

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 11 January 2023.

The ongoing dry conditions across New South Wales has allowed river levels to continue to fall and flooding to subside in many inland catchments. The Bureau of Meteorology has major flood warnings remaining for the Darling River at Tilpa, Wilcannia and Menindee. The flood peak in the Murray River has crossed the New South Wales/South Australian border with the South Australian State Emergency Service issuing flood emergency warnings for the upper and lower Murray River.

Falling river levels are allowing water that has been sitting out on the floodplain to drain back into the main river channels. When this floodwater returns back into the main river channel it can impact on fish health. As high flows recede, fish may also become stranded in disconnected waterbodies and may suffer from exposure to declining water quality and dissolved oxygen, higher air and water temperatures and predators as water depth decreases and these waterbodies eventually dry out.

The Murray, Wakool, Niemur and Darling rivers are continuing to experience low dissolved oxygen. In addition to these critical areas, dissolved oxygen levels in the lower Murrumbidgee River and Merran, Barbers and Thule creeks could be detrimental to fish health.

There have been reports of fish deaths, fish struggling or dying and Murray Crayfish and shrimp exiting the water in the Murray-Darling Basin over recent months, including the Murray, Kolety/Edward and Wakool rivers, lower Gwydir River, Lachlan River, Merran and Yanco-Billabong Creek systems, and the Barwon-Darling River.

To report dead fish, fish struggling or starting to gasp at the water surface, or crayfish exiting the water please call the New South Wales Department of Primary Industries Fisheries, Fishers Watch Phonenumber 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

Where are the main areas of concern?

There are four main areas of concern where dissolved oxygen is at levels that could be detrimental to fish health. These are:

- Murray River from Boundary Bend downstream to the NSW/South Australian border
- Wakool River, including tributaries such as Merran, Little Merran, Thule and Barbers Creeks
- Niemur River

- Darling River from Bourke to Wilcannia

The Bureau of Meteorology has forecast air temperatures will increase above 40°C in these critical areas this week. As air temperature increases, so does the water temperature. The process of bacteria breaking down organic material in the water speeds up as water temperature increases, which uses up the oxygen in the water even faster. Also, as the temperature of the water increases, the amount of dissolved oxygen the water can hold decreases.

Dissolved oxygen levels – Murray River catchment

Flood warnings for the Murray River at Mildura and Wentworth have eased to the moderate level. Satellite-derived Sentinel colour infrared images show how the extent of flooding in the southern Murray Darling Basin (dark coloured areas) has decreased from 5 December 2022 (left image) to 5 January 2023 (right image). The image on the right from 5 January also highlights there is still an area of floodplain inundated at Boundary Bend upstream of Robinvale where the flows from the Murray and Murrumbidgee Rivers merge.

