NSW Southern Basin dissolved oxygen update No. 3

Multiple agencies are undertaking water quality monitoring to assess dissolved oxygen conditions across NSW and identify potential risks to ecological communities. This update provides an assessment of dissolved oxygen data from the southern valleys collected up to 15 October.

Key information

- Monitoring shows there is currently a low risk to fish health from declining dissolved oxygen levels in the Southern Basin.
- Oxygen levels in the Lachlan River at Willandra Weir declined to 4 mg/L this week. The critical threshold for fish health is 2 mg/L.
- The long-term climatic outlook is for above average rainfall from November 2020 through to January 2021. Above average rainfall increases the risk of flooding and the potential for hypoxic blackwater events in the southern valleys of NSW.
- The short-term outlook for NSW is for showers and lower air temperatures over the weekend and settled, dryer conditions early next week. Predicted rainfall totals for the next eight days are low, indicating a low risk of major flooding triggering a hypoxic blackwater event.

Stages of criticality for dissolved oxygen

Continuous dissolved oxygen sensors located in the Murray, Murrumbidgee, Lachlan and lower Darling river catchments show levels at all sites are above critical ecological thresholds and pose minimal risk to aquatic ecosystems.

Dissolved oxygen at most sites is remaining above 6 mg/L. Oxygen levels in the Lachlan River at Willandra Weir has declined down to 4 mg/L during the week. The critical threshold for fish health is 2 mg/L. Figures 1 and 2 highlight the Stages of Criticality at monitoring sites in the Southern Basin. All sites apart from the Lachlan River at Willandra Weir are on Criticality Stage 1. Definitions of the Stages of Criticality are below Figure 2. Continuous dissolved oxygen data is available here on the WaterNSW real time data web site.

Figure 1: Stages of criticality at continuous dissolved oxygen monitoring sites in the Murrumbidgee and lower Lachlan and Darling rivers

Figure 2: Stages of criticality at continuous dissolved oxygen monitoring sites in the Murray catchment

Key to dissolved oxygen Stages of Criticality

Stage	Definition
Stage 1	Dissolved oxygen level above 4 mg/L at all times. Low risk to aquatic ecosystems
Stage 2	Daily dissolved oxygen level dropping below 4 mg/L at night/early morning, then increasing to above 4 mg/L during the day. Will impact on fish health, but may not result in deaths
Stage 3	Dissolved oxygen level dropping below 2 mg/L at night/early morning. High risk to aquatic ecosystems. Fish deaths may occur
Stage 4	Dissolved oxygen level remaining below 2 mg/L. Very high risk to aquatic ecosystems. Fish deaths will, or have already occurred

Continuous dissolved oxygen monitoring

Dissolved oxygen levels at monitoring sites in the Murrumbidgee and Lachlan valleys are mostly above 6 mg/L (Figure 3). Dissolved oxygen in the Lachlan River at Booligal has remained above the 2 mg/L critical threshold for fish health since 23 September and is currently fluctuating above 7 mg/L. The Lachlan River at Willandra Weir is showing a decline in oxygen levels over the past three days, reaching 4 mg/L. As dissolved oxygen is on a continuing downward trend, the site has been assigned a Criticality Stage 2. The downward trend coincides with a decrease in flow (Figure 4). A drop in air temperature over the weekend from the approaching cold front may assist in improving oxygen levels. As dissolved oxygen at other monitoring sites in the Lachlan River are at safe levels, there are opportunities for fish to swim to areas of better water quality if oxygen levels at Willandra Weir continue to decline.

