

Murray Darling Basin – water quality and dissolved oxygen results

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 27 April 2023.

On 16 and 17 March there were mass fish deaths in the reach of the Darling River between Lake Wetherell Main Weir and Menindee town. On 28 March additional fish deaths were reported in the Darling River between Menindee town and Menindee Creek, with tens to hundreds of dead Golden Perch and Silver Perch observed.

There remains a high risk of further fish deaths as fish in an already stressed condition succumb to 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 hence more susceptible to environmental stresses, like low oxygen levels and changes in water temperature.

To maintain an oxygenated flow in the Darling River through Menindee township, releases of water from the Lake Pamamaroo outlet are continuing, although volumes are being reduced. Releases from Lake Menindee are also being reduced to assist in the flow of water from Lake Pamamaroo past Menindee town, as well as to manage flow targets further downstream.

The progression of poor quality water from Menindee down the lower Darling River in March, resulted in additional deaths of fish downstream, including thousands of Bony Herring and hundreds of large-bodied native fish including Golden Perch, Silver Perch and Murray Cod. Dissolved oxygen levels have been improving gradually at locations monitored in the lower Darling River. Further fish deaths are still a possibility in the lower Darling River in coming weeks.

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

Dissolved oxygen levels – Darling River at Menindee

Water quality data indicates that dissolved oxygen levels in the Darling River from Lake Pamamaroo to Menindee town are currently all above 5 mg/L. Monitoring undertaken in Menindee Lakes highlights that the water being released from Lakes Pamamaroo and Menindee is oxygenated and

above the safe threshold for fish health. Releases from both Lake Pamamaroo and Lake Menindee continue to be managed day-by-day to minimise the risk of hypoxia-related fish deaths in the lower Darling River.

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 is a Google Earth image showing the location and results from the survey of dissolved oxygen levels down the Darling River on 24 April from Lake Pamamaroo to Menindee town. The results show that there was a slight decrease in oxygen levels with distance down the Darling River.



Figure 1: Google Earth image showing dissolved oxygen results (mg/L) from the Lake Pamamaroo outlet to Menindee Creek on 24 April

Frequent longitudinal surveys of dissolved oxygen have been undertaken down this reach of the Darling River over recent weeks. Figure 2 shows that over time, dissolved oxygen levels have been improving in response to the operational measures in place.