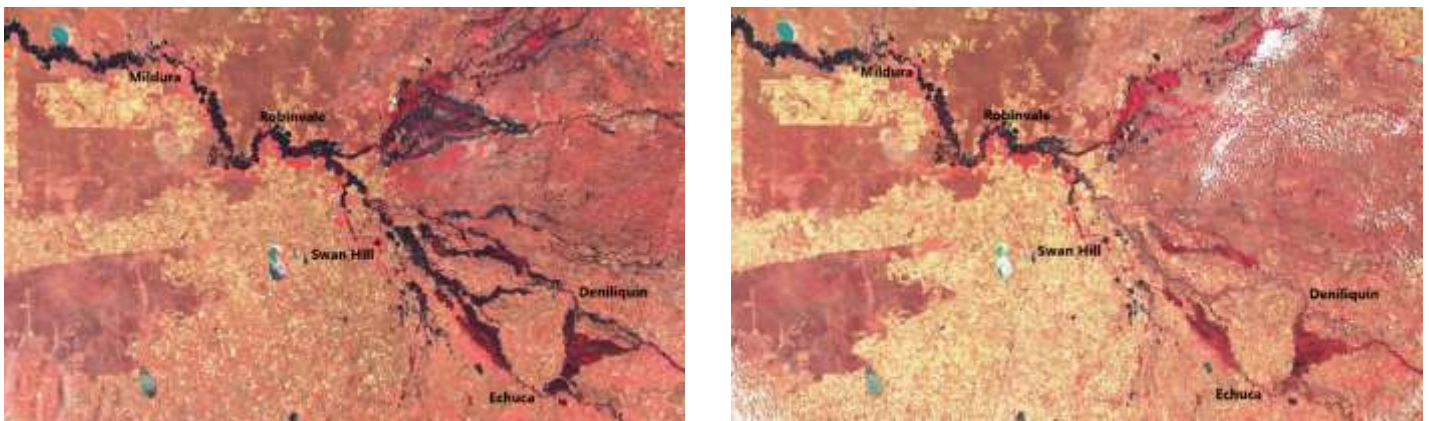


Figure 1: Satellite-derived Sentinel colour infrared image of the Murray River – 5 December 2022 (left) and 5 January 2023 (right)

Dissolved oxygen levels in the Murray River are at levels that are safe for fish health down to Pental Island, upstream of Swan Hill. Further downstream at Boundary Bend (Murray River-Murrumbidgee River junction) dissolved oxygen levels have been less than 2 mg/L for some time but have improved above this level in the last week (Figure 2). Fish may be seen gasping at the water surface when dissolved oxygen falls to this low level. 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 if levels are below 4 to 5 mg/L for prolonged periods.

Downstream of Robinvale, the monitoring site on the Murray River at Wemen is showing oxygen levels have increased above 2 mg/L. Oxygen levels have also improved further downstream at Wentworth.

