

Lower Darling River – water quality and flow release update – 15 February 2024

Multiple agencies are monitoring water quality at Menindee and the lower Darling River to minimise the risk of further fish death events. This update provides a summary of information up to 15 February 2024.

On Saturday 10 February, reports were received of 10s of dead Golden Perch in the Darling River at Menindee. Site assessment during the week have estimated up to approximately 100 dead fish in the Menindee town weir pool. There were 100's of further fish struggling at the water surface, however there were observations that this reduced during the day with improved water quality conditions.

Water quality monitoring data showed that dissolved oxygen levels in the Darling River at the time were well above the critical levels required for fish health through the entire weir pool at Menindee. Initial assessments suggest the fish are being impacted by *Lernaea*, a parasitic anchor worm that can increase in numbers during warmer summer conditions. Impacted fish usually exhibit red ulcerations on their bodies and around their gills. Significant infestations can contribute to the death of impacted fish. Samples of affected fish have been collected for analysis at Department of Primary Industries laboratories for more detailed analysis.

Pathologists at DPI's Elizabeth Macarthur Agricultural Institute (EMAI) have completed an initial assessment of the samples collected from the Darling-Baaka River and confirmed the presence of *Lernaea* species on the deceased fish. Additional samples have been taken for histology and culturing to determine if there are any other potential causes of mortality. Until the further analysis is complete, the exact cause of the fish deaths cannot be confirmed.

DPI Fisheries has continued to receive reports of small numbers of dead fish within the Weir 32 weir pool. Some of the recent mortalities have exhibited little or no evidence of *Lernaea* infestations. Additional water quality analysis will be carried over the next week to determine if there may be other factors impacting fish health. Observations from the community and field staff suggest some fish are continuing to struggle at the surface. Investigations into the cause are ongoing.

Lernaea are not harmful to humans, however the NSW Food Authority advice on ulcerated fish indicates that mildly affected fish are safe for human consumption, but heavily ulcerated fish should not be consumed due to the potential presence of other unknown pathogens.

Fish in a stressed condition can be more susceptible to *Lernaea* infestations. As a precautionary measure the existing flow release of 750 ML/day from Lake Pamamaroo was increased to 1,450 ML/day for 24 hours on 10 February to provide a pulse of good quality water through the weir pool. Additional water released from the Lakes to reduce the risk of fish deaths is being debited against the lower Darling Environmental Water Allowance provided for in the Water Sharing Plan. This allowance is expected to be exhausted within a week, at which stage water allocations from The Living Murray will be used in addition to minimum operating flows.

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 Phonenumber 1800 043 536 or fill in a fish kill protocol and report form (including a photo) at: <https://www.dpi.nsw.gov.au/fishing/habitat/threats/fish-kills-2019-2020/info-sheet> or <https://www.dpi.nsw.gov.au/fishing/compliance/report-illegal-activity> using the 'dead or dying fish' check box.

Vertical profile water quality monitoring buoys – Darling River at Menindee

As the surface water of the river is heated by the sun, the water at the bottom of the deeper pools is often not warmed to the same temperature. During the summer months this can result in a difference in temperature between surface and bottom waters which is known as thermal stratification. This can lead to other issues such as increased algal blooms on the surface, and nearer the riverbed, low dissolved oxygen and higher nutrient concentrations. In addition, the amount of dissolved oxygen water can hold decreases with increasing water temperature during summer.

Five multi depth monitoring buoys have been installed in the Menindee area. These buoys monitor water quality at specific depths down through the water column. This data can be used to indicate when stratification starts, how long it has been present and if it has broken down, allowing the mixing of dissolved oxygen. The locations of the buoys are shown in Figure 1. The sites are:

- Lake Wetherell. Installed by NSW Department of Climate Change, Energy, the Environment and Water (DCCEEW) – Biodiversity, Conservation and Science
- Darling River at Menindee weir pool – upper. Installed by DCCEEW – Biodiversity, Conservation and Science
- Darling River upstream Menindee. Installed by WaterNSW

- Darling River at Menindee weir pool – town. Installed by DCCEEW – Biodiversity, Conservation and Science
- Darling River downstream Menindee. Installed by WaterNSW.

