

Murray-Darling Basin – water quality and dissolved oxygen results

Multiple agencies are undertaking water quality monitoring to review dissolved oxygen conditions across NSW and identify potential risks to ecological communities. This update provides an assessment of information collected up to 1 November 2022.

As flooding continues across all inland valleys in New South Wales and floodwater is reaching areas of floodplain that have not been inundated for some time, the risk of hypoxic blackwater events increases. Hypoxic, or low oxygen, blackwater occurs when organic material, such as sticks, leaves, bark, grass or crops are broken down in floodwater or washed off the floodplain into the river. The breakdown of this material by bacteria can rapidly use up all the oxygen in the water. This process of breaking down organic material speeds up as water temperature increases, which uses up the oxygen even faster.

With ongoing flooding and warmer air and water temperatures as summer approaches, the possibility of hypoxic blackwater events increases. Unfortunately, so does the risk that fish deaths like those experienced during the 2011 and 2016 floods could occur. There have been reports from the Murray River valley of dead fish, as well as crayfish exiting floodwaters to escape poor quality water. NSW Department of Primary Industries - Fisheries staff have investigated a fish death event in the Little Murray River. They have also relocated crayfish to the Narrandera Fisheries Centre until conditions improve. Fish and other aquatic animals have difficulty surviving when oxygen levels drop below 2 mg/L.

NSW and Commonwealth agencies will continue to assess the risks of poor water quality and to monitor dissolved oxygen levels over the coming months to identify areas that may require further action. Agencies are also providing information to the media to ensure the community are informed about the areas of highest risk and who to contact in the event fish deaths do occur.

Where are the main areas of concern?

Dissolved oxygen levels in most rivers and streams across the Murray-Darling Basin are safe for fish and other aquatic life. However, there are some areas where oxygen levels have been declining as large areas of floodplain are inundated by floodwater.

Current areas of most concern in New South Wales are:

- Mid Murray River catchment from Tocumwal downstream to Wentworth
- Wakool River
- Kolety/Edward River
- Barwon River between Walgett and Brewarrina

Dissolved oxygen levels – Kolety/Edward River

Dissolved oxygen in the Kolety/Edward River were above the critical thresholds for fish health for most of October. A dramatic increase in river heights saw water push further out onto the floodplain, inundating more organic material. Combined with higher water temperatures, which speeds up the carbon break down process and uses up dissolved oxygen at a faster rate, oxygen levels have dropped to critical levels. Agencies will continue to monitor oxygen levels in the Kolety/Edward River as hypoxic blackwater events and fish deaths have occurred in this river system in the past.

