Community update for Barwon–Darling, Menindee Lakes and Lower Darling–Baaka river

Fish deaths

Dead fish have been found in the lower section of the Menindee weir pool between where Little Menindee Creek flows into the weir pool and Weir 32. Dead fish have also been found in Little Menindee Creek and in Lake Menindee.

So far, dead fish numbers are in the 100s – the majority of fish recorded have been Carp with small numbers of native species including Bony Herring, Golden Perch and Silver Perch. The Barkandji River Rangers have been on the water the last few days, searching for dead fish, measuring them and removing them.

The department has had staff on the water checking water quality and getting additional observations to inform decisions on water management following reports of dead fish.

Fisheries are urging community to **report dead fish, fish struggling or gasping at the water surface** by calling the NSW Department of Primary Industry **Fisheries Phoneline on 1800 043 536.** Noting the location of the dead fish and suspected species is also important.

Why are the fish dying?

While we aren't certain, the likely cause is extreme water quality conditions in Lake Menindee that are causing the fish to die in some of the shallow areas. The carcases are then being washed down into the regulator as water is currently being released from Lake Menindee to meet MDBA's call on water. That flow continues to push the dead fish into the weir pool and then downstream.

Water quality in Lake Menindee

There are algal blooms present in Lake Menindee. Sampling results confirmed high levels of algae and a RED alert is in place for recreational activity at multiple sites in the Lake, including the Menindee Outlet Regulator. The latest satellite imagery from 27 January is below (Figure 1). Algae produce oxygen during the day but, at night, fish and other organisms, including algae, use up the oxygen which can cause dissolved oxygen to crash, particularly in shallow areas. The recent extreme temperatures would also cause water in shallow areas to heat up, placing further stress on fish. Figure 2 shows the temperature of the water and dissolved oxygen (DO) during the afternoon.

Data from similar environments indicates that dissolved oxygen can crash overnight to 0 mg/L which may be responsible for localised fish (carp) deaths. Native species appear to avoid low dissolved oxygen more effectively than carp.

