

Fish deaths in the Darling–Baaka River – Part B

Part B of the submission to the OCSE independent review into the February to March 2023 fish deaths in the Darling–Baaka River, Menindee

July 2023



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Water quality update, Meeting No. 1 – 10 October 2022

Northern Basin

Barwon River

Discharge in the Barwon River at Walgett is over 58,000 ML/day from floodwater coming out of the Namoi Valley (Figure 1). Namoi River at Goangra is at a moderate flood level with more floodwater at Gunnedah and Narrabri. Flow is increasing at Geera and Brewarrina.

Dissolved oxygen at Collarenebri remains at safe ecological levels. The higher flows from the Namoi River have impacted dissolved oxygen levels at Walgett, and now Geera and Brewarrina (Figure 2). Water temperatures decreased over the weekend following widespread rain and cooler air temperatures (Figure 3). Sentinel images are showing the floodwaters from the Namoi River are turbid, rather than the distinct blackwater appearance observed during the November/December flood last year.

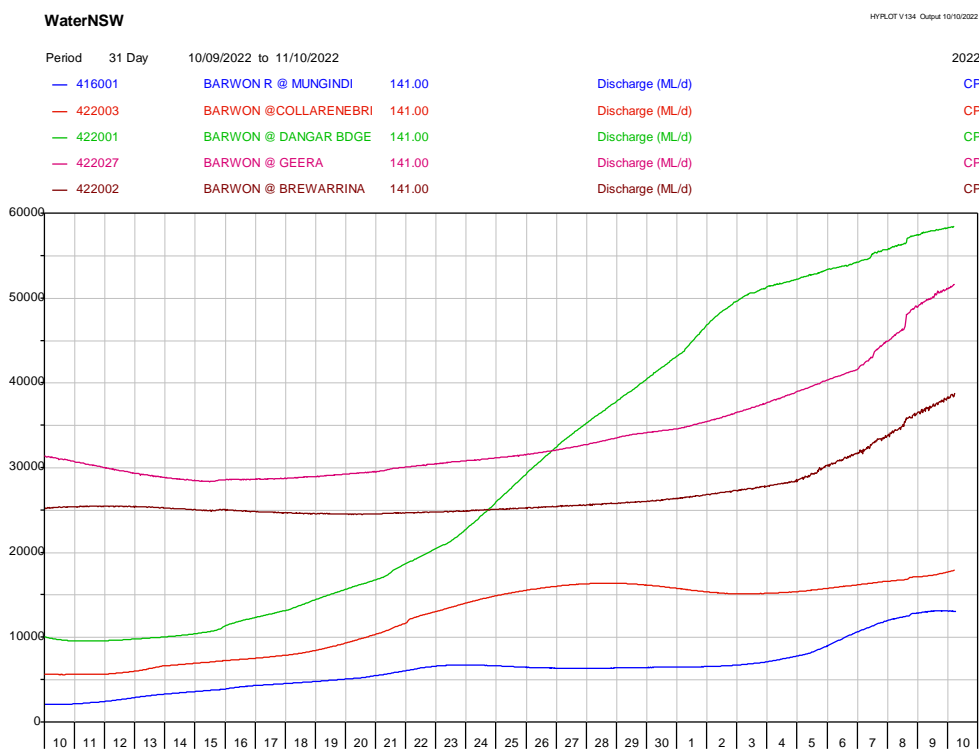


Figure 1. Discharge (ML/day) in the Barwon River

WaterNSW

HYFLOT V134 Output 10/10/2022

Period	31 Day	10/09/2022 to 11/10/2022	2022
422003	BARWON @ COLLARENEBRI	2351.00	DO (mg/l) CP
422001	BARWON @ DANGAR BDGE	2351.00	DO (mg/l) CP
422027	BARWON @ GEERA	2351.00	DO (mg/l) CP
422002	BARWON @ BREWARRINA	2351.00	DO (mg/l) CP

