
Multiple agencies are undertaking water quality monitoring to assess dissolved oxygen conditions across NSW and identify potential risks to ecological communities. This update provides an assessment of dissolved oxygen data collected up to 17 December 2021.

What is hypoxic blackwater?

NSW has experienced one of its wettest Novembers on record. The Bureau of Meteorology predicts the current weather pattern of above average rainfall across eastern Australia could continue until late summer or early autumn 2022. Above average rainfall increases the chance of flooding, and with flooding comes the added risk of hypoxic blackwater events.

Hypoxic, or low oxygen blackwater is a feature of Australian lowland river systems and occurs when organic material, such as sticks, leaves, bark and grass is broken down in the 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. 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.

There are currently two main areas of concern – the Barwon and Darling rivers in the north and the Koley/Edward River in the south.

Barwon and Darling rivers

High rainfall has resulted in flooding in all catchments across the Northern Basin. As the floodwaters flow across the Border Rivers, Gwydir, Namoi and Macquarie/Castlereagh floodplains and into the Barwon and Darling rivers, dissolved oxygen levels have been declining. Monitoring sites on the Barwon River show dissolved oxygen levels have dropped below critical ecological thresholds (Figure 1).

Satellite-derived Sentinel colour infrared images show blackwater is flowing into the Barwon River from the Namoi River. Image 1 shows the junction of the Namoi and Barwon Rivers at Walgett, highlighting the different coloured water as the blackwater from the Namoi River merges into the turbid Barwon River. The blackwater from the Namoi River is hugging the bank where the gauging station is located.

The photograph of the Barwon River at Boorooma (14 December 2021), halfway between Walgett and Brewarrina upstream of the junction of the Macquarie and Barwon rivers, shows the hypoxic blackwater is progressing downstream.

NSW Murray Darling Basin dissolved oxygen

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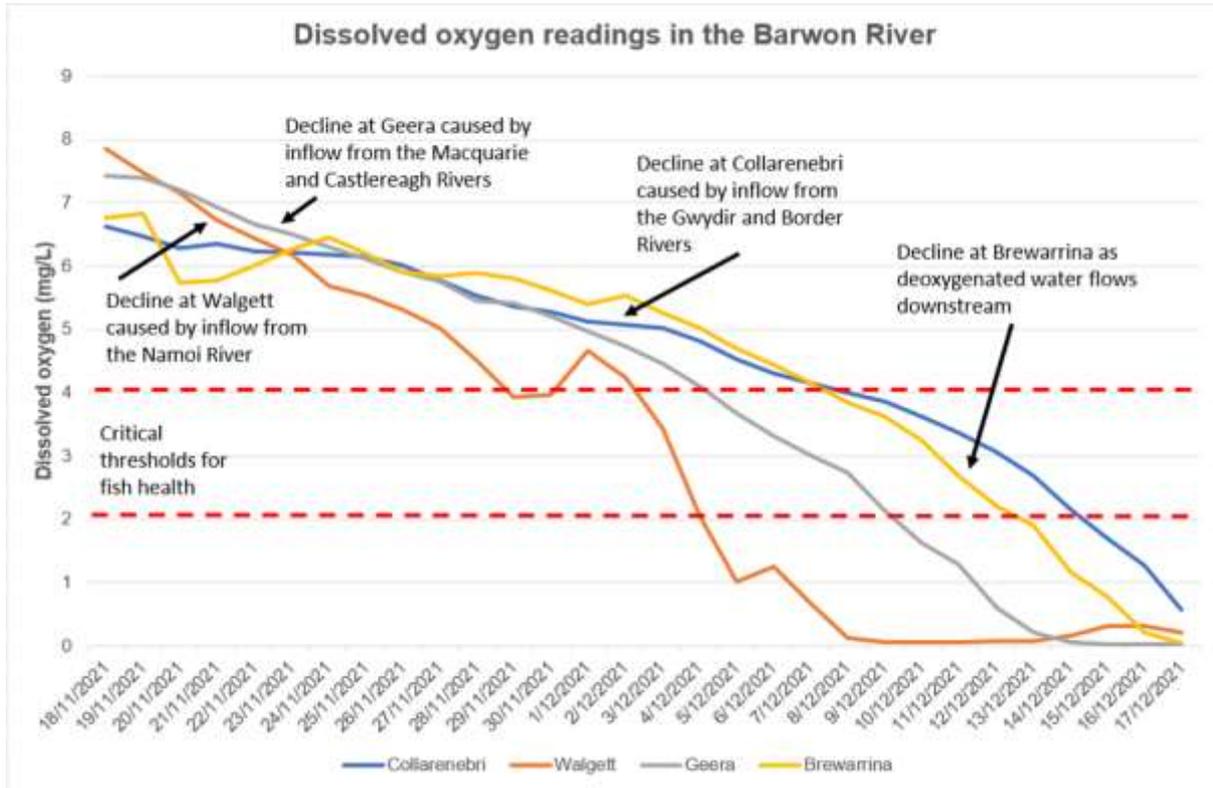


