

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 1 February 2023.

Major flooding is continuing in the Darling River at Menindee. The Bureau of Meteorology has predicted the river level at Menindee may fall below the major flood level this week. The main flood peak in the lower Darling River downstream of Menindee is at Pooncarie, where river levels are peaking above the moderate flood level. River levels are likely to remain elevated at Pooncarie into mid-February. Downstream of Pooncarie at Burtundy, major flooding is occurring with a peak forecast for 3 to 5 February. Further river rises are possible as floodwaters arrive from upstream.

River levels continue to fall in other catchments, with the last of the remaining water sitting out on the floodplain draining back into the main river channels. In many cases, 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, as well as 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, including the Murray, Darling, Koley/Edward and Wakool Rivers, lower Gwydir River, Macquarie River distributaries, Menindee Lakes System, Barwon 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 Phonenumber on 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

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 at Burtundy
- Lower Niemur River

The Bureau of Meteorology has forecast air temperatures in these critical areas will decrease this week. As air temperature decreases, so does the water temperature. The amount of dissolved oxygen water can hold increases with decreasing water temperature. These cool changes provide an opportunity for dissolved oxygen levels in rivers to recover before warmer weather returns.

Dissolved oxygen levels – Darling River

Major flooding continues in the Darling River at Menindee. River levels in the Darling River at Pooncarie have peaked and are continuing to rise at Burtundy, with major flooding predicted in February. Figure 1 is a Landsat colour infrared image showing the Darling River from Wilcannia to Menindee. The image highlights most of the floodwater immediately downstream of Wilcannia has returned back into the main river channel, with the tail end of the main flooding upstream of Lake Wetherell.

A small amount of the darker coloured flood water from Lake Wetherell can be seen pushing into Lake 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. As Menindee Lakes remain in flood operations, there is limited ability to manipulate or divert a portion of low oxygen flood flows into the shallow lakes, as was achieved successfully during last year's flood event.

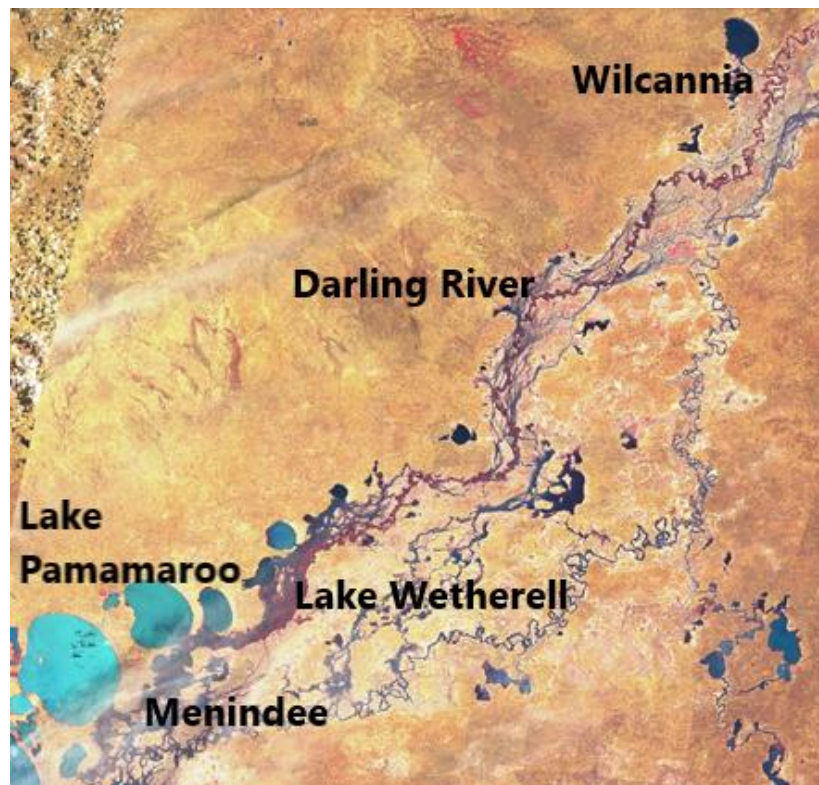


Figure 1: Satellite derived Sentinel colour infrared image of the Darling River and Menindee Lakes – 28 January 2023

Dissolved oxygen levels at Wilcannia have been less than 1 mg/L for the past week (Figure 2). Dissolved oxygen levels in the upper reaches of Lake Wetherell at Nellia Gaari have just dropped below 4 mg/L as low oxygen water arrives from upstream. At this stage the Darling River downstream of Menindee at Weir 32 is remaining in the safe range for fish health. 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.