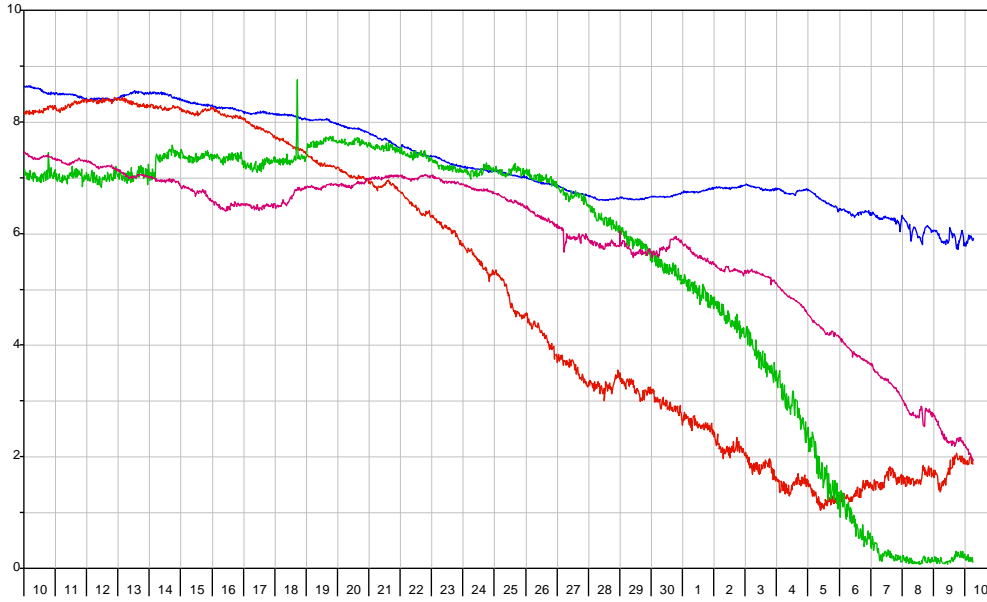


Figure 2. Continuous dissolved oxygen (mg/L) in the Barwon River

WaterNSW

HYFLOT V134 Output 10/10/2022

Period	31 Day	10/09/2022 to 11/10/2022	2022
422003	BARWON @ COLLARENEBRI	2080.001 Hour Inst.	Water Temp(C) CP
422001	BARWON @ DANGAR BDGE	2080.001 Hour Inst.	Water Temp(C) CP
422027	BARWON @ GEERA	2080.001 Hour Inst.	Water Temp(C) CP
422002	BARWON @ BREWARRINA	2080.001 Hour Inst.	Water Temp(C) CP