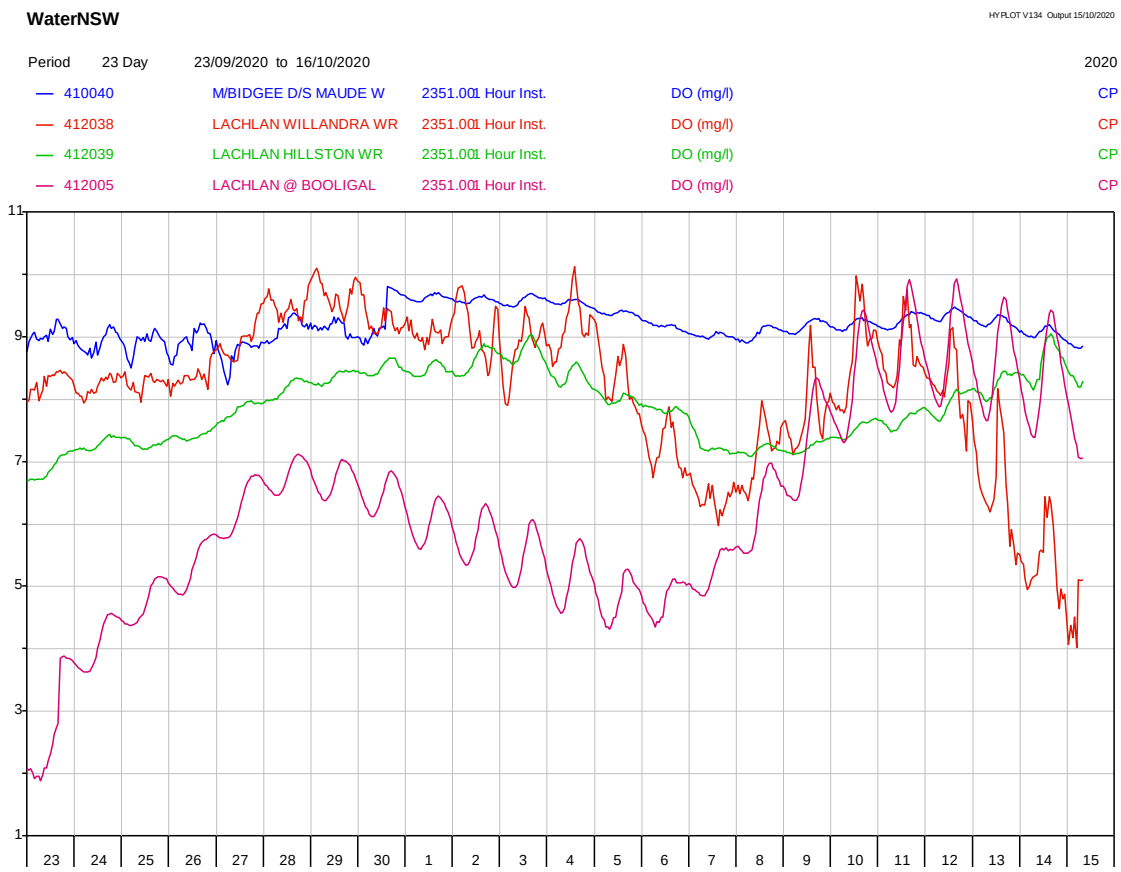

Figure 3: Continuous dissolved oxygen (mg/L) for the Murrumbidgee and Lachlan rivers

Figure 4: Discharge (ML/day), water temperature (°C) and dissolved oxygen (mg/L) in the Lachlan River at Willandra Weir

Dissolved oxygen monitoring in the Murray Valley is showing the levels at most sites are above 7.5 mg/L, which is in the safe range for fish health. Figure 5 illustrates the dissolved oxygen levels at selected monitoring locations in the Murray River catchment for the past three weeks. The Wakool River at Stoney Crossing decreased to below 6 mg/L for one morning last week but has recovered back up to higher levels again. All sites in the Murray valley are above ecological thresholds (Criticality Stage 1).