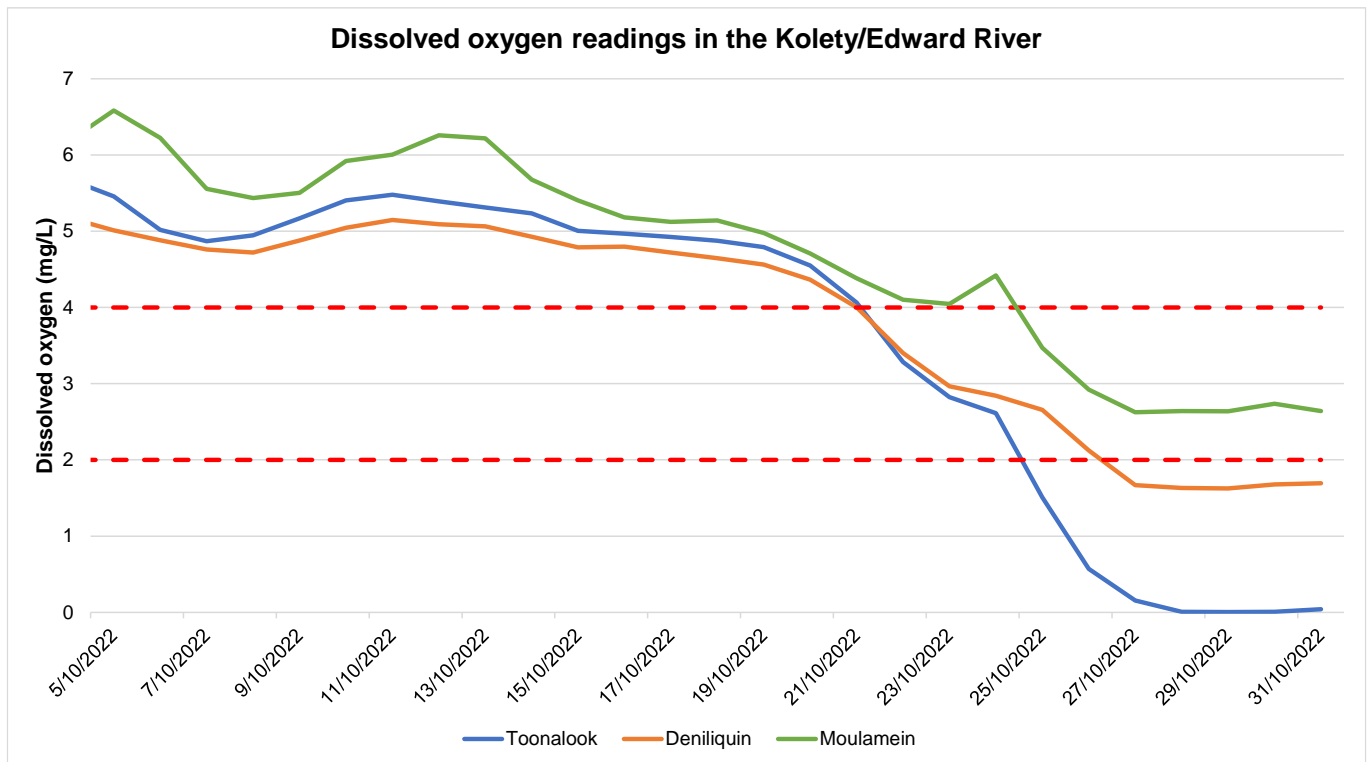


Figure 1: Dissolved oxygen (mg/L) in the Kolety/Edward River at Toonalook, Deniliquin and Moulamein

Dissolved oxygen levels – Wakool River

In a similar situation to the Kolety/Edward River, dissolved oxygen levels in the Wakool River have been continuing to decline as river level and water temperatures increase. Dissolved oxygen in the Wakool River has been below the critical threshold of 2 mg/L for over a week, but is showing some minor improvement with the cooler temperatures over the last few days (Figure 2). Depending on their size and health, fish may begin to suffer when oxygen levels drop below this level. As for the Kolety/Edward River, fish deaths have occurred in the Wakool River during previous blackwater events.

