

# 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 responding to the mass fish death event in the Darling River. This update provides a summary of information collected up to 29 March 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. The dead fish species were predominantly Bony Herring, with large-bodied natives including Murray Cod and Golden Perch, and some non-native Carp, also observed in this event.

To maintain an oxygenated flow in the Darling River through Menindee township, releases of better quality water from the Lake Pamamaroo outlet is continuing. Releases from Lake Menindee have been reduced to assist in the flow of water from Lake Pamamaroo past Menindee town, and to manage flow targets further downstream.

Whilst these operational measure are assisting with dissolved oxygen levels downstream of Menindee Main Weir and Lake Pamamaroo outlet, water quality monitoring in the area is showing that oxygen levels are remaining below the critical threshold for fish health of 2 mg/L further downstream at Menindee township. 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.

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.

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](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 Planet satellite image showing the Darling River and Menindee Lakes at Menindee on 25 March. Dissolved oxygen monitoring results (mg/L) collected near the water surface on 28 March have been added to Figure 1.

Water quality data indicates reasonable dissolved oxygen levels in water released to the Darling River from Lake Pamamaroo, but longitudinal oxygen monitoring has demonstrated progressive reduction in dissolved oxygen levels downstream past Menindee town to the Menindee Creek Junction, where releases from Lake Menindee again replenish oxygen levels. These low dissolved oxygen levels resulted in the deaths of large-bodied native fish between Menindee town and Menindee Creek on 28 March, and there is an ongoing risk of further fish deaths in this area.

Figure 1 also highlights the dark green coloured water from Lake Wetherell flowing into Lake Pamamaroo and across to the Lake Pamamaroo outlet. This does not appear to be negatively impacting the oxygen levels of the water being released from Lake Pamamaroo into the Menindee town weir pool. Monitoring of water quality in Lake Wetherell, just upstream from Lake Pamamaroo, this week by WaterNSW has confirmed dissolved oxygen levels in water passing to Lake Pamamaroo are generally above 4 mg/L. Ongoing monitoring will identify if water being drawn into the Pamamaroo outlet deteriorates.

