

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 November 2022.

Air temperatures dropped dramatically last week as the cold change crossed New South Wales. The cooler air temperatures caused the water temperature in the rivers to decrease, which in turn slowed the breakdown of organic material in the water by bacteria. This allowed dissolved oxygen levels to improve slightly in many rivers. However, the respite was only short-lived and, due to ongoing flooding and higher air and water temperatures this week, the possibility of hypoxic blackwater events increases again.

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. This process of breaking down organic material speeds up as water temperature increases, which uses up the oxygen even faster.

There have been isolated reports of dead fish in the southern Murray-Darling Basin and, with rising temperatures, further fish kills are likely. To report dead fish or fish starting to gasp at the water surface call the NSW Department of Primary Industries 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

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.

Where are the main areas of concern?

There are four main areas of concern where dissolved oxygen levels are at critical levels for fish health. These areas of most concern in New South Wales are:

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

Dissolved oxygen levels – mid Murray River catchment

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

Major flooding in the Murray River peaked at Echuca on 26 October. Large volumes of floodwater have flowed into Koondrook-Perricoota Forest, an extensive forest of river red gums and woodlands along the Murray River downstream of Echuca. When inundated, the breakdown of the organic material such as leaves, bark, sticks and grass on the forest floor can result in hypoxic blackwater events. In addition to the forests, large areas of pastures and crops in agricultural areas have been flooded. Water with low dissolved oxygen is currently flowing out of the forests into the Merran, 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 evident in the Murray River. Dissolved oxygen levels downstream of Koondrook-Perricoota Forest at Barham, where the Wakool River joins the Murray River and at Colignan have all declined to less than 2 mg/L (Figure 1).

Monitoring is showing that oxygen levels in the Murray River downstream of Wentworth have also declined below 4 mg/L. Depending on their size and health, fish may begin to suffer when dissolved oxygen falls below this level.

Flooding in the Murray River peaked at Swan Hill on 8 November. The Bureau of Meteorology has predicted major flooding for the Murray River at the Wakool River junction next week on 15 to 17 November and at Wentworth during the first week of December.