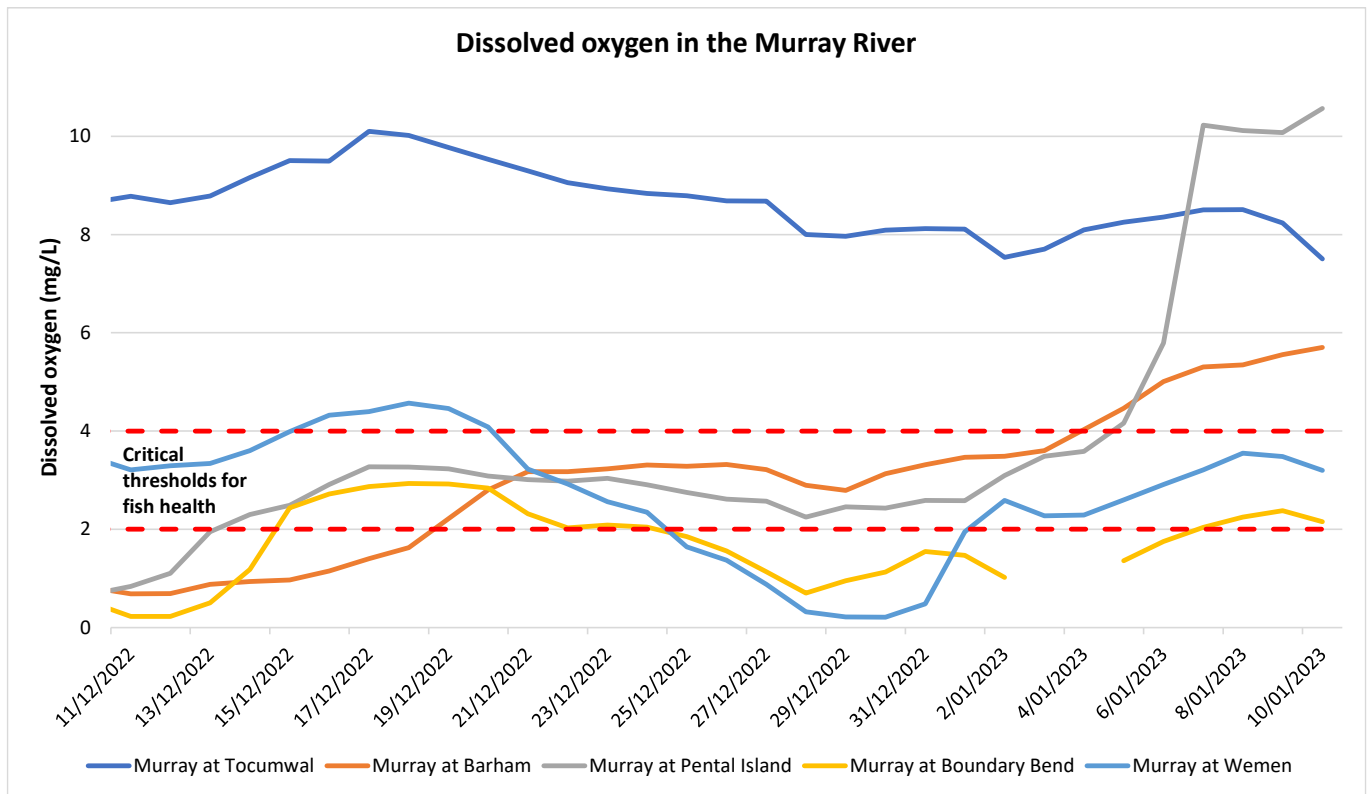


Figure 2: Mean daily dissolved oxygen (mg/L) in the Murray River at Tocumwal, Barham, Pental Island, Boundary Bend and Wemen from 11 December 2022 to 10 January 2023

Dissolved oxygen levels – Wakool and Niemur rivers

The dissolved oxygen levels in the Wakool River and lower Niemur River are remaining at critical levels for fish health (Figure 3). Dissolved oxygen levels at both monitoring sites on the Wakool River remain below 2 mg/L. Waterways that feed into the Wakool River such as Merran, Little Merran, Thule and Barbers creeks also have low dissolved oxygen.

The upper reaches of the Niemur River at Barham-Moulamein Road remain more oxygenated while the site toward the end of the catchment at Mallan School was improving but has decreased again this week. Recent monitoring results by scientists from Charles Sturt University who are monitoring the benefits of the delivery of Commonwealth environmental water found dissolved oxygen readings taken at the water surface have been higher than those reported at the same site from the automated gauges where dissolved oxygen is measured at the bottom of the water column. This indicates fish may be finding refuge in the oxygenated water closer to the water surface.