Figure 1: Continuous dissolved oxygen (mg/L) in the Barwon River

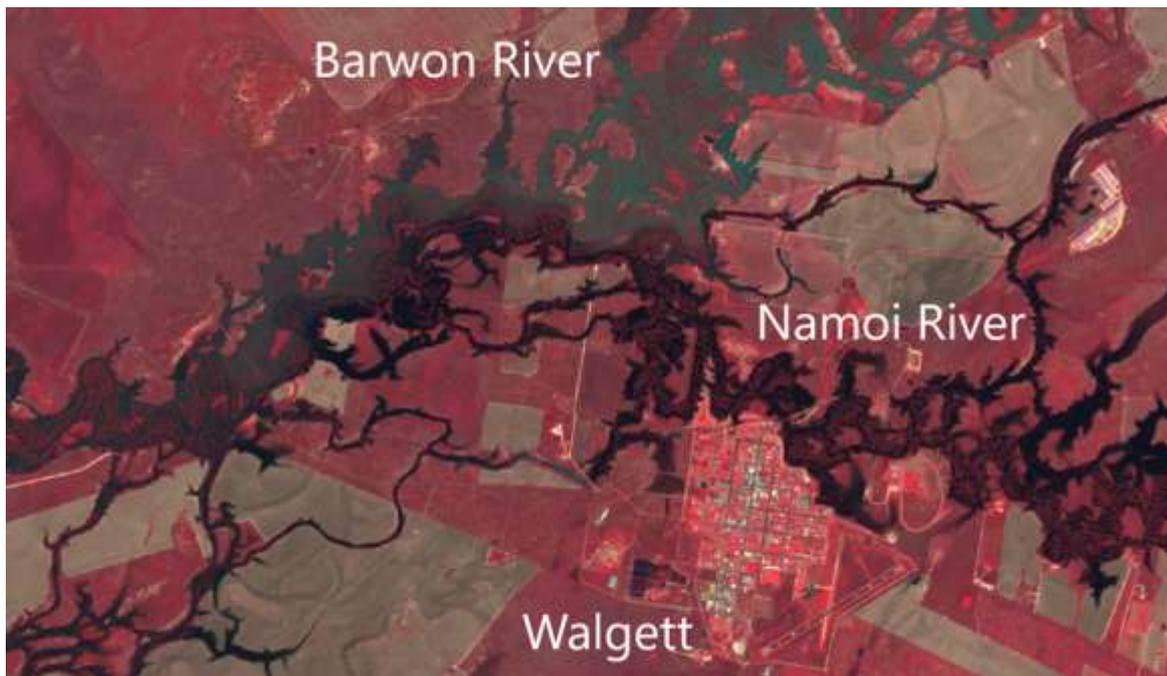


Image 1: Junction of the Namoi and Barwon rivers at Walgett (Sentinel colour infrared image 13 December)

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Barwon River at Boorooma upstream of the Macquarie River junction (WaterNSW)

There are similar trends in the Darling River, with declining dissolved oxygen levels at Warraweena (junction of the Culgoa River), Bourke and Louth (Figure 2). Levels at Wilcannia and Burtundy (Lower Darling) are currently remaining above critical ecological thresholds, but may become impacted as the hypoxic water progresses down the system.

There have been no reports of fish deaths in the Barwon or Darling rivers.