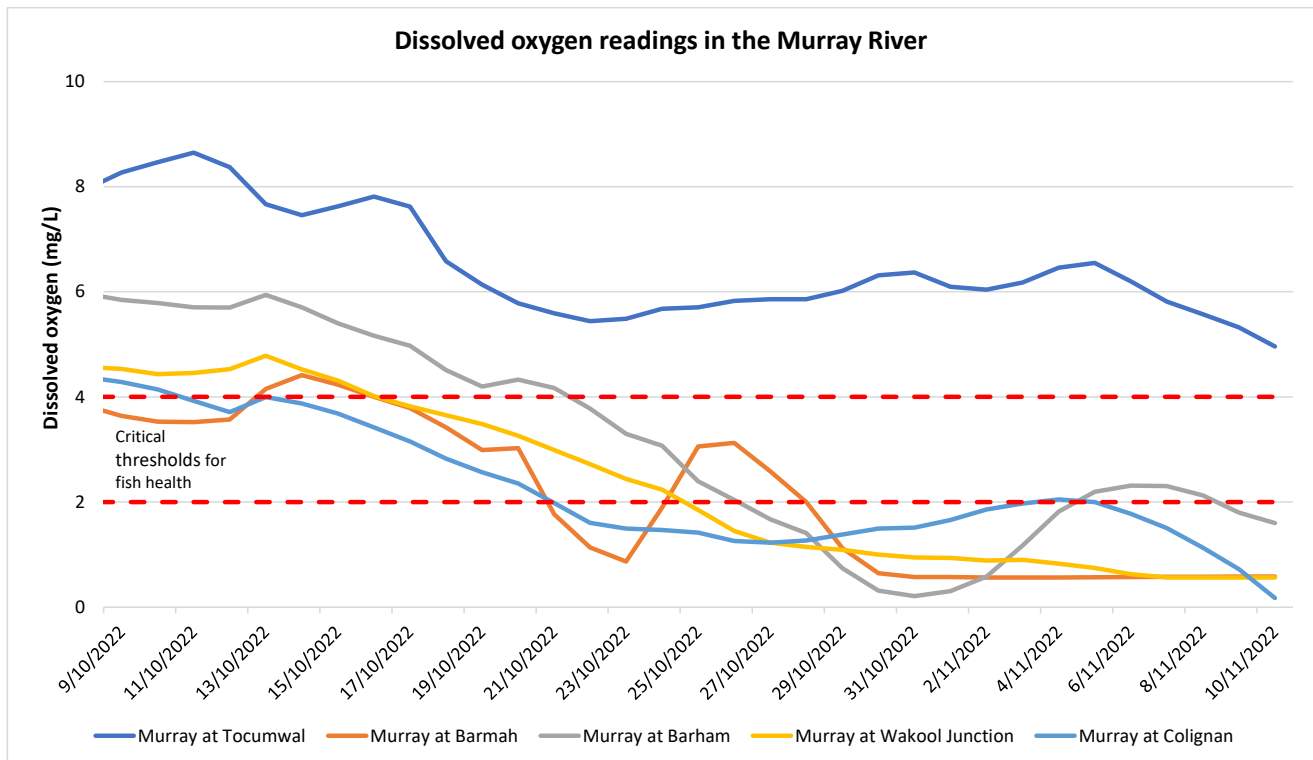


Figure 1: Dissolved oxygen (mg/L) in the Murray River at Tocumwal, Barmah, Barham, downstream of the Wakool River junction and at Colignan

Dissolved oxygen levels – Kolety/Edward River

A dramatic increase in river heights saw water push further out onto the Kolety/Edward River floodplain. Dissolved oxygen dropped to zero at the Toonalook monitoring site, which is located immediately downstream of Barmah/Millewa Forest. Dissolved oxygen at Deniliquin fell below the critical threshold of 2 mg/L. There was some recovery of oxygen levels with the arrival of the cool change last week. But as the weather has warmed up again, dissolved oxygen at all three sites on the Kolety/Edward River is now below 2 mg/L (Figure 2). As hypoxic blackwater events and fish deaths have occurred in this river system in the past, agencies will continue to monitor oxygen levels in the Kolety/Edward River.

