

# Murray Darling Basin – water quality and dissolved oxygen results

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Multiple agencies are undertaking water quality monitoring to review dissolved oxygen conditions across NSW, identify potential risks to ecological communities, implement mitigating measures and respond to the mass fish death event in the Darling River. This update provides a summary of information collected up to 19 June 2023.

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To maintain an oxygenated flow in the Darling River through Menindee township, the release of water from the Lake Pamamaroo outlet is continuing, although volumes have been reduced over recent weeks to preserve the water resource in the upper lakes. Releases from Lake Menindee are being maintained.

To prevent the poorer quality water in Lake Wetherell from entering Lake Pamamaroo, the inlet between the two lakes was closed in late March. As inflows from the Darling River into Lake Wetherell have continued, the water level difference between the two lakes reached the stage where this inlet had to be reopened to ensure the integrity of the regulator itself. Monitoring is showing that the initial opening of the Pamamaroo inlet has not impacted dissolved oxygen levels in the Darling River. As flow through the Pamamaroo inlet is increased, ongoing monitoring will identify if less oxygenated water from Lake Wetherell is being drawn through the Pamamaroo outlet and into the Darling River downstream.

There remains a risk of further fish deaths in the Darling River at Menindee as fish in an already stressed condition may succumb to any further decrease in dissolved oxygen, increased competition for depleting food resources and cooler temperatures. This is particularly the case for Bony Herring, which boomed during the recent floods, and many may now be in poor condition and are more susceptible to environmental stresses like cold water temperatures. There are still large numbers of Bony Herring and Carp in the reach of Darling River downstream of Lake Pamamaroo.

To report any further incidents of dead fish, fish struggling or starting to gasp at the water surface, or crayfish exiting the water, please call the NSW 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](http://www.dpi.nsw.gov.au/fishing/habitat/threats/fish-kills-2019-2020/info-sheet)

## Dissolved oxygen levels – Darling River at Menindee

It was identified earlier in the year that poorer quality water was entering Lake Pamamaroo from Lake Wetherell and being drawn through the Pamamaroo outlet and discharged into the Darling River upstream of Menindee. For this reason, the inlet between Lake Wetherell and Lake

Pamamaroo has been closed since late March. The difference in water levels between the two lakes reached the stage where this inlet had to be reopened. A Planet satellite image from 17 June shows the green coloured, less turbid water from Lake Wetherell pushing through the inlet into the more turbid water of Lake Pamamaroo (Figure 1). Monitoring in Lake Wetherell prior to opening the inlet showed that dissolved oxygen levels had improved since March.

Monitoring following the initial opening of the Pamamaroo inlet showed dissolved oxygen levels in the Darling River have not been adversely impacted. Flow through the Pamamaroo inlet from Lake Wetherell will be increased over the coming weeks. An additional temporary dissolved oxygen sensor has been installed in the Darling River downstream of Lake Wetherell Main Weir to assess if less-oxygenated water entering Lake Pamamaroo from Lake Wetherell is again being drawn through the Lake Pamamaroo outlet and into the Darling River, and if there is an increased risk to fish health.



Figure 1: Planet satellite image showing water from Lake Wetherell entering Lake Pamamaroo through the Pamamaroo inlet – 17 June 2023

Figure 2 is a Google Earth image showing the location and results from the survey of dissolved oxygen levels down the Darling River on 14 June from Lake Pamamaroo, through Menindee town and down past the junction with the inflow from Lake Menindee. The results show that there was a gradual decrease in oxygen levels with distance down the Darling River, with a more rapid decline downstream from the Menindee railway bridge. The lowest result was immediately upstream of the Darling River-Menindee Creek junction (3.46 mg/L). Dissolved oxygen levels improve again following dilution by the oxygenated water being released from Lake Menindee. 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.



Figure 2: Google Earth image showing dissolved oxygen results (mg/L) from the Lake Pamamaroo outlet to downstream of the Darling River-Menindee Creek junction on 14 June 2023

Frequent longitudinal surveys of dissolved oxygen have been undertaken by WaterNSW down this reach of the Darling River. Figure 3 shows that dissolved oxygen levels have improved since the initial profile undertaken on 25 March. Dissolved oxygen levels increased in April but were still below the critical threshold for fish health of 4 mg/L in the vicinity of Menindee town. During May, oxygen levels improved to above 4 mg/L. The most recent survey undertaken on 14 June shows oxygen levels are remaining above critical levels for fish health for most of this reach apart from immediately upstream of the Darling River-Menindee Creek junction.

