

## 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 a summary of information collected up to 8 February 2023.

The main flood peak in the lower Darling River has reached Burtundy and will remain above the major flood level for another week, as well as remaining elevated between Burtundy and Wentworth during February. Moderate flooding is occurring at Pooncarie and easing to minor flooding at Menindee.

As the floodwater progresses down the Darling River and levels continue to fall, the last of the remaining water sitting out on the Darling River floodplain upstream of Menindee Lakes is draining back into the main river channel. This is bringing low oxygen water into the Darling River and into Lake Wetherell. NSW and Commonwealth agencies will continue to assess the risks in this area as the low oxygen water makes its way into Menindee Lakes and the lower Darling River and to monitor dissolved oxygen levels during higher air temperatures over summer.

In many catchments, rivers have returned to more normal regulated flow conditions and the potential for fish deaths from hypoxic (low oxygen) blackwater has eased. As flows recede, fish may become stranded in disconnected waterbodies on the floodplain where they 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.

There have been reports of fish deaths, fish struggling at the surface or edges and Murray Crayfish and shrimp exiting the water in the Murray-Darling Basin over recent months. Areas include the Murray, Darling, Kolety/Edward and Wakool Rivers, lower Gwydir River, Macquarie River distributaries, Menindee Lakes System, Barwon River, Namoi River and Merran and Yanco-Billabong Creek systems.

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 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](http://www.dpi.nsw.gov.au/fishing/habitat/threats/fish-kills-2019-2020/info-sheet)

High concentrations of nutrients, such as nitrogen and phosphorus flushed into the rivers during flooding, increases the risk of harmful algal blooms. Nutrient rich inflows combined with warm, slow moving water provide ideal conditions for algal growth.

## Where are the main areas of concern?

There are two main areas of concern in New South Wales where dissolved oxygen is at levels that could be detrimental to fish health.

These are:

- Darling River from Wilcannia to Lake Wetherell at Menindee and in the lower Darling River downstream of Menindee
- Lower Niemur River

The Bureau of Meteorology has forecast maximum air temperatures in these critical areas will increase up towards 40°C this week, before returning to cooler temperatures again next week. As air temperature increases, so does the water temperature. The amount of dissolved oxygen water can hold decreases with increasing water temperature which can add additional stress to fish that may already be struggling.

## Dissolved oxygen levels – Darling River

Moderate flooding continues in the Darling River at Pooncarie. River levels in the Darling River at Burtundy have peaked, with major flooding predicted to persist through February. Figure 1 is a satellite derived Sentinel colour infrared image showing the Darling River and Menindee Lakes at Menindee. The image highlights most of the floodwater upstream of Lake Wetherell has returned to the main river channel and similarly downstream of Menindee township, floodwater is receding.

The image also highlights the darker coloured flood water from Lake Wetherell pushing into lakes Pamamaroo and Tandure, where it is mixing with the turbid water (blue colour) 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. While Menindee Lakes remain in flood operations, there is limited ability at this stage to manipulate or divert a portion of the low oxygen flood flows into the shallow lakes, as was achieved successfully during last year's flood event.