Monitoring data from the buoys installed by the DCCEEW for the Darling-Barka flood recovery program is available online via [Dashboard - Darling Barka River Health Program \(tago.run\)](#). Similarly the data from the two buoys installed by WaterNSW is available on their WaterInsights web page ([WaterInsights - WaterNSW](#)).



Figure 1: Locations of vertical profile water quality monitoring buoys at Menindee

Water temperature monitoring in the weir pool upstream of Menindee township shows that thermal stratification had been breaking down every morning for the past week (Figure 2). Monitoring further downstream of Menindee town and upstream of the junction of the Darling River/Menindee Creek shows that the water column had started to stratify on 9 February but mixed again on 10 February (Figure 3). The pulsed release of 1,450 ML/day from Lake Pamamaroo following the reporting of fish deaths on 10 February encouraged the continued breakdown in thermal stratification at the lower monitoring site.

With the decrease in discharge from Lake Pamamaroo from 1,450 ML/day to 750 ML/day on 12 February, the lower flow and higher air temperatures resulted in failure of thermal stratification to break down on the morning of 13 February at the site upstream of the junction of the Darling River/Menindee Creek (Figure 3). A return to cooler overnight air temperatures has resulted in complete mixing of the water column for the last two mornings.

Discharge from Lake Pamamaroo is being maintained at 750 ML/day with discharge from Lake Menindee being held at 50 ML/day to prevent water backing up in the weir pool through Menindee.

