

# 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 25 October 2022.

Continued rain on already saturated catchments is causing major flooding across most river valleys in New South Wales. This has resulted in the inundation of large areas of floodplain and an increasing risk of hypoxic blackwater events. Hypoxic, or low oxygen blackwater, 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. The breakdown of this material by bacteria can rapidly use up all the oxygen in the water.

Fish and other aquatic animals have difficulty surviving when oxygen levels drop below 2 mg/L. NSW DPI Fisheries are aware of isolated fish deaths in the region and crayfish exiting floodwaters, and have staff in the area undertaking further investigations.

With ongoing flooding and warmer air and water temperatures as summer approaches, the possibility of hypoxic blackwater events increases and unfortunately, so to the risk that fish deaths like those experienced during the 2011 and 2016 floods could occur. NSW and Commonwealth agencies will continue to assess the risks of poor water quality by monitoring dissolved oxygen levels over the summer months to identify areas at risk and if actions to mitigate those risks are possible.

## Where are the main areas of concern?

Dissolved oxygen levels in most rivers and streams across the Murray-Darling Basin are safe for fish and other aquatic life. However, there are some areas where oxygen levels have been declining as large areas of floodplain are inundated by floodwater.

Current areas of most concern are:

- Mid-Murray River catchment from Tocumwal downstream to Wentworth
- Wakool River
- Koley/Edward River
- Murrumbidgee River at Balranald
- Barwon River between Walgett and Brewarrina

## Dissolved oxygen levels – mid-Murray catchment

Up until this week, dissolved oxygen in the Kolety/Edward River had remained above the critical thresholds for fish health. Increasing river heights are inundating more floodplain areas in this river system. Combined with higher water temperatures, which speeds up the carbon break down process and uses up dissolved oxygen at a faster rate, oxygen levels have dropped to critical levels. Water managers are diverting water from the Mulwala channel into the Kolety/Edward River to provide an oxygenated refuge area for aquatic organisms. Agencies will continue to monitor oxygen levels in the Kolety/Edward River as hypoxic blackwater events have occurred in this area in the past.

In a similar situation to the Kolety/Edward River, dissolved oxygen levels have been continuing to decline in the Wakool River as river level and water temperatures increase. Dissolved oxygen in the Wakool River has dropped below the critical threshold of 2 mg/L. Depending on their size and health, fish may begin to suffer when oxygen levels drop below this level.

Dissolved oxygen levels in the Murray River at Tocumwal, upstream of the Barmah Forest, have been remaining in the safe range for fish health (Figure 1). Monitoring at the outflow from the forest at Barmah shows oxygen levels had dropped below 2 mg/L, but made a small recovery this week.

Floodwaters from the Goulburn and Campaspe rivers in Victoria are combining with high flows in the Murray River, resulting in major flooding at Echuca. The Murray River at Echuca peaked on Wednesday 26 October.

The Koondrook-Perricoota Forest is an extensive forest of river red gums and woodlands along the Murray River downstream of Echuca. When inundated, the breakdown of the organic material on the forest floor can result in hypoxic blackwater events. In addition to the forests, large areas of pastures and crops in agricultural areas are also being flooded. The breakdown of all this material in the floodwater by bacteria is using up oxygen. Water with low dissolved oxygen is currently flowing into Little Merran, Thule and Barber creeks and then into the Wakool River. This has caused the dissolved oxygen levels in these waterways to decline below safe ecological thresholds.

As the floodwater from all these systems makes its way downstream, the impact on dissolved oxygen is starting to show in the lower Murray River. Dissolved oxygen levels downstream of Koondrook-Perricoota Forest at Barham, and where the Wakool and Murrumbidgee Rivers join the Murray River, is also declining (Figure 1). Monitoring is showing that oxygen levels in the Murray River downstream of Wentworth have also started to decline.

For the coming week, the Bureau of Meteorology has forecast air temperatures at Echuca will increase up to a maximum of 21°C on Sunday 30 October and decline again into early next week. The forecast maximum air temperature on Sunday for Deniliquin is 22°C and Mildura 23°C. In the short term, these lower air temperatures compared to last week, cloud cover and occasional showers, will help maintain lower water temperatures in this area and may provide an opportunity for oxygen levels to recover slightly before warmer weather arrives.