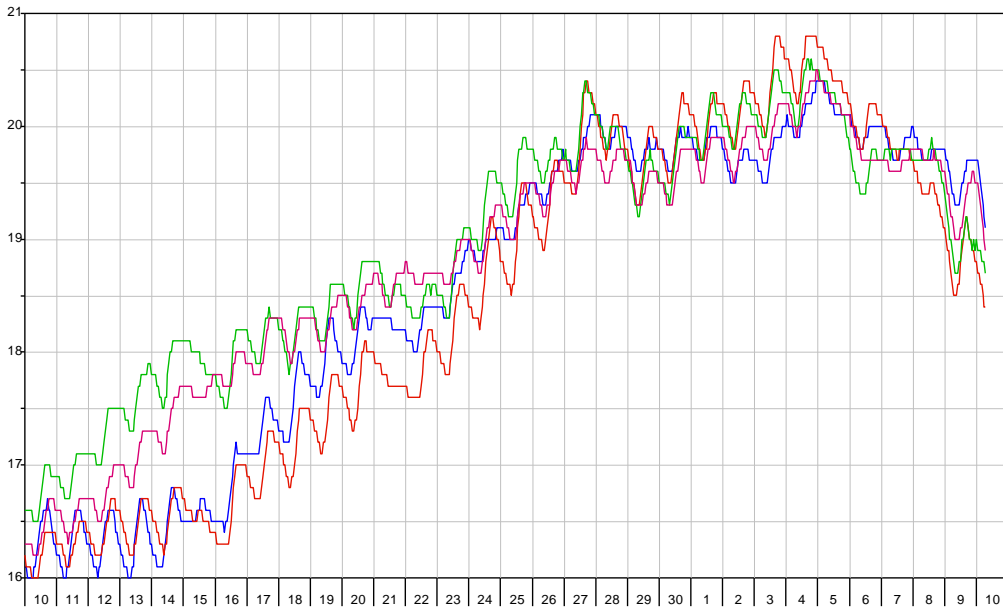


Figure 3. Water temperature (°C) in the Barwon River

Upper Darling River

Discharge has been increasing at all sites on the upper Darling River (Figure 4). Dissolved oxygen has dipped as water temperature increased, but still at safe ecological levels (Figure 5).