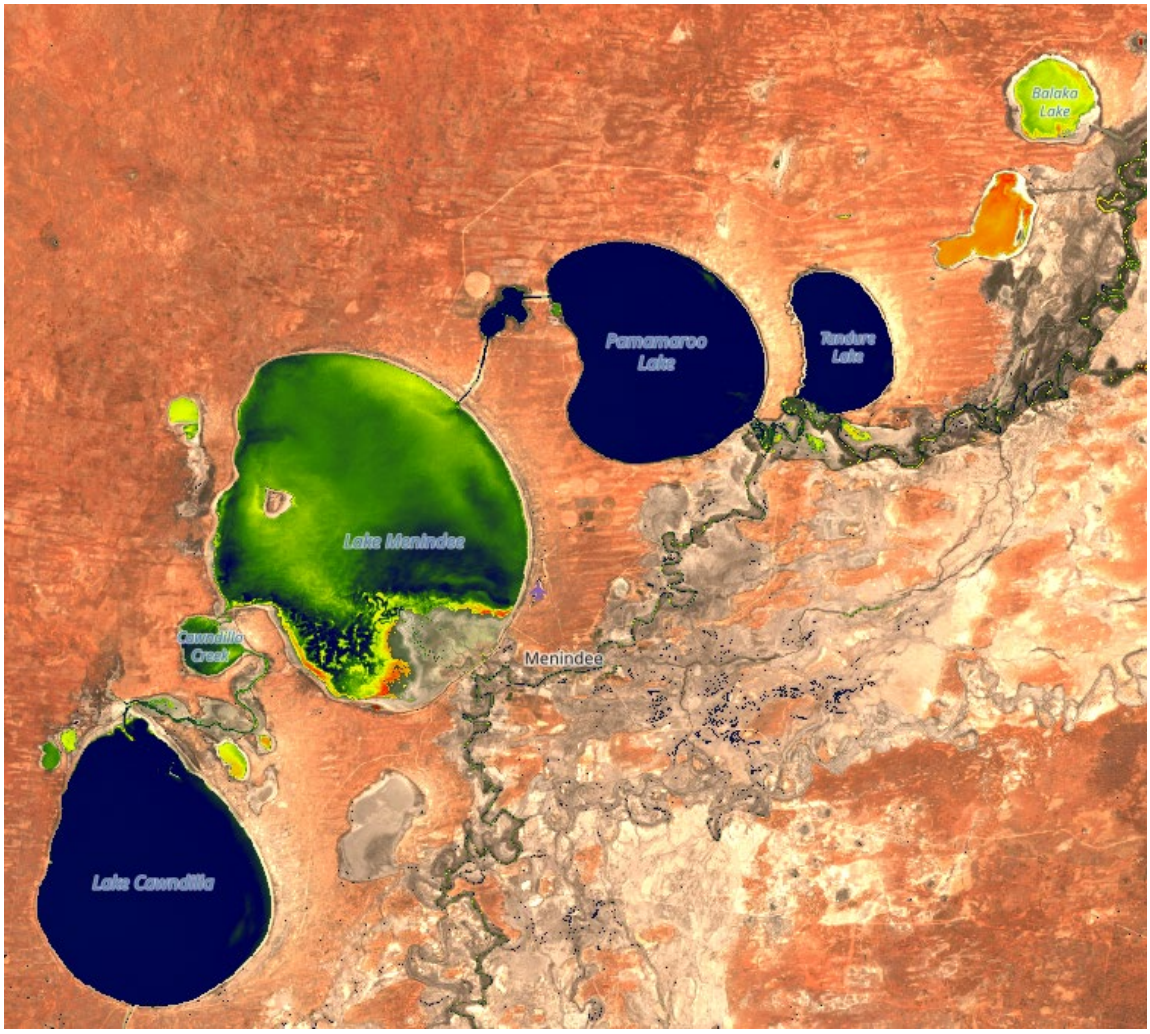


Figure 1 – Satellite imagery with custom algal script from 27 January

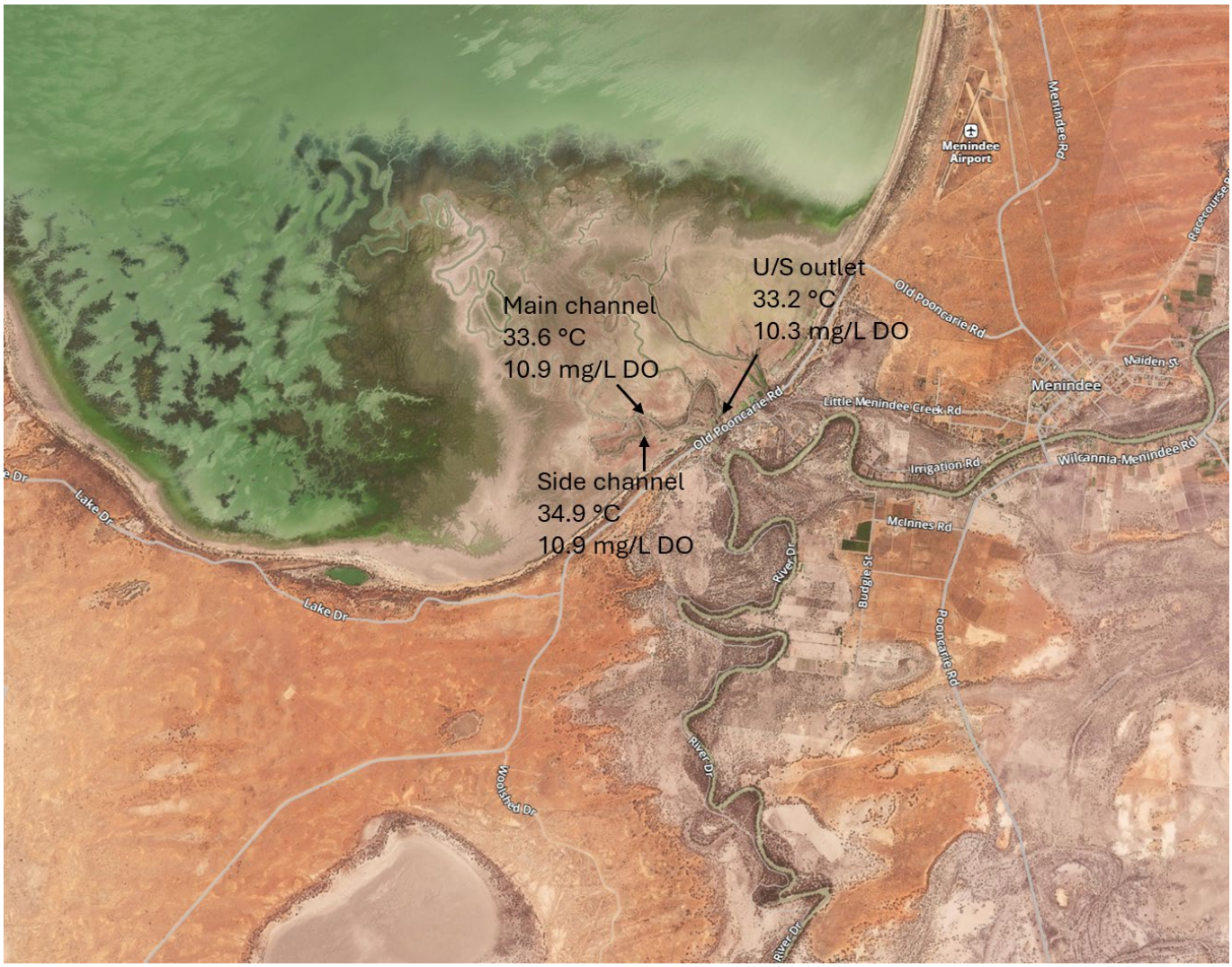


Figure 2 – Temperature and dissolved oxygen (DO) results taken from handheld readings on 28 January

Water quality in the weir pool

Critical water quality parameters such as dissolved oxygen in the Menindee town weir pool are currently in normal ranges of tolerance for native fish. The monitoring pontoons, buoy, and fixed-depth sensors in the weir pool are providing us with real-time information to help inform our decisions.

The department was also on the water yesterday taking measurements of various water quality parameters to investigate potential causes of the fish deaths and to see if fish had died upstream of the junction with Little Menindee Creek. Boat transects in the lower Menindee weir pool indicate relatively good water quality in terms of fish health, with concentrations above 4 mg/L.

It is estimated that, with current rates of water releases, it takes about 1 day for the water to travel to Weir 32 from the water coming out of Little Menindee Creek. Therefore, water quality in this

lower section of the weir pool is primarily controlled by a shandy of water from Lake Menindee flows and water from upstream of Menindee Ck.

Agencies are prepared to increase flows from the upper lakes to send a ‘pulse’ of water down for 2 days if dissolved oxygen declines and our trigger in the Incident Action Plan is reached. This will promote destratification and mix dissolved oxygen throughout the water column.

Figure 3 below shows the dissolved oxygen levels at the surface throughout the weir pool, including in Little Menindee Creek, yesterday remaining above critical levels for fish health.

The department has been closely monitoring water quality conditions during this week's extreme heat. There have been some declines in dissolved oxygen levels due to temperatures exceeding 45 degrees Celsius. However, we expect a recovery when cooler conditions arrive on Sunday. The department and WaterNSW continue to monitor the multi-depth monitoring pontoons and buoys in the Menindee area that measure key parameters such as temperature, dissolved oxygen and turbidity. These are key in understanding stratification of the water column which has led to past fish death events.

