

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 15 February 2023.

The Darling River from Wilcannia to Lake Wetherell, in Lake Wetherell and the lower Darling River downstream of Menindee, are the main areas of concern. Dissolved oxygen in these areas is at levels that could be detrimental to fish health. Flooding has peaked at the major flood level in the lower Darling River at Burtundy and will remain elevated between Burtundy and Wentworth during February. Minor flooding is occurring at Pooncarie.

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. Low intensity heat wave conditions have been forecast for the majority of the state from Thursday 16 February through to Sunday 19 February. 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.

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 recent reports of fish deaths, fish struggling at the surface or edges in the Murray-Darling Basin over recent months, including the Darling, Barwon and Namoi rivers, Macquarie River distributaries, Menindee Lakes System and Lake Hume.

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

Dissolved oxygen levels – Darling River

Flooding in the Darling River at Menindee has decreased below the minor flood warning level. Downstream of Menindee, minor flooding is occurring at Pooncarie and river levels in the Darling River at Burtundy have peaked, with 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 on 12 February. The image highlights most of 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 floodwater 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 13 and 14 February. The results (in mg/L) are shown on Figure 1. All results are above 2 mg/L. The lowest reading was in the upper reaches of 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.

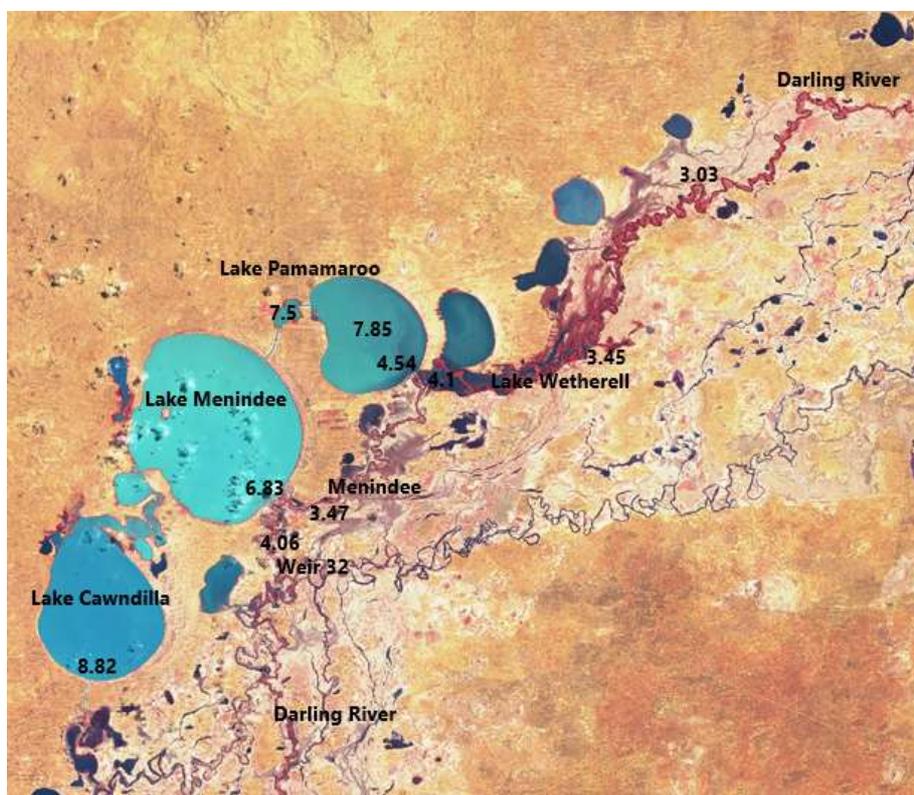


Figure 1: Satellite derived Sentinel colour infrared image of the Darling River and Menindee Lakes, 12 February 2023. Dissolved oxygen results are in mg/L

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. More recent readings at Nelia Gaari show dissolved oxygen is remaining less than 2 mg/L as the low dissolved oxygen water that was at Wilcannia in late January makes its way through Lake Wetherell. The Darling River downstream of Menindee at Weir 32 had also been decreasing toward 2 mg/L, but has improved 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. Dissolved oxygen in the Darling River at Burtundy had dropped below 2 mg/L in late January, but following cooler air temperatures, oxygen levels have increased back up above 4 mg/L (Figure 2).

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 and to 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.

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 the growth of potentially toxic blue green algae. Ongoing monitoring will identify if algal concentrations increase.

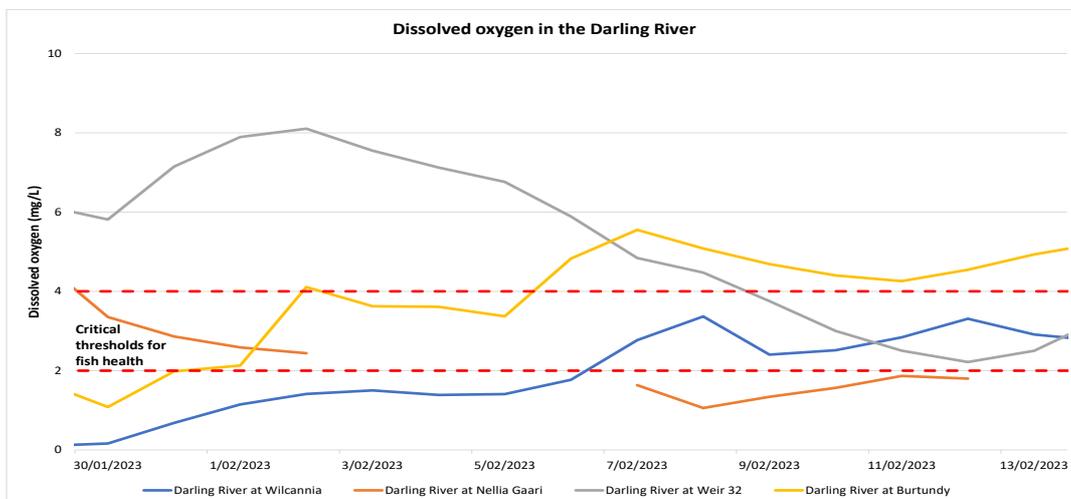


Figure 2: Mean daily dissolved oxygen (mg/L) in the Darling River at Wilcannia, Nelia Gaari, Weir 32 and Burtundy – 30 January to 14 February 2023

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 no new confirmed fish death events related to poor water quality reported in the last week up to 15 February, and three previous reports continue to be investigated:

- Investigation into the report from 8 February of 20 to 30 dead Redfin (an introduced species) at Hume Dam near the dam wall and along nearby edges remains ongoing. It is unclear if the cause is low dissolved oxygen. Fisheries staff inspected the area on 10 February and collected additional samples for laboratory analysis.
- Investigation into the report 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 low oxygen events.

What is being done?

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. The main focus of activities is now on Menindee Lakes and the lower Darling River. Ongoing monitoring will inform the best operational measures to mitigate the risk to aquatic life as much as possible. Updates are being provided to the media and posted on agency web pages to ensure the community is informed of high-risk areas.

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 able to divert small volumes of environmental water to provide a refuge from declining water quality. You can find out more about the Commonwealth's current environmental water releases in the mid-Murray at: [Latest water use - Mid-Murray - DCCEEW](#)

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@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

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](#).