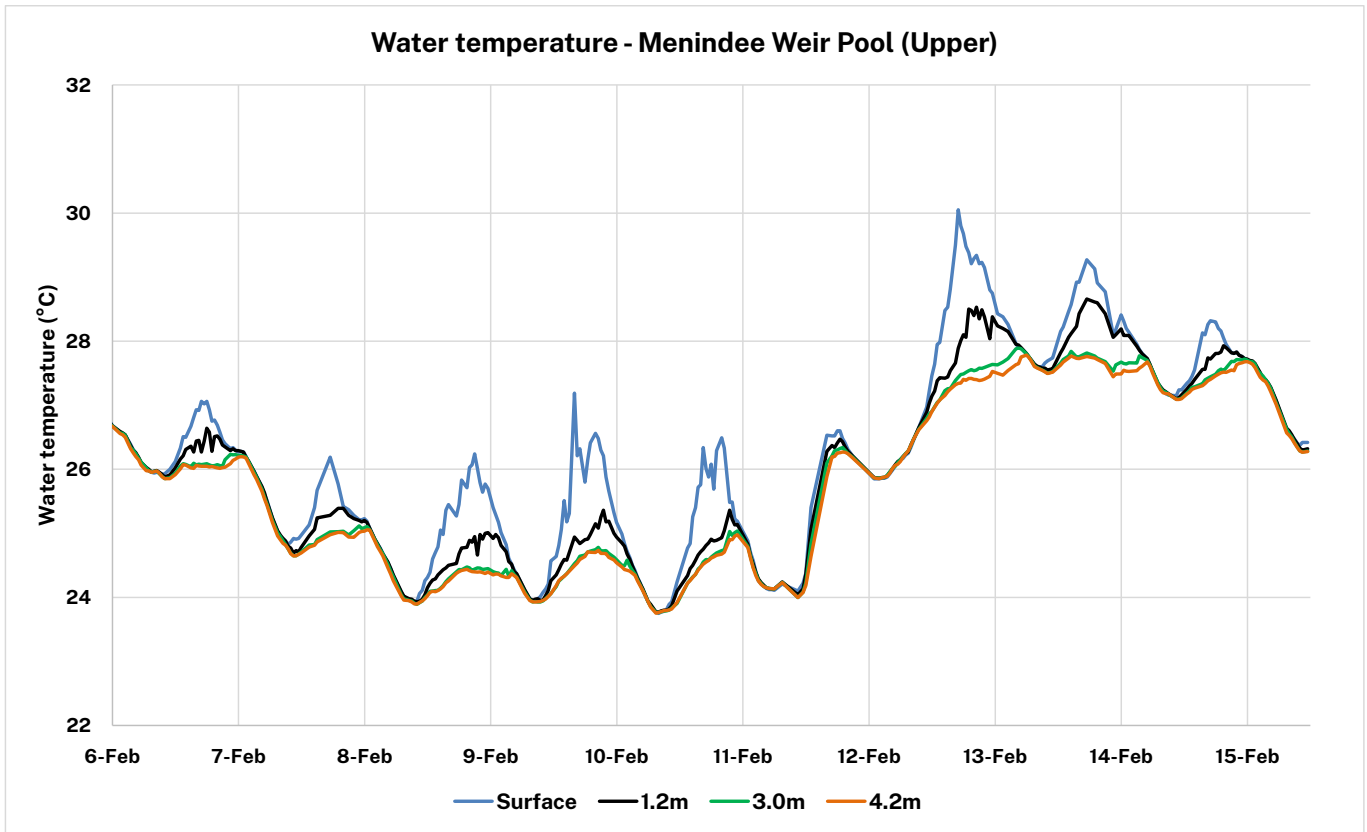


Figure 2: Water temperature (°C) continuous monitoring in the Darling River upstream of Menindee

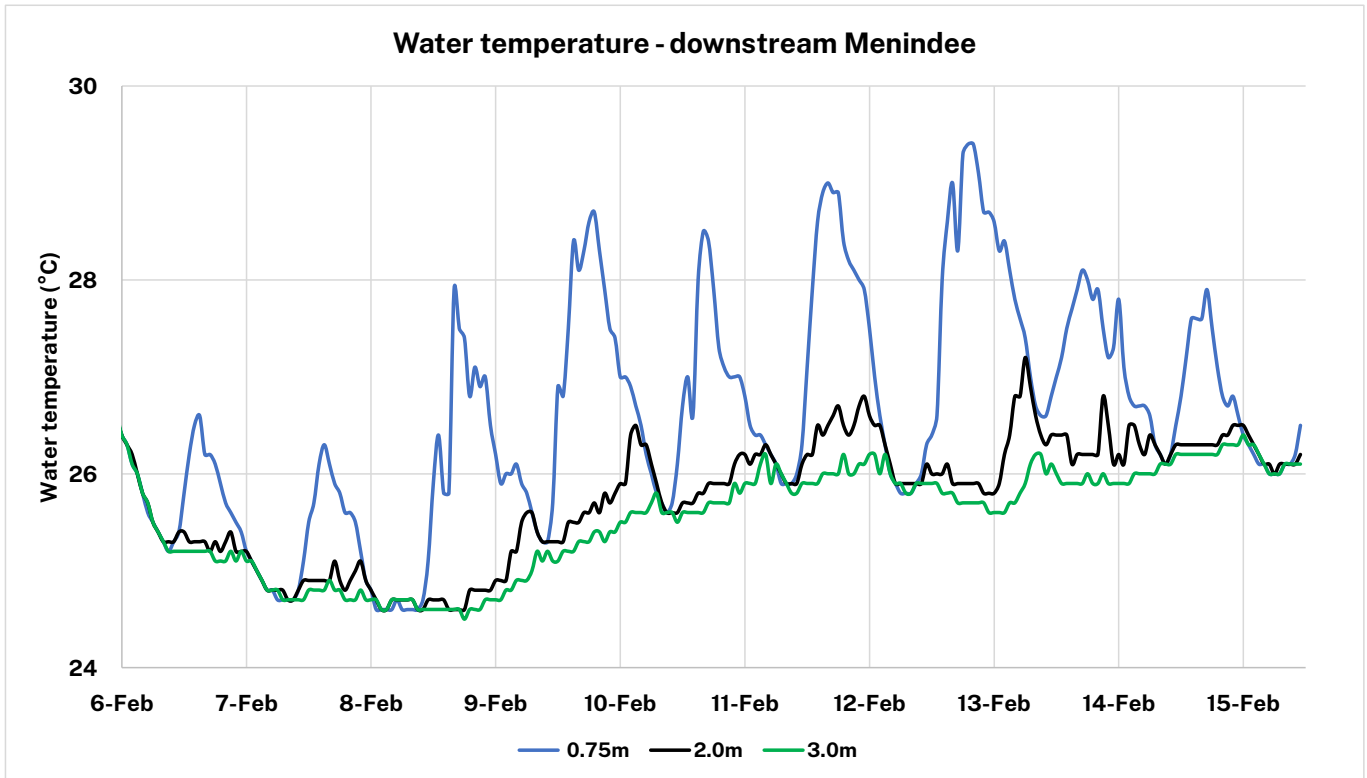


Figure 3: Water temperature (°C) continuous monitoring in the Darling River downstream of Menindee