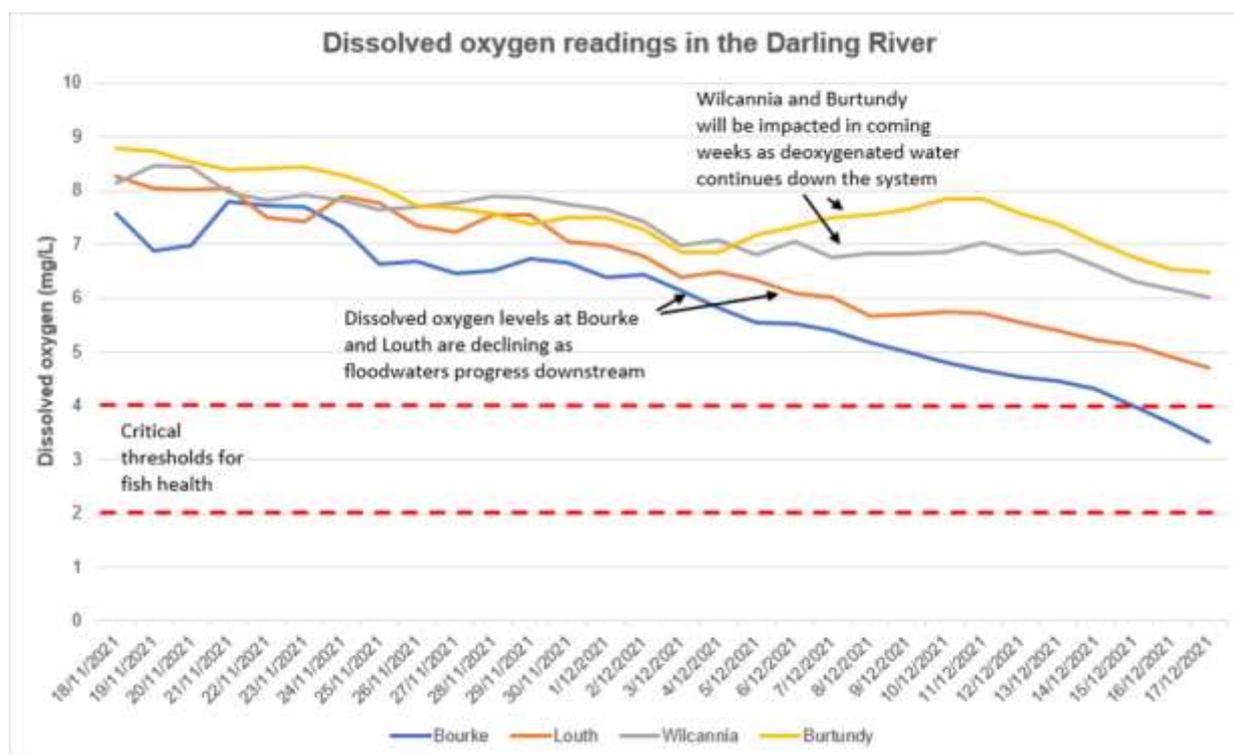


Figure 2: Continuous dissolved oxygen (mg/L) in the Darling River

Management options to address hypoxic blackwater in the Barwon and Darling rivers

There are very limited options available to address a hypoxic blackwater event on this scale. The issue extends over hundreds of kilometres of river and it is continuing to progress downstream.

As Menindee Lakes is full and in flood operation, there will be limited ability to manage the quality of the releases downstream into the Lower Darling when the low dissolved oxygen water arrives from upstream.

The situation, however; will continue to be monitored by WaterNSW and the Department of Planning, Industry and Environment.

Kolety/Edward River

High flows, increasing water temperatures and high loads of leaf litter on the floor of the Barmah/Millewa forests, is causing low dissolved oxygen in the Kolety/Edward River. There was a slight improvement in dissolved oxygen at both Toonalook and Deniliquin with lower air temperatures at the end of last week. However with the return of warmer days, levels have declined again (Figure 3).

Water managers have diverted water from the Mulwala Channel into the Kolety/Edward River to provide an oxygenated refuge area for aquatic organisms. This has led to an improvement in dissolved oxygen levels downstream at Deniliquin.

