

# 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, and implement mitigating measures. This update provides a summary of information collected up to 15 March 2023.

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The main focus of activities is on Menindee Lakes and the lower Darling River. Dissolved oxygen in the Darling River is at levels that could be detrimental to fish health. There are fish deaths (predominantly Bony Herring) in the Darling River between Lake Wetherell (Menindee main weir) and Menindee township.

The Bureau of Meteorology has forecast maximum air temperatures at Menindee will increase to 40°C this weekend, before returning to cooler temperatures again next week. Low intensity heatwave conditions have been forecast from Friday 17 March through to Sunday 19 March. 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. Ongoing monitoring will inform operational measures to mitigate risks to aquatic life as much as possible. NSW and Commonwealth agencies are continuing to assess the risks to fish health in this area.

Further downstream, river levels in the lower Darling River are continuing to recede and are flowing down the Darling River arm of the Wentworth weir pool and merging into the Murray River. As the river level drops, the last of the floodwaters around Burtundy are draining off the floodplain and back into the main river channel. As flows recede, fish can become stranded in disconnected waterbodies and billabongs on the floodplain where they may suffer from declining water depth, dissolved oxygen depletion (particularly overnight when photosynthetic production of oxygen ceases), higher air and water temperatures and exposure to predators as these waterbodies dry out.

Since mid-February fish deaths have been recorded upstream of Pooncarie both in the main channel of the Darling River and in off-channel wetlands and depressions where fish became stranded as water levels dropped. Most of the dead fish were native Bony Herring and non-native Carp, although high numbers of large-bodied native fish such as Murray Cod and Golden Perch were also documented. The stranding of substantial numbers of Murray Cod and Golden Perch during flood recession in this manner is unusual, suggesting fish were avoiding the particularly poor water quality in the river channel during the recession of this flood event. Typically, we expect Murray Cod and Golden Perch to exit off channel habitats before disconnection.

To report 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

Figure 1 is a satellite-derived Sentinel natural colour image of lakes Wetherell, Tandure, Pamamaroo and Menindee on 14 March. The image highlights the darker-coloured low oxygen flood water from the upper Barwon-Darling River is being captured in Lake Wetherell. As a temporary measure to prevent the poorer quality water from Lake Wetherell being drawn through the Pamamaroo outlet and discharged into the Darling River, the inlet regulator between lakes Wetherell and Pamamaroo was closed in late February. The inlet regulator will be opened again this week to allow the water levels between lakes Wetherell and Pamamaroo to even out.

Figure 1 shows dissolved oxygen results (in mg/L) collected 14 March. The samples were taken close to the water surface during the day. The lowest results were collected in the Darling River upstream of Menindee township (1.39 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.

