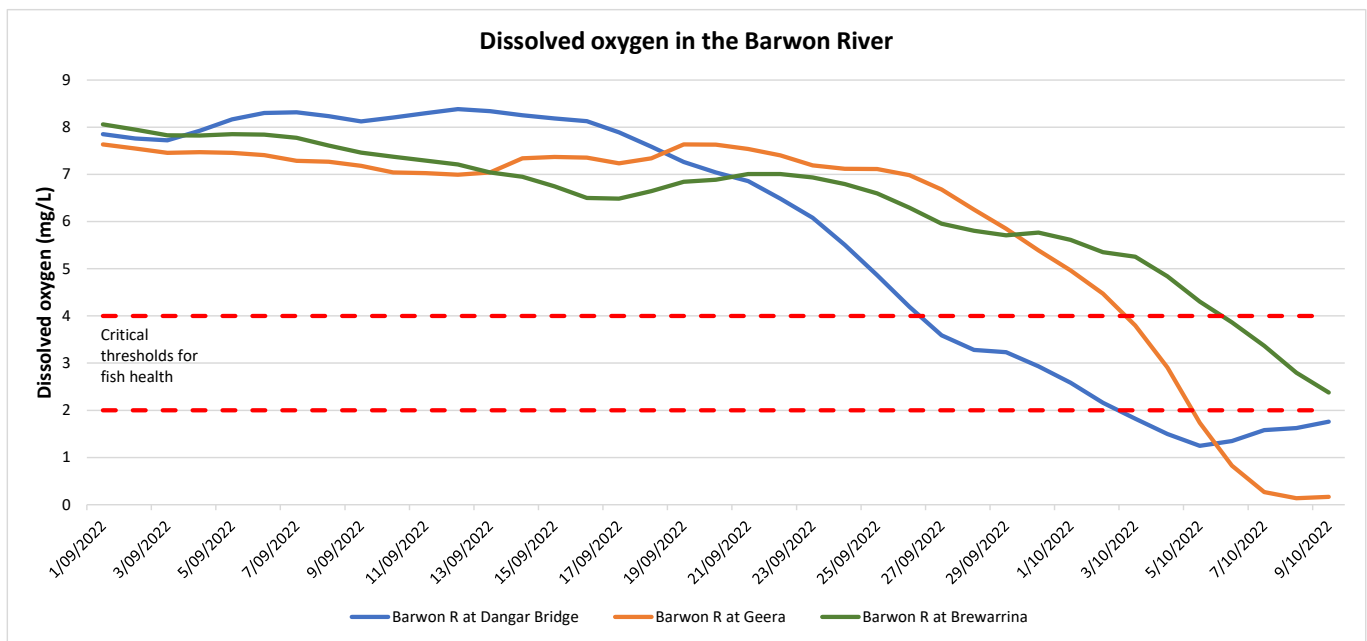


Figure 4. Mean daily dissolved oxygen (mg/L) in the Barwon River at Dangar Bridge (Walgett), Geera and Brewarrina

## What is being done?

The dissolved oxygen levels in most NSW rivers are currently safe for aquatic ecosystems. However, with increasing air and water temperatures as summer approaches, the outlook from the Bureau of Meteorology for above average rainfall until early 2023 and large volumes of vegetation growth on the floodplains, there is a high risk of hypoxic blackwater events occurring in some areas.

With the sheer volume of floodwater currently moving across floodplains in all catchments in the Murray-Darling Basin, complete mitigation of hypoxic blackwater by intervention measures is not possible. Small, oxygenated refuge areas for fish can be provided by delivering environmental water to areas of poor water quality, where possible.

Although hypoxic blackwater events may result in the loss of fish and other aquatic life, the impacts of these events on the environment are usually short-term, as the river water re-oxygenates again as the flooding subsides. Naturally occurring events such as these underpin the broad health of rivers. They provide nutrients that drive the overall production of our river and wetland systems. In the longer term, native fish, water birds and other organisms benefit from the increased production in the river, boosting food supplies and supporting breeding cycles.

La Niña is underway in the Tropical Pacific, increasing the chance of above average rainfall for northern and eastern Australia during spring and summer. NSW and Commonwealth agencies will continue to assess the risks of poor water quality and to monitor dissolved oxygen levels over the summer months to identify areas that may require further action.

## Additional information

To notify the department of potential blackwater events email: [waterqualitydata@dpie.nsw.gov.au](mailto:waterqualitydata@dpie.nsw.gov.au)

To report dead fish or fish starting to gasp at the water surface call the NSW DPI Fisheries Hotline 1800 043 536. Information on recent fish deaths is available at: [Fish kills in NSW](#)

Further information on blackwater events can be found the Department of Planning and Environment 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 of the the MDBA 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 for Menindee Lakes are available at: [WaterInsights - WaterNSW](#)