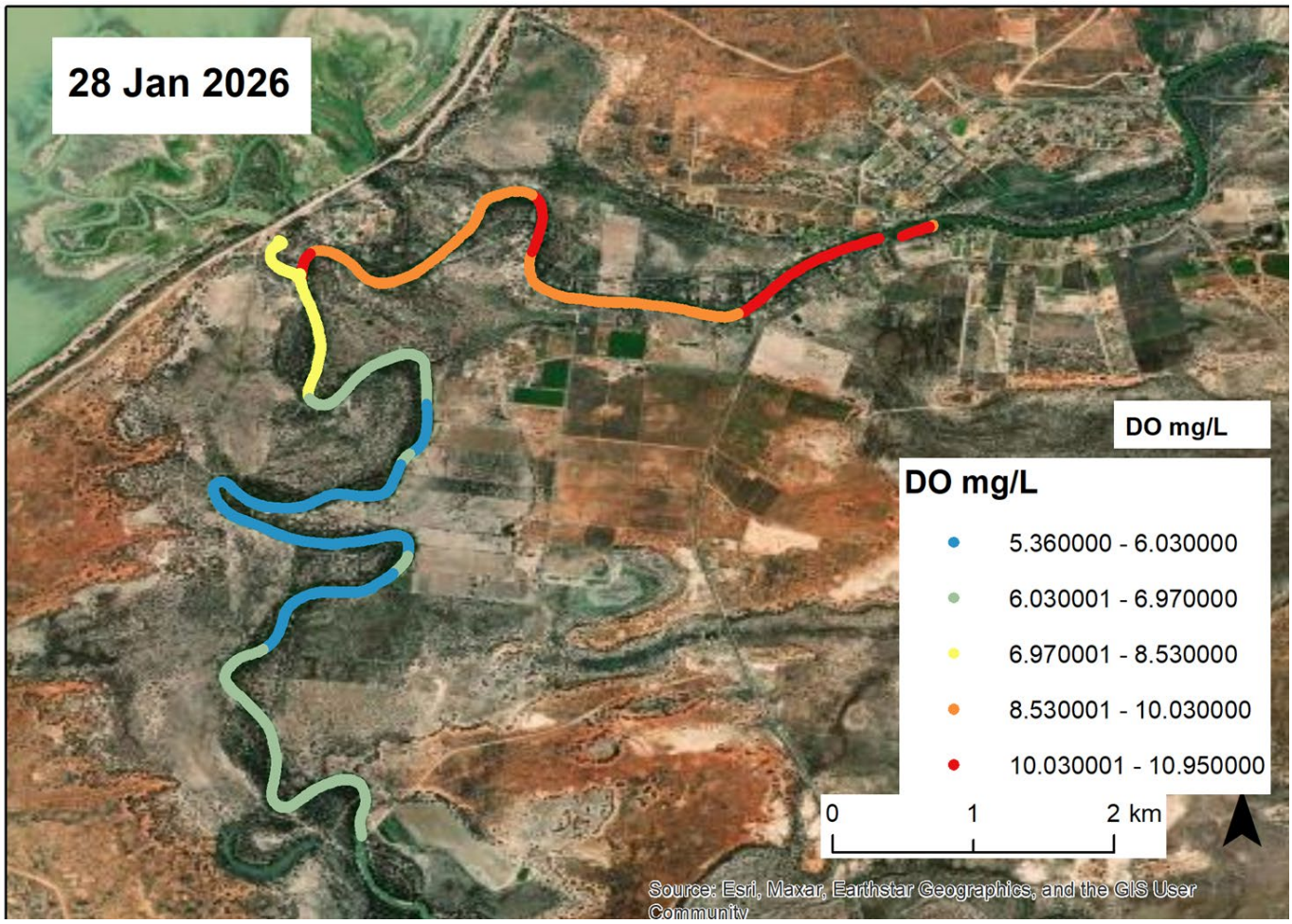


Figure 3 – Dissolved oxygen (DO) at surface of Menindee Weir Pool taken on 28 January.

Mass fish death event- EPA response

The NSW EPA is monitoring the current situation and is on standby to respond any Mass Fish Death Event under the Menindee Mass Fish Death Event Sub Plan. Clean-up contactors and staff are ready for deployment if required.

