

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 24 February 2023.

The main focus of activities is on Menindee Lakes and the lower Darling River. Dissolved oxygen in these areas is at levels that could be detrimental to fish health. There have been reports of fish deaths (predominantly Carp and Bony Herring) in the upper reaches of Lake Wetherell and in the Darling River downstream of Lake Wetherell and downstream of Weir 32. NSW and Commonwealth agencies will continue to assess the risks in this area as low oxygen water makes its way into Menindee Lakes and the lower Darling River and to monitor dissolved oxygen levels while air temperatures remain high. Ongoing monitoring will inform the best operational measures to mitigate risks to aquatic life as much as possible.

River levels in the lower Darling River have receded to a minor flood warning alert for Pooncarie and Burtundy. As the river level drops, floodwaters are draining off the floodplain and back into the main river channel upstream of Pooncarie. This can bring low oxygen water into the Darling River.

The Bureau of Meteorology has forecast maximum air temperatures in far western New South Wales 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 in areas of concern.

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.

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:

<https://www.dpi.nsw.gov.au/fishing/habitat/threats/fish-kills-2019-2020/info-sheet>

Dissolved oxygen levels – Menindee Lakes

WaterNSW are transitioning from flood operations to normal operations at Menindee Lakes as inflows from the Darling River decline. Figure 1 is a satellite-derived Sentinel colour infrared image showing the Darling River and Menindee Lakes at Menindee on 22 February. The image highlights the floodwater upstream of Lake Wetherell has returned to the main river channel. Similarly, floodwater has receded downstream of Menindee township.

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. As flooding continues to decrease, there will be some ability 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.

To assess the impact the low dissolved oxygen floodwater is having on Menindee Lakes and the Darling River, and to guide flow management decisions, dissolved oxygen monitoring was undertaken on 20 to 22 February. The dissolved oxygen results (in mg/L) are shown in Figure 1. These samples were taken close to the water surface during the day with all results from the lakes above 2 mg/L. The lowest readings were in the upper reaches of Lake Wetherell. There were lower readings in the Darling River at Menindee town (1.58 mg/L) and upstream of the town (1.65 mg/L). 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.

Lower dissolved oxygen results are being observed overnight and early in the morning in some areas. Dissolved oxygen levels drop overnight when respiration (microbes and animals breathing oxygen) outpaces oxygen replenishment (photosynthesis from aquatic plants and algae) that occurs during the day.

