

*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 information collected up to 11 March 2022 along the Barwon-Darling River and in Menindee Lakes, as well as the management actions to minimise the risks to fish health. Recent results from the Lachlan, Murrumbidgee and Murray valleys are also outlined.*

## Blackwater and the Menindee Lakes

The bulk of the floodwater from the heavy rain in the Northern Basin catchments in November has made its way into Menindee Lakes. These flood flows mobilised large amounts of organic material from the floodplains. The breakdown of this material caused dissolved oxygen levels in the Barwon and Darling rivers to drop to critical levels for fish health. The tail end of this hypoxic blackwater event has passed Wilcannia and is flowing into Lake Wetherell.

There are two main risks remaining in this area, from:

- The low dissolved oxygen water being captured within Lake Wetherell as the last of the deoxygenated floodwater arrives.
- The low dissolved oxygen water being released from Menindee Lakes into the lower Darling River.

Agencies and scientific experts are working together to continually monitor the dissolved oxygen levels throughout the river system and advise the best operational measures to mitigate the risk to aquatic life as much as possible. This involves:

- transferring the water between the lakes to mix the inflows of low dissolved oxygen water with better quality water
- adjusting the timing, size and location of releases from the Lakes into the lower Darling River to maintain the water quality in the main river
- providing refuge areas of better quality water for fish to move into.

## Dissolved oxygen levels - Barwon and Darling rivers

The river height in the Darling River at Wilcannia has been slowly decreasing over recent weeks following a flood peak of over 36,000 megalitres per day (ML/day) in mid-February. The current discharge at Wilcannia has fallen to less than 4,000 ML/day.

As the water level started to fall, hypoxic blackwater that was sitting out on the floodplain, or in anabranches and billabongs was able to drain back into the main channel of the Darling River. Now that this water has drained back into the main channel, dissolved oxygen levels have started to improve.

# NSW Murray Darling Basin dissolved oxygen



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Monitoring of the Barwon and upper Darling rivers shows dissolved oxygen levels at Bourke and Louth have improved above the thresholds of concern for fish health (Figure 1). This oxygenated water will continue downstream, leading to improved water quality down the system.

As a general guide, native fish and other large aquatic organisms require at least 2 milligrams per litre (mg/L) of dissolved oxygen to survive, but may begin to suffer at levels below 4 to 5 mg/L. Despite the very low dissolved oxygen results recorded during this hypoxic blackwater event, no major fish deaths have been reported in this area.

If you see dead fish or fish starting to gasp at the water surface, please call the **NSW DPI Fisheries Hotline – 1800 043 536**.