The dissolved oxygen results show that with the regular break down in thermal stratification over the last week, dissolved oxygen has been remaining above the critical threshold for fish health of 2 mg/L through the entire water column at all monitoring sites (Figure 4 and Figure 5).

Fish deaths have occurred at Menindee in the past when isolated thunderstorms and an associated rapid drop in air temperature has caused pools to mix suddenly, bringing the low oxygen water up to the surface. Prior to the reported fish deaths on 10 February, there were no climatic factors that could have triggered a fish death event and dissolved oxygen levels through the entire weir pool at Menindee had been above critical levels in the days leading up to the fish deaths.

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 will continue to be managed to minimise the risk of further hypoxia-related fish deaths in the Darling River at Menindee.

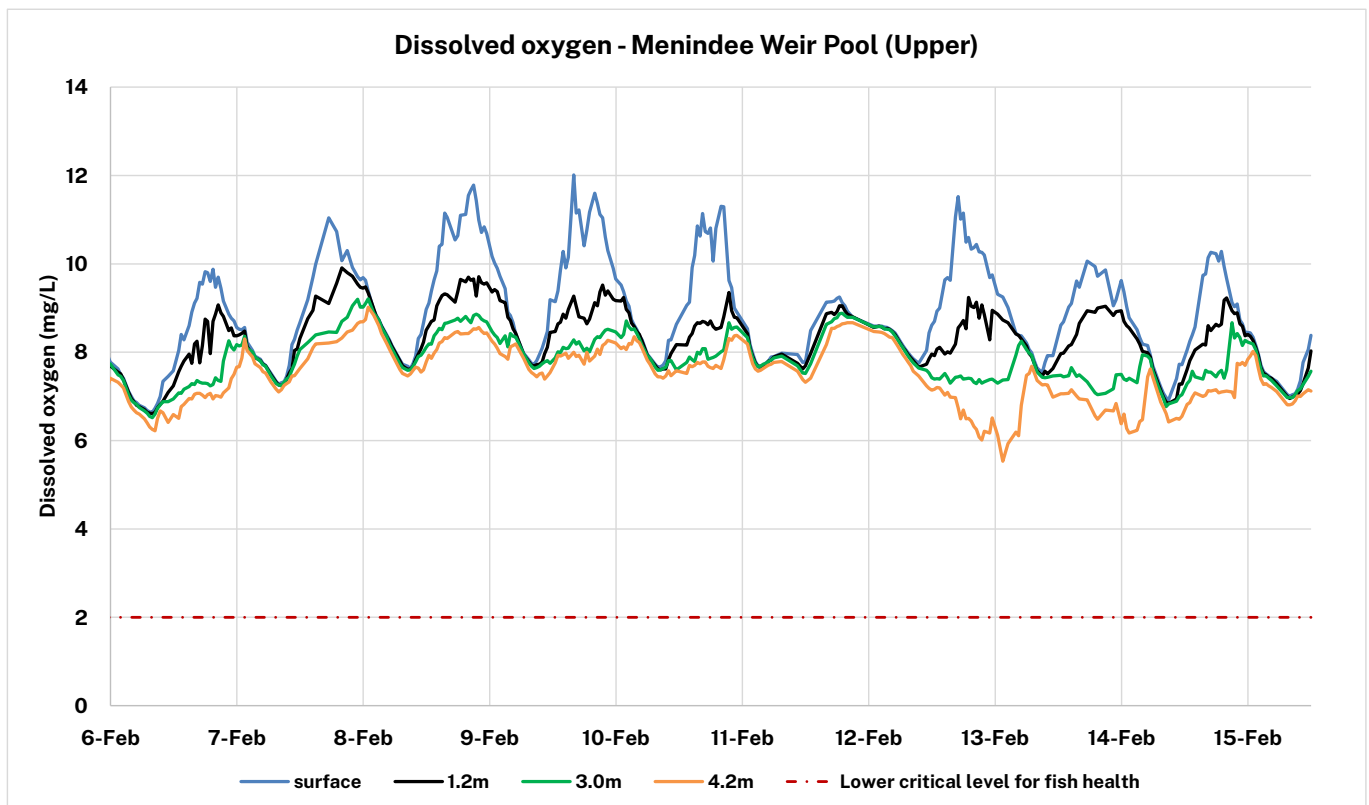


Figure 4: Dissolved oxygen (mg/L) continuous monitoring in the Darling River upstream of Menindee

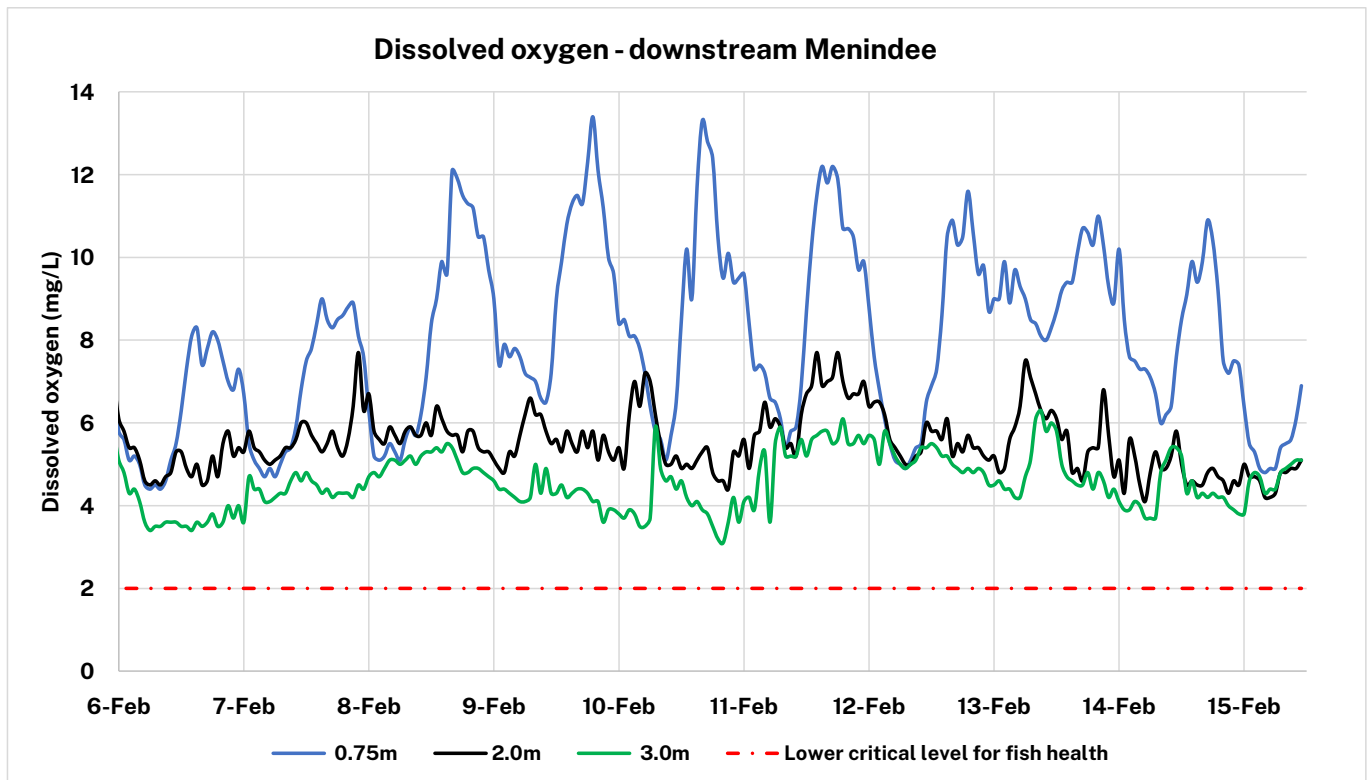


Figure 5: Dissolved oxygen (mg/L) continuous monitoring in the Darling River downstream of Menindee

Fish death summary

In the past week to 15 February there have been reports of up to 100 dead Golden Perch and 100’s of Golden Perch struggling near the water surface in the Darling River at Menindee.