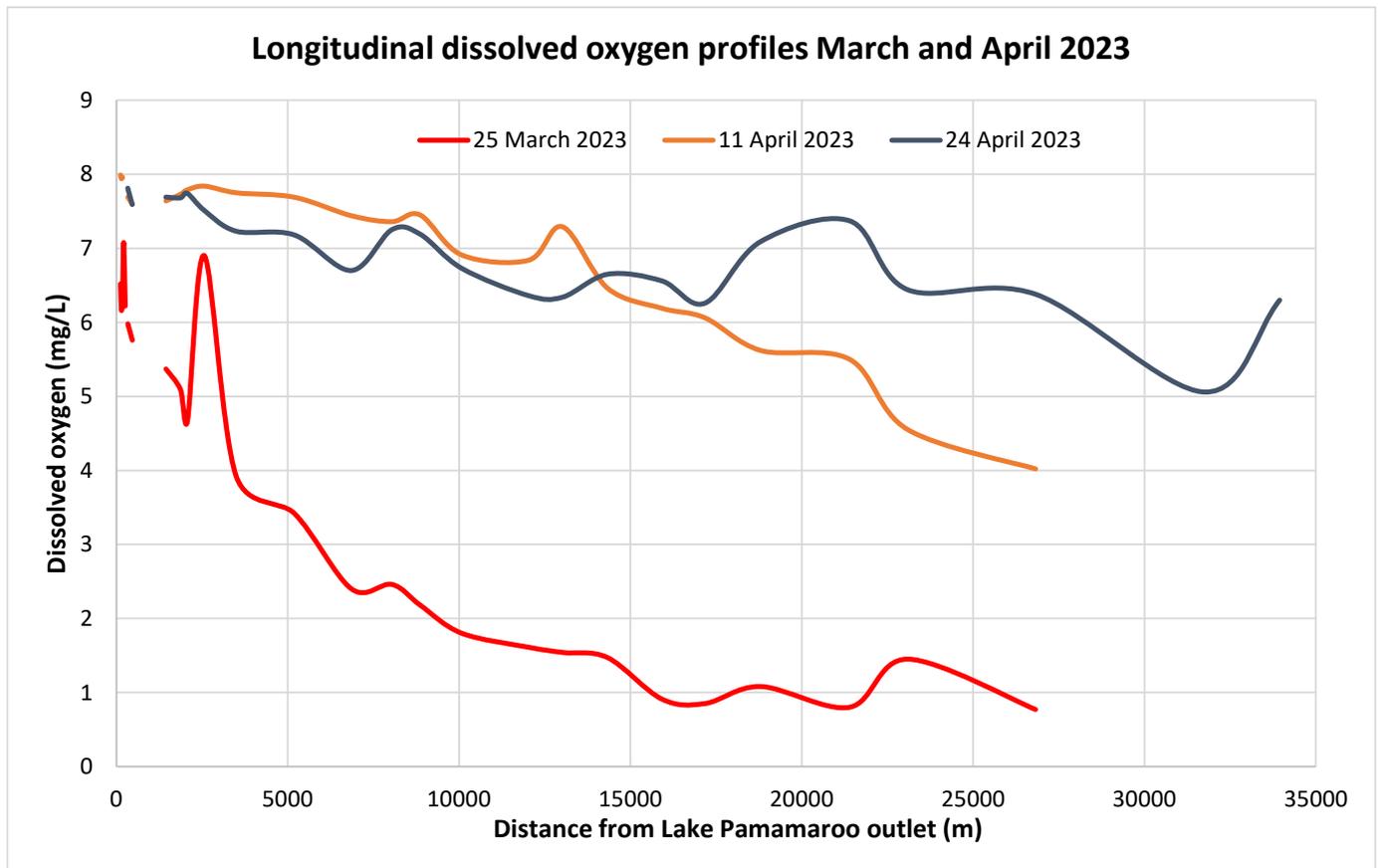


Figure 2: Comparison of dissolved oxygen results (mg/L) from the Lake Pamamaroo outlet to Menindee town. The most downstream measurement on 24 April is downstream of Menindee Creek.

Data from WaterNSW dissolved oxygen sensors at the Menindee pump station, Menindee Town, and further downstream at Weir 32 are shown in Figure 3. These sensors are set at various depths so may not always reflect the readings taken at the water surface. They indicate daily fluctuations in dissolved oxygen, with replenishment during the day, but decreasing overnight. Daytime dissolved oxygen levels have been steadily increasing at the Menindee sites over the past few days.

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.