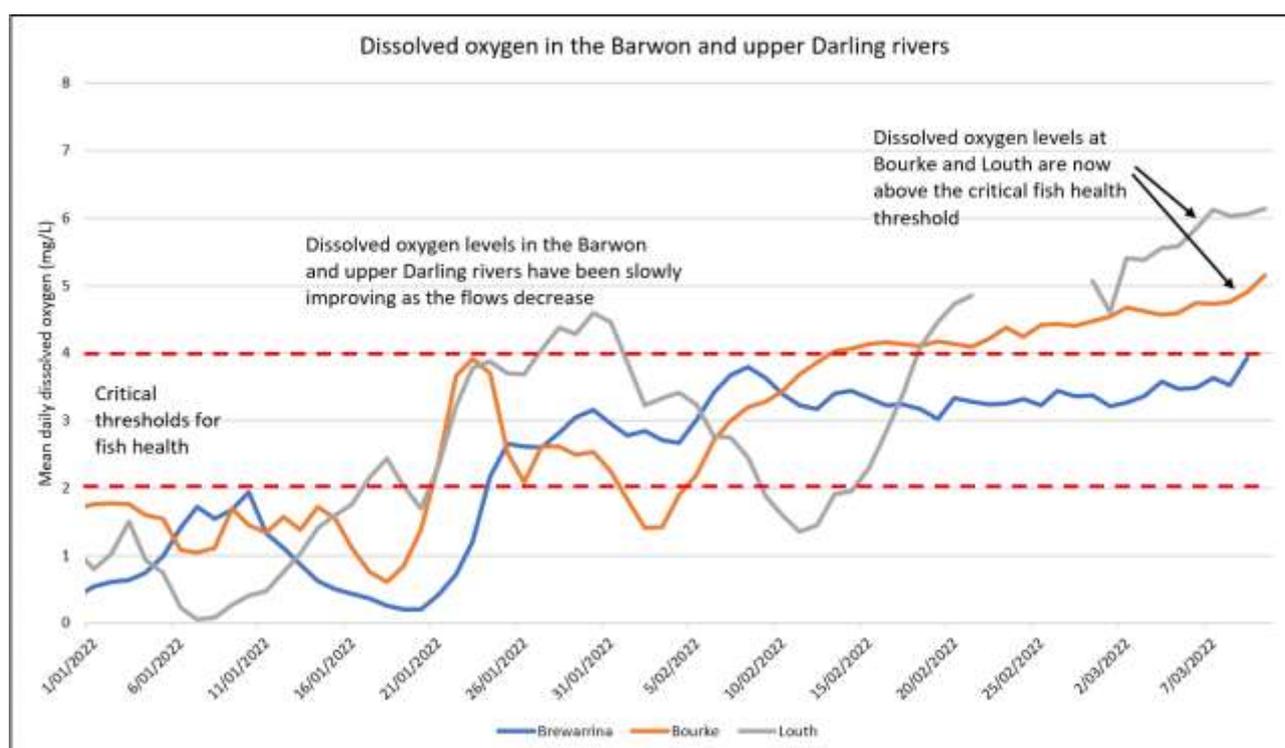


Figure 1. Mean daily dissolved oxygen (mg/L) in the Barwon and upper Darling rivers

## Dissolved oxygen levels - Menindee Lakes and lower Darling/Baaka

Dissolved oxygen at Wilcannia has improved above the critical threshold of 4 mg/L. A new monitoring site installed at the inflow to Lake Wetherell shows dissolved oxygen had dropped to less than 1 mg/L at various stages over the last month as hypoxic blackwater arrived from upstream. The most recent results indicate the dissolved oxygen levels of the water flowing into Lake Wetherell is improving as more oxygenated water arrives from upstream (Figure 2).

Dissolved oxygen levels at a second new monitoring site installed downstream of Menindee at Weir 32 and the existing monitoring site further downstream at Burtundy, are remaining above 4 mg/L. High air temperatures caused a drop in dissolved oxygen levels in early March, but a return to cooler temperatures has helped oxygen levels to recover (Figure 2). Now that summer is

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over, it is expected that continuing cooler air temperatures will help dissolved oxygen levels to improve.