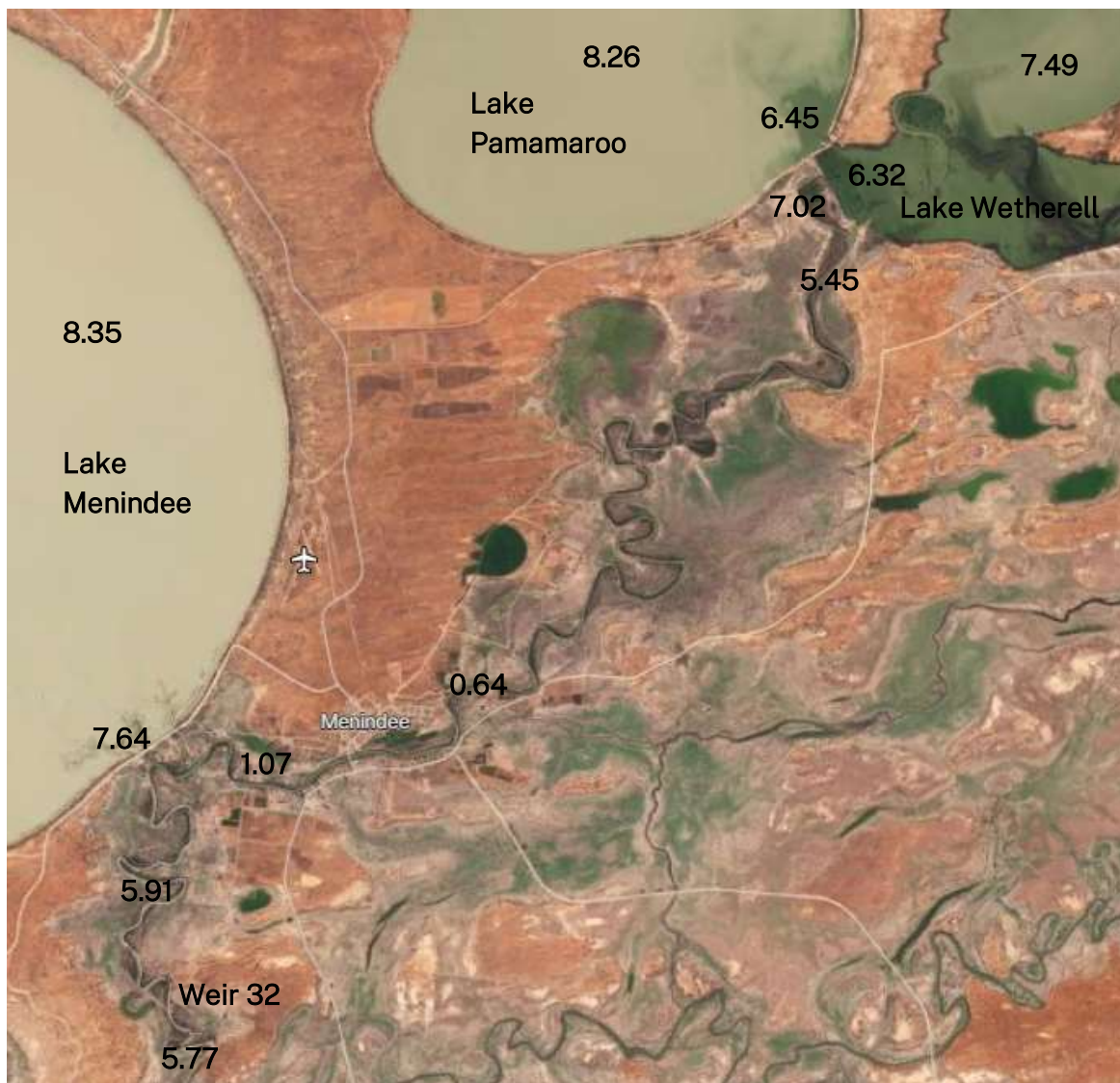


Figure 1: Planet satellite image – Image 25 March. Dissolved oxygen data (mg/L) collected 28 March



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.

Figure 2 is a Google Earth image showing the location and results from the survey of dissolved oxygen levels down the Darling River on 29 March. The results show that despite the continued release of oxygenated water from Lake Pamamaroo, there was a gradual decrease in oxygen levels with distance down the Darling River. Generally 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. Most of this reach of river had dissolved oxygen levels below the critical threshold of 2 mg/L.



Figure 2: Google Earth image showing dissolved oxygen results from the Lake Pamamaroo outlet to Menindee town - 29 March

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 indicate diurnal (daily) fluctuations in dissolved oxygen, with replenishment during the day but decreases overnight. The data also demonstrates that releases of oxygenated water from Lake Menindee are mixing with, and replenishing oxygen levels in, the water progressing from upstream i.e. released from Lake Pamamaroo and passing Menindee town.