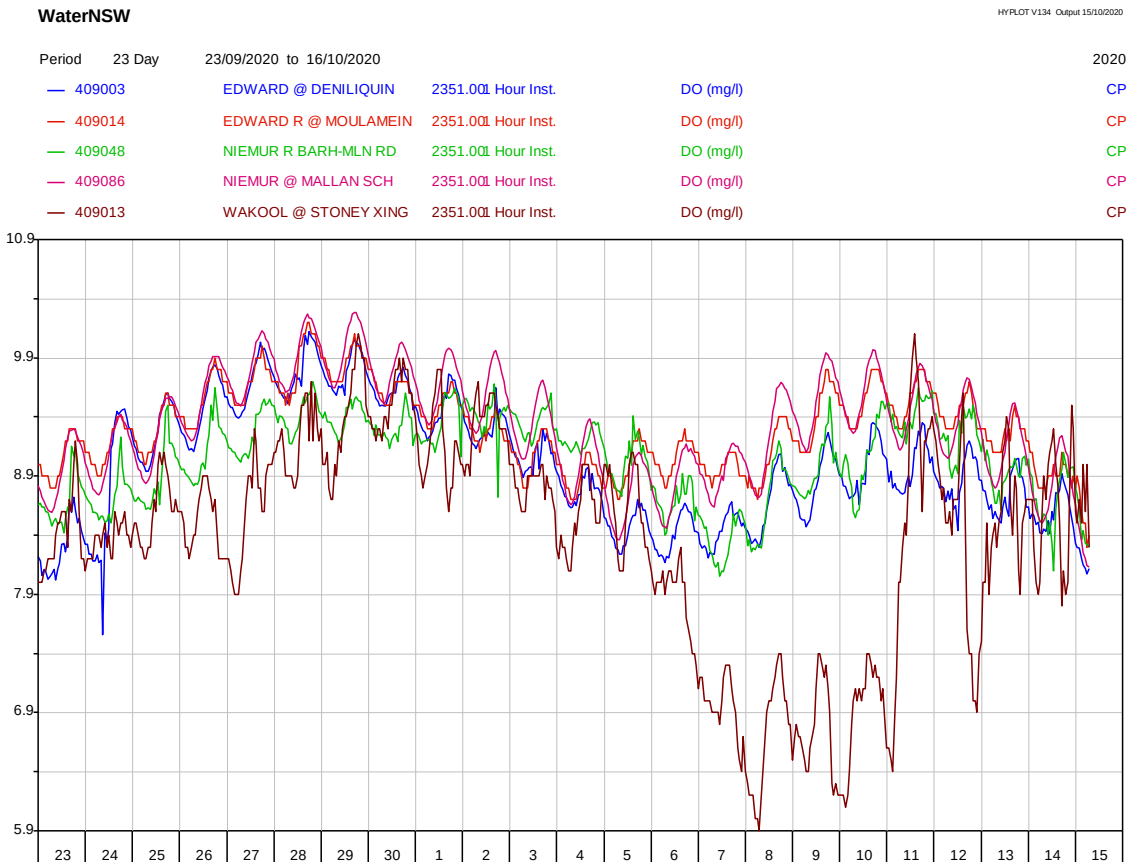

Figure 5: Continuous dissolved oxygen (mg/L) for selected sites in the Murray River valley

Weather forecast

The Bureau of Meteorology total rainfall forecast (Figure 6) indicates light rainfall across NSW in the next eight days, with the highest falls in the south eastern corner of the state. The rainfall outlook for November indicates a high chance of wetter than average conditions for all of NSW (Figure 6). A La Niña alert remains active. La Niña development and warmer eastern Indian Ocean temperatures increases the likelihood of above average rainfall during spring and summer for eastern Australia. Current climate outlook indicates November 2020 to January 2021 will be wetter than average for much of Australia. Above average rainfall increases the risk of flooding and the potential for hypoxic, or low oxygen, blackwater events in the southern valleys. Bureau of Meteorology rainfall maps are available here.

The four-day synoptic forecast (Figure 7) shows an approaching cold front and low pressure system which will bring rain and possible thunderstorms initially to southern NSW on Friday, extending to the rest of NSW over the weekend. A following high pressure system should bring settled, dryer conditions early next week. At this stage, the predicted rainfall totals are low, reducing the risk of major flooding

triggering a hypoxic blackwater event. Synoptic charts are available from the Bureau of Meteorology web site here.

The Bureau of Meteorology have recommenced their Heatwave Service in preparation for the coming summer. A heatwave occurs when the maximum and the minimum temperatures are unusually hot over a three-day period. Hot days followed by hot nights mean the maximum temperature is reached earlier the following day and will last longer. When unusually high night and daytime temperatures persist, river water temperature can increase and dissolved oxygen levels decline, placing additional stress on aquatic ecosystems. A sudden large drop in temperature at the end of heatwave conditions can also result in fish deaths. There are no heatwave conditions predicted for NSW for the next five days. Updates from the Heatwave Service and additional information is available here.