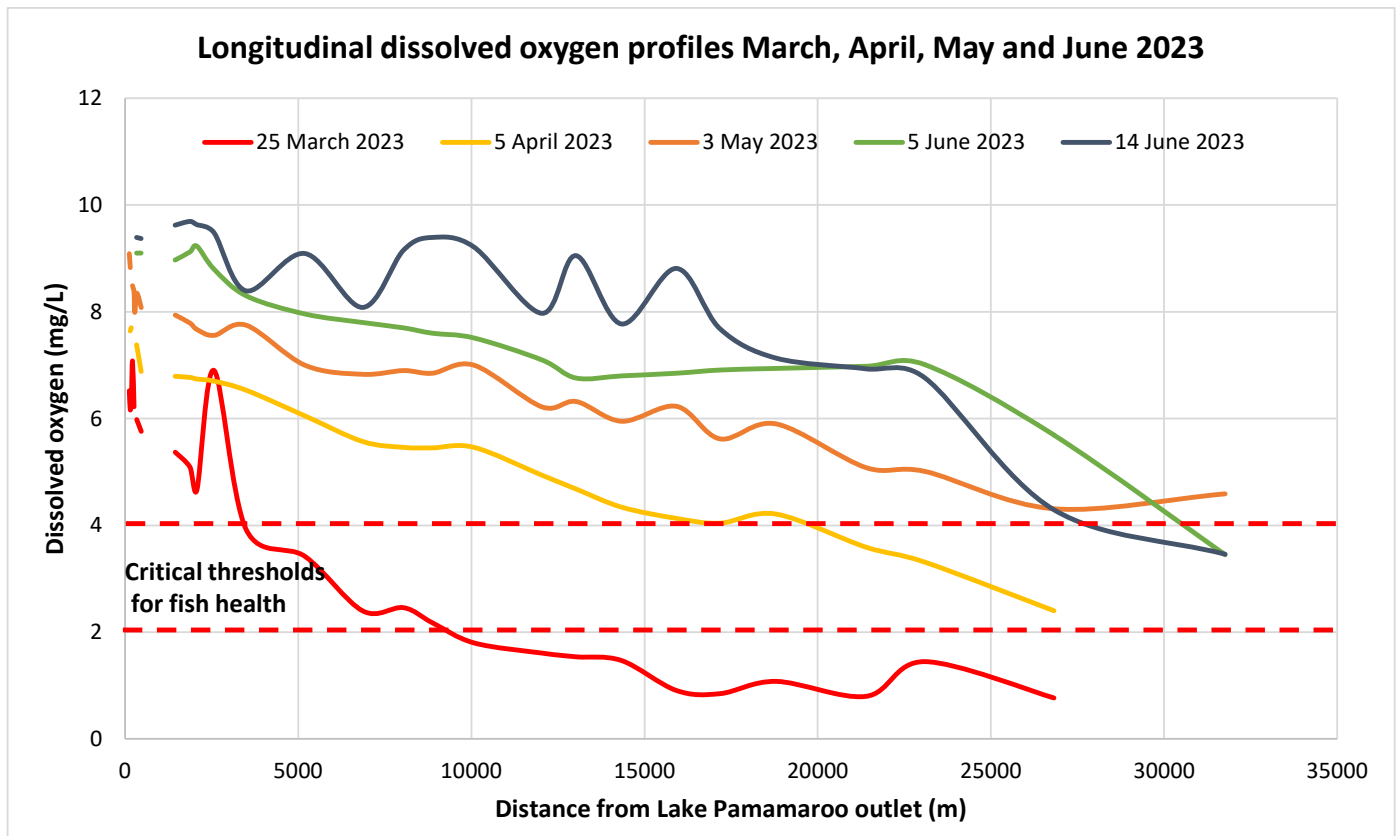


Figure 3: Comparison of dissolved oxygen results (mg/L) from the Lake Pamamaroo outlet to Menindee town on 25 March, and to Menindee Creek on 5 April, 3 May and 5 and 14 June 2023