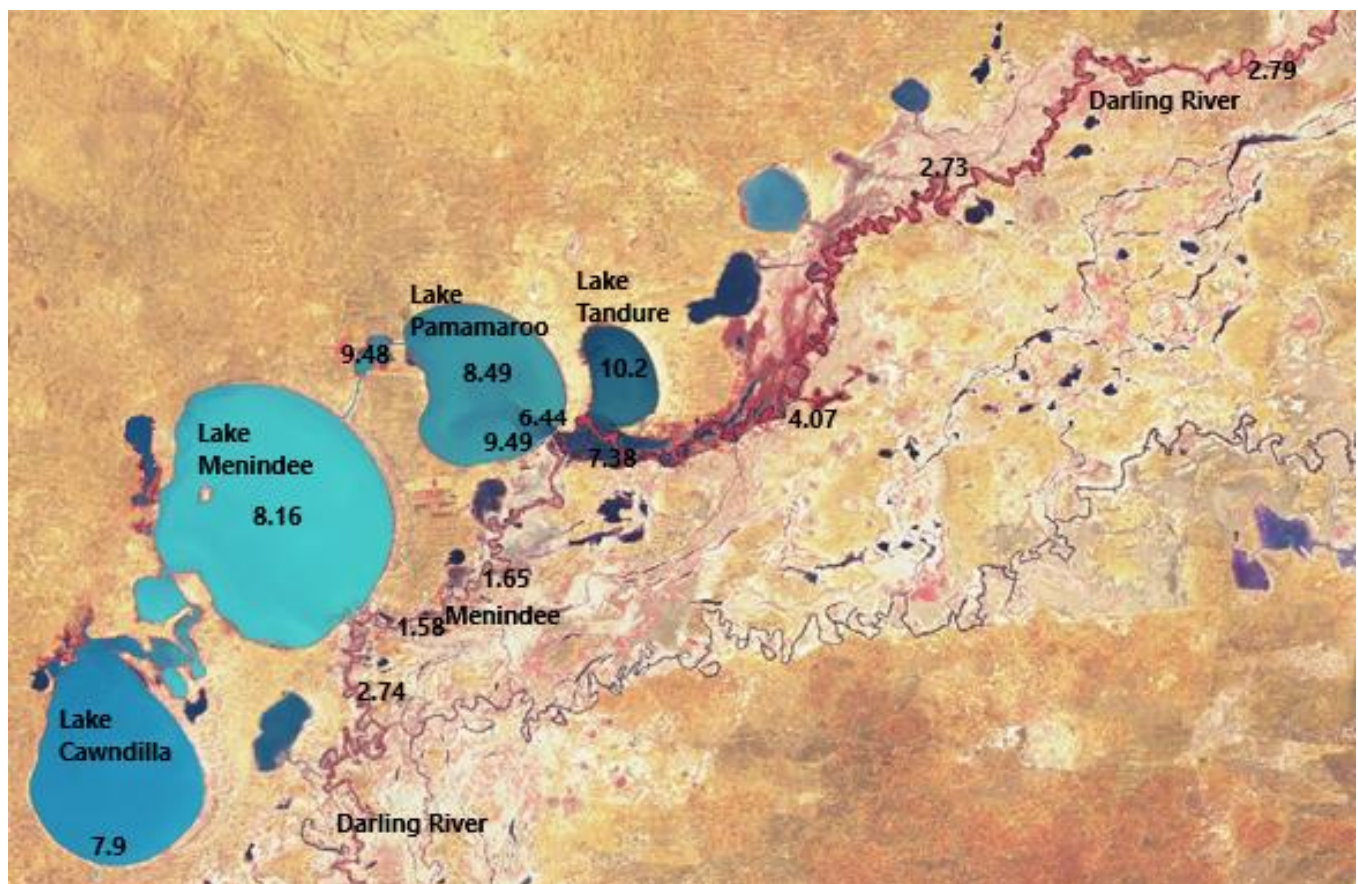


Figure 1: Satellite derived Sentinel colour infrared image of the Darling River and Menindee Lakes, 22 February 2023. Dissolved oxygen results are in mg/L

Dissolved oxygen levels in the Darling River at Wilcannia have been steadily improving as river levels fall and the last of the water returns to the main channel from the floodplain (Figure 2). This indicates that oxygenated water is making its way toward Lake Wetherell. Dissolved oxygen levels in the upper reaches of Lake Wetherell at Nellia Gaari are less than 2 mg/L as the low dissolved oxygen water that was at Wilcannia in late January makes its way through Lake Wetherell.

High concentrations of nutrients such as nitrogen and phosphorus have been flushed into the rivers during flooding. These nutrient-rich inflows combined with warm, still water provide ideal conditions for the growth of potentially toxic blue-green algae and increases the risk that dissolved oxygen levels could deteriorate in this area.

NSW and Commonwealth agencies will continue to work together to assess the risks as floodwaters make their way through Menindee Lakes and into the lower Darling River. The agencies will monitor dissolved oxygen levels throughout the river system and advise the best operational measures to mitigate risks to aquatic life as much as possible. This can involve:

- transferring water between the Menindee Lakes to mix the low dissolved oxygen water in Lake Wetherell with the better quality water in the other Lakes
- 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.

