Murray Darling Basin – dissolved oxygen and other water quality results

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 information collected up to 14 April 2022 along the Barwon-Darling River and in Menindee Lakes and also includes information about recent fish deaths, algal blooms and pesticides.

Hypoxic blackwater

The floodwater from the heavy rain in the Northern Basin catchments in November 2021 has made its way into Menindee Lakes. These flood flows mobilised large amounts of organic material from the floodplains. The breakdown of this material caused dissolved oxygen levels in the Barwon and Darling rivers at times to drop to critical levels for fish health.

Agencies and scientific experts worked together to continually monitor the dissolved oxygen levels throughout the river system and advise the best operational measures for Menindee Lakes to mitigate the risk to aquatic life as much as possible within the Lakes and downstream. There were no mass fish deaths as a result of these inflows.

Dissolved oxygen levels - Barwon and Darling rivers

A second flood peak has been moving down the Barwon and Darling Rivers in recent weeks. Maximum flows were reached at Mungindi on the 12th of March, Walgett on the 24th of March and Bourke on the 8th of April. This resulted on a drop in dissolved oxygen but levels increased again as the peak passed (See Figure 1). Dissolved oxygen fell briefly below critical guidelines at Brewarrina but quickly recovered and did not breach thresholds at Bourke. This water is now moving towards Wilcannia and Menindee Lakes.

As a general guide, native fish and other large aquatic organisms require at least 2 milligrams per litre (mg/L) of dissolved oxygen to survive but may begin to suffer at levels below 4 to 5 mg/L. Despite the very low dissolved oxygen results recorded during this hypoxic blackwater event, no major fish deaths have been reported along the river.

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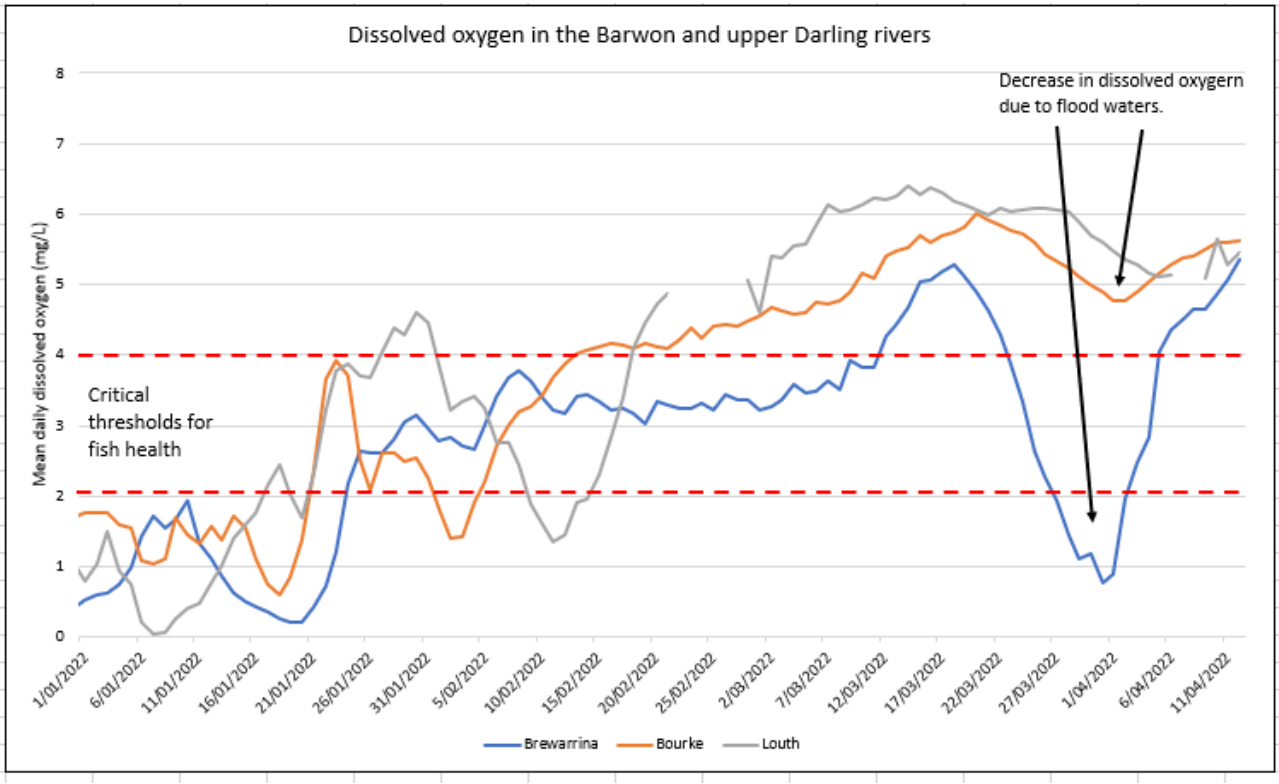