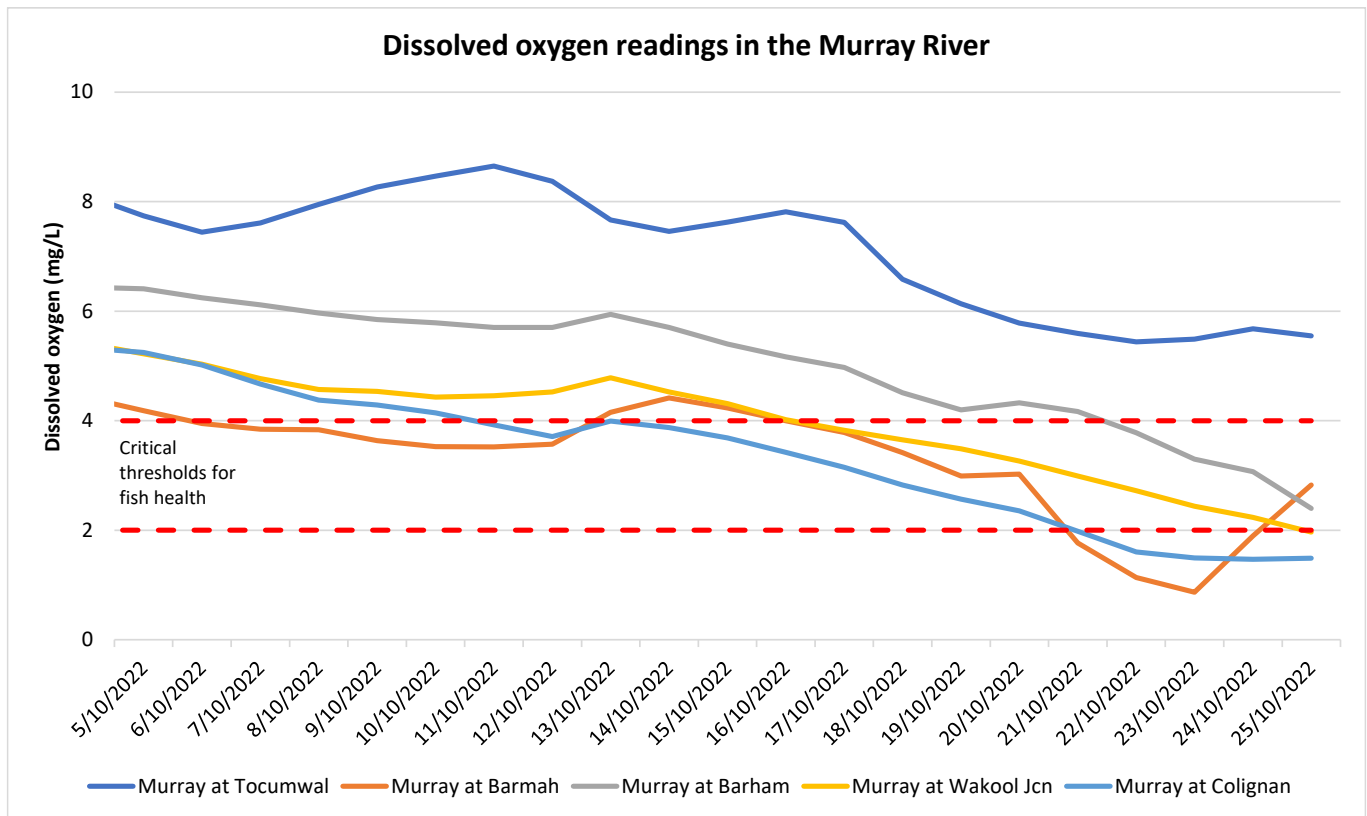


Figure 1: Dissolved oxygen (mg/L) in the Murray River between Tocumwal and Colignan

## Dissolved oxygen levels – Murrumbidgee River

The flood peak progressing down the Murrumbidgee River reached Darlington Point on 22 October. It is expected to cause major flooding in Hay this week and moderate flooding in Balranald in mid-November. Extensive areas of the lower Murrumbidgee floodplain have already been inundated by previous flood events, which has resulted in declining dissolved oxygen levels in the Murrumbidgee River at Balranald since the start of September (Figure 2). Dissolved oxygen at Balranald has now dropped below the ecological threshold of 4 mg/L and is approaching the critical level for fish health of 2 mg/L.

This most recent flood event will push more water out onto the Murrumbidgee floodplain, inundating forested and agricultural areas for longer. Dissolved oxygen could decrease below critical levels when the flood peak passes and the water sitting out on the floodplain is able to flow back into the main river channel. As summer approaches and air temperatures increase, warmer water speeds up carbon breakdown process, which uses up oxygen faster. There is a high risk that dissolved oxygen levels in the lower Murrumbidgee River could remain low for many months.

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.