Data from WaterNSW dissolved oxygen sensors downstream of Lake Wetherell Main Weir, Menindee pump station, Menindee town, and further downstream at Weir 32, are shown in Figure 4. These sensors are set at various depths so may not always reflect the readings taken at the water surface. The new temporary sensor installed downstream of Lake Wetherell Main Weir is showing the water currently being released from Lake Pamamaroo is well oxygenated. Dissolved oxygen levels at the two sites near Menindee have been fluctuating from day to day. The sensor at the pump station is located closer to the water surface and is showing oxygen levels are remaining above the fish health threshold of 4 mg/L. The sensor at Menindee town is located closer to the riverbed (where dissolved oxygen levels can be lower than shallow areas) and had been recording oxygen levels less than the 4 mg/L threshold deeper in the water column. Oxygen levels have now improved above 4 mg/L.

Releases from lakes Pamamaroo and Menindee have been reduced to further preserve the water resource but still maintain flows above operational flow targets at Weir 32. Monitoring is showing an area of low oxygen water immediately upstream of the Darling River-Menindee Creek junction. The results from Weir 32 show reducing the releases from Lake Menindee is drawing some of this low oxygen water from the Darling River upstream of Menindee Creek downstream, which has caused dissolved oxygen levels at Weir 32 to decline to 4 mg/L on some days. Further decreases in dissolved oxygen between Menindee Creek and Weir 32 pose additional risk of fish deaths.