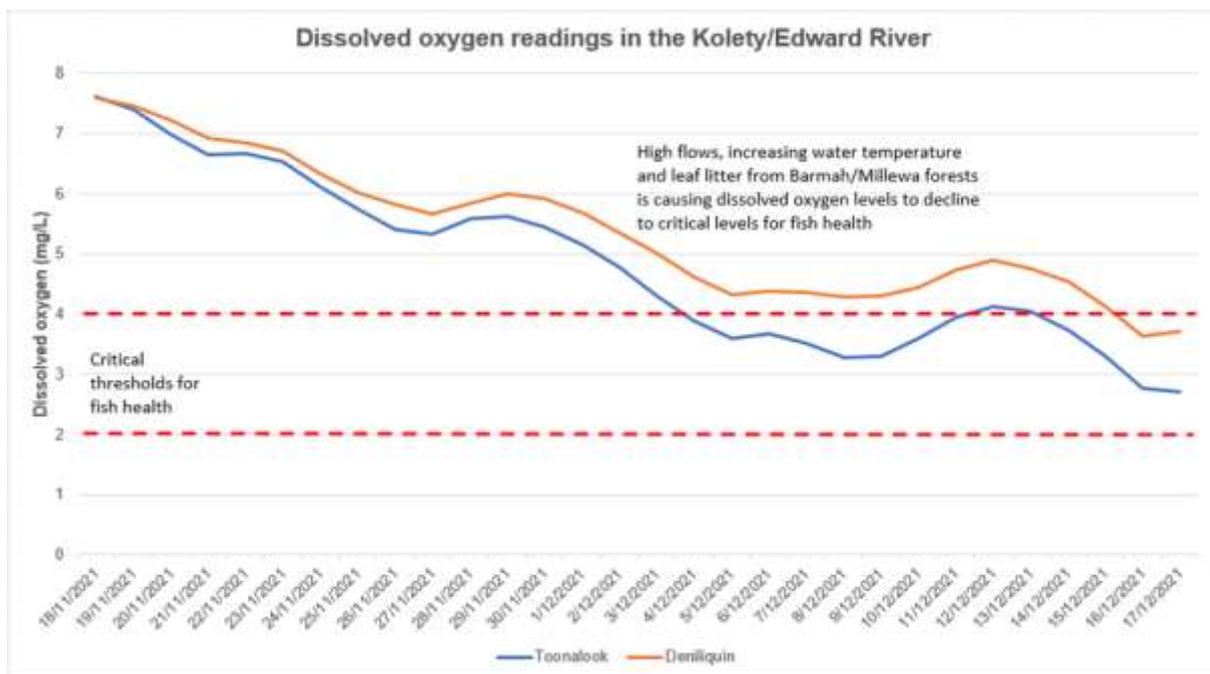


Figure 3: Continuous dissolved oxygen (mg/L) in the Kolety/Edward River

Management options to address hypoxic blackwater in the Kolety/Edward River

The Commonwealth Environmental Water Office is currently delivering environmental water through the following Murray Irrigation escapes to provide pockets of high dissolved oxygen for fish refuge:

- Wakool escape (upper Wakool) 200 megalitres (ML)/day.
- Edward Escape (upstream of Deniliquin) 1000 ML/day.
- Niemur Escape (downstream of Werai forest) up to 200 ML/day.

Weather forecast

The Bureau of Meteorology eight-day total rainfall forecast (Figure 4) indicates showers along the ranges, with decreasing falls in the west of NSW. The predicted totals are unlikely to result in major flooding in the short term.

A La Niña alert is active and increases the likelihood of above average rainfall through to late summer, early autumn 2022. The outlook indicates average to slightly above average rainfall from January to March for most of the east coast of Australia (Figure 5) and below median air temperatures.

Bureau of Meteorology rainfall maps are available at: www.bom.gov.au/jsp/watl/rainfall/pme.jsp