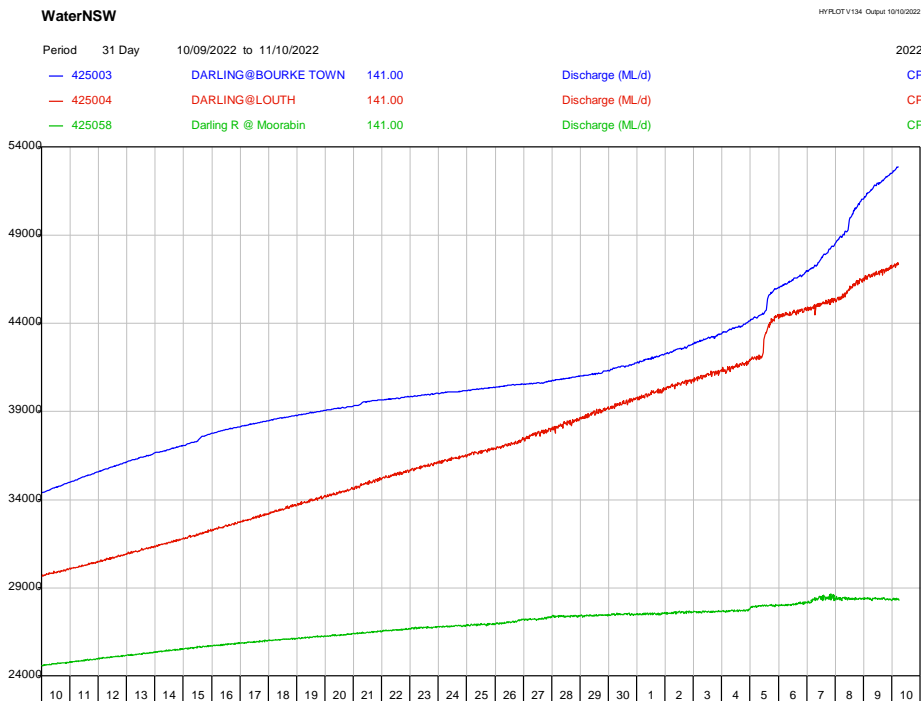


Figure 4. Discharge (ML/day) in the upper Darling River

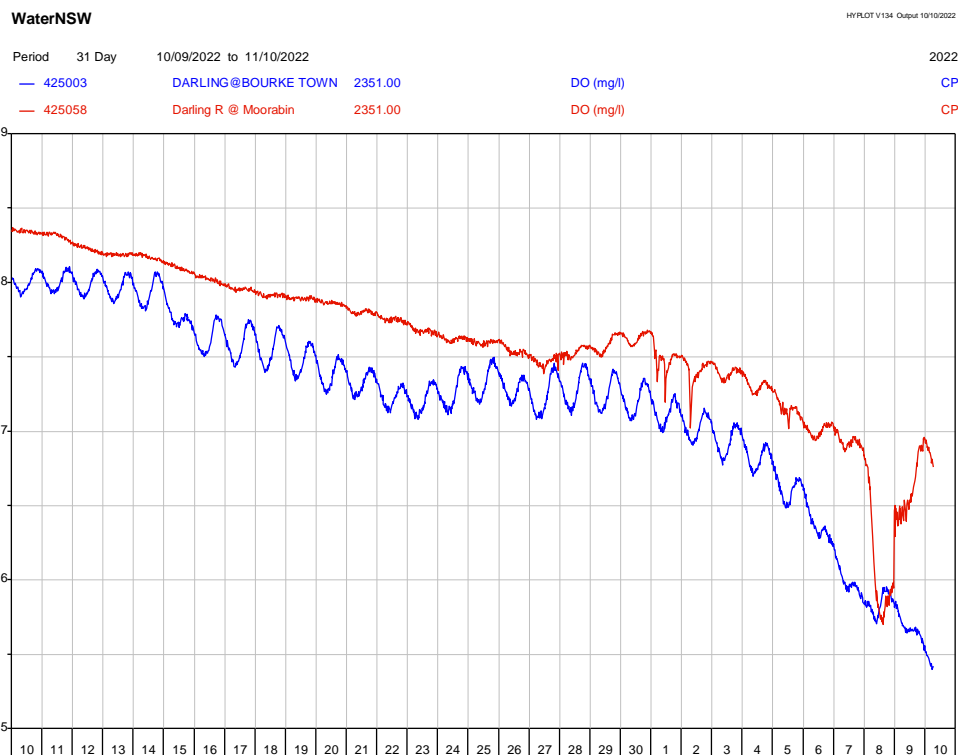


Figure 5. Continuous dissolved oxygen (mg/L) in the upper Darling River

Handheld results from the Intersecting Streams highlights that these systems will again provide an oxygenated refuge for fish to move into (Table 1).

Table 1: Dissolved oxygen readings in Intersecting Streams

Site	Date	Dissolved oxygen (mg/L)
Narran River at Angledool	21/9/2022 13:13	6.66
Birrie River at Goodooga	21/9/2022 12:09	7.18
Bokhara River at Goodooga	21/9/2022 11:45	7.73
Warrego River at Fords Bridge	20/09/2022 15:25	9.19
Paroo River at Willara Crossing	20/09/2022 11:33	7.43

Menindee Lakes and lower Darling River

Releases from Menindee Lakes are maintaining flow at around 22,500 ML/day in the Darling River at Weir 32 and 16,500 ML/day at Burtundy. Dissolved oxygen has dipped as water temperature increased, but still above safe ecological levels (Figure 6).

Monitoring on 26-27 September showed dissolved oxygen at the surface in all Lakes and Darling River at Menindee was above 7 mg/L. No profile readings were taken in the Lakes.

