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 3 July 2023.

To maintain an oxygenated flow in the Darling River through Menindee township, the release of water from lakes Pamamaroo and Menindee is continuing, although volumes were reduced last week to preserve the water resource stored in the upper lakes.

Monitoring is showing improved dissolved oxygen levels in the Darling River at Menindee over the past two weeks. In addition to the release of oxygenated water from lakes Pamamaroo and Menindee, the cooler water temperatures (as air temperatures fall) are providing an opportunity for dissolved oxygen levels to recover.

There remains a risk of further fish deaths in the Darling River at Menindee as fish in an already stressed condition may succumb to any decrease in dissolved oxygen, increased competition for depleting foodweb 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 are more susceptible to environmental stresses like colder water temperatures. There are still large numbers of Bony Herring and Carp in the reach of Darling River downstream of Lake Pamamaroo.

To report any 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 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

Dissolved oxygen levels – Darling River at Menindee

The inlet between Lake Wetherell and Lake Pamamaroo has been open since 9 June. A Planet satellite image from 23 June shows the green coloured, less turbid water from Lake Wetherell flowing through the inlet into the more turbid water of Lake Pamamaroo (Figure 1). An additional temporary dissolved oxygen sensor has been installed in the Darling River downstream of Lake Wetherell Main Weir to assess if less-oxygenated water entering Lake Pamamaroo from Lake Wetherell is being drawn through the Lake Pamamaroo outlet and into the Darling River. Monitoring since the initial opening of the Pamamaroo inlet has shown dissolved oxygen levels in the Darling River have not been adversely impacted.

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Figure 1: Planet satellite image showing water from Lake Wetherell entering Lake Pamamaroo through the Pamamaroo inlet – 23 June 2023

Figure 2 is a Google Earth image showing the location and results from the survey of dissolved oxygen levels down the Darling River on 27 June from Lake Pamamaroo, through Menindee town and down past the junction with the inflow from Lake Menindee. The results show that there was a gradual decrease in oxygen levels with distance down the Darling River, with a slightly more rapid decline downstream from the Menindee railway bridge. The lowest result was immediately upstream of the Darling River-Menindee Creek junction (6.64 mg/L). This is much higher than the result collected at this site on 14 June (3.46 mg/L). Dissolved oxygen levels in the Darling River improve again following dilution by the oxygenated water being released from Lake Menindee. 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.

