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*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 23 December 2021.*

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## Where are the main areas of concern?

Above average rainfall and major flooding has resulted in hypoxic blackwater events in some NSW valleys. Hypoxic, or low oxygen blackwater events occur 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.

A sudden drop or prolonged exposure to low oxygen can have adverse impacts on fish health. 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 (milligrams per litre) of dissolved oxygen to survive, but may begin to suffer at levels below 4 to 5 mg/L.

There are two main areas of concern in NSW – the Barwon and Darling rivers in the north and the Koley/Edward River in the south. State and Commonwealth agencies are also continuing to monitor dissolved oxygen levels in the Murrumbidgee and Lachlan rivers, as well as Yanco Creek.

## Barwon and Darling rivers

Floodwaters from the Border Rivers, Gwydir, Namoi and Macquarie/Castlereagh floodplains continue to flow into the Barwon and Darling rivers. As the floodwater in these valleys drains off the floodplain, it is bringing deoxygenated water and organic material back into the main river channel.

Monitoring of the Barwon River from Collarenebri to Brewarrina shows dissolved oxygen levels have dropped below the critical ecological threshold of 2 mg/L and are now almost zero at all sites (Figure 1). As a result of these low oxygen conditions, it is expected that fish may be seen gasping at the water surface and that fish deaths could occur.

We are beginning to see issues arising, with a report of fish deaths between Brewarrina and Bourke. If you see dead fish or fish starting to gasp at the water surface, please call the **NSW DPI Fisheries Hotline 1800 043 536**.

It is distressing when these events occur, resulting in the loss of fish and other aquatic life. The impacts of these events on the environment are harmful, but 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 to drive the overall production of our river and wetland systems. In the longer term, native fish, water birds and other organisms will benefit from the increased production in the river, boosting food supplies and supporting breeding cycles.

# NSW Murray Darling Basin dissolved oxygen



Water quality update No. 1 | 23 December 2021

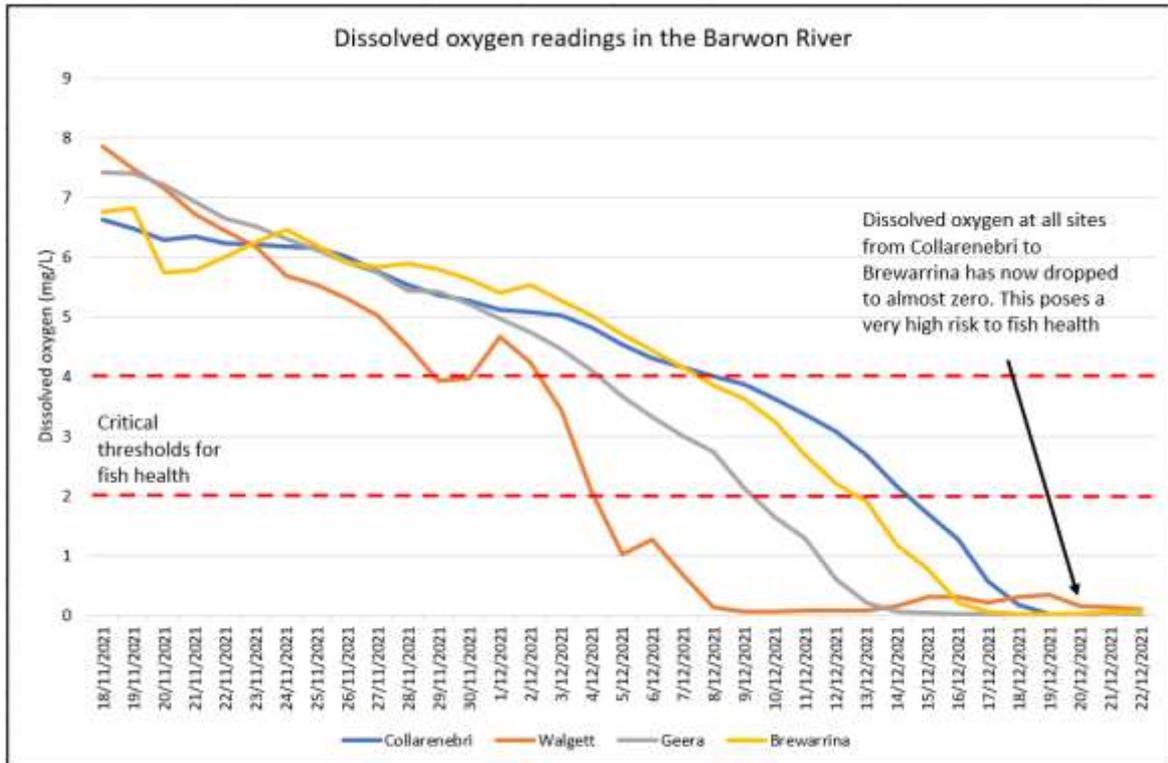


Figure 1: Continuous dissolved oxygen (mg/L) in the Barwon River

There are similar trends in the Darling River, with declining dissolved oxygen levels at Bourke and Louth (Figure 2). Levels at Wilcannia and Burtundy (lower Darling) are currently remaining above critical ecological thresholds, but will become impacted over the coming weeks as the hypoxic water progresses down the system.