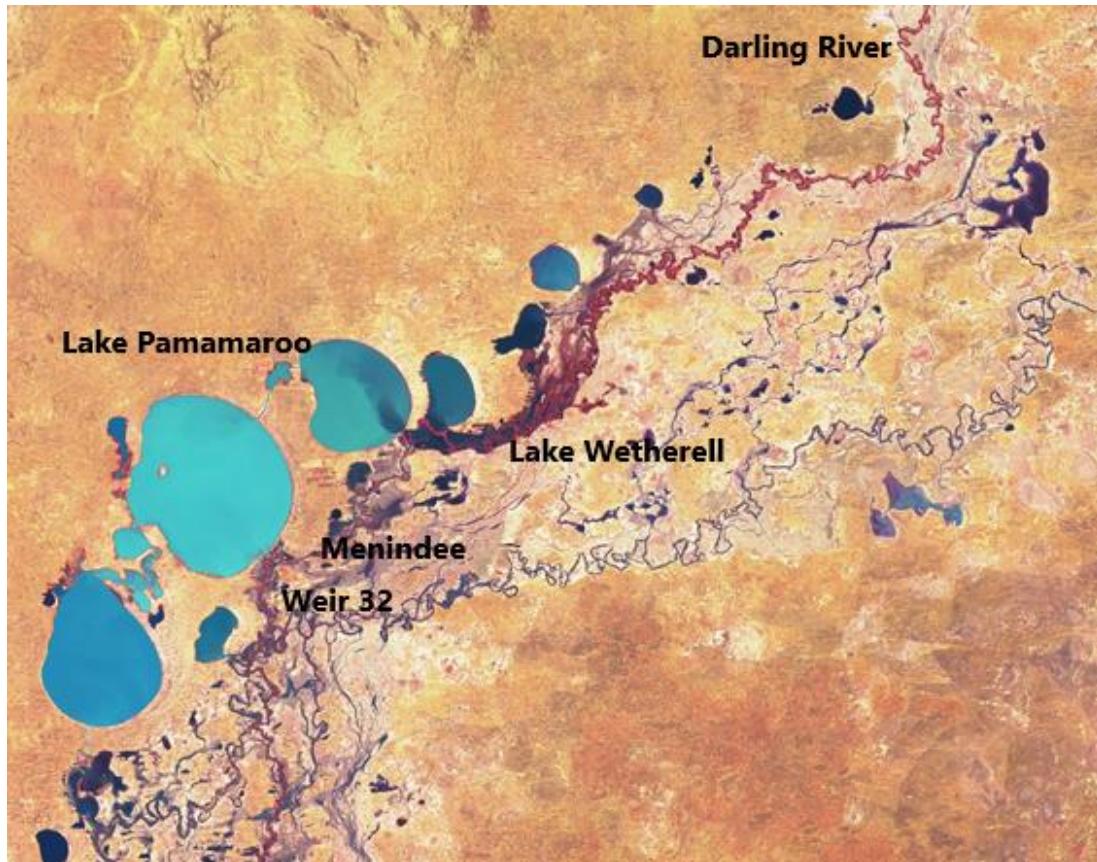


Figure 1: Satellite derived Sentinel colour infrared image of the Darling River and Menindee Lakes – 7 February 2023

Dissolved oxygen levels in the Darling River at Wilcannia had been less than 1 mg/L, but have been steadily improving as river levels fall and the last of the water returns to the main channel from the floodplain (Figure 2).

Dissolved oxygen levels in the upper reaches of Lake Wetherell at Nelia Gaari had dropped below 4 mg/L before the sensor malfunctioned. At this stage the Darling River downstream of Menindee at Weir 32 is remaining in the safe range for fish health, but is also beginning to decline as the low dissolved oxygen water that was at Wilcannia in late January makes its way through Lake Wetherell.

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.

The flooding of higher areas of the lower Darling River floodplain that have not been inundated since 2012, will flush organic material such as sticks, leaves, bark and grass into the river system. The breakdown of this organic material by bacteria uses up the oxygen in the water which can impact fish health. Dissolved oxygen in the Darling River at Burtundy had dropped below 2 mg/L, but following cooler air temperatures last week, levels have increased back up above 4 mg/L again (Figure 2).