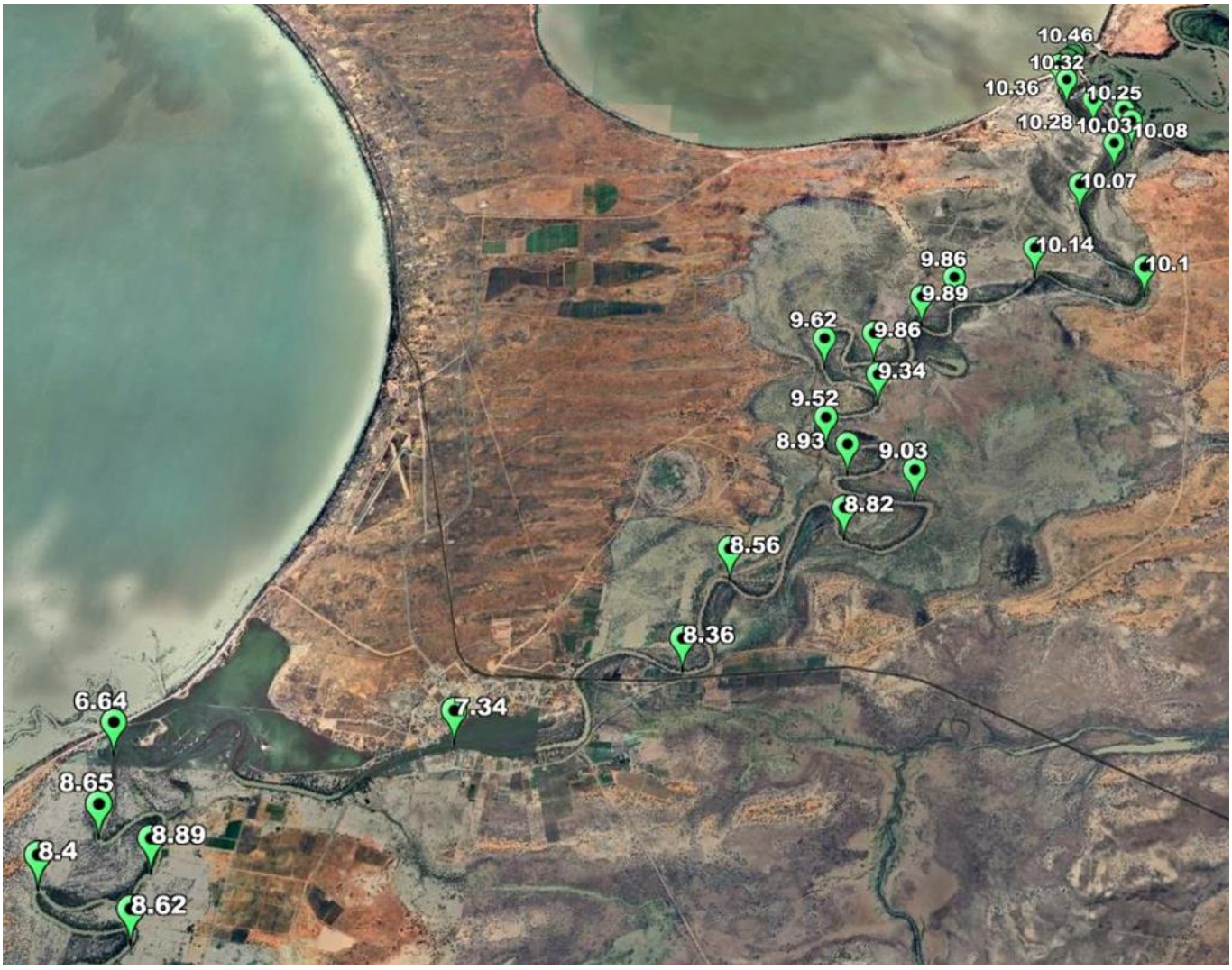

Figure 2: Google Earth image showing dissolved oxygen results (mg/L) from the Lake Pamamaroo outlet to downstream of the Darling River-Menindee Creek junction on 27 June 2023

Frequent longitudinal surveys of dissolved oxygen have been undertaken by WaterNSW down this reach of the Darling River. Figure 3 shows that dissolved oxygen levels have continued to improve since the initial profile undertaken on 25 March. Dissolved oxygen levels increased in April but were still below the critical threshold for fish health of 4 mg/L in the vicinity of Menindee town. During May, oxygen levels improved to above 4 mg/L. The most recent survey undertaken on 27 June shows oxygen levels are the highest they have been for some months and are above critical levels for fish health.

