

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 January 2023.

The Bureau of Meteorology has issued major flood warnings for the Darling River at Menindee. River levels in the Darling River downstream of Menindee at Pooncarie and Burtundy are rising with major flooding predicted for Burtundy in February.

As river levels continue to fall in other catchments, the remaining water that has been sitting out on the floodplain is draining back into the main river channels. When this floodwater returns to the river it can affect fish health. As high flows recede, fish may also become stranded in disconnected waterbodies and 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, including the Murray, Darling, Kooly/Edward and Wakool Rivers, lower Gwydir River, Macquarie River distributaries, Menindee Lakes System, 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 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

Receding flood water may also result in high levels of nutrients in the rivers which 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 where dissolved oxygen is at levels that could be detrimental to fish health. These are:

- Darling River from Bourke to Wilcannia
- Niemur River.

In addition to these critical areas, dissolved oxygen levels in the lower Murray River, Wakool River and the Murrumbidgee River at Balranald have only recently improved above the 4 mg/L threshold for fish health and will continue to be monitored over the coming weeks.

The Bureau of Meteorology has forecast air temperatures in these critical areas could increase up to 40°C this week. As air temperature increases, so does the water temperature. The amount of dissolved oxygen water can hold decreases with increasing temperature. The process of bacteria breaking down organic material in the water speeds up as water temperature increases, which uses up the oxygen in the water even faster.

Dissolved oxygen levels – Darling River

Major flooding in the Darling River continues at Menindee. River levels in the Darling River at Pooncarie and Burtundy are rising with major flooding predicted for Burtundy in February. Figure 1 is a Landsat colour infrared image showing the extent of floodwaters at Menindee. The image highlights floodwater spreading out across the floodplains which makes accurately measuring discharge and predicting downstream flood heights difficult.

Figure 1 also highlights some of the darker coloured flood water from Lake Wetherell is 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.

Dissolved oxygen in the Darling River at Bourke has improved above 2 mg/L. Oxygen levels at Wilcannia had improved but have dropped back below 2 mg/L. Dissolved oxygen levels in the upper reaches of Lake Wetherell the Darling River downstream of Menindee at Weir 32 and Burtundy remain 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.

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 as air temperatures increase over summer.



Figure 1: Landsat colour infrared image of the Darling River and Menindee Lakes – 21 January 2023

Dissolved oxygen levels – Wakool and Niemur rivers

At the beginning of January, dissolved oxygen in the Wakool and lower Niemur rivers had been at critical levels for fish health (Figure 2). In the past week, oxygen levels at both monitoring sites on the Wakool River have improved above 4 mg/L. Oxygen levels in waterways that feed into the Wakool River such as Merran and Little Merran creeks have also increased above 4 mg/L.

Dissolved oxygen in the Niemur River at Barham-Moulamein Road has improved back above 4 mg/L (Figure 2). The monitoring site further downstream at Mallan School remains below 2 mg/L. 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 be finding refuge in the oxygenated water closer to the water surface.