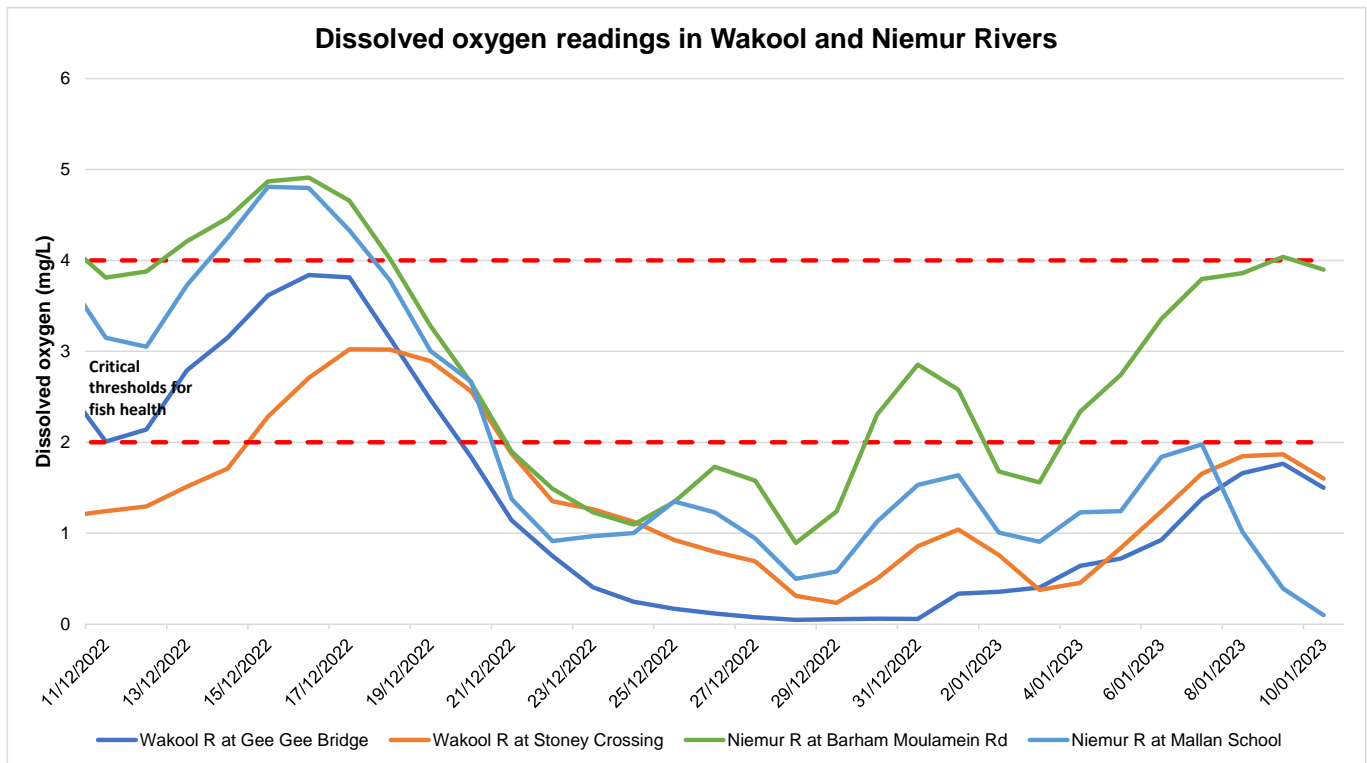


Figure 3: Mean daily dissolved oxygen (mg/L) in the Wakool River at Gee Gee Bridge and Stoney Crossing and Niemur River at Barham-Moulamein Road and Mallan School - 11 December 2022 to 10 January 2023

Dissolved oxygen levels – Darling River

Major flooding in the Darling River continues at Tilpa, Wilcannia and Menindee. River levels at Wilcannia have peaked and are forecast to remain at the major flood level into late January. Figure 4 is a satellite-derived Sentinel colour infrared image showing the extent of floodwaters at Wilcannia and Menindee. The image highlights floodwater is spreading out across the floodplains which makes accurately measuring discharge and predicting downstream flood heights difficult.

Figure 4 also highlights some of the darker coloured flood water from Lake Wetherell is pushing into Lakes Tandure and Pamamaroo where it is mixing with the turbid water held in the lakes. As well as the mixing of floodwater with the more oxygenated water in the lakes, these large shallow lakes allow the water to be more quickly aerated and provide refuge areas for smaller fish and crustaceans to move into if dissolved oxygen conditions deteriorate in Lake Wetherell.

Dissolved oxygen in the Darling River at Bourke and Louth is less than 2 mg/L. Levels at Wilcannia had been very low but have improved above 2 mg/L. Oxygen levels in the upper reaches of Lake Wetherell and the Darling River downstream of Menindee Lakes at Weir 32 and Burtundy are remaining in the safe range for fish health.

NSW and Commonwealth agencies will continue to assess the risks as floodwaters make their way to Menindee and into Menindee Lakes and the lower Darling River and to monitor dissolved oxygen levels as air temperatures increase over Summer.