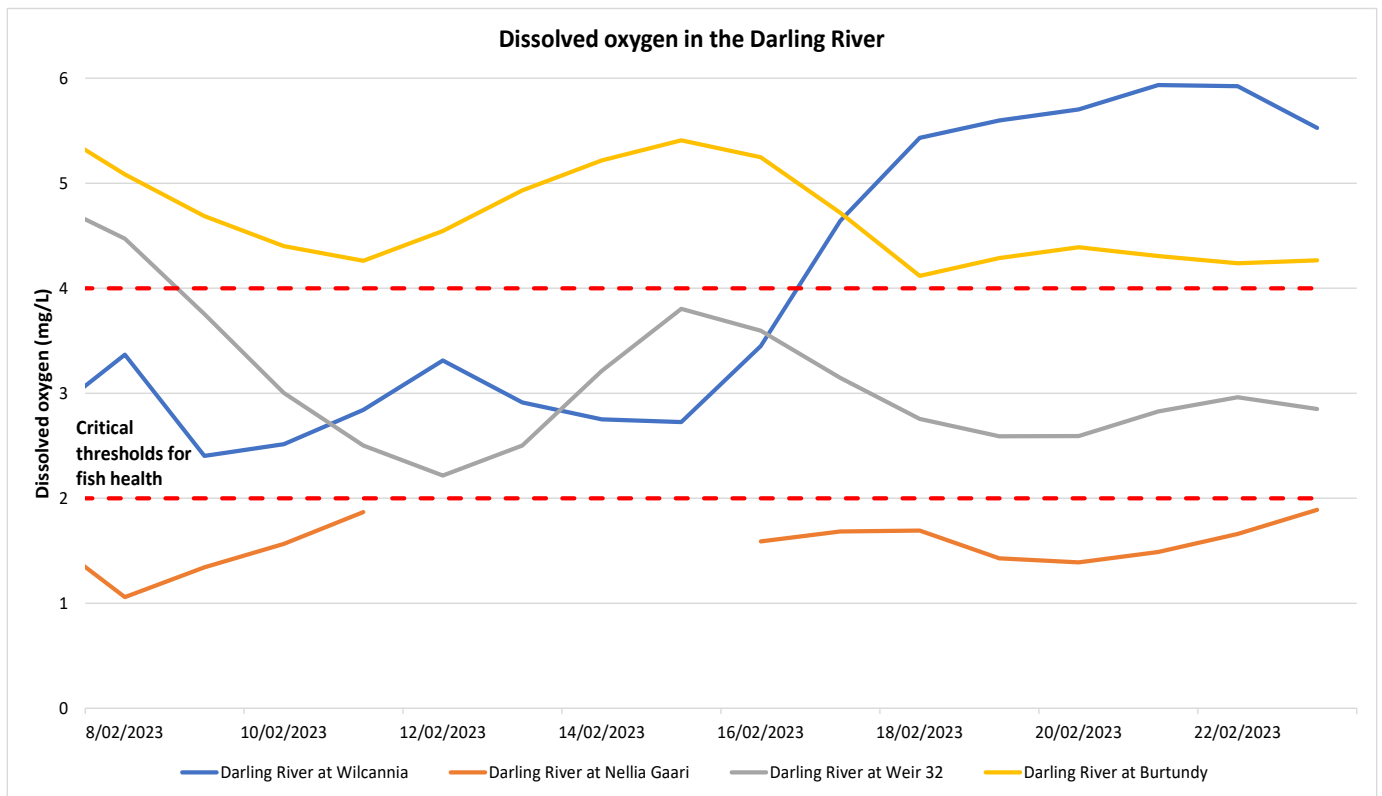


Figure 2: Mean daily dissolved oxygen (mg/L) in the Darling River at Wilcannia, Nellia Gaari, Weir 32 and Burtundy – 8 to 23 February 2023

Dissolved oxygen levels – lower Darling River

Flooding in the lower Darling River has decreased to the minor flood warning level at Pooncarie and Burtundy. Dissolved oxygen in the Darling River downstream of Menindee at Weir 32 had been decreasing toward 2 mg/L but has stabilised at around 3 mg/L in recent days.

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. Despite this water returning off the floodplain, dissolved oxygen in the Darling River at Burtundy has remained above 4 mg/L (Figure 2).

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 increase the risk of further reductions in dissolved oxygen in some areas and the potential for further fish death events.

There have been three confirmed fish death events in the Darling River near Menindee related to poor water quality: in the upper reaches of Lake Wetherell, the Darling River downstream of Lake Wetherell and the Darling River between Menindee and Pooncarie. In all three cases predominantly Common Carp and Bony Herring were affected, with a small number of Murray Cod and yabbies also 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 low oxygen events.

What is being done?

Releases into the lower Darling River are being made from Lake Wetherell, Lake Pamamaroo and Lake Menindee. The location of these outlets is shown in Figure 3.

Monitoring is showing the quality of the water in Lake Pamamaroo is better than in Lake Wetherell. To maintain an oxygenated flow in the Darling River through Menindee township and reduce the risk of fish deaths, the Lake Wetherell outlet will be reduced while the Pamamaroo outlet will remain open. Flows out of Pamamaroo will be maintained at higher levels, rather than returning to normal operations, over the next few days while heat wave conditions prevail. This will provide a flow of more oxygenated water into the Darling River upstream of Menindee town. The flow will also be of sufficient velocity that research has shown provides conditions that are less favourable for harmful algal growth. Ongoing monitoring will identify if the operations are achieving the desired results.