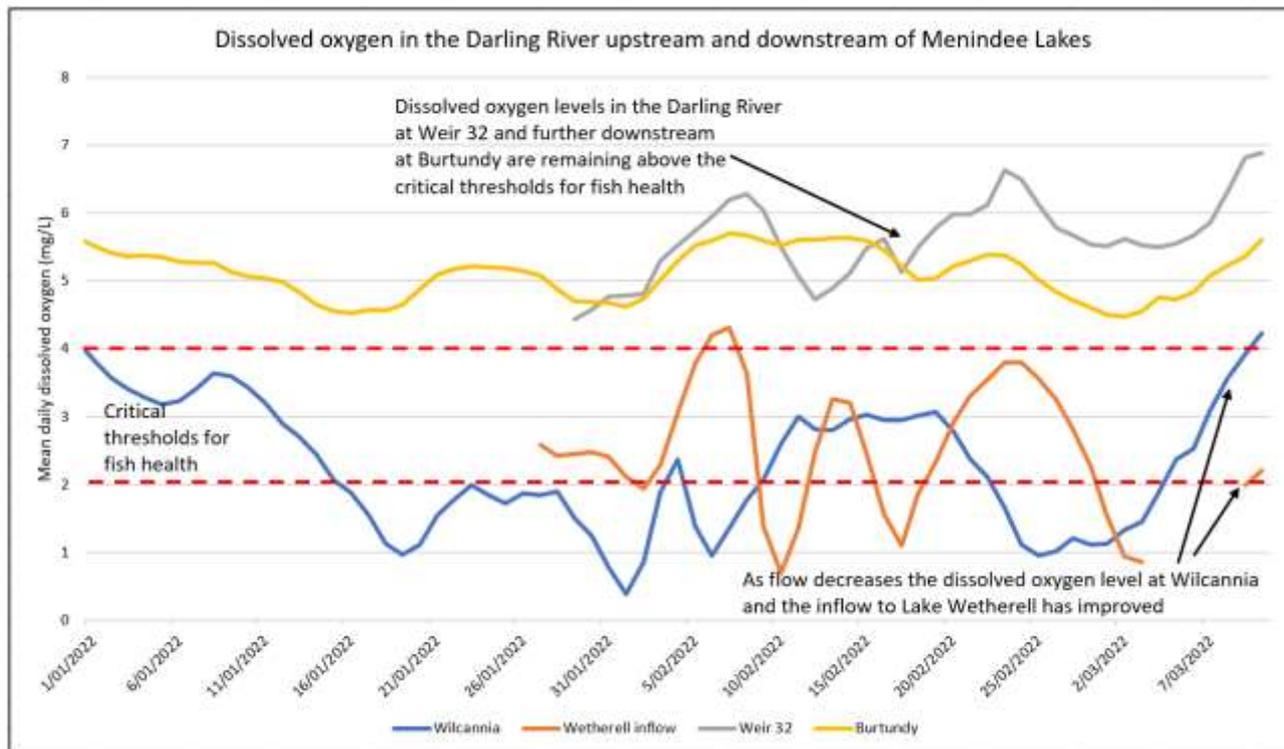


Figure 2. Mean daily dissolved oxygen (mg/L) in the Darling River upstream and downstream of Menindee Lakes

## What is being done?

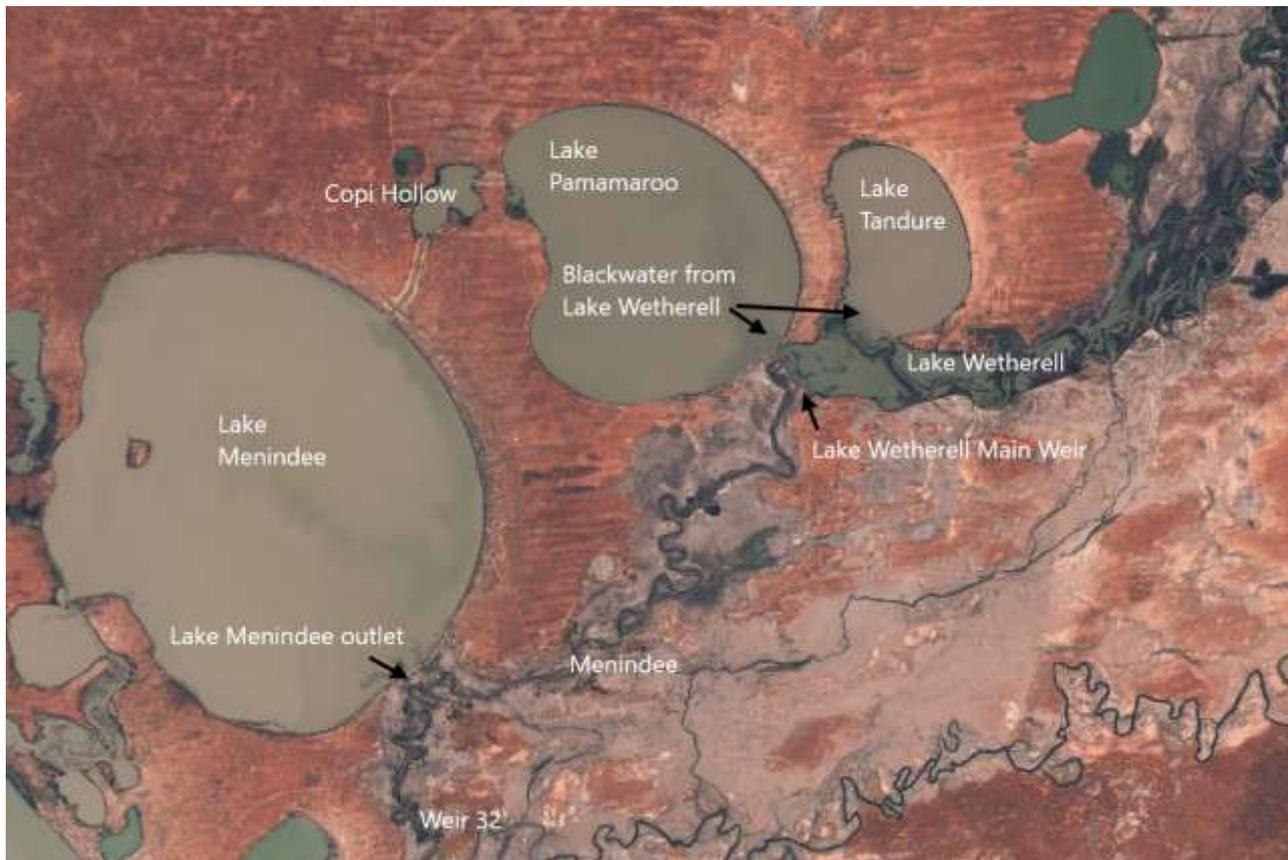
The large volume of flood water combined with the water slowly draining back into the main channel from anabranches and billabongs means hypoxic blackwater has been flowing into Lake Wetherell for weeks. A portion of this water has flowed into lakes Tandure and Pamamaroo (Figure 3). These shallow lakes allow the water to be more quickly aerated and provide refuge areas for smaller fish and crustaceans to move into if conditions become hypoxic in Lake Wetherell.