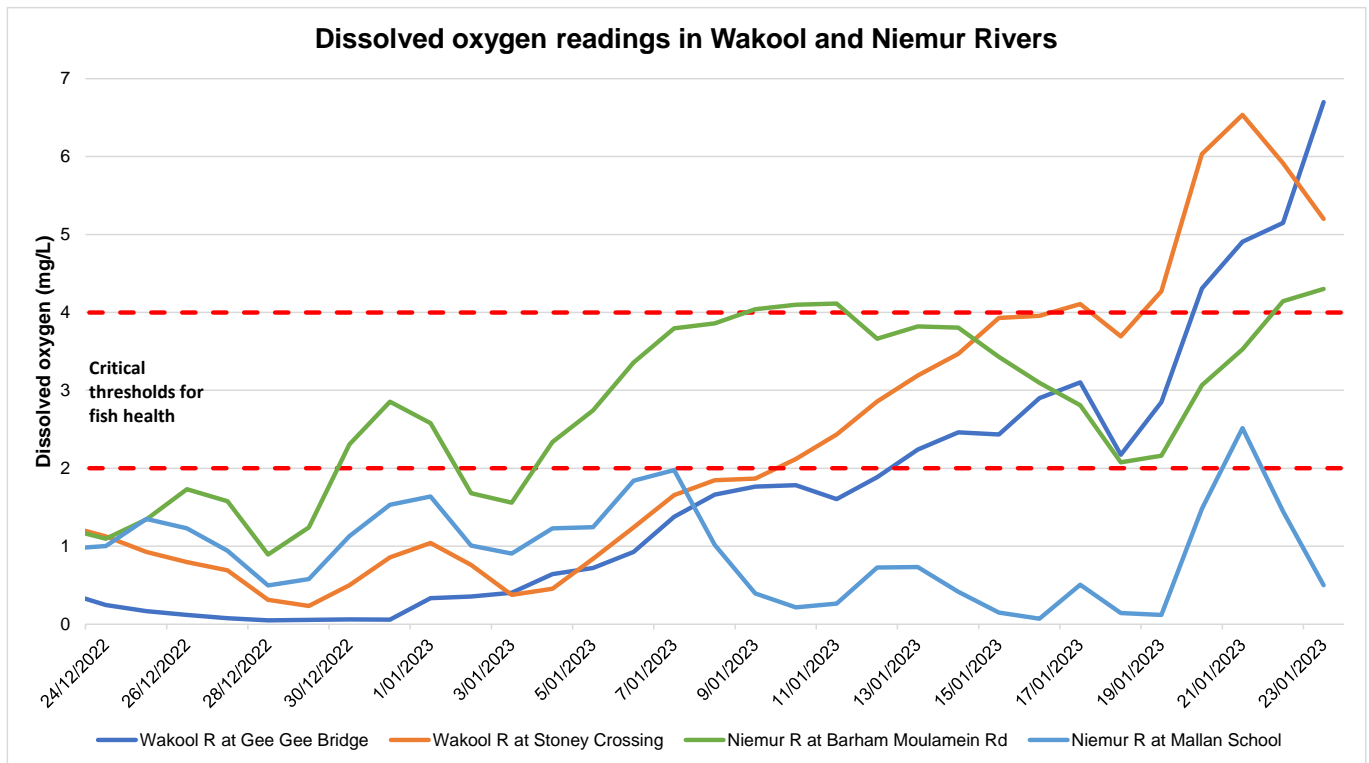


Figure 2: Mean daily dissolved oxygen (mg/L) in the Wakool River at Gee Gee Bridge and Stoney Crossing and Niemur River at Barham-Moulamein Road and Mallan School - 24 December 2022 to 23 January 2023

Dissolved oxygen levels – Murray River

Flood warnings for the Murray River at Wentworth remain at a moderate level. The current and predicted flows in the Darling River are not expected to cause significant river level rises at Wentworth.

Dissolved oxygen levels in the Murray River have been concerning over recent months, however; they are now at levels that are safe for fish health at all monitoring sites. Dissolved oxygen levels in the Murray River at Colignan have improved above the 4 mg/L threshold and remain around 4 mg/L further downstream at Wentworth.

Oxygenated flows from the upper Murray River catchment will assist in diluting the remaining poorer quality floodwaters returning to the main Murray River channel. This will reduce the risk of fish deaths from low oxygen levels over the remaining summer months.

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 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 four new confirmed fish death events related to poor water quality reported in the last week (up to 24 January):

- On 17 January in the Darling River at Tilpa up to tens of thousands of Common Carp, Bony Herring, Murray Cod, Golden Parachanna and Silver Perch have been affected. The suspected cause is critically low dissolved oxygen. The majority of the fish affected are the introduced Common Carp.
- On 19 January, in table drains along Wambianna Road and in Reddenville Break near Gin Gin in the Macquarie catchment, limited numbers of Common Carp and Murray Cod have died. The fish deaths in these shallow isolated pools have been attributed to deteriorating water quality during the recent hot and dry weather, following recession of high flows.
- On 23 January DPI Fisheries received a report from community of dead fish in Ellengerah Creek, nearby to Reddenville Break and investigations are ongoing.
- On 23 January, a community member alerted DPI Fisheries staff to dead Bony Herring in Lake Pamamaroo (part of the Menindee Lakes complex). Photographs supplied confirm the deaths of potentially tens of thousands of Bony Herring along a 5 to 10 km section of the lake edge. These deaths are not attributed to hypoxia. Instead it is likely the fish died after aggregating in large numbers at the lake's inlet structure as flood waters continue to enter the lake. Bony Herring numbers have increased substantially in the Menindee Lakes in recent years due to increased productivity (linked to inflowing waters). With flow rates precluding safe passage through the regulator out of the lake, many have become exhausted at or near the inlet regulator and died before being transported back throughout the lake by wind and flow.

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 for February with a high chance of exceeding the median maximum temperature for March to May. 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@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](#).