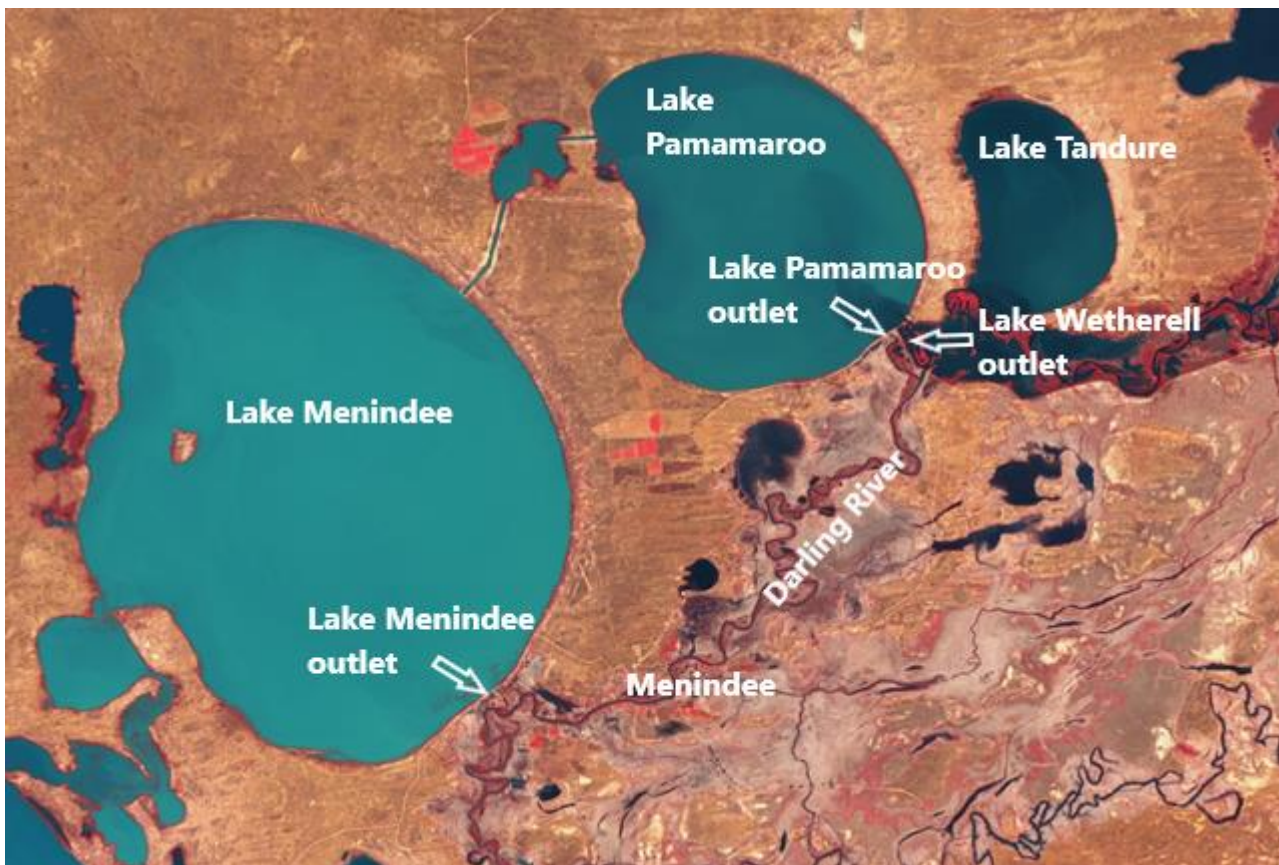


Figure 3: Satellite derived Sentinel colour infrared image of Menindee Lakes showing the location of discharge outlets

Weather outlook

The Bureau of Meteorology has forecast median maximum air temperatures will remain close to average to slightly lower for March with a higher chance of exceeding the median maximum temperature for March to May across most of New South Wales. The forecast is that rainfall figures for March through to May will be similar or slightly lower than 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@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 1800 043 536 or fill in a fish kill protocol and report form at: <https://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:
<https://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:
<https://www.epa.nsw.gov.au/news/news/2022/nsw-storm-and-flood-updates-2022>

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