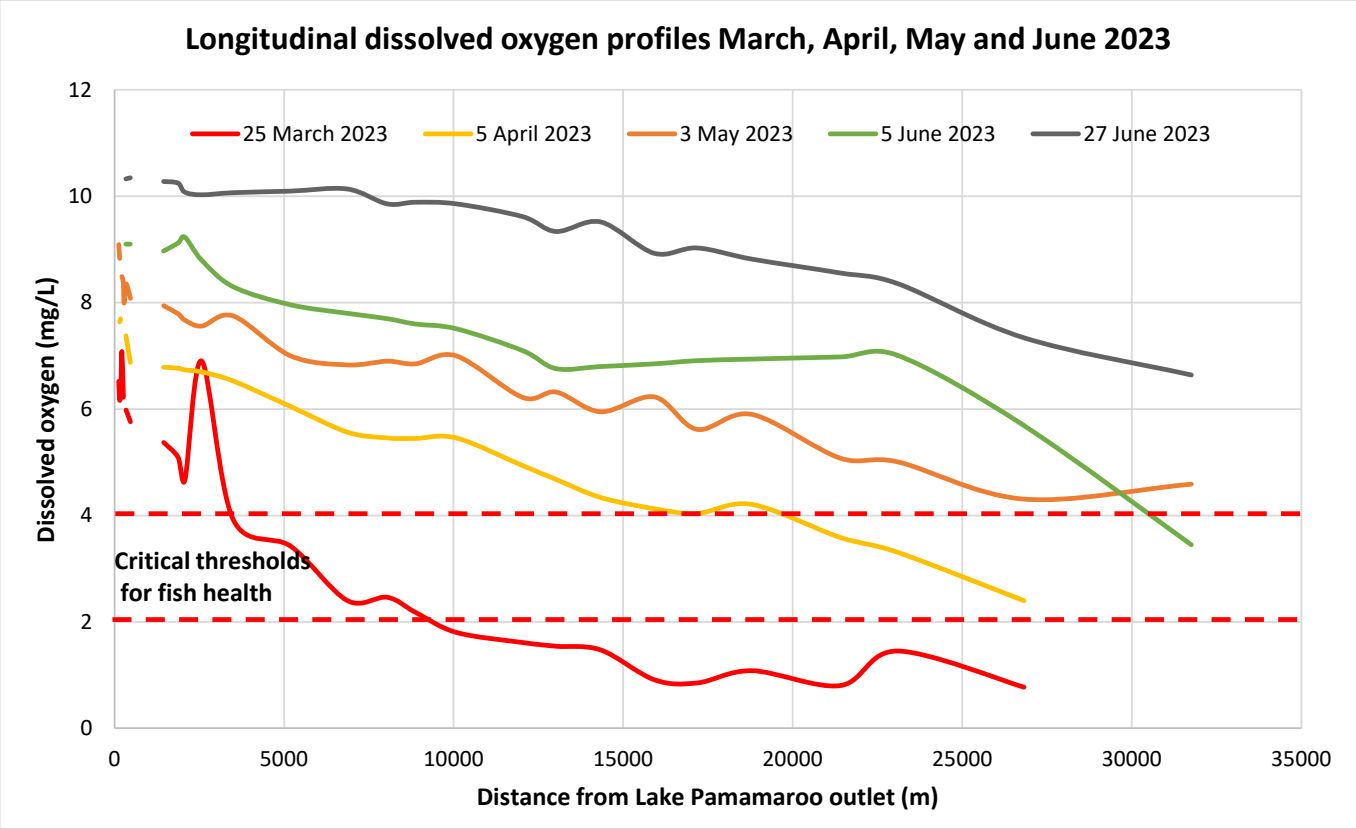

Figure 3: Comparison of dissolved oxygen results (mg/L) from the Lake Pamamaroo outlet to Menindee town on 25 March and 5 April and to Menindee Creek junction on 3 May and 5 and 27 June 2023

Data from WaterNSW dissolved oxygen sensors downstream of Lake Wetherell Main Weir, at the Menindee pump station, Menindee town, and further downstream at Weir 32, are shown in Figure 4. These sensors are set at various depths so may not always reflect the readings taken at the water surface. The new temporary sensor installed downstream of Lake Wetherell Main Weir is showing the water being released from Lake Pamamaroo is well oxygenated. Dissolved oxygen levels at the two sites near Menindee (Menindee pump station and Menindee town) have been fluctuating from day to day. The sensor at the pump station is located closer to the water surface and is showing oxygen levels are remaining above the fish health threshold of 4 mg/L. The sensor at Menindee town is located closer to the riverbed (where dissolved oxygen levels can be lower than shallow areas) and has also been recording oxygen levels above 4 mg/L, indicating that oxygen is being mixed through the whole water column.

Dissolved oxygen levels in the Darling River at Weir 32 decreased below 4 mg/L on 24 June, but quickly recovered to 8 mg/L.