Large numbers of Bony Herring and Carp remain in the reach of Darling River between Main Weir and Menindee Creek (Weir 32 weir pool). 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, limited food supply and may be more susceptible at reduced flow rates.

What is being done?

Flow releases into the lower Darling-Baaka

Prior to the pulsed release of 1,450 ML/day for 24 hours commencing on 10 February, the discharge from Lake Pamamaroo had been maintained at 750 ML/day since 25 January. This flow volume has shown to be sufficient to encourage the breakdown of thermal stratification, reoxygenation of the water column and provide conditions that are less favourable for algal blooms in the Menindee weir pool.

The pulsed release following the reporting of the fish deaths on 10 February was commenced to provide a flush of good quality water through the weir pool, to minimise any additional stress on the fish in the weir pool in addition to the infestation of *Lernaea*.

The Emergency Operations Centre led by NSW Police have been notified and they are on standby should there be an increase in fish deaths. A contractor has also been stood up to be available to remove dead fish from the river as soon as possible if a mass fish death event were to occur.

Discharge from Menindee Lakes cannot be reduced below the minimum flow of 350 ML/day as required under the Wa. Ongoing monitoring will continue to inform operations to mitigate potential fish deaths.

Flows from Lake Cawndilla into the Great Darling Anabranch

Commonwealth environmental water is being used to maintain a flow releases of 400 ML/day from Lake Cawndilla to the Great Darling Anabranch. The flow is continuing to deliver environmental benefits by maintaining connectivity through the Great Darling Anabranch, which facilitates the dispersal of native fish predominantly golden perch. The flows are also benefitting vegetation, waterbirds, bush birds, aquatic bugs, frogs, yabbies and other animals that live on the floodplain.

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 (NHMRC 2008).

The most recent results indicate a red alert warning for recreational use in Lake Wetherell and Lake Tandure. 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.

Darling-Barka flood recovery program

The Darling-Barka flood recovery program is a comprehensive river health monitoring program that extends the NSW Government's incident response to the floods and fish kill disasters that occurred in early 2023.

The program is coordinated by the Environment Protection Authority as the lead agency for the NSW Environmental Services Functional Area. It will be delivered until June 2025, extending on the incident response sampling already undertaken this year.

Through the River Health Project, Department of Climate Change, Energy, the Environment and Water – Biodiversity, Conservation and Science have installed 4 telemetered loggers which collect real-time data on water quality in the project area. You can access the real time data online via [Dashboard - Darling Barka River Health Program \(tago.run\)](#)

Weather outlook

Refer to the [Bureau of Meteorology website](#) for the latest forecasts.

Additional information

To notify the NSW Department of Climate Change, Energy, the Environment and Water of potential blackwater events email: waterqualitydata@dpie.nsw.gov.au

To view community updates issued, visit [Community updates and frequently asked questions | Water \(nsw.gov.au\)](#)

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: <https://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 and provide photographs. If possible, please also record what species are affected and an estimate of number of each species observed.

Monitoring data from the monitoring buoys installed by the NSW Department of Climate Change, Energy, the Environment and Water for the Darling-Barka flood recovery program is available online via [Dashboard - Darling Barka River Health Program \(tago.run\)](#).

Monitoring data from the monitoring buoys installed by WaterNSW and operational updates are available on their Water Insights web page ([WaterInsights - WaterNSW](#)).

Further information on blackwater events can be found at the NSW Department of Climate Change, Energy, the Environment and Water website at: <https://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: <https://www.mdba.gov.au/publications/mdba-reports/water-management-101-factsheets>

Water quality data collected after the fish deaths at Menindee is available on the Environment Protection Authority web page at: <https://www.epa.nsw.gov.au/working-together/community-engagement/updates-on-issues/menindee-fish-kill>

To report suspected algal blooms see the [WaterNSW website](#).