Monitoring is showing that despite the blackwater inflows from Lake Wetherell, dissolved oxygen levels in both lakes are remaining above critical fish thresholds and are providing a refuge area for native fish. Monitoring of oxygen levels in the lakes will continue as the last of the blackwater arrives from upstream.

Discharge at Weir 32 has been slowly and progressively reduced to enable the water from the lower Darling floodplains to return to the river and mix with the better quality water currently in-channel. With the drop in river height, the floodplain water has now returned back to the channel. Dissolved oxygen monitoring in the Darling River at Burtundy shows that this measure has been successful with levels remaining above 4 mg/L.

Releases from the Wetherell and Pamamaroo outlets have been reduced, with the bulk of flow to the lower Darling River coming from Lake Menindee to maintain dissolved oxygen levels.

The management of inflows into the Lakes, and their release, has been a careful balancing act, which has been continually monitored and adjusted as needed.



**Figure 3. Satellite Image from 9 March 2022 showing the blackwater entering Lakes Tandure and Pamamaroo**

## Fish deaths at Menindee

Several thousand dead carp and bony herring were detected in the Darling River in recent weeks downstream of the outlets from Lakes Pamamaroo, Wetherell, Menindee and Lake Cawndilla and adjacent to Lake Menindee inlet regulator (extending to Sunset Strip). Although dissolved oxygen levels are low in some areas, it was not believed to be the cause of the fish deaths. These deaths are likely related to trauma from fish passing through the inlet/outlet regulators or aggregating directly downstream of structures and becoming injured in the highly turbulent water.

## Blue-green algae at Wilcannia

A Red Alert level warning (high alert) for potentially toxic blue-green algae has been issued for Darling River at Wilcannia, as well as sites up and downstream of Wilcannia.

As well as mobilising large volumes of organic material, the flooding in the Northern Basin has also flushed high concentrations of nutrients such as nitrogen and phosphorus off the landscape and into the Barwon and Darling rivers. Low flow combined with high carbon loads, nutrients and warm, still weather conditions, provide ideal conditions for the growth of potentially toxic blue-green algae.

Monitoring by WaterNSW is showing that algal numbers are increasing and a red alert warning for the Darling River at Wilcannia, Trevallyn and Caulpaulin has been issued.

For definitions of algal alerts and further information visit the WaterNSW website:

[www.waternsw.com.au/water-quality/algae](http://www.waternsw.com.au/water-quality/algae)

## Lachlan Valley

Rainfall in the upper Lachlan catchment has resulted in higher flows at Forbes. Good flows are being maintained to the lower catchment at Booligal. Dissolved oxygen levels have mostly remained above 4 mg/L for the last month.