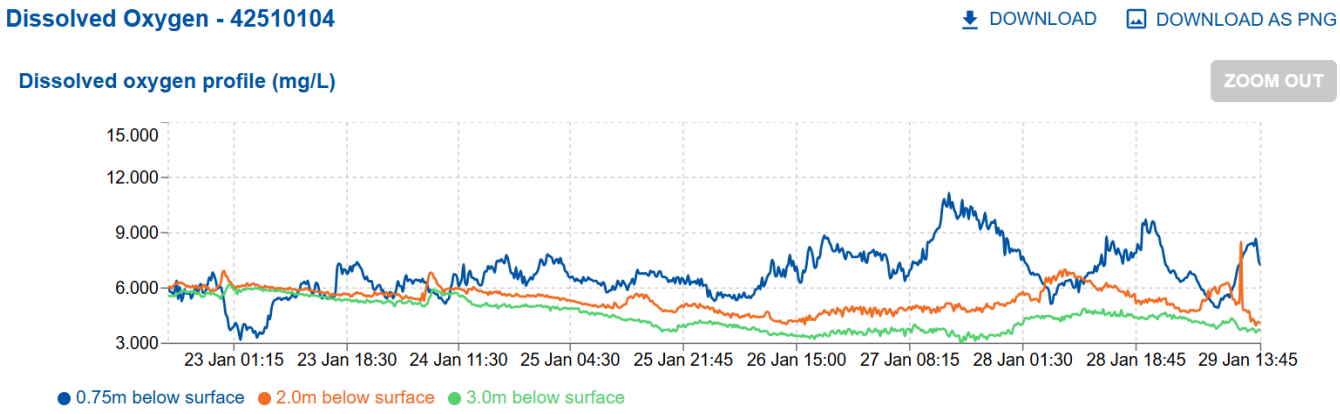
Current water releases

Current releases over Weir 32 are just above 1,800 ML/day and gradually reducing. Lake Menindee outlet continues to be maximised at around 1,100 ML/day (and reducing daily) with 750 ML/day being released from Lake Pamamaroo to maintain water quality within the Menindee weir pool. The flow and water level in the weir pool will continue to reduce slightly over coming weeks as the flow rate continues to fall from the Menindee outlet.

Stratification

Stratification occurs when flow velocities in a river are low and warm water at the surface sits above a layer of cooler water deeper in the river. This creates ideal conditions for algal blooms at the surface and may result in dangerously low dissolved oxygen at depth. The deeper water becomes oxygen depleted and once the water column rapidly mixes, or 'destratifies', fish deaths can occur if the resulting dissolved oxygen is too low.

The multi-depth sensors within the river allow the department to monitor the oxygen levels at different depths and use calculations to predict dissolved oxygen at mixing. The below graph from today shows the water at the Menindee Town water mixing down to 2 metres and our models show predicted dissolved oxygen of around 4-5mg/L if the water column de-stratifies. This is in the safe range for fish.



Darling Baaka- algae conditions

The current heatwave conditions being experienced at Menindee, and much of NSW, is ideal for the development blue green algae blooms. WaterNSW continues to sample across the region and monitor satellite imagery. The algal bloom in the middle and upper reaches of Lake Wetherell remains but satellite imagery is showing it has not spread to the lower reaches of the Lakes.

Water NSW has issued a GREEN alert for multiple sites in Lake Wetherell, Copi Hollow and Lake Pamamaroo inlet. AMBER alerts remain from Weir 32 right downstream to Tapio on the Lower Darling Baaka.

Algae level definitions

At GREEN alert levels blue-green algae are present in the water at low densities, possibly signalling the early stages of the development of a bloom, or a period where a bloom is declining. At these densities, the blue-green algae do not pose a threat to recreational, stock or domestic use.

At AMBER level, the algae are multiplying, and the water often has a green tinge. While the water remains suitable for recreational use, it is considered unsuitable for potable use and raw water should be treated prior to domestic use. 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.

RED alert levels represent 'bloom' conditions. The water may appear green and may have strong, musty or organically polluted odours. Blue-green algae may be visible as clumps or as scums. Consider the 'blooms' to be toxic to humans and animals, and the water should not be used for drinking (without prior treatment), stock watering, or for recreation.

Additional information

- To notify the NSW Department of Climate Change, Energy, the Environment and Water of potential blackwater events email: water.enquiries@dcceew.nsw.gov.au
- To view community updates issued, visit water.nsw.gov.au/menindee-updates
- If you've got any questions regarding this update or other water matters **contact your local implementation officer, Kate McBride on 0458 945 149** or kate.mcbride@dcceew.nsw.gov.au
- To report dead fish, fish struggling or gasping at the water surface, or crayfish leaving the water please call the **NSW Department of Primary Industry 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 and provide photographs. 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 department's website at: water.nsw.gov.au/hypoxic-blackwater
- Additional information is also available on the Murray–Darling Basin Authority website at: www.mdba.gov.au/climate-and-river-health/water-quality/fish-deaths www.mdba.gov.au/water-management/infrastructure/menindee-lakes
- WaterNSW operational updates are available in WaterInsights
- Water quality data collected after the fish deaths at Menindee is available on the Environment Protection Authority web page at: www.epa.nsw.gov.au/working-together/community-engagement/updates-on-issues/menindee-fish-kill
- Real-time water quality data from the department – Strategic Science & Engagement monitoring buoys can be accessed from the Darling–Baaka River Health Project dashboard
- Data from the WaterNSW gauging network can be found in WaterInsights at: https://waterinsights.waternsw.com.au/12104-lower-darling-regulated-river/river-data