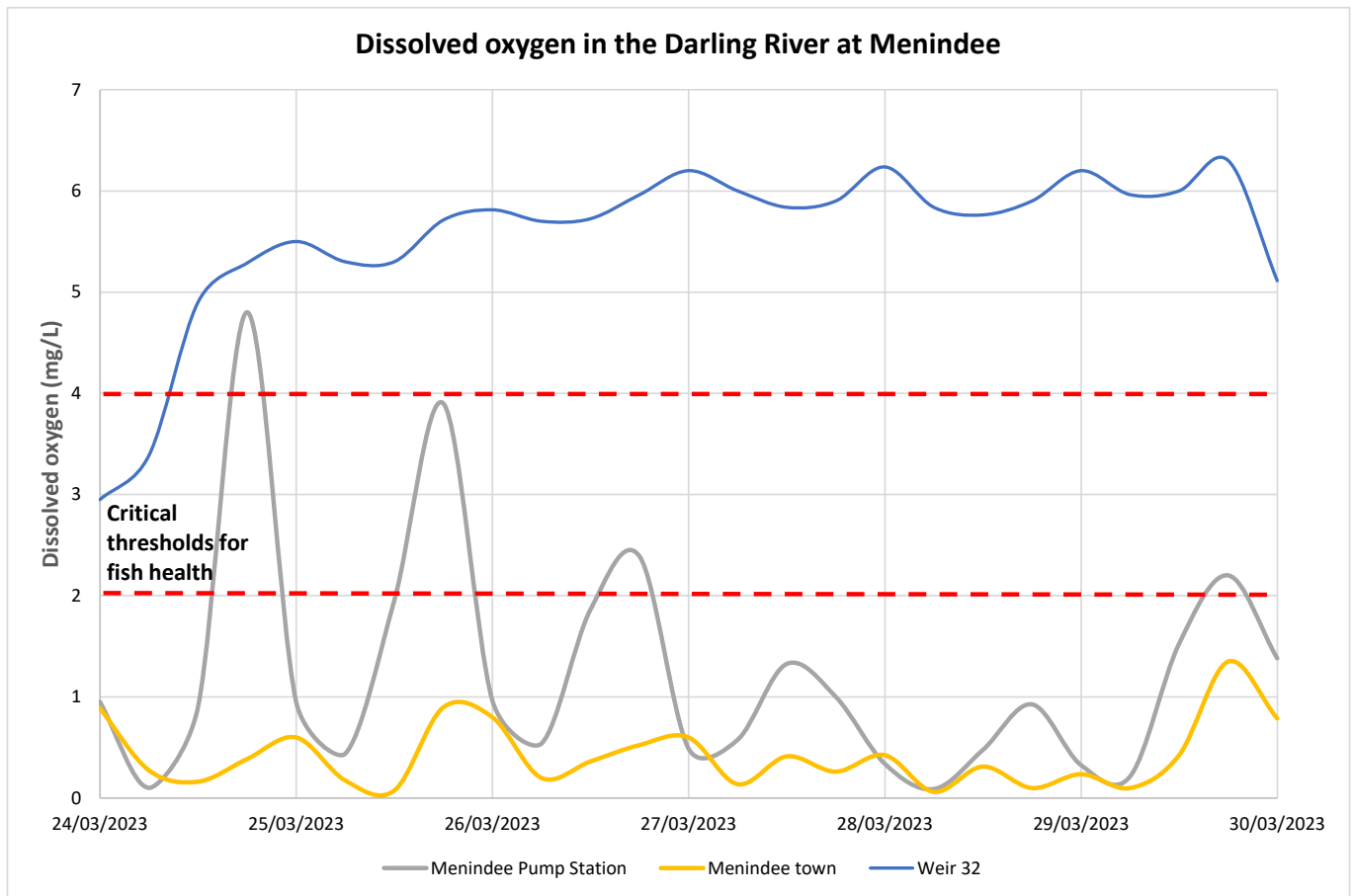


Figure 3: Dissolved oxygen (mg/L) in the Darling River at Menindee: Menindee pump station, Menindee town and Weir 32 – 24 to 29 March 2023

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

Downstream of the Menindee Lakes, dissolved oxygen levels in the Darling River have also been low for several weeks following recession of floodwaters. Furthermore, poor water from the Menindee town weir pool at the time of the mass fish deaths (mid-March) is progressing downstream, further reducing oxygen levels. The progression of this front of poor water resulted in additional deaths of fish along the Darling River downstream of the Menindee Lakes, including thousands of Bony Herring, and hundreds of larger-bodied native fish including Golden Perch, Silver Perch and Murray Cod. This front reached Pooncarie on 26 March with reports of fish struggling and dying near town and at the Pooncarie weir. This front of low dissolved oxygen water is now progressing downstream towards Burtundy weir and further fish deaths are possible in the Darling River from Pooncarie through to Wentworth in coming weeks.

Table 1 shows recent dissolved oxygen data in the lower Darling River with critical readings below 2 mg/L highlighted in red and Figure 4 shows results for Burtundy over the last 6 days.

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

Monitoring site	24/3/2023	25/3/2023	26/3/2023	27/3/2023	28/3/2023	29/3/2023
Darling River at Karoola	0.82	2.77		2.67	2.64	1.80
Darling River at Moorara	0.51	0.63	0.67	0.54	0.99	
Darling River at Pooncarie	2.87	2.23	1.13	0.76	0.76	1.03
Darling River at Lethero		3.47	3.34	1.36		
Darling River at Ellerslie		3.84	3.94	3.63		3.73