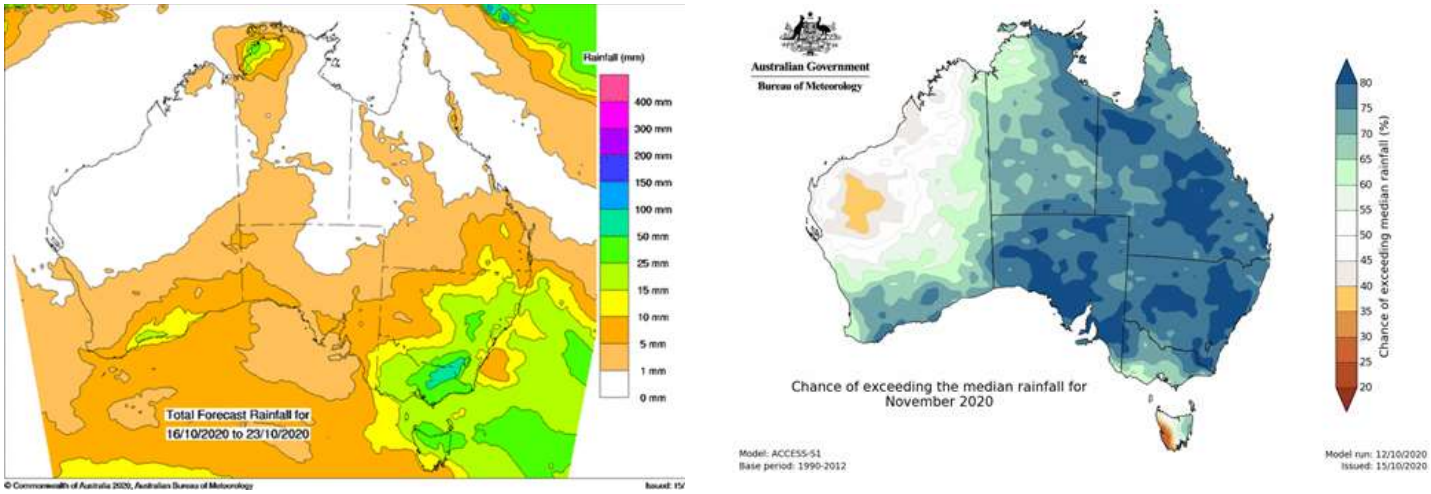

Figure 6: Eight-day rain forecast (left) and chance of exceeding median rainfall for November (right)

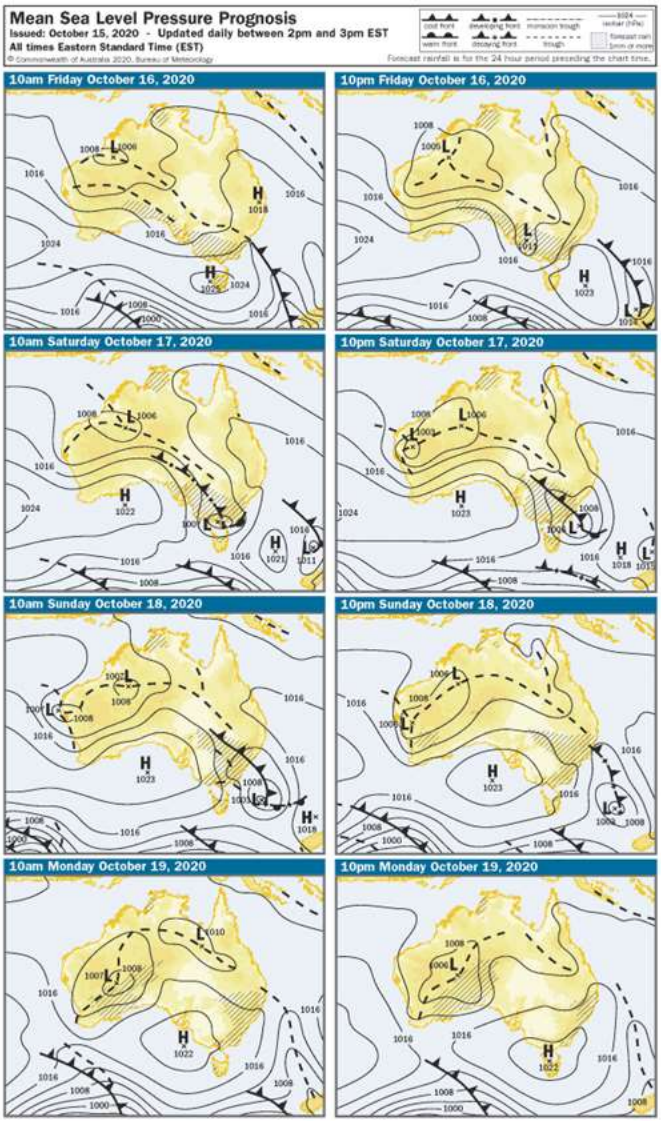

Figure 7: Bureau of Meteorology four-day forecast

Additional information

NSW and Commonwealth agencies will continue to monitor weather and river conditions over the coming summer. To notify the department of potential blackwater events email: waterqualitydata@industry.nsw.gov.au or to report a fish kill call the NSW Fisheries Hotline on 1800 043 536.

Further information on hypoxic blackwater can be found at: www.industry.nsw.gov.au/water/allocations-availability/droughts-floods/drought-update/managing-drought-recovery