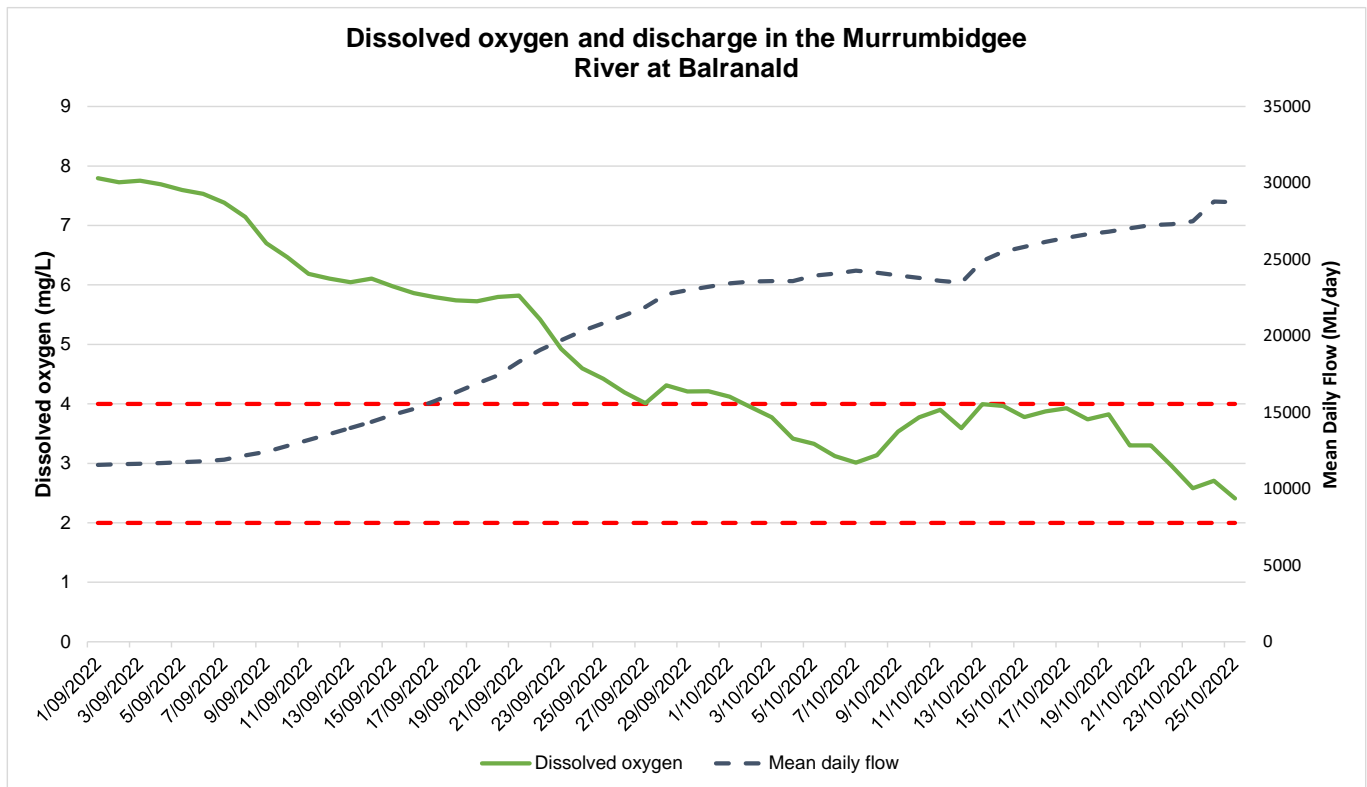


Figure 2: Dissolved oxygen (mg/L) (left axis) and mean daily flow (ML/day) (right axis) in the Murrumbidgee River at Balranald

### Dissolved oxygen levels – Barwon River

Heavy rainfall and flooding in the Northern Murray-Darling Basin has inundated large areas, resulting in water with low dissolved oxygen flowing into the Barwon River. Dissolved oxygen levels in the Barwon River from Walgett to Brewarrina have decreased below the critical threshold for fish health of 2 mg/L, but have been slowly recovering at Walgett as the flood flows move downstream (Figure 3). Despite the recovery, dissolved oxygen is still low and in the range where it can impact fish health. There have been no reports of fish deaths or of fish gasping at the water surface in the Barwon River.

Oxygen levels in the Darling River at Bourke have dropped below 4 mg/L as the flood flows progress downstream. These flows will impact dissolved oxygen levels further downstream at Wilcannia over the coming weeks.