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

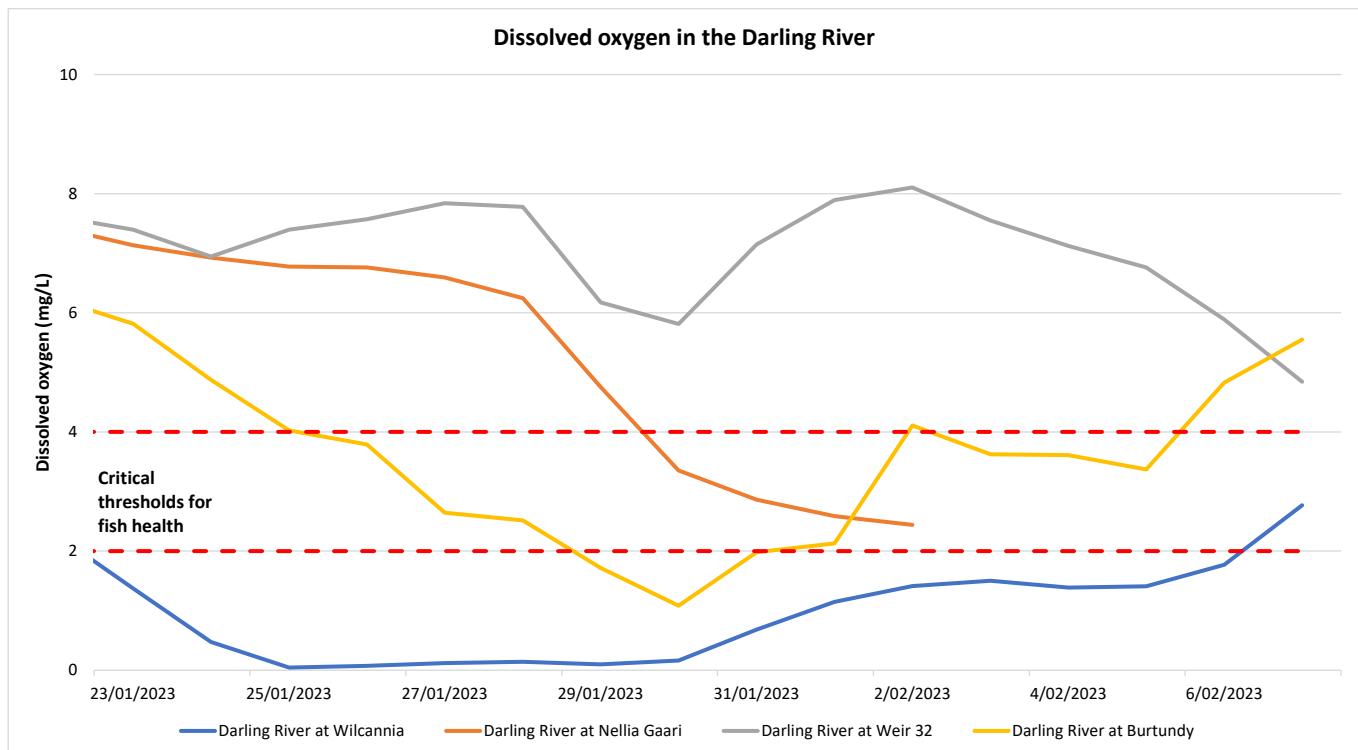


Figure 2: Mean daily dissolved oxygen (mg/L) in the Darling River at Wilcannia, Nelia Gaari, Weir 32 and Burtundy – 23 January to 7 February 2023

### Dissolved oxygen levels – Niemur River

Dissolved oxygen in the Niemur River at Barham-Moulamein Road has continued to improve above 4 mg/L (Figure 3). The monitoring site further downstream at Mallan School had been improving, but has dropped back below the 2 mg/L fish health threshold. With a discharge of around 1,000 megalitres (ML)/day in the Niemur River, fish are able to move upstream towards Barham-Moulamein Road to find more oxygenated water.

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 also be finding refuge in the oxygenated water closer to the water surface.