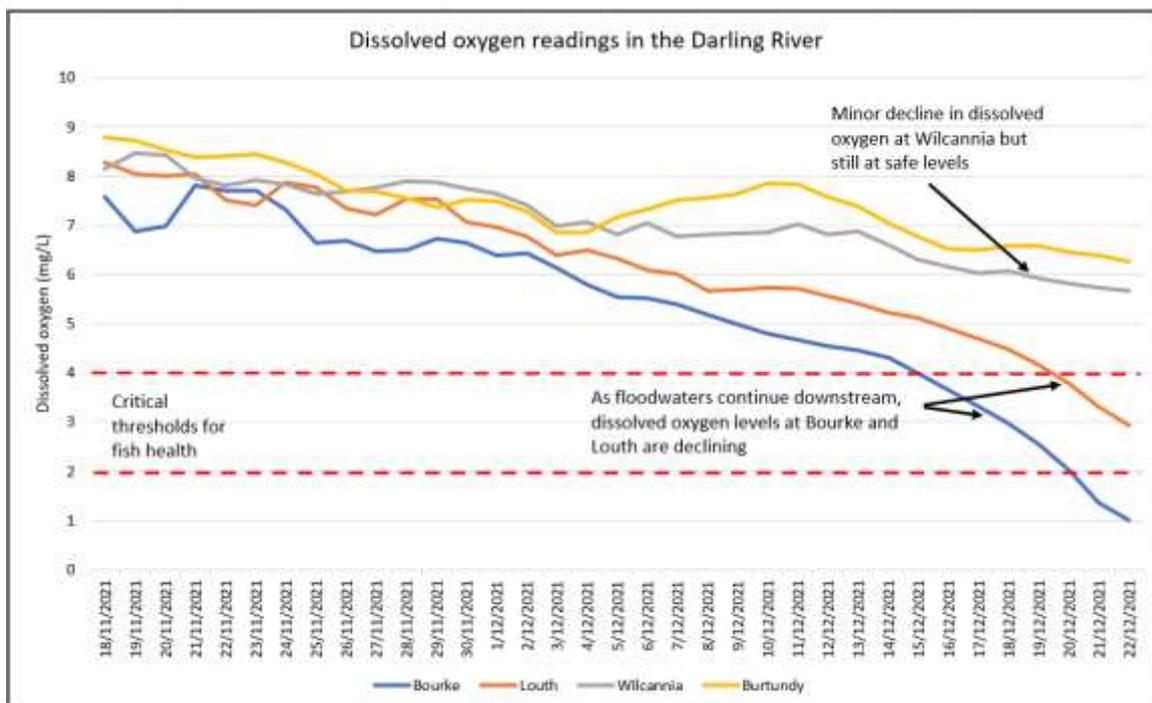


Figure 2: Continuous dissolved oxygen (mg/L) in the Darling River

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

There are very limited options available to address an hypoxic blackwater event on this scale in the Barwon and Darling rivers. The issue of very low dissolved oxygen extends over hundreds of kilometres of river and it will continue to progress downstream.

Dissolved oxygen levels in the Intersecting Streams are better than levels in the Barwon River. These tributaries will provide a refuge area for fish to move into, however; there is not enough flow from these rivers to provide any significant dilution to improve the low dissolved oxygen in the Barwon or Darling rivers.

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 will continue to be monitored by WaterNSW, DPI Fisheries, 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 caused dissolved oxygen in the Kolety/Edward River to decline. As flow in the Kolety/Edward River is decreasing, there is less water flowing out into the Barmah/Millewa forests and bringing less organic material back into the main channel. Dissolved oxygen at both Toonalook and Deniliquin have improved above 4 mg/L, reducing the immediate risks to fish health. (Figure 3).