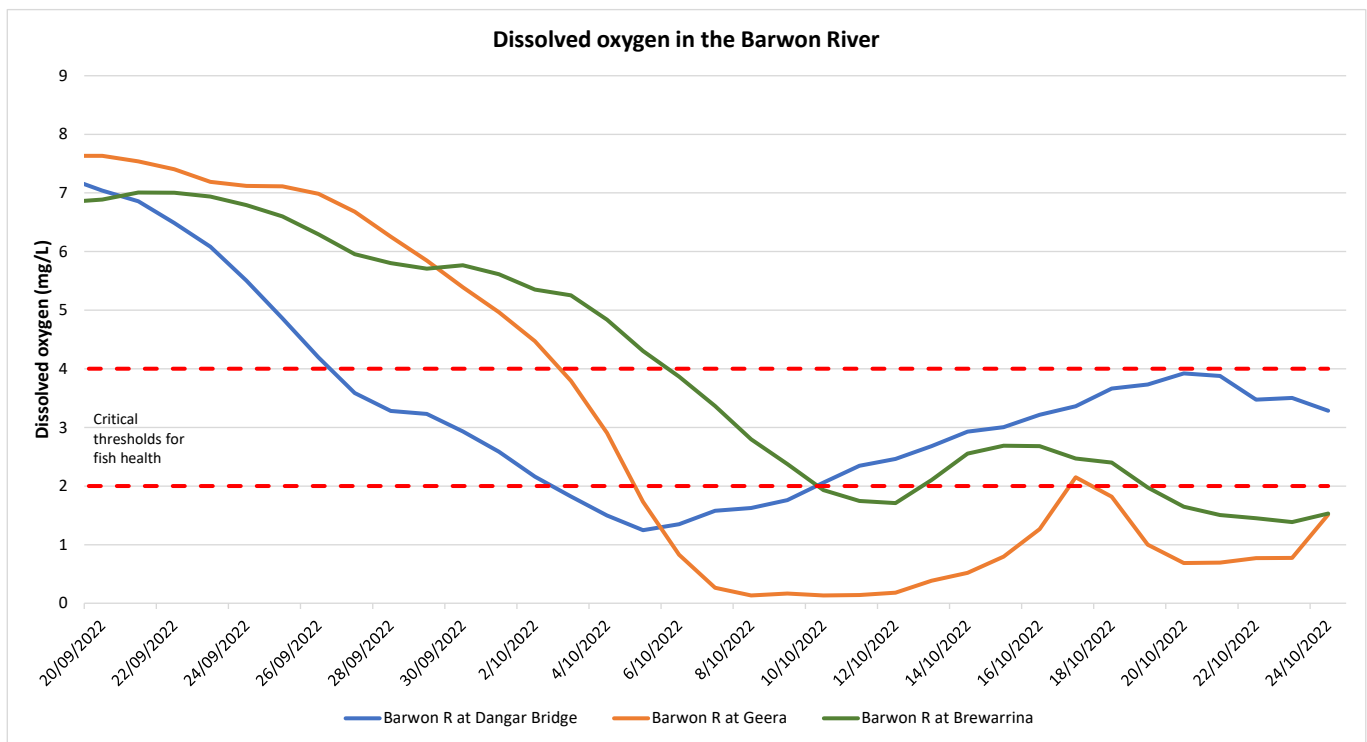


Figure 3: Dissolved oxygen (mg/L) in the Barwon River at Walgett, Geera and Brewarrina

## What is being done?

The scale and magnitude of flooding on public and private property means mitigation methods to get oxygen back into the water are extremely limited. Methods used in drought situations, such as artificial aerators in specific river sections, won't be viable for combating large volume and widespread hypoxic blackwater events.

With the sheer volume of floodwater currently moving across floodplains in all catchments in the Murray-Darling Basin, complete mitigation of hypoxic blackwater by flow intervention measures is not possible. Small, oxygenated refuge areas for fish can be provided by delivering environmental water to areas of poor water quality. The Commonwealth Environmental Water Office are continuing to deliver small volumes of environmental water to the Wakool, Kolety/Edward and Neimur rivers and Whymoul, Thule, Murrain-Yarrein and Cockrans creeks, to provide a refuge from declining water quality. You can find out more about the Commonwealth's current environmental water releases in the mid-Murray at: [Latest water use - Mid-Murray - DCCEE](#)

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.

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 at risk and if actions to mitigate those risks are possible.

## 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 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](#)

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

The latest algal alert advisory information can be found at: [www.waternsw.com.au/water-quality/algae](http://www.waternsw.com.au/water-quality/algae)