Figure 1. Mean daily dissolved oxygen (mg/L) in the Barwon and upper Darling rivers

Dissolved oxygen levels - Menindee Lakes and lower Darling/Baaka

Dissolved oxygen at Wilcannia, the inflow to Lake Wetherill, Weir 32 and Burtundy are currently all well above 4mg/L (Figure 2). However now that summer is over, it is expected that continuing cooler air temperatures will improve dissolved oxygen levels. Recent spot measurements taken in Tandure, Pamamaroo and Menindee Lakes and in Copi Hollow and sites along the Darling River were also above 4mg/L.

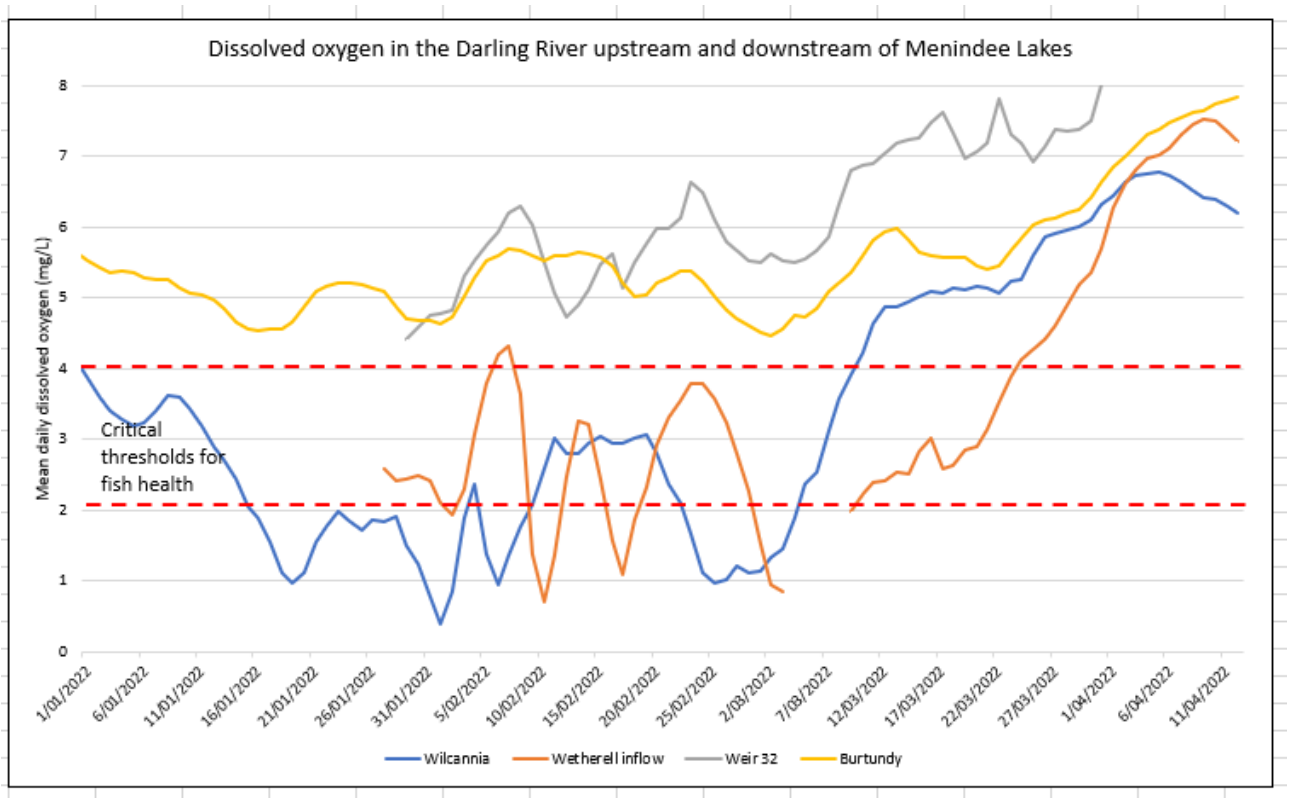

Figure 2. Mean daily dissolved oxygen (mg/L) in the Darling River upstream and downstream of Menindee Lakes

What is being done?

Dissolved oxygen will continue to be monitored in case conditions require further action. Current dissolved oxygen levels do not pose a threat to aquatic ecosystems. The darker coloured plumes of water flowing into the lakes seen in earlier satellite imagery are no longer apparent (Figure 3)

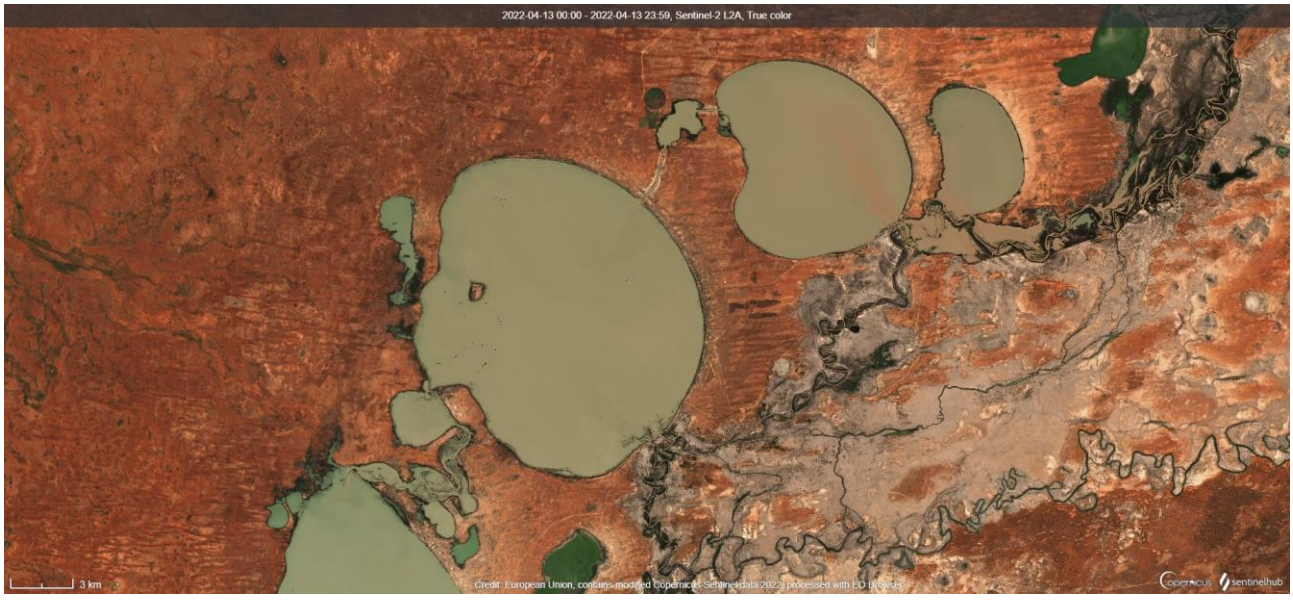

Figure 3. Sentinel-2 Satellite Image from 13 April 2022.