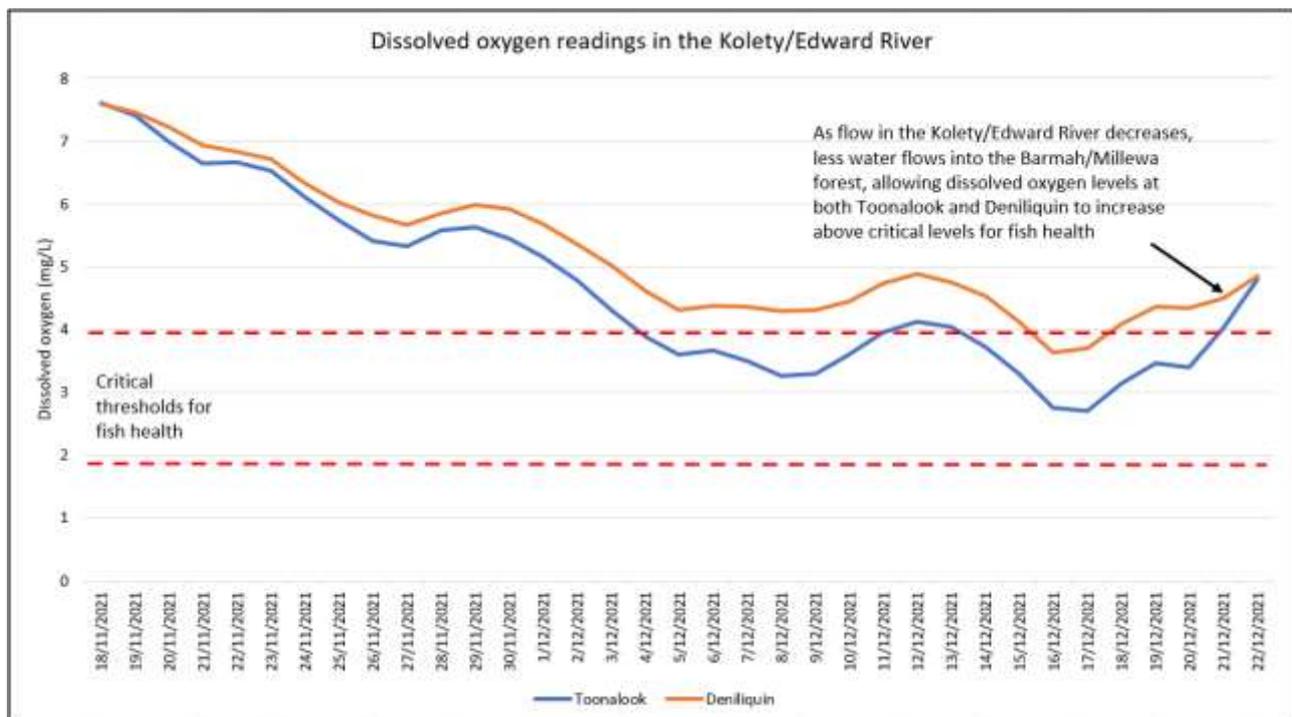


Figure 3: Continuous dissolved oxygen (mg/L) in the Kolety/Edward River

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

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

- Wakool Escape (upper Wakool) 200 megalitres (ML)/day.
- Edward Escape (upstream of Deniliquin) 500 ML/day.
- Niemur Escape (downstream of Werai forest) up to 200 ML/day.

## Other areas of concern

State and Commonwealth agencies are continuing to monitor dissolved oxygen levels in the Murrumbidgee and Lachlan rivers as flooding in these valleys subsides.

The Commonwealth Environmental Water Office and Department of Planning, Industry and Environment are working with WaterNSW to deliver water to provide an oxygenated refuge to address low dissolved oxygen at the bottom end of Yanco and Billabong creeks.

## Weather forecast

The Bureau of Meteorology eight-day total rainfall forecast (Figure 4) indicates the highest falls will be on the far North Coast and adjacent ranges, with decreasing falls toward the south 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 the east coast of NSW (Figure 5) and below median air temperatures.