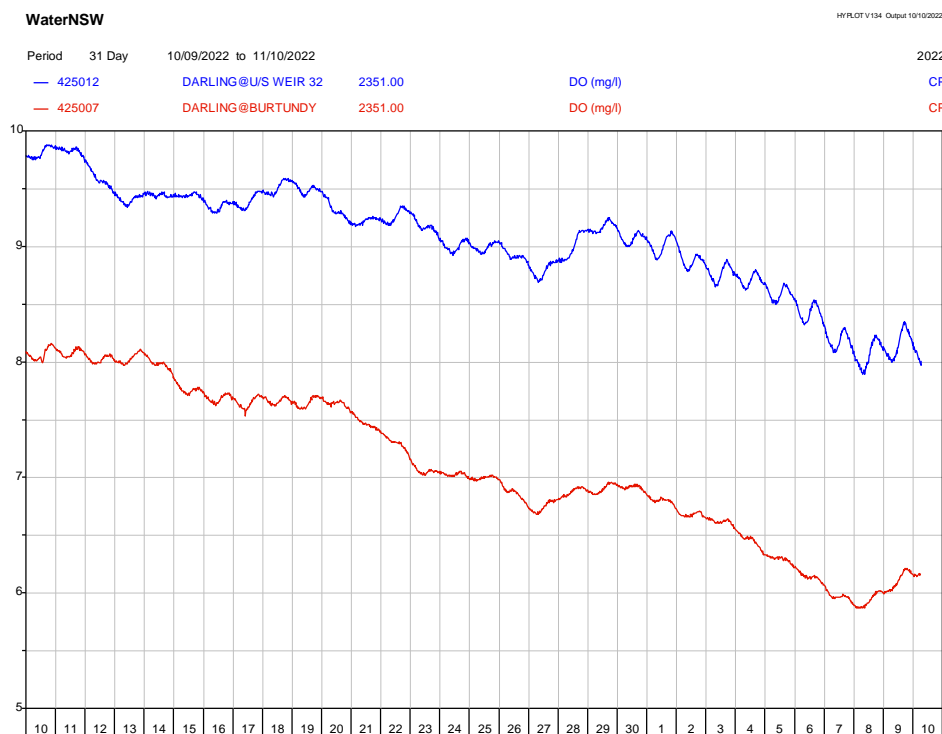


Figure 6. Continuous dissolved oxygen (mg/L) in the lower Darling River

Southern Basin

Lachlan

Rainfall over the past several days and weeks has caused prolonged flooding along the Lachlan River and its tributaries. Major flooding expected at Forbes this week (Figure 7). The Lachlan River at Hillston Weir is expected to experience moderate flooding. The Lachlan River at Booligal Weir may peak around mid to late October, with minor flooding.

With the exception of Condobolin, dissolved oxygen has declined at Lake Cargelligo, Willandra, Hillston and Booligal. However, dissolved oxygen levels remain above 4 mg/L (Figure 8).

Hand-held dissolved oxygen readings were collected in the first week of October at Belubula River at Canowindra (10.75 mg/L), and Lachlan River at Forbes (8.74mg/L) indicating oxygenated water upstream.