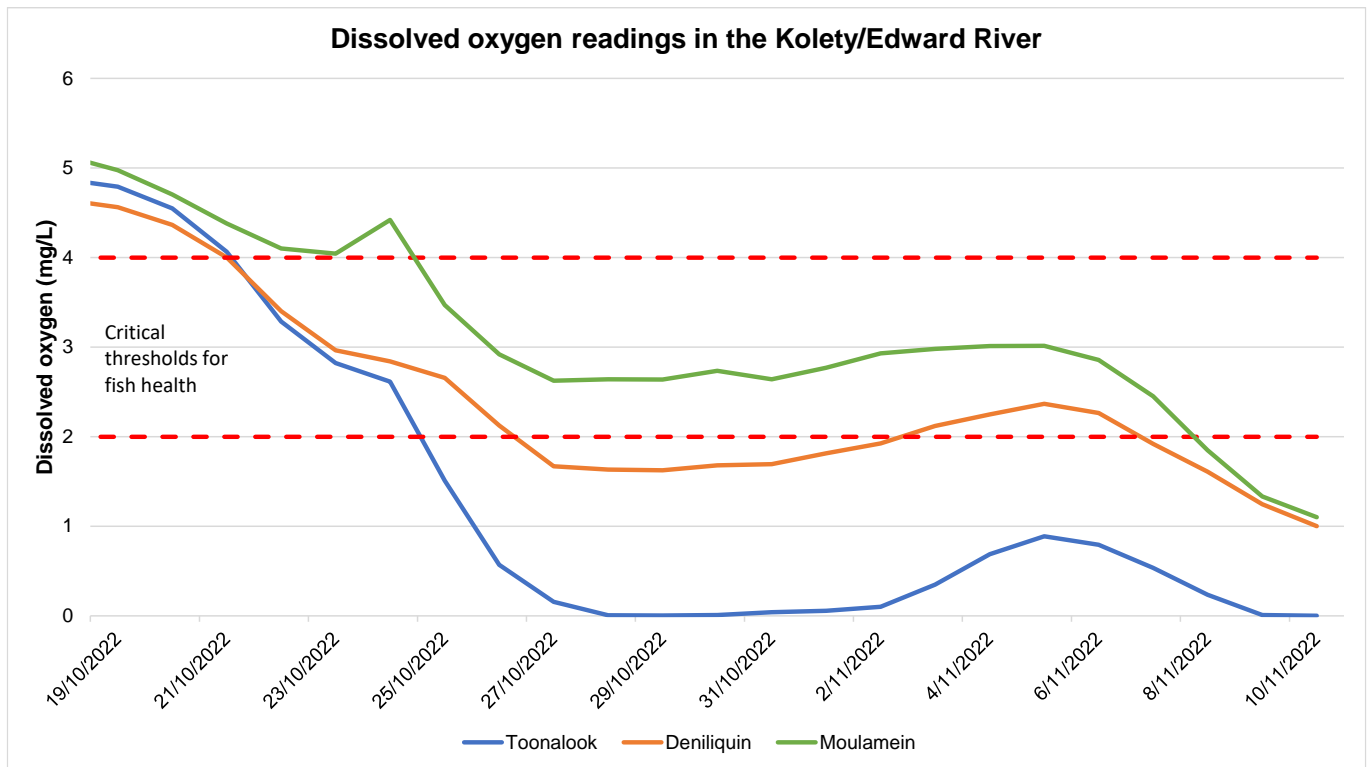


Figure 2: Dissolved oxygen (mg/L) in the Kolety/Edward River at Toonalook, Deniliquin and Moulamein

Dissolved oxygen levels – Wakool River

In a similar situation to the Kolety/Edward River, dissolved oxygen levels in the Wakool River have been continuing to decline as river level and water temperatures increase. Dissolved oxygen in the Wakool River showed some minor improvement with the cooler temperatures, but has now dropped to less than 1 mg/L at Gee Gee Bridge and Stoney Crossing (Figure 3). As for the Kolety/Edward River, fish deaths have occurred in the Wakool River during previous blackwater events.