This flood event is the highest experienced at Pooncarie since 2012 (Figure 3). The flooding of higher areas of the lower Darling River floodplain that have not been inundated for 10 years 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 on fish health. Dissolved oxygen in the Darling River at Burtundy has dropped below 2 mg/L this week (Figure 2).

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

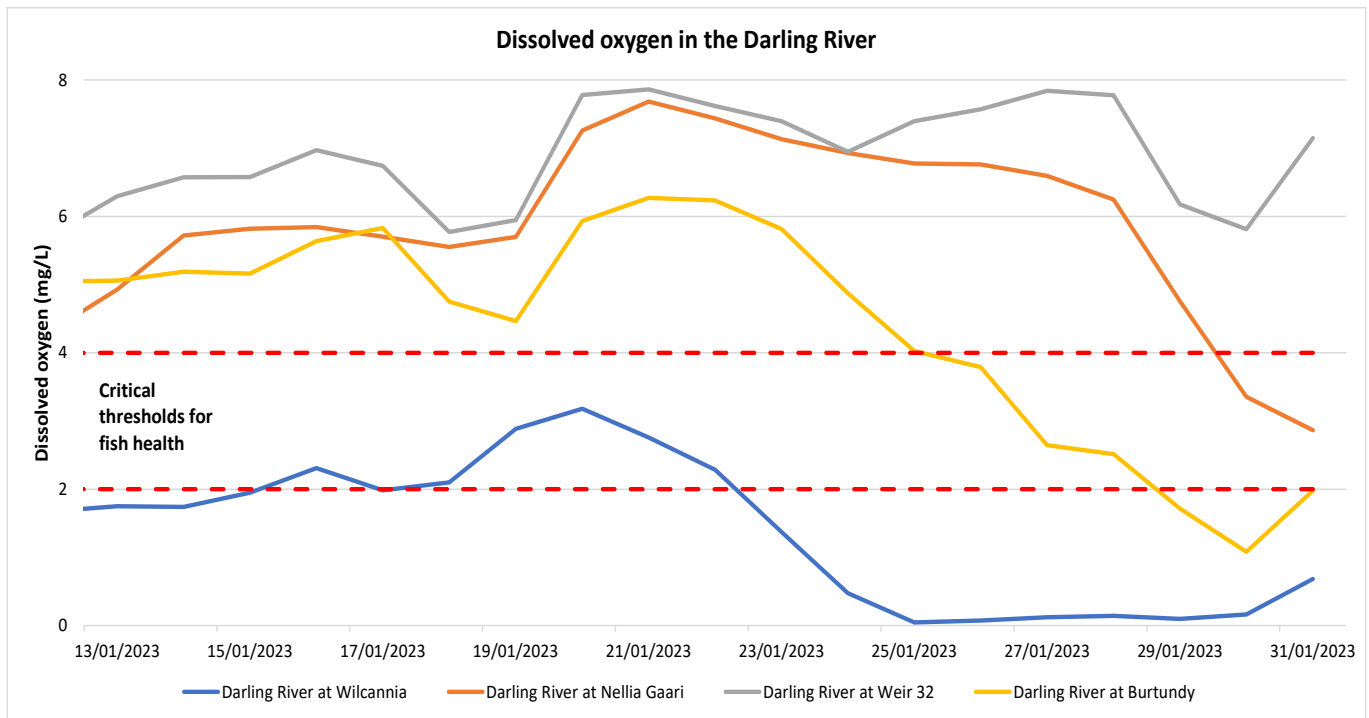


Figure 2: Mean daily dissolved oxygen (mg/L) in the Darling River at Wilcannia, Nella Gaari, Weir 32 and Burtundy – 13 to 31 January 2023