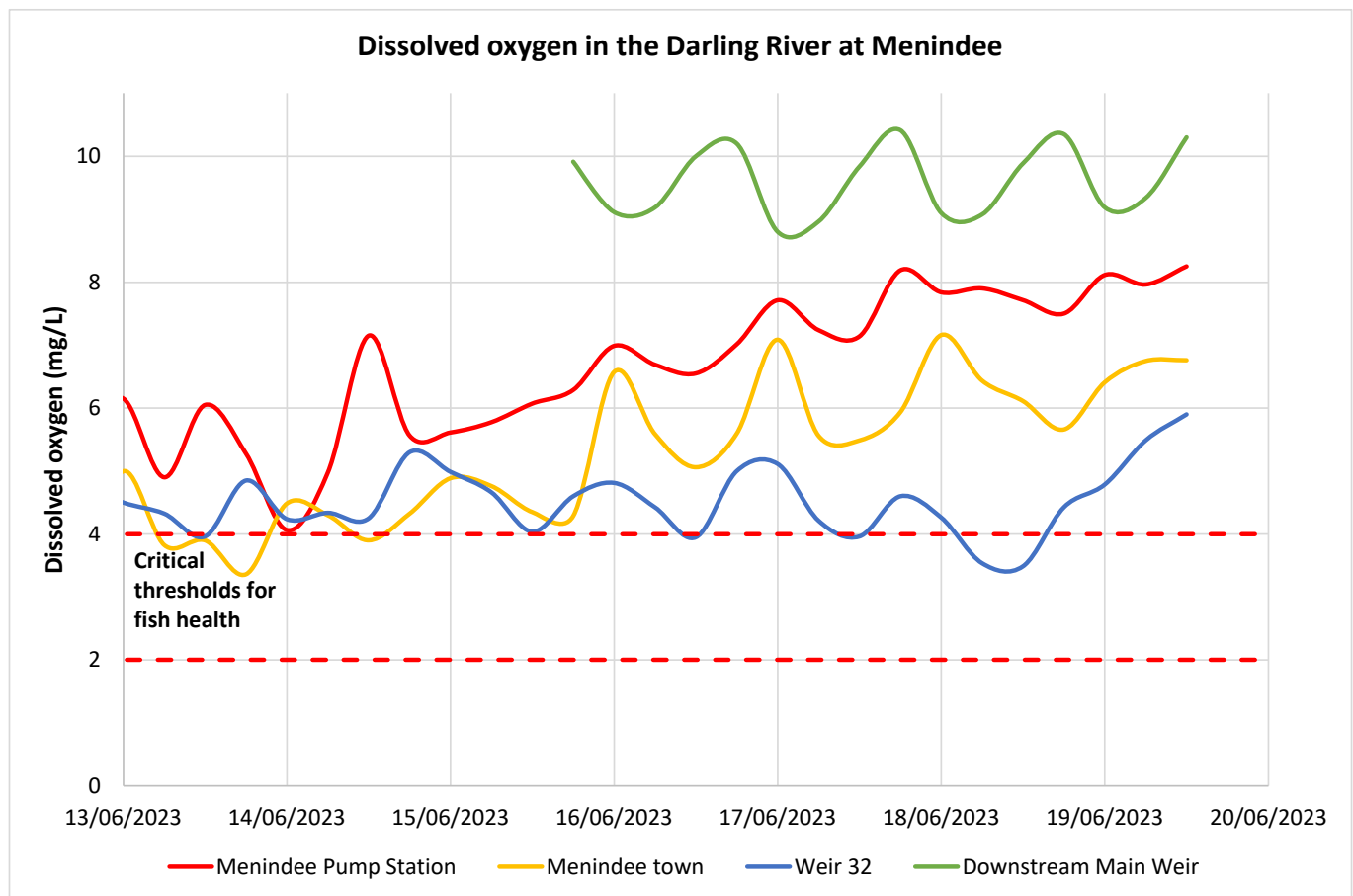


Figure 4: Dissolved oxygen (mg/L) in the Darling River at Menindee: Menindee pump station, Menindee town and Weir 32 – 12 to 19 June 2023

NSW and Commonwealth agencies will continue to work together and monitor dissolved oxygen levels in this area and advise the best operational measures to mitigate risks to aquatic life as much as possible. This can involve adjusting the timing, size and location of releases from the lakes into the lower Darling River to maintain the quality of the water in the river. Releases from both Lake Pamamaroo and Lake Menindee continue to be managed to minimise the risk of further hypoxia-related fish deaths in the Darling River at Menindee.

### Hypoxia-related fish death summary

In the past 8 months, NSW DPI Fisheries has received reports of fish deaths, fish struggling and crustaceans leaving the water across many areas in the Murray-Darling Basin, including in the Darling, Murray, Kolety/Edward, Wakool, Murrumbidgee, Lachlan, Gwydir, Barwon, Namoi and Macquarie rivers and Yanco-Billabong Creek system.

In the past week to 19 June, there has been one new report of fish deaths in inland NSW. On Wednesday 14 June, a number of dead Golden Perch in the size range of 40 to 55 cm were observed in the Peel River in the pool immediately and up to 100 m downstream from Chaffey Dam. The dead fish had blister-like ulcers or lesions. The cause is currently being investigated and it is suspected that low oxygen levels may have been a factor. There have not been any new reports of fish deaths in the Darling River near Menindee. However, there remains a risk of fish deaths in the Menindee

area as fish (particularly Bony Herring) may be in poor condition from previous low oxygen conditions and may be more susceptible as temperatures decrease and flow rates recede.

### What is being done?

Emergency releases of oxygenated water from the Menindee Lakes are continuing. This is to maintain flow between Lake Pamamaroo outlet and Weir 32 with the aim of reducing the risk of further fish deaths. These releases have been gradually reduced to preserve the water resource in the upper lakes. This water is being debited from environmental water accounts. Ongoing dissolved oxygen monitoring will identify if the operations continue to achieve the desired result of improved dissolved oxygen levels and will be used to inform future operational decisions.

With the re-opening of the inlet between lakes Wetherell and Pamamaroo, online monitoring will identify if the water from Lake Wetherell is being drawn through the Lake Pamamaroo outlet and impacting dissolved oxygen levels in the Darling River.

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 low oxygen events.

### Blue-green algae

WaterNSW undertake routine blue green algae monitoring in Menindee Lakes and in the Darling River. Alert warnings are declared where algal cell numbers exceed the triggers identified in the Guidelines for Managing Risk in Recreational Waters (2008).

The most recent results indicate red alert warnings for recreational use in Talyawalka Creek at the Menindee-Pooncarie Road and Darling River at Tolarno, with algal numbers at most sites in the Menindee Lakes area remaining in the amber alert range for recreational use ([Algae Alerts NSW map - WaterNSW](#)). When a red alert warning is in place, people should avoid recreational activities that brings them into contact with the water and drinking untreated water. At the amber alert warning level, blue-green algae may be multiplying in numbers but remains suitable for recreational use. The water may have a green tinge and musty or organic odour.

The water should be considered unsuitable for potable use and alternative supplies or prior treatment of raw water for domestic purposes should be considered. The water may also be unsuitable for stock watering. Water users should use caution and avoid water where signs of blue-green algae are present.

### Weather outlook

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: <https://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](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](#).