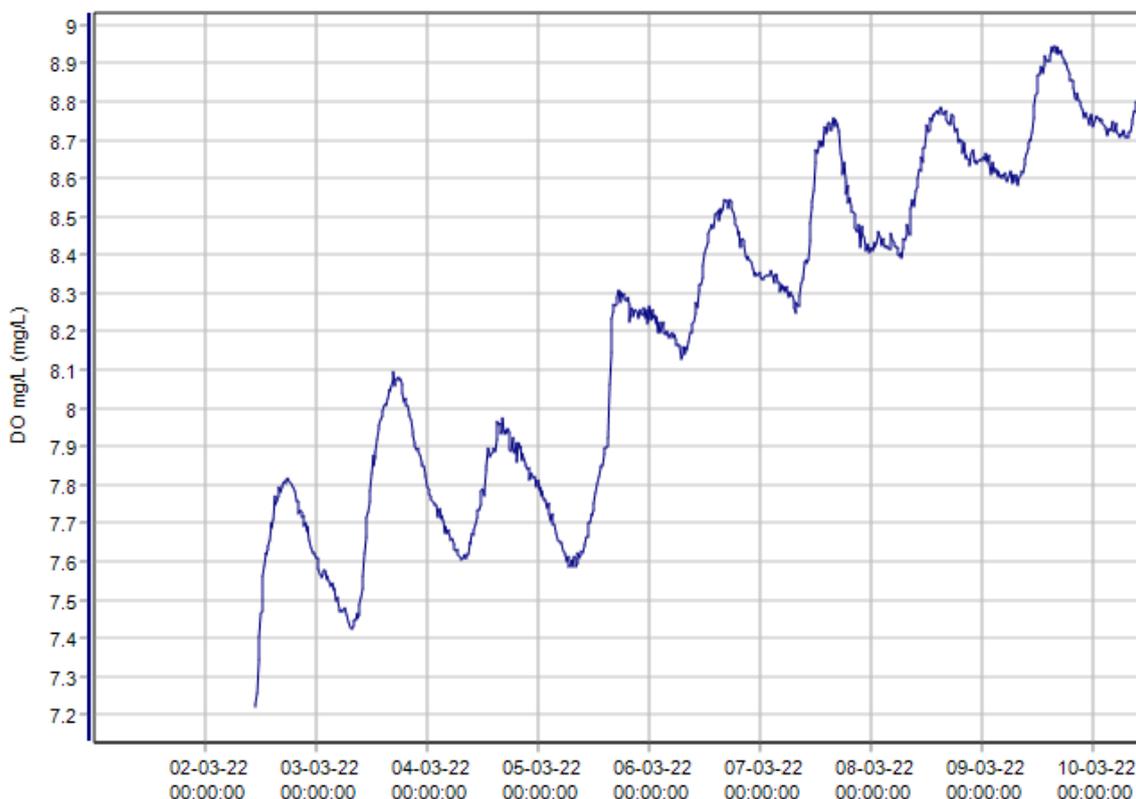
## Murrumbidgee Valley

Flow has increased at Gogeldrie Weir and Darlington Point. Flow in the lower catchment is around 4,000 ML/day. Dissolved oxygen levels at Maude, Redbank and Balranald weirs have been above 4 mg/L for the last month. Readings in the Yanco/Billabong systems are also above 4 mg/L.

## Murray Valley

Dissolved oxygen in Murray River downstream of Hume Dam (Heywoods) since mid February has been mostly above critical ecological levels, with the exception of a two-day period where releases could not be made through the cone valves at Hume Dam. Dissolved oxygen levels in the Murray River downstream of Hume at Albury and Yarrawonga Weir, in the Murray-Wakool system and in the Edward and Niemur rivers are all above ecological thresholds .

A temporary dissolved oxygen sensor has been installed downstream of Lock 10 to assess the mixing of the water from the Darling River with the Murray River (Figure 4). This is showing that the dissolved oxygen levels are currently well above critical thresholds.



**Figure 4. Continuous dissolved oxygen in the Murray River downstream of Wentworth**

## 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: [www.dpi.nsw.gov.au/fishing/habitat/threats/fish-kills](http://www.dpi.nsw.gov.au/fishing/habitat/threats/fish-kills)

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](http://www.industry.nsw.gov.au/water/allocations-availability/droughts-floods/drought-update/managing-drought-recovery/blackwater)

As well as 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.watnsw.com.au/12104-lower-darling-regulated-river/updates](http://waterinsights.watnsw.com.au/12104-lower-darling-regulated-river/updates)

Information on algal alerts is available at: [www.watnsw.com.au/water-quality/algae](http://www.watnsw.com.au/water-quality/algae)