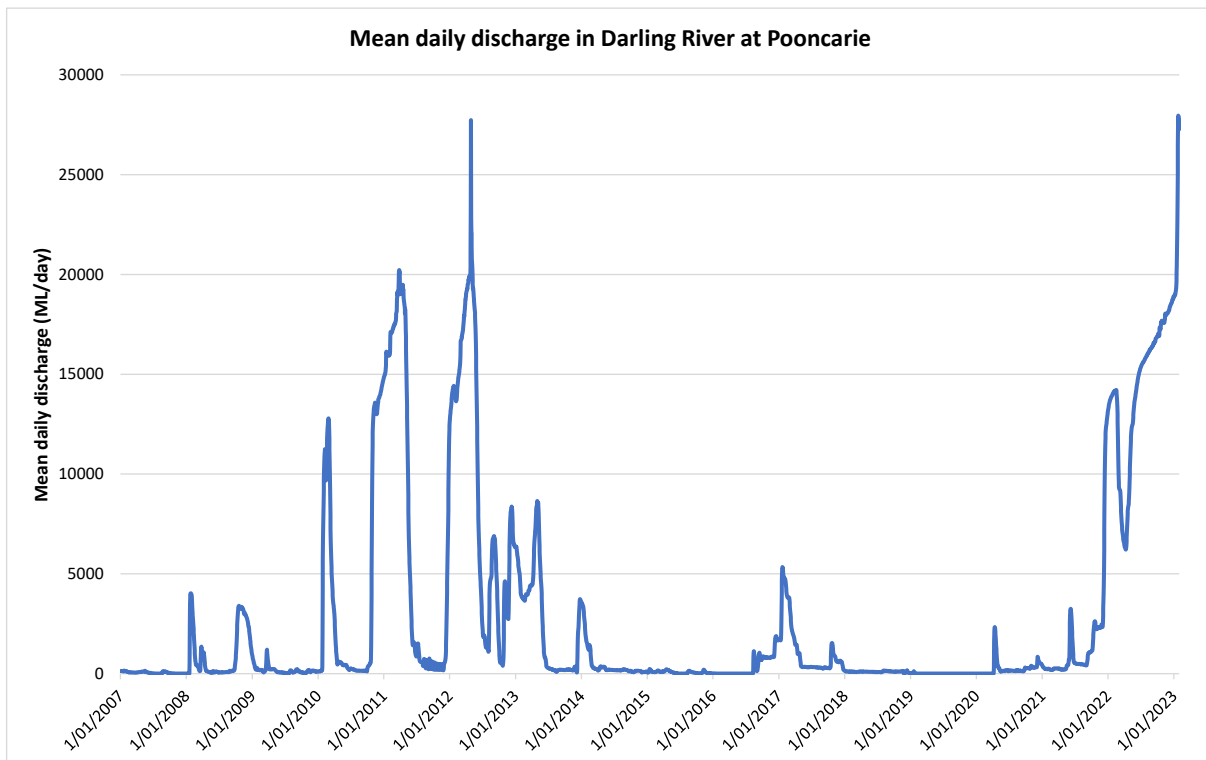


Figure 3: Mean daily discharge (ML/day) in the Darling River at Pooncarie – January 2007 to January 2023

Dissolved oxygen levels –Niemur River

Dissolved oxygen in the Niemur River at Barham-Moulamein Road has improved to above 4 mg/L (Figure 4). The monitoring site further downstream at Mallan School has also improved, but remains

below the 2 mg/L fish health threshold. With a discharge of around 1,000 ML/day in the Niemur River, fish are able to move upstream towards Barham-Moulamein Road to find more oxygenated water.

Recent monitoring results by scientists from Charles Sturt University 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.