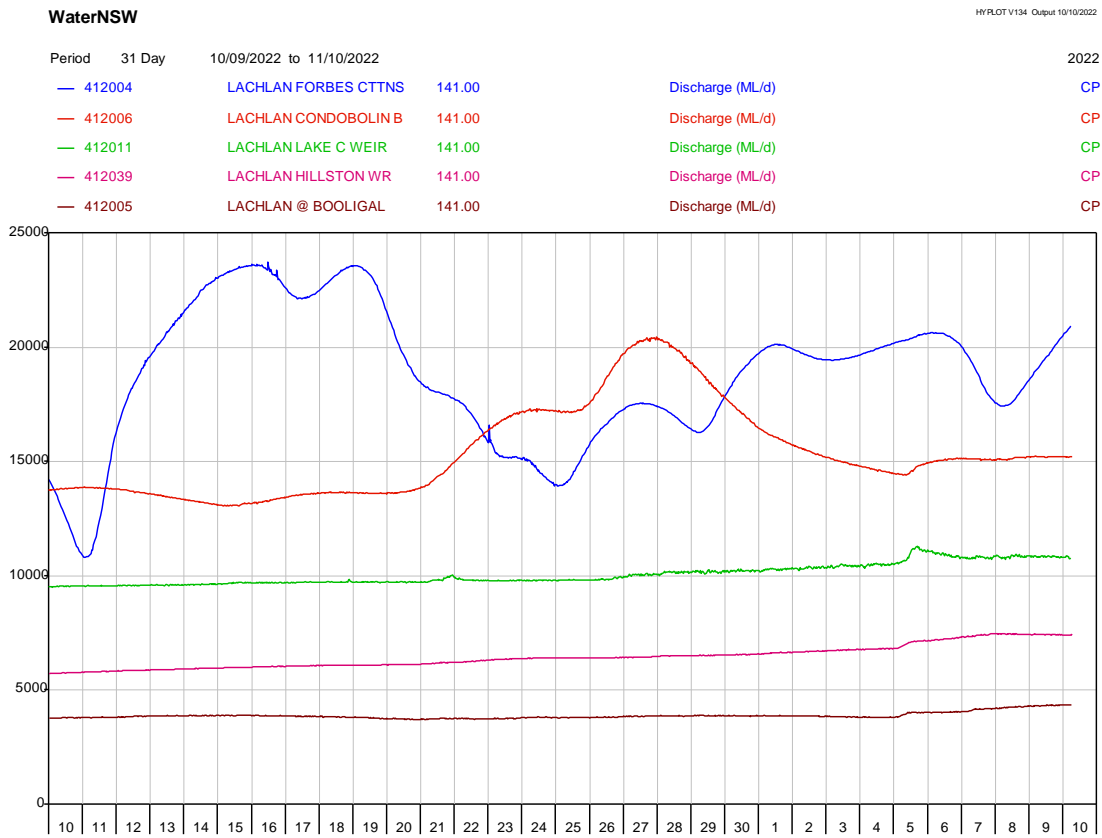


Figure 7. Discharge (ML/day) in the Lachlan River

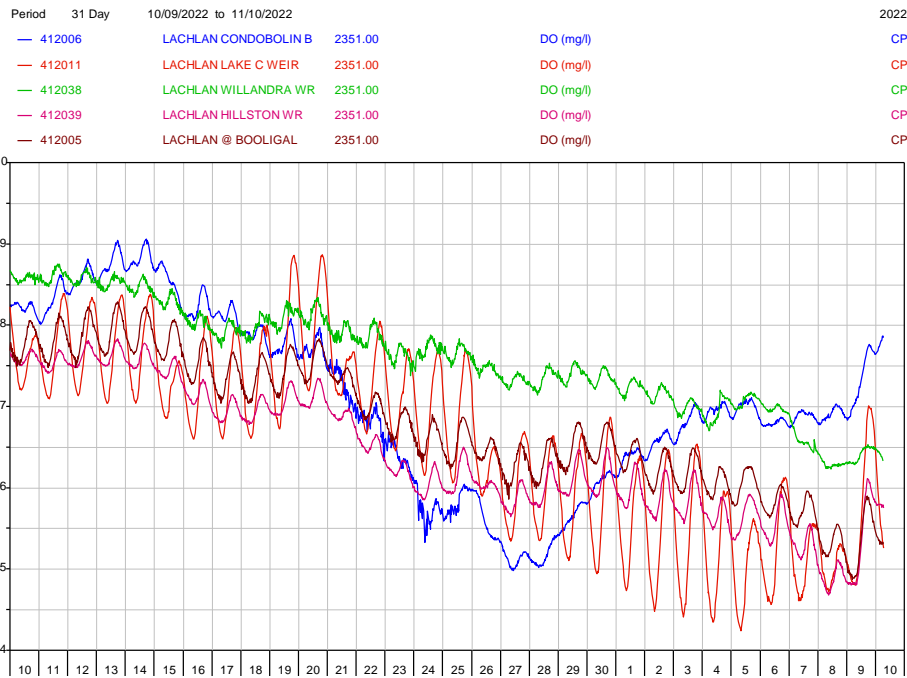


Figure 8. Continuous dissolved oxygen (mg/L) in the Lachlan River

Murrumbidgee

Minor flooding is occurring along the Murrumbidgee. Discharge of over 55,000 ML/day at Wagga and over 30,000 ML/day at Gogeldrie Weir. Flows are currently steady in the lower Murrumbidgee with over 23,000 ML/day at Balranald. (Figure 9).