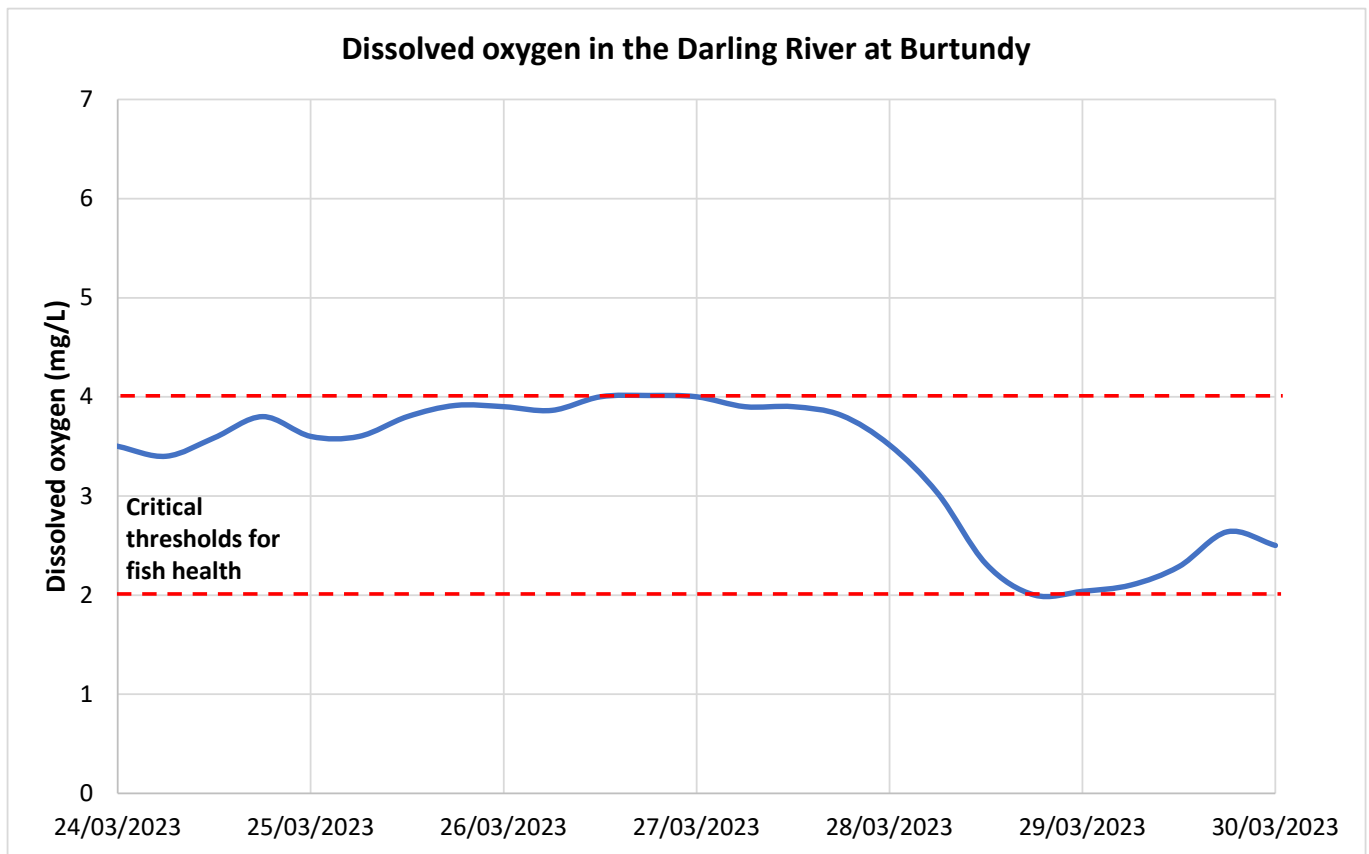


Figure 4: Dissolved oxygen (mg/L) in the Darling River at Burtundy – 24 to 29 March 2023

## 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 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 levels). 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 26 March there was a report of fish struggling and dying at Pooncarie.

As mentioned above, on 28 March another fish death event occurred in the Darling River between Menindee town and Menindee Creek. Golden Perch and Silver Perch have been affected with tens to hundreds of dead fish observed.

### 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. This water is being debited from environmental water accounts. 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 will also continue to dilute the low oxygen water coming down the Darling River past Menindee town. 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 and be used to inform future operational decisions. Additional water testing is being done to see if there are toxins in the water that could be exacerbating the problem.