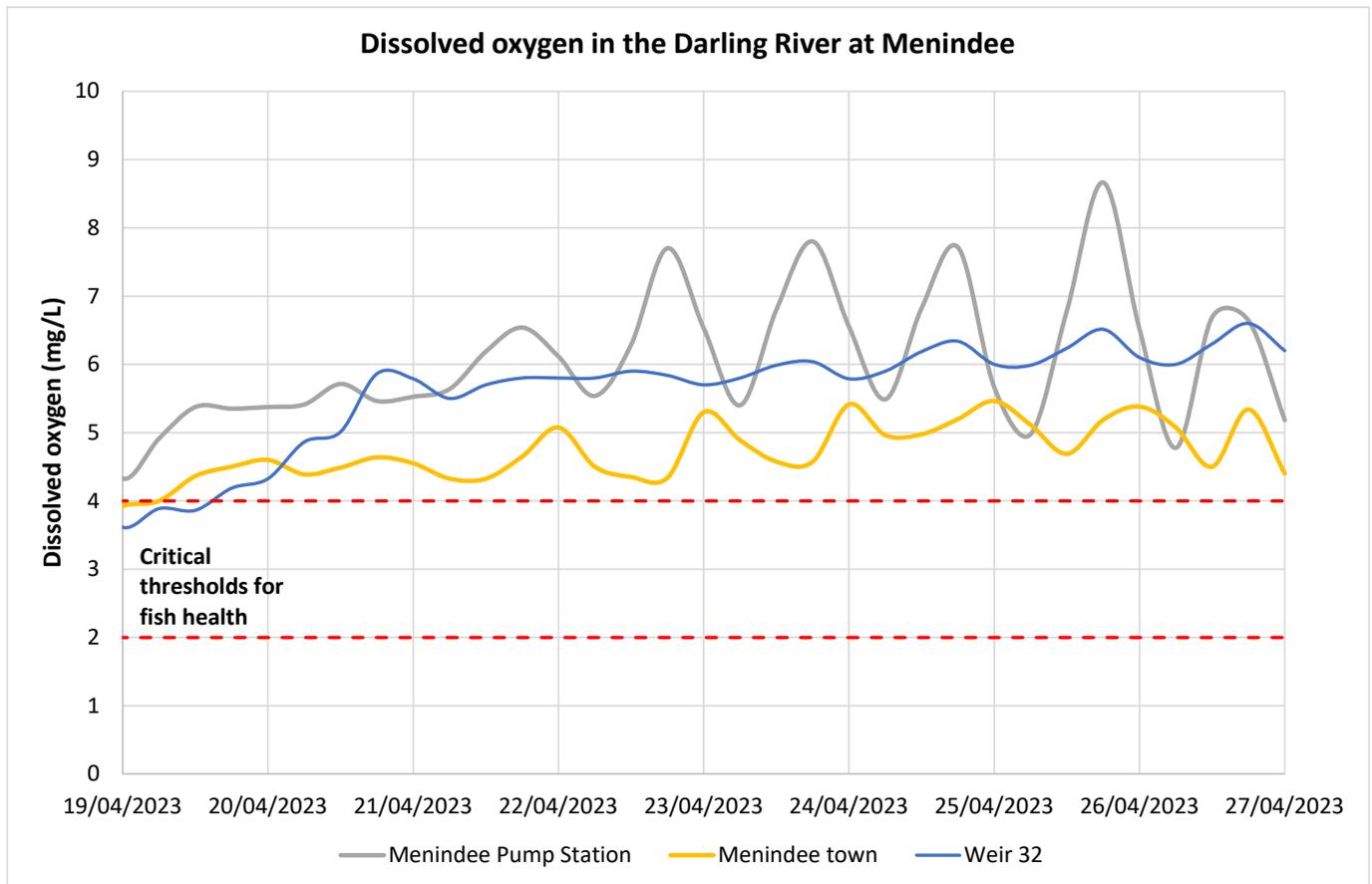


Figure 3: Dissolved oxygen (mg/L) in the Darling River at Menindee: Menindee pump station, Menindee town and Weir 32 – 19 April to 26 April 2023

Dissolved oxygen levels – lower Darling River

Downstream of the Menindee Lakes, dissolved oxygen levels in the Darling River were also low for several weeks following the recession of floodwaters. Poor quality water from the Menindee town weir pool at the time of the mass fish deaths (mid-March) further reduced oxygen levels. This resulted in additional deaths of fish along the Darling River downstream of the Menindee Lakes, including thousands of Bony Herring and hundreds of large-bodied native fish including Golden Perch, Silver Perch and Murray Cod. Dissolved oxygen levels at sites in the lower Darling have improved over the past few weeks.

Table 1 shows recent dissolved oxygen data in the lower Darling River from Moorara (upstream of Pooncarie) down to Tapio in the Wentworth weir pool. Critical readings below 2 mg/L have been highlighted in red. Figure 4 shows dissolved oxygen results for the Darling River at Burtundy over the last 7 days. These are now above critical levels for fish health.

Table 1: Dissolved oxygen (mg/L) readings in the Darling River between Weir 32 and Tapio

Monitoring site	30/3/23	31/3/23	1/4/23	2/4/23	3/4/23	4/4/23	6/4/23	11/4/23	13/4/23
Darling River at Moorara		1.33	1.38	1.71					
Darling River at Pooncarie	1.66	1.75	1.77	2.18	2.56		2.72		3.93
Darling River at Lethero	1.82	2.07	1.95	2.14	2.53				
Darling River at Ellerslie	2.75	3.08	3.15	3.42		5.44		5.70	
Darling River at Tapio	4.04	3.48	3.70	4.27		5.51		6.03	