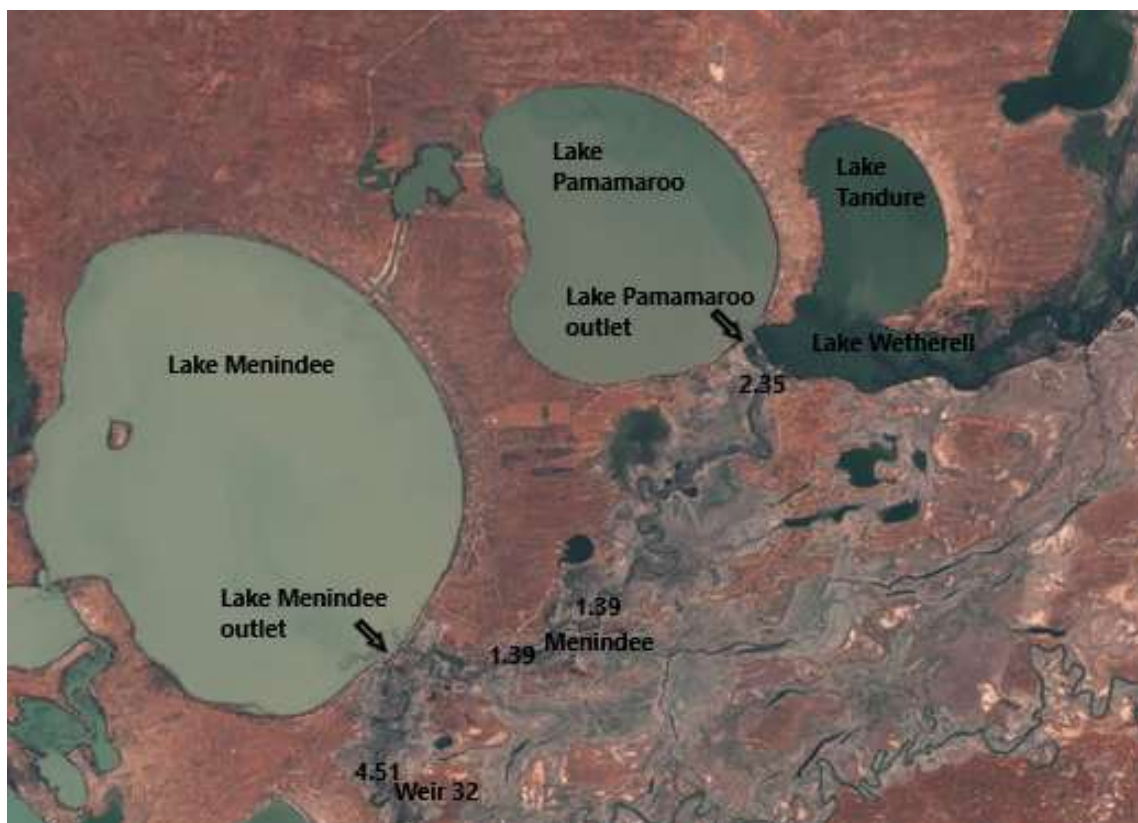


Figure 1: Satellite derived Sentinel natural colour image – Image 14 March. Data collected 14 March (mg/L)

After successive years of high flows and successful fish breeding events, a large biomass of fish is congregating in the reach of the Darling River between Lake Wetherell main weir and Menindee town. There have been reports of fish deaths in this area this week (predominantly Bony Herring) as

dissolved oxygen levels dropped below 2 mg/L. 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.

The majority of water being released to meet flow targets at Weir 32, downstream of Menindee town, is being drawn from Lake Menindee. However, in an attempt to maintain an oxygenated flow in the Darling River through Menindee township and reduce the risk of further fish deaths, releases from the Lake Pamamaroo outlet are being maintained. Releases from Lake Menindee have been reduced to assist in the flow of water from Lake Pamamaroo, past Menindee town and through to the lower Darling River. This action will have an impact on the volume of water in the top lakes.

Lower dissolved oxygen results are also being recorded overnight and early in the morning in the upper reaches of Lake Wetherell.

Dissolved oxygen in the Darling River downstream of Menindee at Weir 32 had been low, decreasing to less than 2 mg/L on 25 February. In response to the operational measures implemented, and the better quality water being drawn from Lake Menindee, dissolved oxygen levels have improved above the safer level for fish health of 4 mg/L (Figure 2).