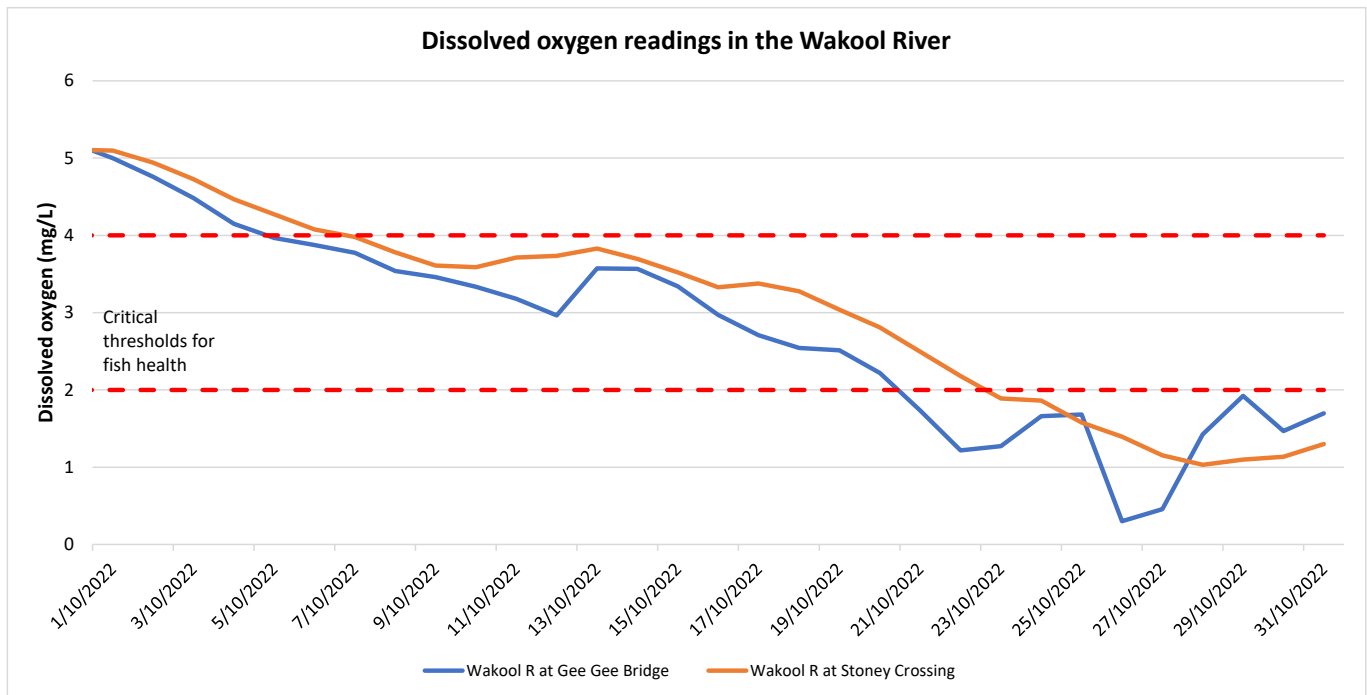


Figure 2: Dissolved oxygen (mg/L) in the Wakool River at Gee Bridge and Stoney Crossing

Dissolved oxygen levels – Murray River catchment

Dissolved oxygen levels in the Murray River at Tocumwal, upstream of the Barmah Forest, have been remaining in the safe range for fish health (Figure 3). Monitoring at the outflow from the forest at Barmah, shows oxygen levels have dropped below 2 mg/L.

Floodwaters from the Goulburn and Campaspe rivers in Victoria, combined with high flows in the Murray River, resulted in major flooding at Echuca. The Koondrook-Perricoota Forest is an extensive forest of river red gums and woodlands along the Murray River downstream of Echuca. When inundated, the breakdown of the organic material such as leaves, bark, sticks and grass on the forest floor can result in hypoxic blackwater events. In addition to the forests, large areas of pastures and crops in agricultural areas are also being flooded. Water with low dissolved oxygen is currently flowing into Little Merran, Thule and Barber creeks and then into the Wakool River. This has caused the dissolved oxygen levels in these waterways to decline below safe ecological thresholds.

As the floodwater from all these systems makes its way downstream, the impact on dissolved oxygen is starting to show in the lower Murray River. Dissolved oxygen levels downstream of Koondrook-Perricoota Forest at Barham, the Wakool - Murray River junction and at Colignan, have all declined to less than 2 mg/L (Figure 3). In the Murray River at Swan Hill, Murray Crayfish have been leaving the water and walking up onto trees and logs to escape the hypoxic conditions. NSW Department of Primary Industries - Fisheries staff rescued a number of these threatened species and relocated them to the Narrandera Fisheries Centre. Here they will be cared for until the quality of the water in the Murray River has improved and they can be returned to the same location where they were caught.

Monitoring is showing that oxygen levels in the Murray River downstream of Wentworth have also started to decline.

The Bureau of Meteorology has forecast air temperatures at Echuca and Deniliquin will slowly increase up to a maximum of 26°C on Monday 7 November. The forecast maximum air temperature for Mildura on Monday is 31°C. In the short term, the lower air temperatures and cloud cover this week will help maintain lower water temperatures and may provide an opportunity for oxygen levels to recover slightly before warmer weather arrives over the weekend.