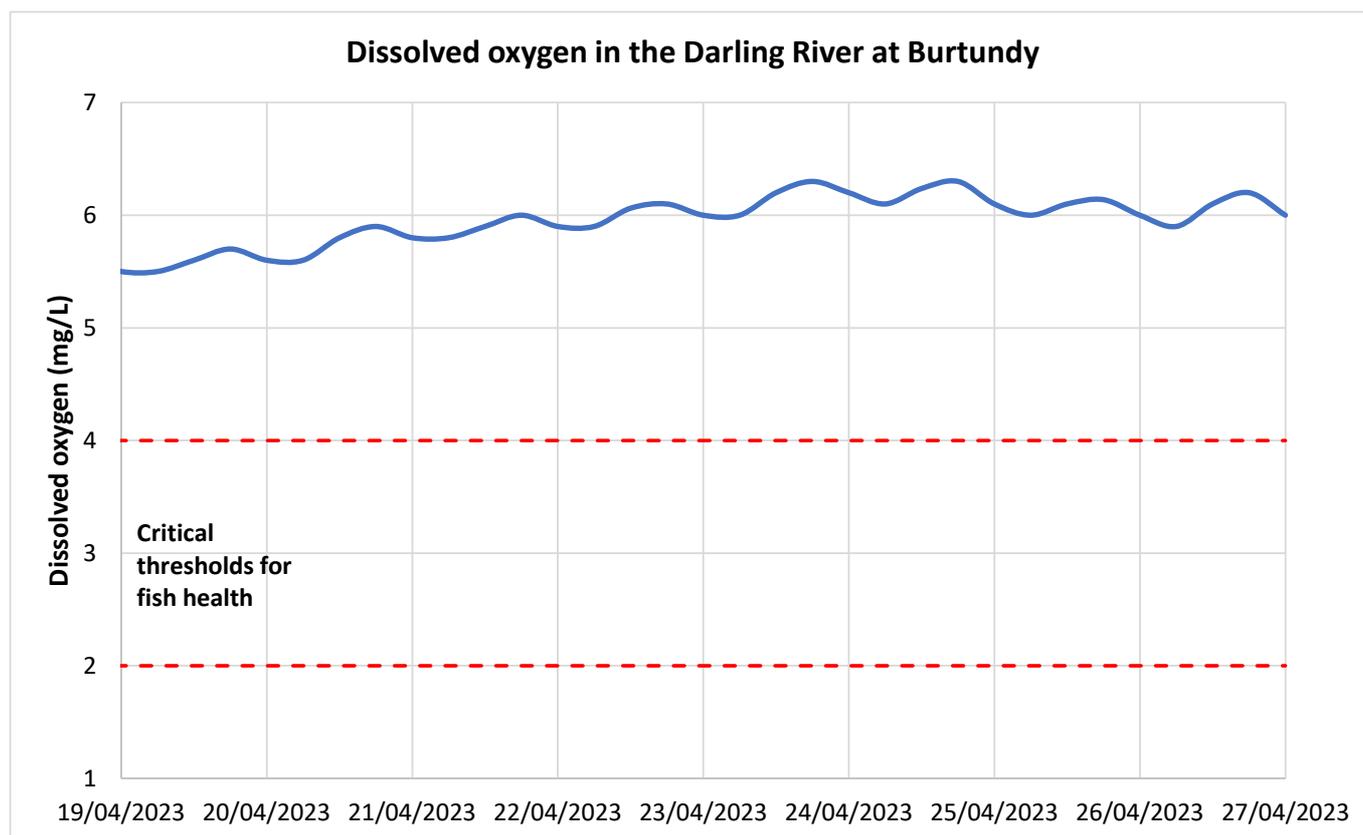


Figure 4: Dissolved oxygen (mg/L) in the Darling River at Burtundy – 19 April to 26 April 2023

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

On 16 and 17 March there were mass fish deaths in the reach of the Darling River between Lake Wetherell main weir and Menindee town as a result of hypoxia (low dissolved oxygen). Hot temperatures coupled with high biomass of fish and organic matter in the water exacerbated the existing low oxygen conditions in this area. The dead species were predominantly Bony Herring, with large-bodied natives (Murray Cod and Golden Perch) also observed in this event. On 28 March additional fish deaths in the Darling River between Menindee town and Menindee Creek were reported, with tens to hundreds of dead Golden Perch and Silver Perch observed.

On Tuesday 18 April a small number (tens) of dead Golden Perch and Bony Herring were observed in the Darling River approximately 600 m downstream from Main Weir. It was noted that dissolved oxygen levels in this area were good at the time and some of the Golden Perch appeared to have lesions suggesting they were in poor condition prior to death and succumbed even though dissolved oxygen levels were above thresholds for fish survival. There remains a significant risk of further fish deaths as fish that may be in poor condition from previous low oxygen conditions and may be more susceptible as temperatures decrease and flow rates recede.

There have been observations of small numbers (tens to hundreds) of dead Bony Herring in the reach downstream from the Lake Pamamaroo Outlet on 26 April. The dissolved oxygen levels in this reach have improved and are above levels for fish health, so it is likely these fish were in poor condition from previous stress and have now died as a result of lack of food resources and competition with Carp.

What is being done?

Emergency releases of well oxygenated water are being made from the Menindee Lakes to maintain flow between Pamamaroo outlet and Weir 32 with the aim of reducing the risk of further fish deaths. These releases are gradually being reduced. This water is being debited from environmental water accounts. Ongoing monitoring will identify if the operations achieve the desired results and be used to inform future operational decisions.

To reduce the future risks to native fish that are already in poor condition, a commercial fishing contractor has been engaged to harvest live Carp since Sunday 23 April to reduce competition for resources. Carp removal is being conducted in a discrete section between Menindee township and Lake Pamamaroo Outlet where Carp have accumulated and are competing with native fish for food and oxygen. Carp removal would not have prevented the mass fish death incident in March 2023 (as that was caused by the return of large volumes of organic-rich floodwater from floodplains using up dissolved oxygen), however; it offers an opportunity support the remaining native fish population in the impacted area.

There are no other 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.

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 algal numbers are in the amber alert range for recreational use at numerous sites ([Algae Alerts NSW map - WaterNSW](#)).

At amber alert warning levels, blue-green algae may be multiplying in numbers. The water may have a green tinge and musty or organic odour. The water should be considered as 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. The water remains suitable for recreational use, however algal concentrations can change rapidly. 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@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

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](#).