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.

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 the Darling River at Menindee. 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 (Figure 5). 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.



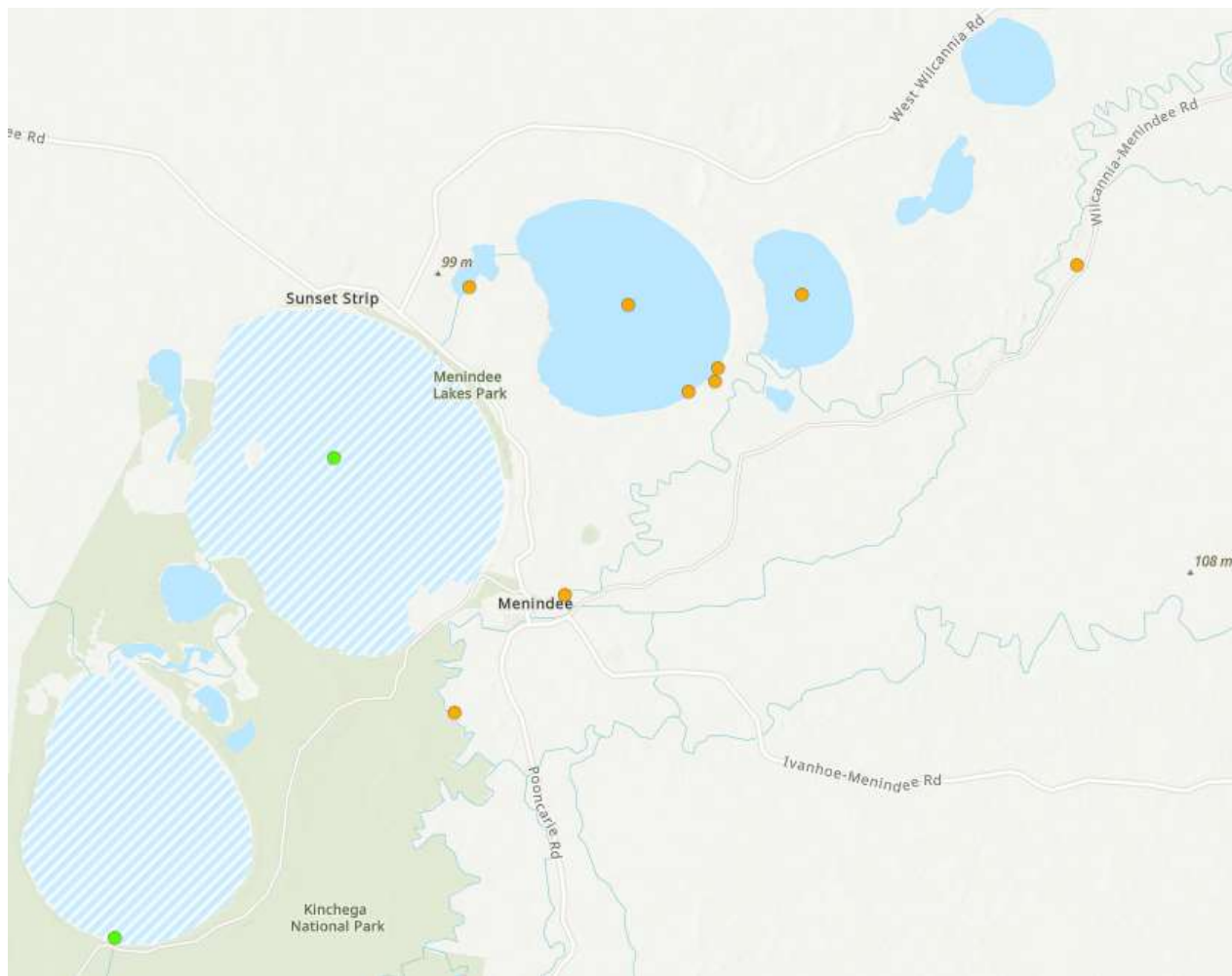


Figure 5: Recreation alert warnings for blue green algae at Menindee Lakes and Darling River at Menindee – 29 March 2023

## 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@dpie.nsw.gov.au](mailto: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](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](#).