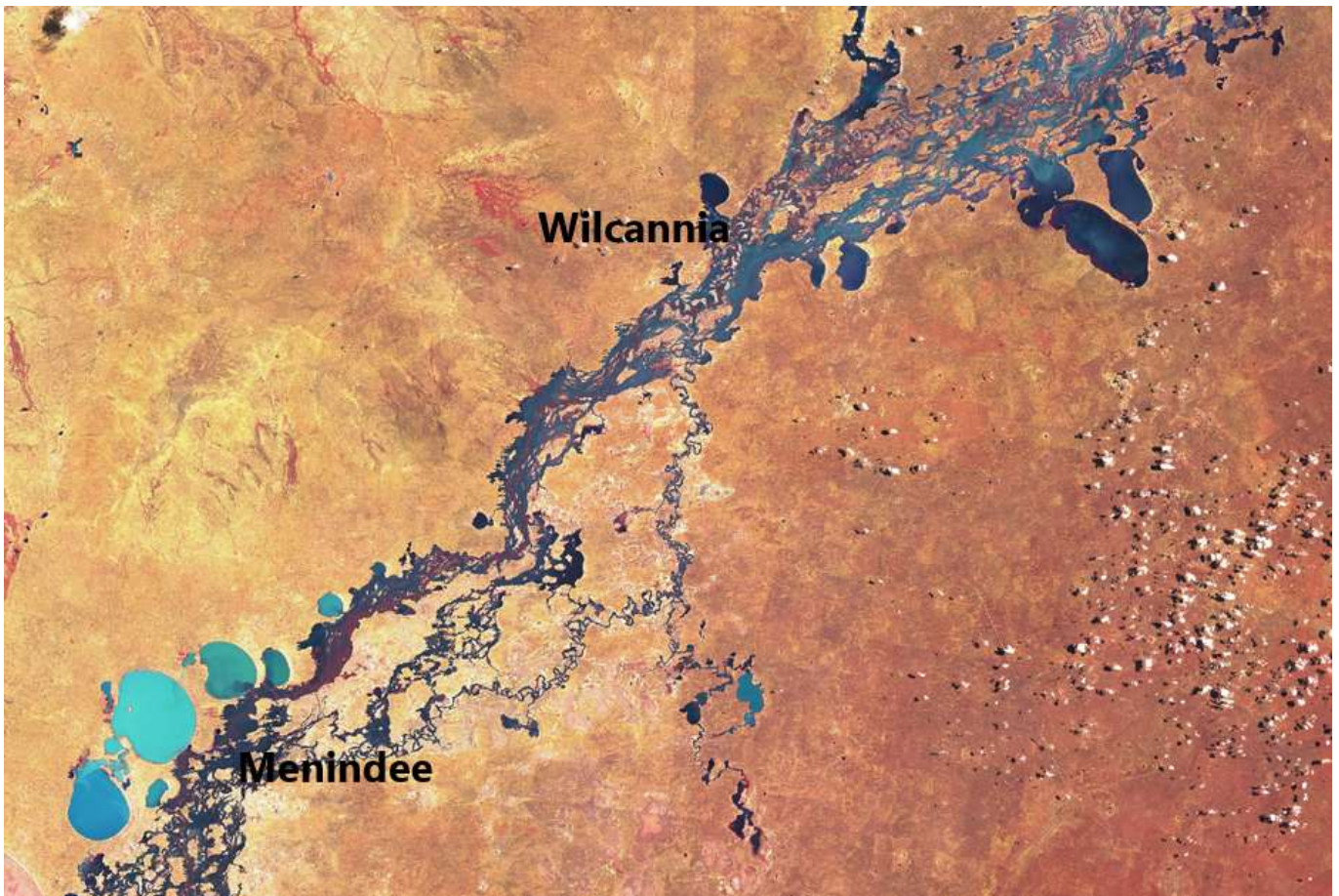


Figure 4: Satellite-derived Sentinel colour infrared image of the Darling River and Menindee Lakes – 8 January 2023

Hypoxic blackwater fish death summary

In recent months NSW DPI Fisheries has received reports of fish deaths, fish struggling and crustaceans leaving the water across a broad area in the Murray-Darling Basin, including in the Murray, Kolety/Edward, Wakool, Murrumbidgee, Lachlan, Gwydir and Barwon-Darling rivers and Yanco-Billabong Creek system. High air temperatures over Summer increases the risk of further reductions in dissolved oxygen in some areas and the potential for further fish death events.