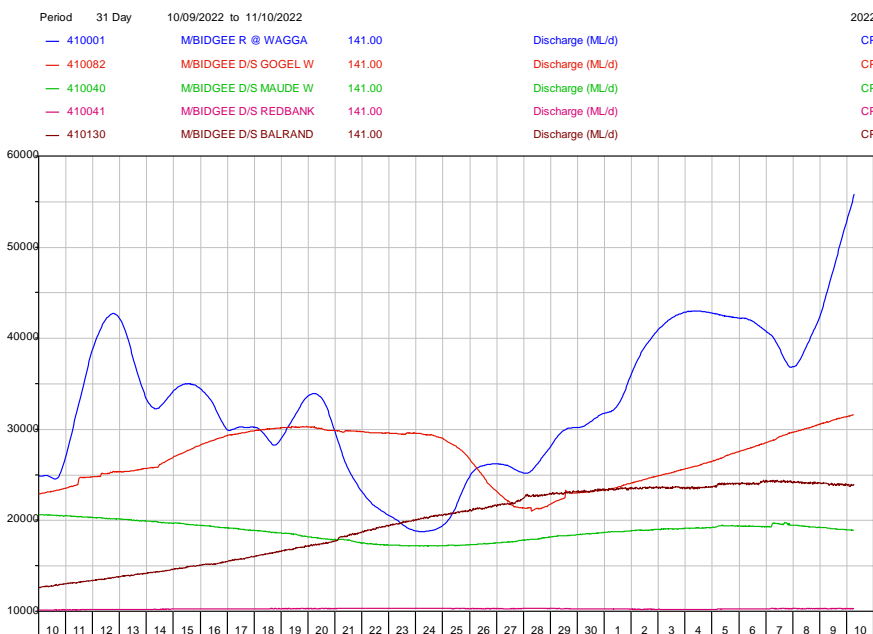


Figure 9: Discharge (ML/day) in the Murrumbidgee River

Dissolved oxygen has been declining with increased flows and water temperature. Currently Balranald is around 3 mg/L. Maude and Redbank Weir remain above 5 mg/L (Figure 10).

