Hypoxic water - Summer 2020

Update No. 2 I 18 December 2020

Hypoxic water update

With the return to wetter conditions after a prolonged dry period, hypoxic (low oxygen) blackwater is a potential water quality risk for many river valleys in NSW. Hypoxic water can also occur during hot summer periods when flows are low. A portion of the Lachlan Water Quality Allowance will be released from late December 2020 through to March 2021 to mitigate water quality risks in the lower Lachlan.

Key information

- Flows in the Lachlan River at Booligal decreased below 50 megalitres (ML)/day in November 2020. These lower flows and increasing water temperatures saw dissolved oxygen levels at Booligal decrease to less than 3 mg/L, putting fish at risk.
- Flows in December 2020 then increased as a result of the arrival of releases for environmental purposes and dissolved oxygen levels improved. However, these releases will finish in late December 2020 and then flows would normally return to the minimum flows of 50 ML/day or less from late December onwards.
- Past experience has shown that using some of the Lachlan Water Quality Allowance over summer months to top up these minimum flows to at least 50 ML/day, and preferably around 100 ML/day, significantly reduces water quality risks.
- The department has approved the use of 5,470 ML of the Lachlan Water Quality Allowance to top up end of system flows to 100 ML/day from 1 January 2021 and 31 March 2021 if needed.
- The use of water from the allowance will:
    - buffer rising water temperatures and poor water quality in shallow refuge pools
    - reduce the occurrence of harmful algal blooms
    - maintain dissolved oxygen levels above critical ecological thresholds for fish
    - improve water quality for lower Lachlan landholders.
- Dissolved oxygen levels in the Murray and Murrumbidgee valleys to date have tracked above critical thresholds because of high in-river flows and no flooding.

Forecast flow conditions for the lower Lachlan River

An environmental release will provide flows of at least 400 ML/day at Booligal until up to 25 December 2020 in the lower Lachlan. However, the target flow at Booligal for the remainder of December 2020 to the end of February 2021, will decrease down to 45 ML/day. This will then be further reduced to 30 ML/day in March 2021, as per end of system flow requirements of the Lachlan water sharing plan.

With high temperatures, a flow rate of only 45 ML/day during January 2021 and February 2021, is likely to result in dissolved oxygen (DO) dropping below critical ecological thresholds and the development of potentially toxic blue-green algal blooms.

The department has approved the use of up to 5,470 ML of the Lachlan Water Quality Allowance to top up end of system flows to around 100 ML/day at Booligal through January 2021 to March 2021. If conditions are dry, an additional 2,100 ML may also be provided to maintain this higher

flow through until the end of April. The water will be released from Lake Brewster. The Lachlan water sharing plan provides for up to 20 gigalitres (GL) a year to be set aside for water quality purposes in the Lachlan Valley.

If above average rainfall eventuates and tributary flows increase flows in the lower Lachlan River to 100 ML/day, then release of the water quality allowance will cease. However, as releases from Lake Brewster can take 16 days to reach Booligal, then planning for this release has to be made in advance.

Past experience in the Lachlan Valley

Over the summer months, DO levels at Booligal can drop to low levels when flows are less than 50 ML/day. Generally, native fish and other large aquatic organisms require DO levels of at least 2 mg/L, but suffer at levels below 4 to 5 mg/L.

After DO levels dropped below 2mg/L at times in December 2019 and January 2020 (as shown in the graph below),1,335 ML of the Lachlan Water Quality Allowance was released. This assisted in keeping flows above 50 ML/day and ensuring that DO levels remained above 2 mg/L from late January through to March 2020. Given the very dry conditions at the start of 2020, the aim was to provide sufficient flow to keep DO levels at acceptable rates, however; algal blooms were still of concern.