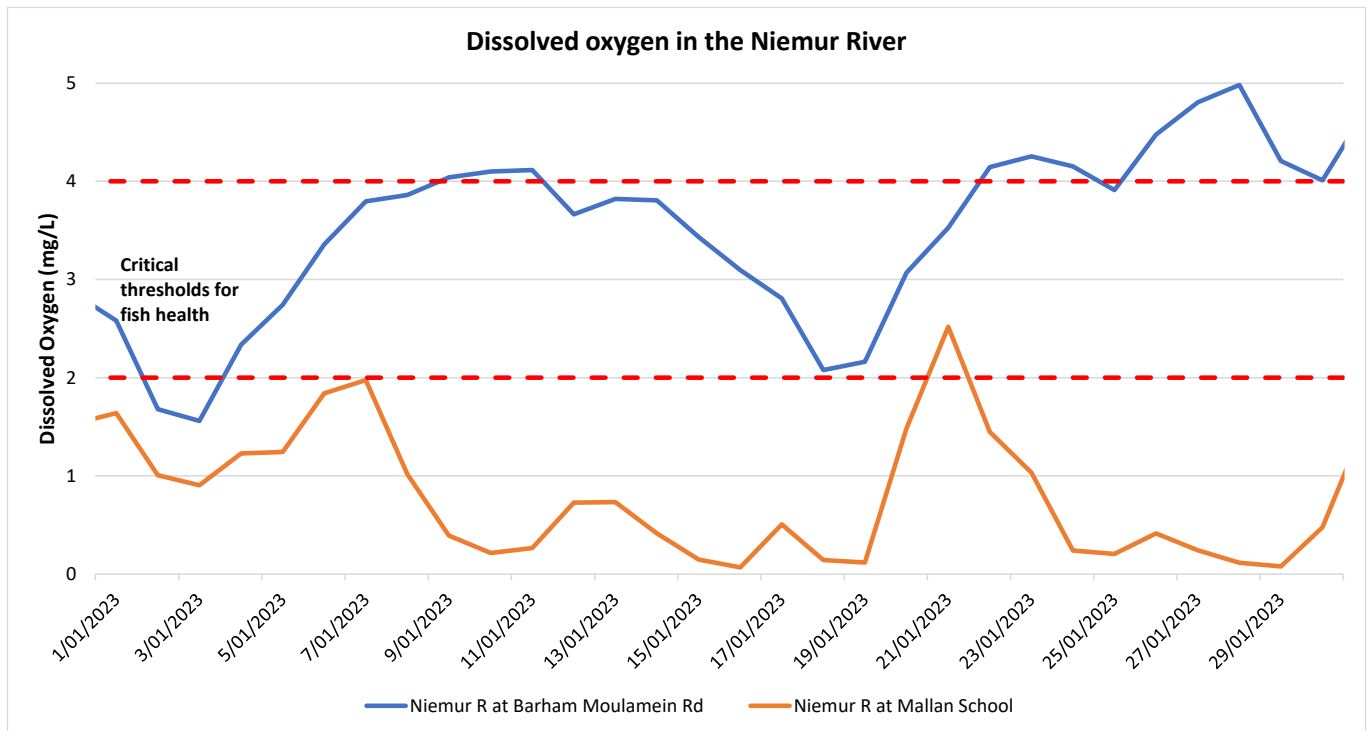


Figure 4: Mean daily dissolved oxygen (mg/L) in the Niemur River at Barham-Moulamein Road and Mallan School – 1 to 31 January 2023

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, 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 1 February:

- 31 January - a community member alerted DPI Fisheries staff to dead Golden Perch in the Barwon River at Walgett and the investigation is ongoing. Initial information indicates hundreds of fish may be impacted.

- 31 January - DPI Fisheries received a report of stressed and dead fish in the Namoi River downstream of Keepit Dam and the investigation is ongoing. Initial information indicated less than ten fish have been impacted.

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 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.

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.

Scientists from Charles Sturt University are continuing to monitor the water quality in the Niemur River. They have 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](#)

As floodwater continue to recede, NSW and Commonwealth agencies will 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.

Additional information

To notify the NSW Department of Planning and Environment – Water of potential blackwater events email: waterqualitydata@dpi.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 on 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

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

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