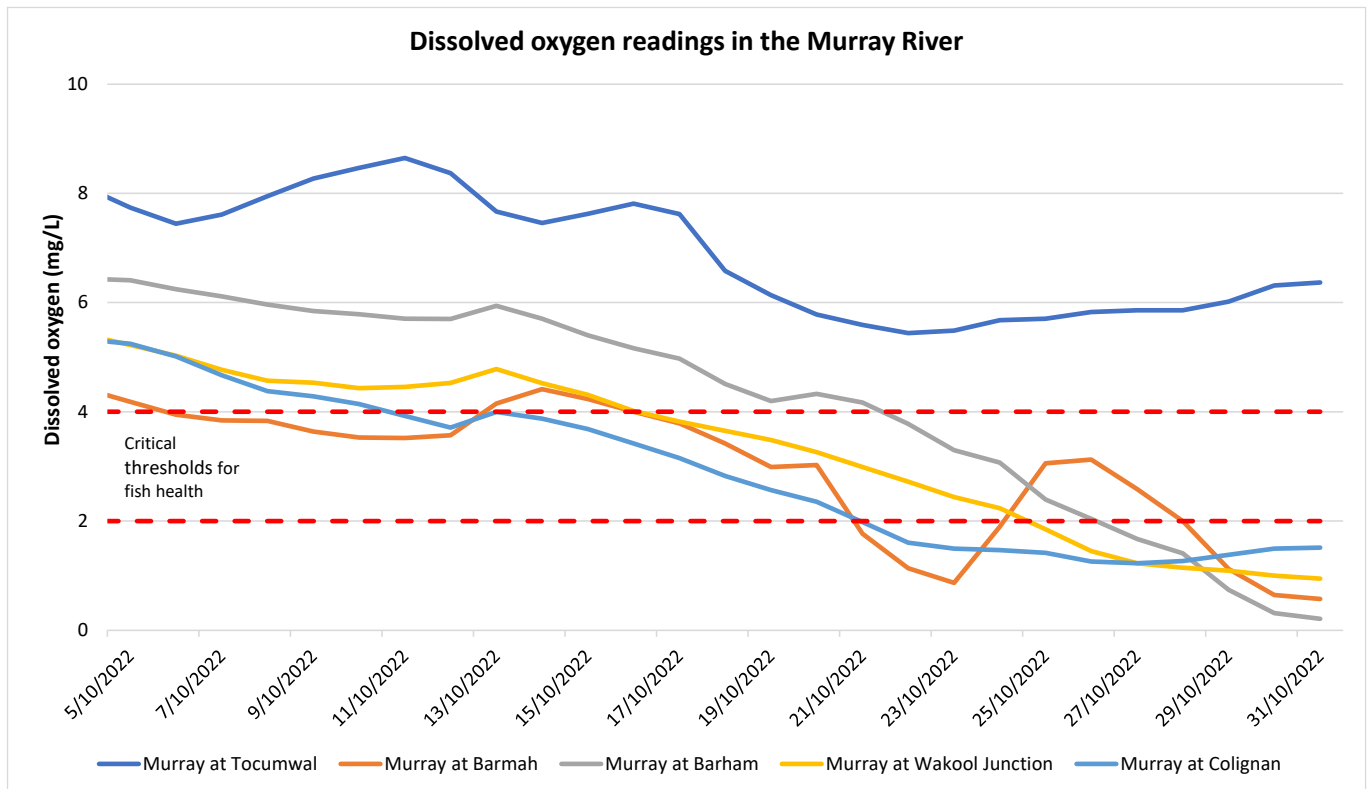


Figure 3: Dissolved oxygen (mg/L) in the Murray River at Tocumwal, Barmah, Barham, downstream of the Wakool River junction and at Colignan

Dissolved oxygen levels – Barwon River

Heavy rainfall and flooding in the Northern Murray-Darling Basin have inundated large areas of floodplain, resulting in water with low dissolved oxygen flowing into the Barwon River. A satellite-derived Sentinel colour infrared image shows the inundation of the Border Rivers, Gwydir and Namoi catchments (Figure 4). The blue coloured areas indicate more turbid floodwater. The darker and black areas (Macquarie and Bogan rivers) are clearer water, which can indicate the presence of hypoxic blackwater conditions.