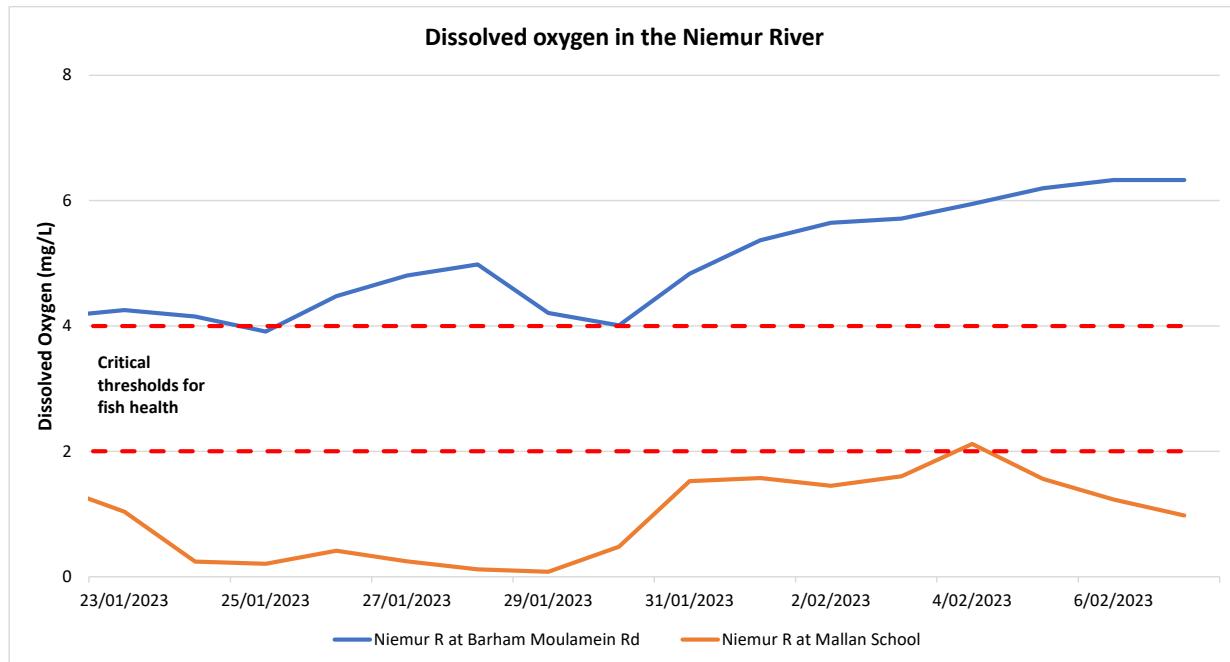


Figure 3: Mean daily dissolved oxygen (mg/L) in the Niemur River at Barham-Moulamein Road and Mallan School – 23 January to 7 February 2023

## 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, Darling, Barwon, Namoi and Macquarie 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 related to poor water quality reported in the last week up to 8 February, and two previous reports continue to be investigated:

- On 6 February, a report of up to several thousand dead Bony Herring along the edges in the upstream end of Lake Wetherell. Investigations are ongoing into the event and the suspected cause is a drop in dissolved oxygen (DO), with a front of poor water quality moving through the Barwon-Darling system as flood waters recede. Yabbies and shrimp were also observed dying along the edges.
- On 8 February, a report of 20 to 30 dead Redfin (an introduced species) at Hume Dam near the dam wall and along nearby edges over previous few days. Investigations ongoing and cause currently not known.
- Investigation into the reports from 31 January, of dead Golden Perch in the Barwon River at Walgett, remains ongoing. Reports indicate hundreds of fish have been impacted.
- Investigation into the report from 31 January of dead fish in the Namoi River downstream of Keepit Dam remains ongoing. Reports indicate tens of fish have been impacted. Unclear if

related to low dissolved oxygen, hence samples of affected fish have been sent for laboratory analysis.

NSW agencies are working together to investigate and determine if any other native fish have been affected. 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 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, Cockrands and Jimaringle creeks to provide a refuge from declining water quality.

Scientists from Charles Sturt University are continuing to monitor the water quality in the Niemur River. They found that the delivery of Commonwealth environmental water from the Niemur escape is creating a refuge in the Niemur River that has higher dissolved oxygen concentrations than the sites in the Niemur River upstream of the escape. The environmental watering action has reduced the length of time that dissolved oxygen is below critical levels in the refuge area.

You can find out more about the Commonwealth's current environmental water releases in the mid-Murray at: [Latest water use - Mid-Murray - DCCEEW](#)

NSW and Commonwealth agencies will continue to assess the risks of poor water quality and 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.

## Weather outlook

The Bureau of Meteorology has forecast median maximum air temperatures will remain close to average to slightly lower for February, with a high chance of exceeding the median maximum temperature for March to May in the western districts of New South Wales. The forecast is that rainfall figures for February through to March will be similar to historic averages for the majority of New South Wales. Refer to the [Bureau of Meteorology website](#) for the latest forecasts.

## Additional information

To notify the NSW Department of Planning and Environment – Water of potential blackwater events email: [waterqualitydata@dpie.nsw.gov.au](mailto: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](http://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/allocation-availability/droughts-floods/drought-update/managing-drought-recovery/blackwater](http://www.industry.nsw.gov.au/water/allocation-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](http://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 Environment Protection Authority web page at:  
[www.epa.nsw.gov.au/news/news/2022/nsw-storm-and-flood-updates-2022](http://www.epa.nsw.gov.au/news/news/2022/nsw-storm-and-flood-updates-2022)

To report suspected algal blooms see the [WaterNSW website](#).