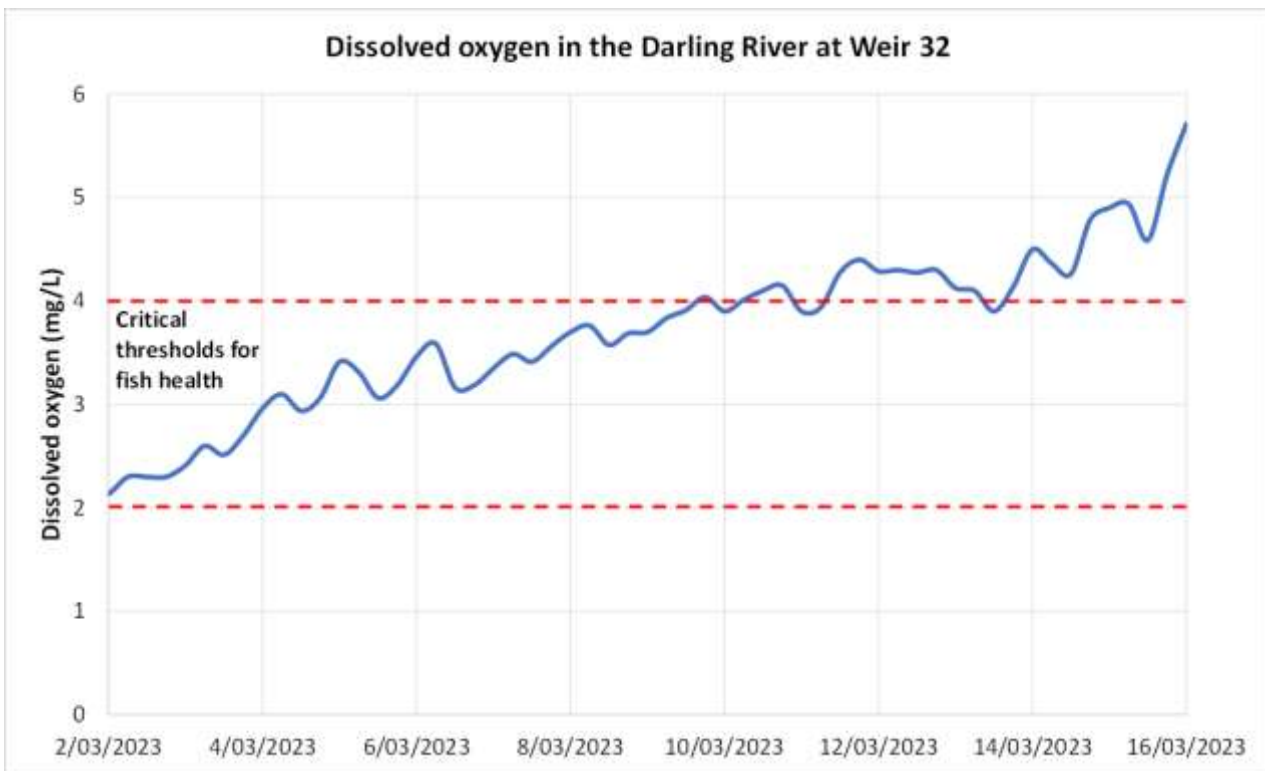


Figure 2: Dissolved oxygen (mg/L) in the Darling River at Weir 32 – 2 to 15 March 2023

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.

## Dissolved oxygen levels – lower Darling River

In the lower Darling River, the majority of the floodwater has returned to the channel with some water remaining in larger billabongs and depressions. Figure 3 is a series of satellite derived Sentinel colour infrared images of the lower Darling River at Burtundy. The image on the left was taken on 27 February during flooding at Burtundy. The centre image (4 March) shows, as river levels drop, floodwater is returning back into the main channel. By 14 March (right) the majority of the floodwater has returned to the channel with the remaining water in larger billabongs and depressions.

As the low oxygen floodwaters continue downstream, dissolved oxygen levels are being monitored in the Darling River arm of the Wentworth weir pool (Lock 10). Results show that dissolved oxygen levels through the weir pool are between 2 and 4 mg/L as the last of the flood water continues down the Darling River arm of the Wentworth weir pool and merges into the Murray River.



Figure 3: Series of satellite derived Sentinel colour infrared images of the lower Darling River at Burtundy. Images 27 February (left), 4 March (middle) and 14 March(right)

## 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.

DPI Fisheries have received reports of additional dead fish in the Darling River near Menindee (downstream of Menindee Main Weir) this week. These deaths are likely related to low dissolved oxygen levels in the water (which we are seeing in other areas where flood waters are receding). Hot temperatures this week, coupled with high biomass in the water, are exacerbating this hypoxia, causing ongoing high risk of fish deaths. Large numbers of Bony Herring, potentially hundreds of thousands, are being affected with the potential for large-bodied native fish, such as Murray Cod and Golden Perch, to also be affected.

In the last few weeks there have been confirmed fish deaths in the Darling River upstream of Pooncarie related to poor quality floodplain return water and the stranding of fish in off channel wetlands as the river disconnected. Large numbers of Bony Herring and Carp were affected with increasing numbers of large-bodied native fish, such as Murray Cod and Golden Perch, also dying.

The speed of the recession of floodwater is typical of floods in the lower Darling River, which makes the stranding of these native species in this manner somewhat unusual, as the fish appear to have avoided returning to the river channel, presumably because the quality of the water in the channel at the time was poorer relative to that on the floodplain.

NSW agencies are working together to investigate and determine if any other native fish have been affected. There may be other fish death incidents that have not yet been reported directly to NSW DPI 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?

Water for the environment is being delivered to reduce the risk of fish deaths by maintaining oxygenated releases from the Menindee Lakes and providing of water between Main Weir and Weir 32. With forecast heatwave conditions this weekend, to maintain an oxygenated flow in the Darling River through Menindee township and reduce the risk of further fish deaths, releases from the Lake Pamamaroo outlet will continue. Releases from Lake Menindee have also been reduced to assist in the flow of water from Lake Pamamaroo, past Menindee town and through to the lower Darling River. The discharge will attempt to maintain flow velocity that research has shown provides conditions that are less favourable for harmful algal bloom formation. Ongoing monitoring will identify if the operations achieve the desired results.

There are no operational measures available to reduce the current risk of further fish deaths in the lower Darling River downstream of the Menindee Lakes. Oxygenated water is being released from Lake Menindee, but this will take some weeks to pass along the system. The volume of water being released will not be sufficient to reconnect billabongs on the floodplain to allow any remaining stranded fish to return to the main river channel.

### Weather outlook

The Bureau of Meteorology has forecast median maximum air temperatures will remain higher than the median for April with a very high chance of exceeding the median maximum temperature for April to June across most of NSW. The forecast is that rainfall figures for April through to June will be lower than historic averages for the majority of NSW. 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](mailto: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: [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: [www.industry.nsw.gov.au/water/allocations-availability/droughts-floods/drought-update/managing-drought-recovery/blackwater](http://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](#).