Recent fish deaths at Menindee

The management of inflows meant the risk of fish kills by hypoxia was minimised and no widespread fish kills were reported in areas where low dissolved oxygen levels were recorded.

However, several fish kills were reported at the Lakes' outlet structures (and in stream downstream as dead fish were transported in the flow). These kills consisted predominantly of Bony herring (native) and non-native carp juveniles and are considered to be the result of trauma experienced either passing through the regulator structures, or when aggregating downstream of the outlets.

A recent fish kill directly below Menindee Main Weir in March/April 2022 is thought to consist largely of small bony herring which may have become trapped in the pool between the weir and the bank/crossing downstream. With a reluctance to pass through pipes, these fish may have essentially been stranded in the pool, and eventually lost condition due to a lack of food and were thus susceptible to cooler temperatures as Summer transitioned into Autumn.

Bony herring are a particularly common native species that responds quickly to the boom-bust cycle of floods and drought in our rivers. They are however particularly vulnerable to physical trauma or temperature changes, especially when in poor condition. We should expect reports of fish kills involving hundreds to thousands of bony herring in coming months across the lowland sections of the Murray Darling Basin. These events are known to occur at the end of productive high flow sequences and are a result of a boom in numbers followed by a reduction in resources (food). As food supplies diminish body condition of individuals will decrease, making them vulnerable to changes in temperature (particularly at the start of winter or the beginning of spring).

Whilst these are a natural phenomenon, NSW Fisheries do ask the public to report fish kills (and please take a few photos of the impacted area). Contact details for the hotline are at the end.

NSW Fisheries also note that Carp numbers are increasing across the Murray Darling Basin. Whilst unfortunate this is also expected given Carp breed in warmer shallow waters which recent high flows have created across the system.

Blue-green algae

As well as mobilising large volumes of organic material, the flooding in the Northern Basin has also flushed high concentrations of nutrients such as nitrogen and phosphorus off the landscape and into the Barwon and Darling rivers. High levels of nutrients can contribute to the growth of potentially toxic blue-green algae..

Red alert warnings for blue green algae are current for Lake Wetherell, Lake Pamamaroo and at Burtundy. Algal biovolumes have decreased in recent samples and the risk of further blooms is expected to fall as water temperatures cool. No algal toxins were detected in a sample collected from the Darling River at Menindee at the end of March.

For definitions of algal alerts and further information visit the WaterNSW web page (available at https://www.waternsw.com.au/water-quality/algae).

Pesticides

A sample was collected from Menindee on 28 March 2022 and analysed for a range of common pesticides. Trace levels of two herbicides were detected, Metolachlor (0.03 μg/L) and Atrazine (0.15 μg/L). These values are well below the recommended guideline values for the protection of aquatic ecosystems so these amounts are not expected to have any impact on wildlife. They are also significantly below the health values for human consumption as specified in the Australian Drinking Water Guidelines (2011). Both of these chemicals are widely used for weed control in a variety of applications. They have been widely detected across the Murray Darling Basin over a number of years. Atrazine is relatively stable, with a half life of around 2 months in freshwater systems. It does not bioaccumulate significantly.

Further detail can be obtained from the Australian and New Zealand Water Quality Guidelines:

https://www.waterquality.gov.au/anz-guidelines/guideline-values/default/water-quality-toxicants/search

Additional information

To notify the department of potential blackwater events email waterqualitydata@dpie.nsw.gov.au

To report dead fish or fish starting to gasp at the water surface call the NSW DPI Fisheries Hotline 1800 043 536. Information on recent fish deaths is available at Fish kills in NSW

Further information on blackwater events can be found at the DPIE Water website https://www.industry.nsw.gov.au/water/allocations-availability/droughts-floods/drought-update/managing-drought-recovery/blackwater

or the MDBA website https://www.mdba.gov.au/publications/mdba-reports/water-management-101-factsheets

Operational updates for Menindee Lakes are available at WaterInsights - WaterNSW