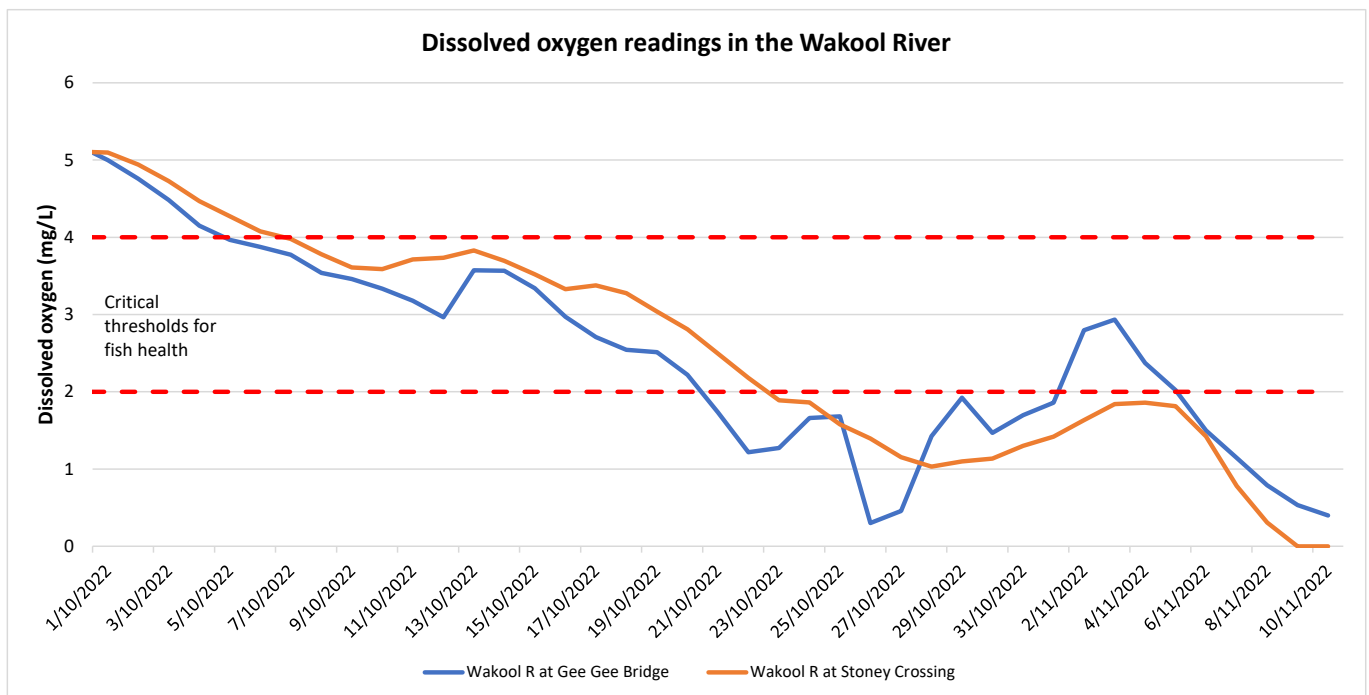


Figure 3: Dissolved oxygen (mg/L) in the Wakool River at Gee Gee Bridge and Stoney Crossing

Dissolved oxygen levels – Barwon River

The inflow of floodwater from the Northern Murray-Darling Basin catchments into the Barwon River has caused dissolved oxygen levels from Walgett to Brewarrina to decrease below the 2 mg/L critical threshold for fish health (Figure 4). There have not been any reports of fish deaths or of fish gasping at the water surface in the Barwon River. Better quality water in the Intersecting Streams may be providing a refuge area for fish to move into until conditions in the Barwon River improve.

Oxygen levels in the Darling River at Bourke have been declining toward 4 mg/L and are expected to decrease further as the low oxygen water arrives from upstream and air temperatures increase. These flood flows will continue to impact dissolved oxygen levels further downstream at Wilcannia and Menindee Lakes over the coming months.