Bureau of Meteorology rainfall maps are available at: [www.bom.gov.au/jsp/wat/rainfall/pme.jsp](http://www.bom.gov.au/jsp/wat/rainfall/pme.jsp)

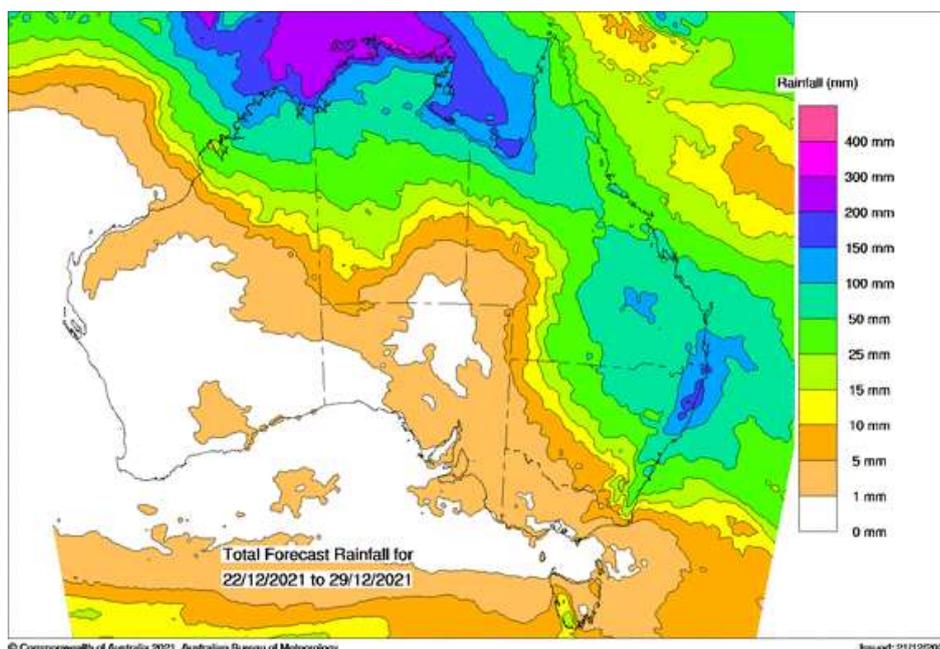
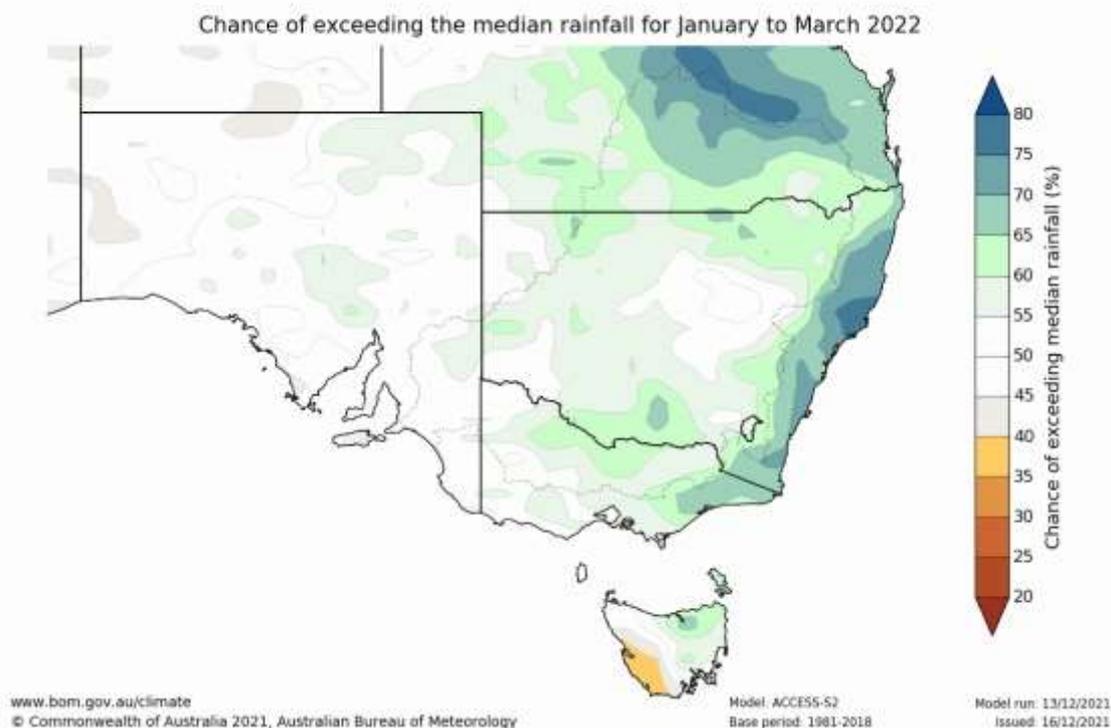


Figure 4: Eight-day rain forecast from 22 to 29 December



**Figure 5: Chance of exceeding median rainfall for January to March in South Eastern Australia**

## Additional information

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

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

The MDBA website: [www.mdba.gov.au/publications/mdba-reports/water-management-101-factsheets](http://www.mdba.gov.au/publications/mdba-reports/water-management-101-factsheets)