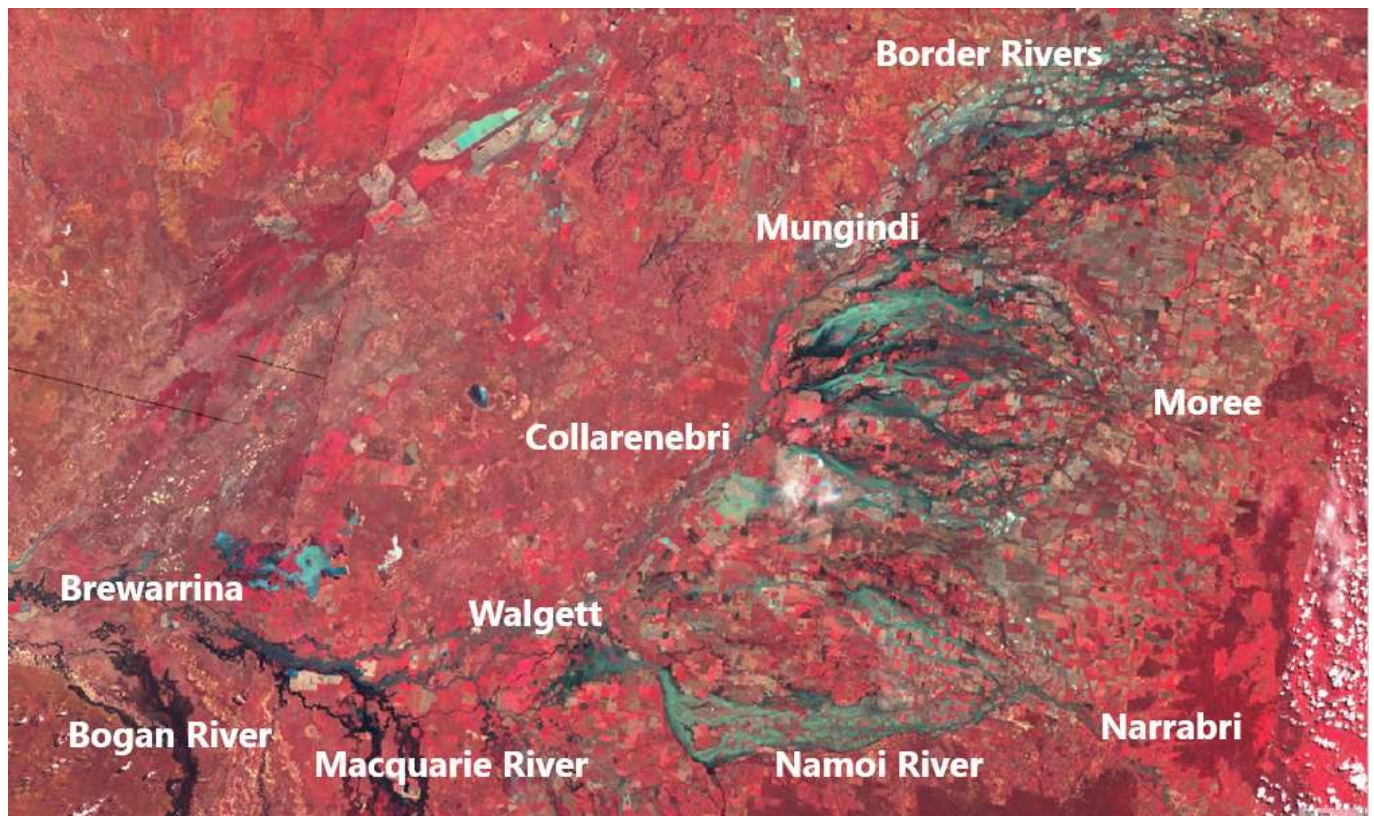


Figure 4: Satellite derived Sentinel colour infrared image (29 October) showing flooding in the Border Rivers, Gwydir, Namoi, Macquarie, Bogan and Barwon rivers

The inflow of floodwater from the Northern Basin has caused dissolved oxygen levels in the Barwon River from Walgett to Brewarrina to decrease below the critical threshold for fish health of 2 mg/L (Figure 5). There have not been any reports of fish deaths or of fish gasping at the water surface in the Barwon River. Better quality water in the Intersecting Streams may provide a refuge area for fish to move into until conditions in the Barwon River improve.

Oxygen levels in the Darling River at Bourke have dropped to 4 mg/L, but are expected to decrease further as the low oxygen water arrives from upstream. These flows will continue to impact dissolved oxygen levels further downstream at Wilcannia and Menindee Lakes over the coming months.