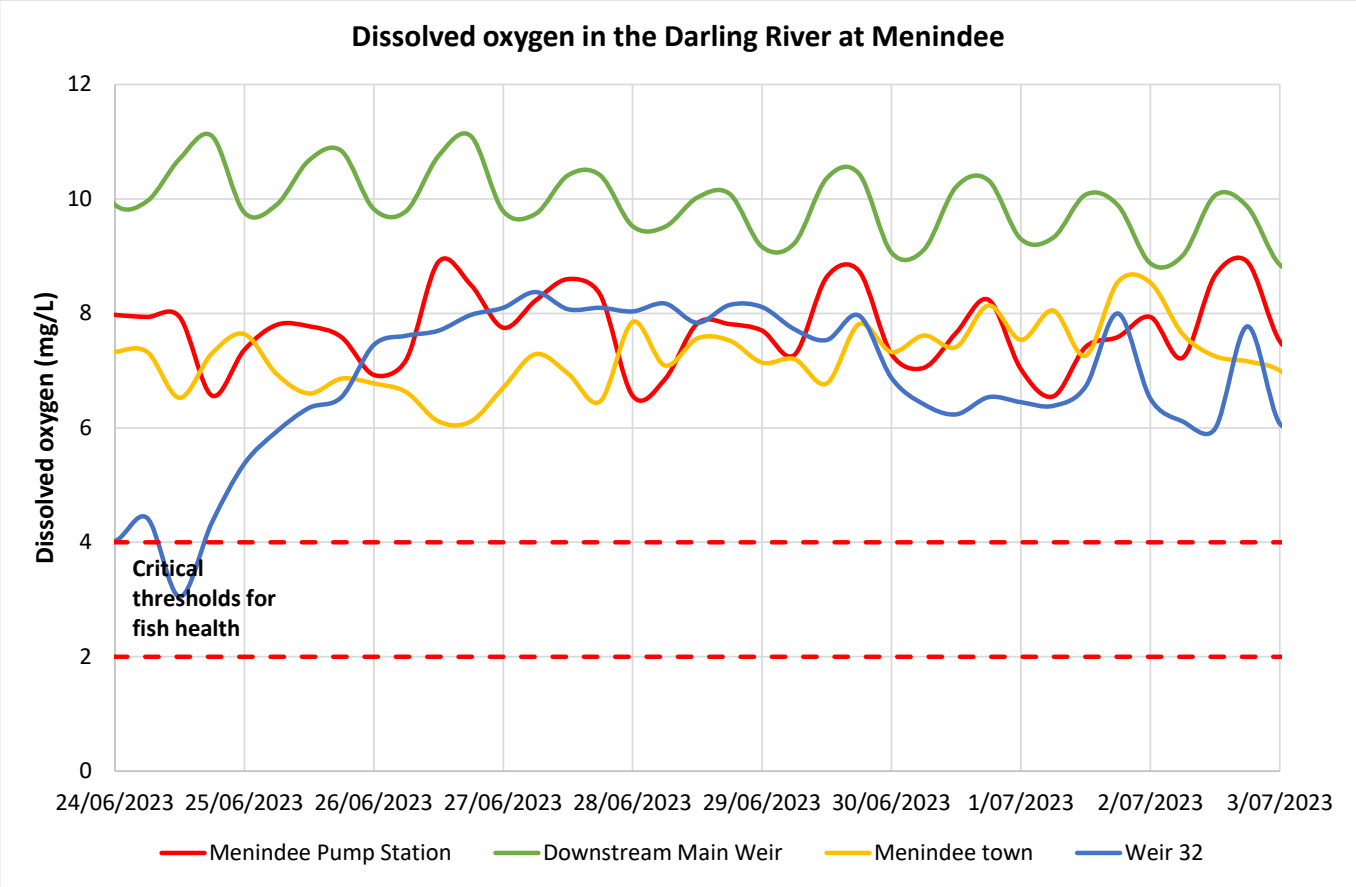

Figure 4: Dissolved oxygen (mg/L) in the Darling River at Menindee: Menindee pump station, Menindee town and Weir 32 – 23 to 30 June 2023

Monitoring is showing dissolved oxygen levels in the Darling River at Menindee have continued to improve. In addition to the release of oxygenated water from lakes Pamamaroo and Menindee, water temperatures have been slowly falling as air temperatures cool. The amount of dissolved oxygen water can hold increases with decreasing water temperature. The process of bacteria breaking down organic material in the river slows down as water temperature decreases, which uses up less oxygen. The combination of these two processes is providing an opportunity for dissolved oxygen levels to recover.

In response to the improved oxygen conditions and continuing cooler temperatures through winter, releases from lakes Pamamaroo and Menindee were reduced last week to further preserve the water resource stored in the lakes, but still maintain flows above operational flow targets at Weir 32. 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. Releases from both Lake Pamamaroo and Lake Menindee continue to be managed to minimise the risk of further hypoxia-related fish deaths in the Darling River at Menindee.

Hypoxia-related fish death summary

In the past eight months, NSW DPI Fisheries has received reports of fish deaths, fish struggling and crustaceans leaving the water across many areas in the Murray-Darling Basin, including in the Darling, Murray, Kolety/Edward, Wakool, Murrumbidgee, Lachlan, Gwydir, Barwon, Namoi and Macquarie rivers and Yanco-Billabong Creek system.

In the past week to 3 July, there has been a report of fish deaths in the Darling River near the Lake Pamamaroo outlet, with tens to hundreds of dead Carp observed. These fish likely succumbed as a result of reduced health and condition from a lack of foodweb resources, and additional 'winter stress' from reduced temperatures.

There remains a risk of further fish deaths in the Menindee area as fish (particularly Bony Herring) may be in poor condition from previous low oxygen conditions and may be more susceptible as temperatures decrease and reduced flow rates.

At Lake Wyangan near Griffith, a small number (less than 10) dead Bony Herring were reported on 26 June, along with a large aggregation of small Carp. It is expected that cooler temperatures in the region, as well as reduced flows into the system may have affected these fish, with Bony Herring known to be susceptible to sudden reductions in temperature.

What is being done?

Emergency releases of oxygenated water from the Menindee Lakes are continuing. This is to maintain flow between Lake Pamamaroo outlet and Weir 32 with the aim of reducing the risk of further fish deaths. These releases have been gradually reduced to preserve the water resource in the upper lakes. This water is now being debited from the Lower Darling Environmental Water Allowance. Ongoing dissolved oxygen monitoring will identify if the operations continue to achieve the desired result of improved dissolved oxygen levels and will be used to inform future operational decisions.

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 a red alert warning for recreational use in Talyawalka Creek at the Menindee-Pooncarie Road, with algal numbers at most sites in the Menindee Lakes area remaining in the amber alert range for recreational use (Algae Alerts NSW map - WaterNSW). When a red alert warning is in place, people should avoid recreational activities that brings them into contact with the water and drinking untreated water. At the amber alert warning level, blue-green algae may be multiplying in numbers but remains suitable for recreational use. The water may have a green tinge and musty or organic odour.

The water should be considered 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. 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@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.