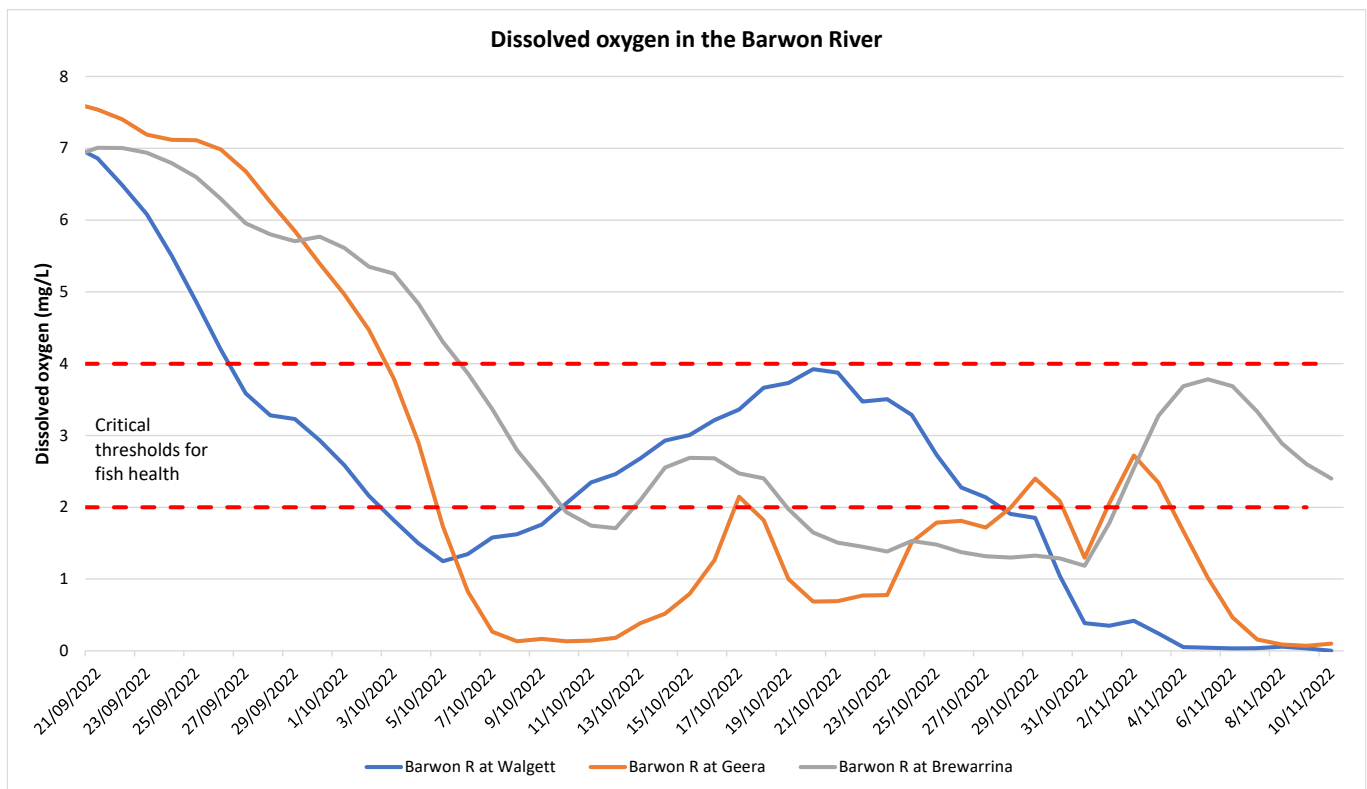


Figure 4: Dissolved oxygen (mg/L) in the Barwon River at Walgett, Geera and Brewarrina

What is being done?

The Bureau of Meteorology has forecast air temperatures at Echuca and Mildura will increase up to a maximum of 31°C over the weekend. This will result in an increase in water temperature and, although lower air temperatures are predicted for early next week, it may take longer for water temperature to decrease and oxygen levels to recover. The magnitude of flooding and high temperatures means that the prevention of a hypoxic blackwater event is not possible and mitigation methods to get more oxygen back into the water are extremely limited. Methods used in drought situations, such as artificial aerators, won't be viable for combating the large volume of water and the widespread hypoxic blackwater events being experienced in the Murray valley or the Barwon River.

Small, oxygenated refuge areas for fish can be provided by diverting environmental water to areas of poor water quality. The Commonwealth Environmental Water Office is 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. You can find out more about the Commonwealth's current environmental water releases in the mid-Murray at: [Latest water use - Mid-Murray - DCCEEW](#)

Hypoxic blackwater events may result in the loss of both native and invasive fish and other aquatic life, but the impacts of these events on the environment are usually short-term as the river water re-oxygenates again when the flooding subsides. These events are naturally occurring and 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 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 department of potential blackwater events email: 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

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

Further information on blackwater events can be found on the DPE Water website at:

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

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

Flood updates can be found on the EPA's website at: www.epa.nsw.gov.au/news/news/2022/nsw-storm-and-flood-updates-2022