There have been two new confirmed fish death events suspected to be related to hypoxic blackwater reported in the last fortnight up to 11 January 2023. On 30 December 2022 in Jemalong Creek near Gobothery in the Lachlan valley, the introduced species Carp were affected, likely by poor water quality, with tens of thousands reported to be killed. Yabbies were also observed leaving the water. On 6 January 2023 in the Barwon-Darling near Bourke, thousands of Bony Herring, plus small numbers of Murray Cod and Golden Perch, were reported in a fish death event, as well as yabbies observed leaving the river.

There may be fish death incidents that have not yet been reported directly to NSW Department of Primary Industries Fisheries.

Programs to benefit native fish such as improving fish passage and habitat restoration to provide conditions conducive to fish breeding and population growth are ongoing. These works are vital and provide an environment where fish populations can bounce back from hypoxic blackwater events.

What is being done?

The Bureau of Meteorology has forecast median maximum air temperatures will remain close to average for February with a high chance of exceeding the median maximum temperature for March to May. The forecast is that rainfall figures for February through to March will be similar to historic averages for the majority of New South Wales.

A fish kill (1,000's of small carp) in Jemalong Creek (Lachlan River catchment) was reported on Friday 30 December. Indications were that the high water level in the Jemalong weir pool was causing low dissolved oxygen floodwater to back up in Jemalong Creek and not drain freely into the Lachlan River channel. As a mitigating measure, the water level in Jemalong Weir was drawn down to allow the poor quality water to drain into the Lachlan River channel and water from the Lachlan Water Quality Allowance was released from Wyangala Dam to assist with dilution and flushing. Monitoring showed oxygen levels in Jemalong Creek have improved to safe levels for fish health and there has not been any negative impact on dissolved oxygen levels downstream of Jemalong Weir.

The Commonwealth Environmental Water Office (CEWO), in collaboration with the NSW DPE Environment and Heritage Group, Murray Irrigation, and the CEWOs community reference group, are continuing to divert small volumes of environmental water to the Wakool, Kolety/Edward and Niemur rivers and Thule, Murrain-Yarrein, Cockrans and Jimaringle creeks to provide a refuge from declining water quality. Monitoring of water quality and fish responses to refuge flows from the Edward River Escape and Niemur Escape is being undertaken by scientists from Charles Sturt University. You can find out more about the Commonwealth's current environmental water releases in the mid-Murray at: [Latest water use - Mid-Murray - DCCEEW](#)

As floodwater continue to recede, NSW and Commonwealth agencies will assess the risks of poor water quality and to monitor dissolved oxygen levels 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 NSW Department of Planning and Environment – Water of potential blackwater events email: waterqualitydata@dpie.nsw.gov.au

To report dead fish, fish struggling or gasping at the water surface, or crayfish leaving the water please call the NSW DPI Fisheries Phoneline 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](#). When reporting, please include the name of the river/waterbody, location and date of your observation. If possible, please also record what species are affected and an estimate of number of each species observed.

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

Additional information is also available on the Murray-Darling Basin Authority website at: www.mdba.gov.au/publications/mdba-reports/water-management-101-factsheets

Department of Planning and Environment

Water Quality Update – 11 January 2023



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

Flood updates can be found on the Environment Protection Authority web page at: www.epa.nsw.gov.au/news/news/2022/nsw-storm-and-flood-updates-2022