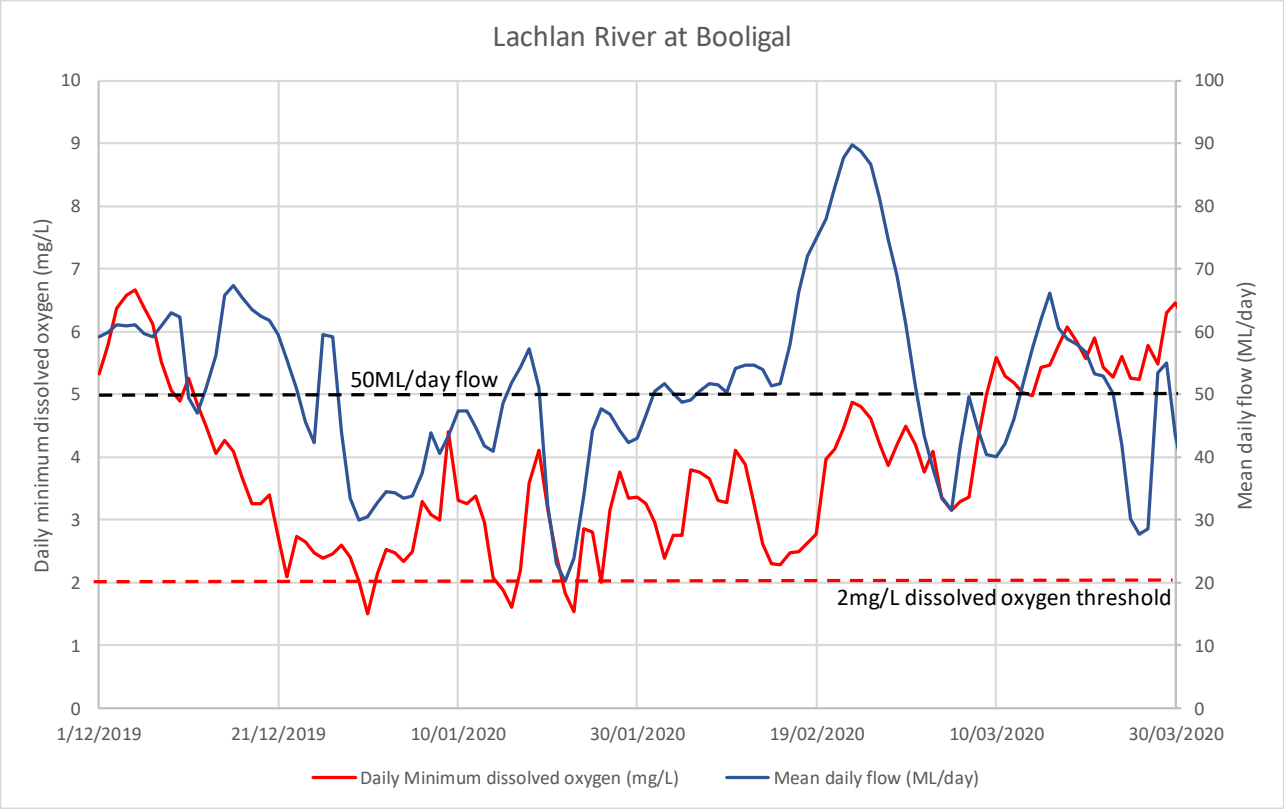

Figure 1: Comparison of daily minimum dissolved oxygen (left axis) and mean daily flow (right axis) in the Lachlan River at Booligal from December 2019 to March 2020

However, a larger flow of 100 ML/day at Booligal will provide much greater benefits – connecting pools along the river and providing sufficient depth for fish to move along reaches. This flow rate is also enough to disrupt thermal stratification and reduce harmful algal growth.

In early 2019, 4,936 ML of Lachlan Water Quality Allowance was used to maintain a flow of 100 ML/day at Booligal. The use of the water quality allowance in early 2019 was successful. There were no fish deaths reported and numbers of potentially toxic blue-green algae were maintained below the red alert warning level for recreational use. Lower Lachlan landholders also benefited from the improved water quality.

Dissolved oxygen levels in the Murrumbidgee and Murray

Regular dissolved oxygen updates for the Southern Basin are posted on the DPIE-Water Drought page at: www.industry.nsw.gov.au/water/allocations-availability/droughts-floods/drought-update/managing-drought-recovery/blackwater

There were some earlier concerns that high flows in the Murray and Murrumbidgee could lead to a repeat of conditions that occurred in 2016 and hypoxic blackwater events in these valleys. To date, the constant river flows and lack of overbank flooding have meant that dissolved oxygen levels have remained above the ecological thresholds. However, conditions are being constantly monitored and if flooding occurs, hypoxic blackwater could occur.

More information

DPIE-Water: www.industry.nsw.gov.au/water/allocations-availability/droughts-floods/drought-update/managing-drought-recovery/blackwater

DPI Fisheries: www.dpi.nsw.gov.au/fishing/habitat/threats/fish-kills

WaterNSW: www.waternsw.com.au/water-quality/algae