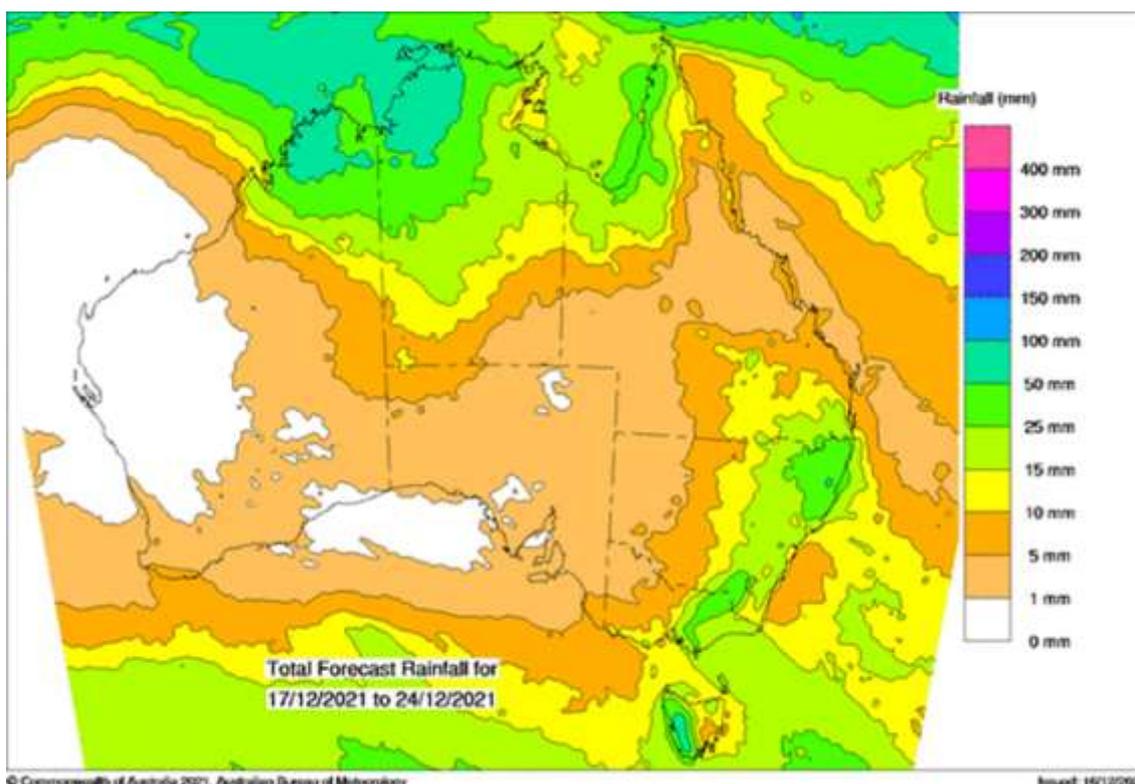


Figure 4: Eight-day rain forecast from 17 to 24 December

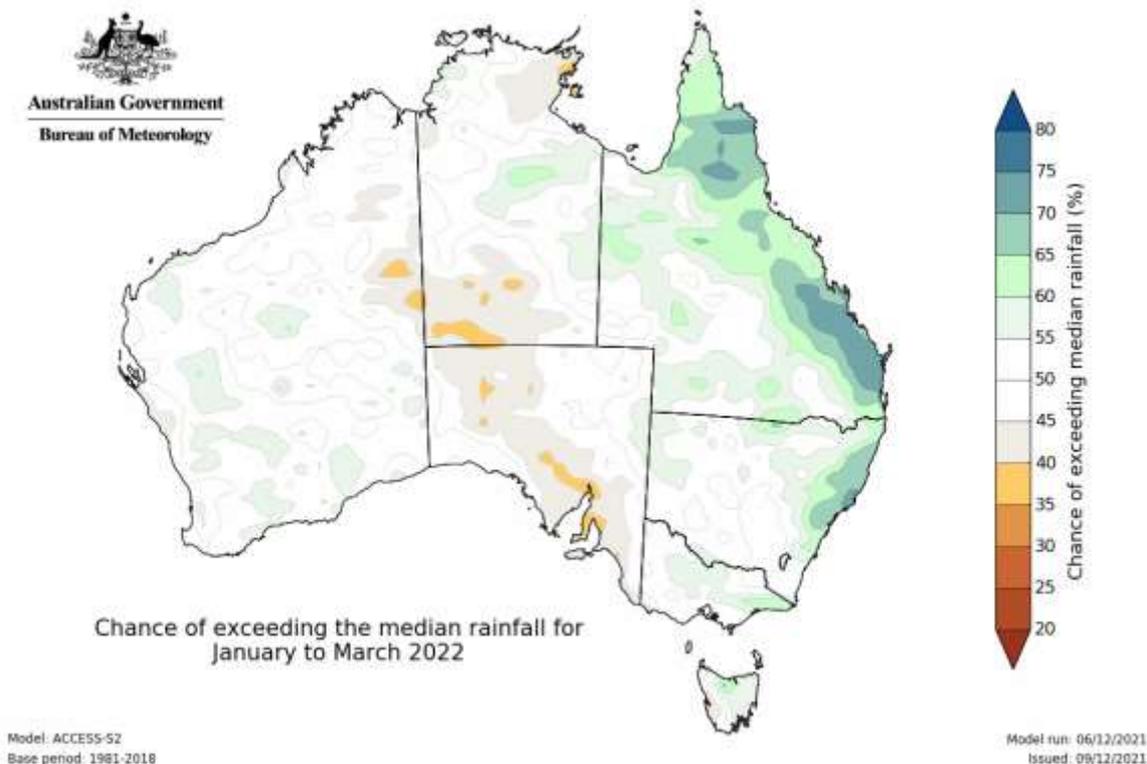


Figure 5: Chance of exceeding median rainfall for January to March

Additional information

NSW and Commonwealth agencies will continue to monitor weather and river conditions over the coming summer.

To notify the department of potential blackwater events email: waterqualitydata@dpie.nsw.gov.au or to report dead fish or fish starting to gasp at the water surface call the NSW DPI Fisheries Hotline 1800 043 536.

Further information on blackwater events can be found on the department's website at: www.industry.nsw.gov.au/water/allocations-availability/droughts-floods/drought-update/managing-drought-recovery/blackwater

On the MDBA website at: www.mdba.gov.au/publications/mdba-reports/water-management-101-factsheets