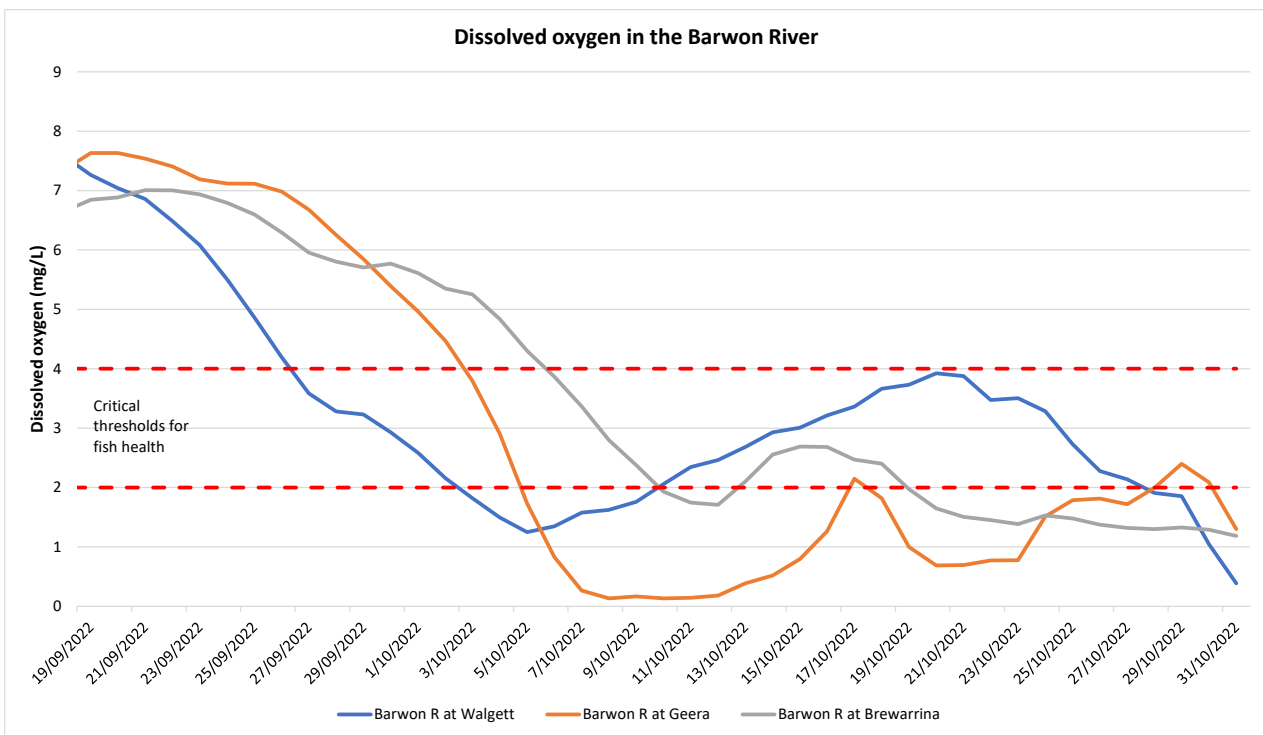


Figure 5: Dissolved oxygen (mg/L) in the Barwon River at Walgett, Geera and Brewarrina

What is being done?

The magnitude of flooding means that the prevention of a hypoxic blackwater event is not possible and mitigation methods to get more oxygen back into the water are extremely limited. Methods used in drought situations, such as artificial aerators, won't be viable for combating the large volume of water and the widespread hypoxic blackwater events being experienced in the Murray Valley or the Barwon River.

Small, oxygenated refuge areas for fish can be provided by delivering environmental water to areas of poor water quality. The Commonwealth Environmental Water Office is continuing to deliver small volumes of environmental water to the Wakool, Kolety/Edward and Niemur rivers and Whymoul, Thule, Murrain-Yarreirin and Cockrans creeks, to provide a refuge from declining water quality. You can find out more about the Commonwealth's current environmental water releases in the mid-Murray at: [Latest water use - Mid-Murray - DCCEEW](#)

Although hypoxic blackwater events may result in the loss of fish and other aquatic life, the impacts of these events on the environment are usually short-term as the river water re-oxygenates again as the flooding subsides. Naturally occurring events such as these underpin the broad health of rivers. They provide nutrients that drive the overall production of our river and wetland systems. In the longer term, native fish, water birds and other organisms benefit from the increased production in the river, boosting food supplies and supporting breeding cycles.

NSW and Commonwealth agencies will continue to assess the risks of poor water quality and to monitor dissolved oxygen levels over the summer months to identify areas that may require further action. Updates are being provided to the media and posted on agency websites to ensure the community remains informed.

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 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](#)

Further information on blackwater events can be found at the DPE - Water website at:

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

Additional information is also available on the MDBA website at:

www.mdba.gov.au/publications/mdba-reports/water-management-101-factsheets

Operational updates are available at: [WaterInsights - WaterNSW](#)