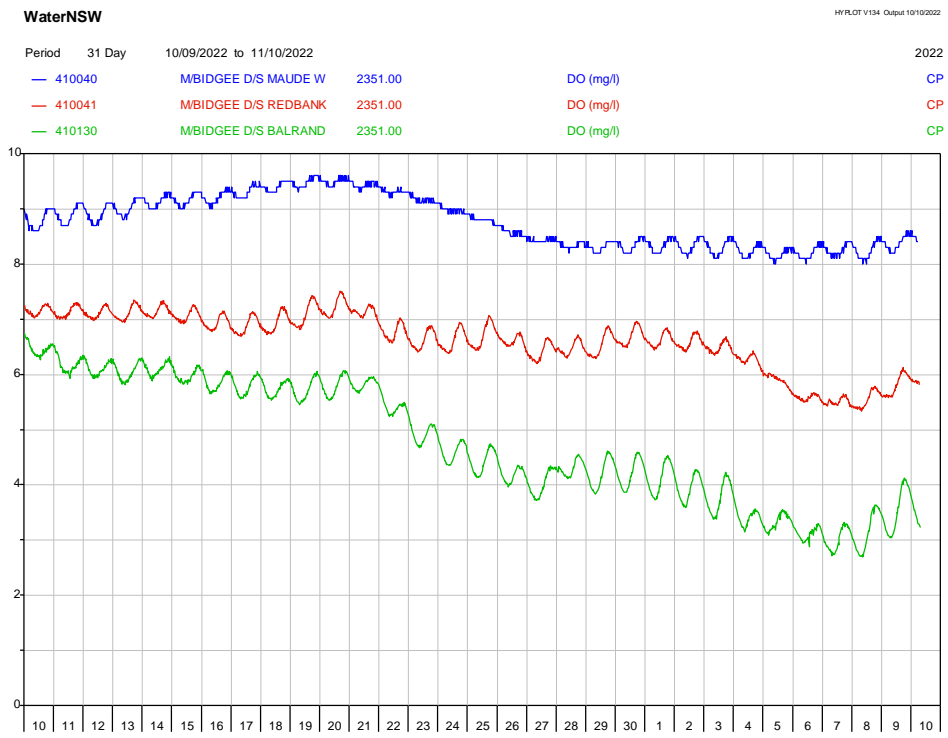


Figure 10: Continuous dissolved oxygen (mg/L) in the Murrumbidgee River

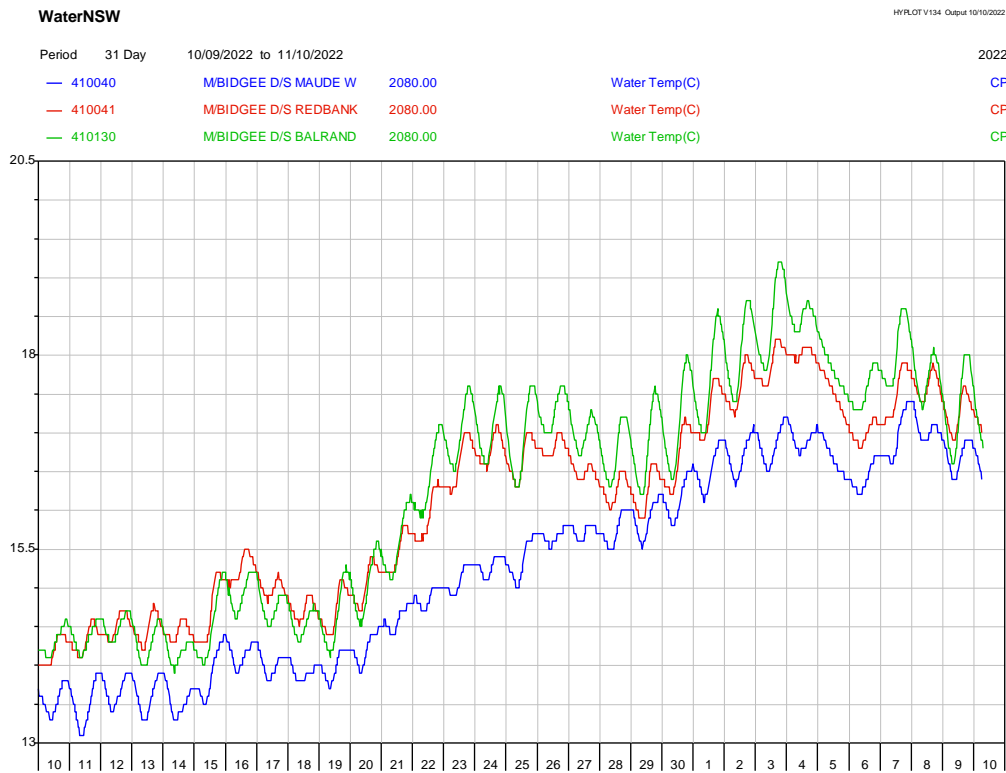


Figure 11: Water temperature in the Murrumbidgee River

Hand-held oxygen readings collected in the first week of October confirm the Murrumbidgee River at Balranald is experiencing dissolved oxygen levels below ecological thresholds (Table 2).

Table 2: Dissolved oxygen readings in Murrumbidgee catchment

Site	Date	Dissolved oxygen (mg/L)
Murrumbidgee River at Wagga	4/10/2022 9:10	9.65
Murrumbidgee River at Balranald	5/10/2022 12:42	2.72
Yanco Creek at Yanco Bridge	4/10/2022 9:36	7.76
Billabong Creek at Walbundrie	5/10/2022 12:38	8.48
Billabong Creek ay Jerilderie	4/10/2022 10:09	6.73
Billabong Creek at Darlot	5/10/2022 9:43	7.99

Kolety/Edward River

Along the Kolety/Edward River, dissolved oxygen continues to decline but remains above 4 mg/L (Figure 12). The river is experiencing minor to moderate flooding. Over 20,800 ML/day at Toonalook and Deniliquin has levelled off at just over 35,000 ML/day. Water temperature in the Edward River was increasing but dropped off over the weekend (Figure 13).

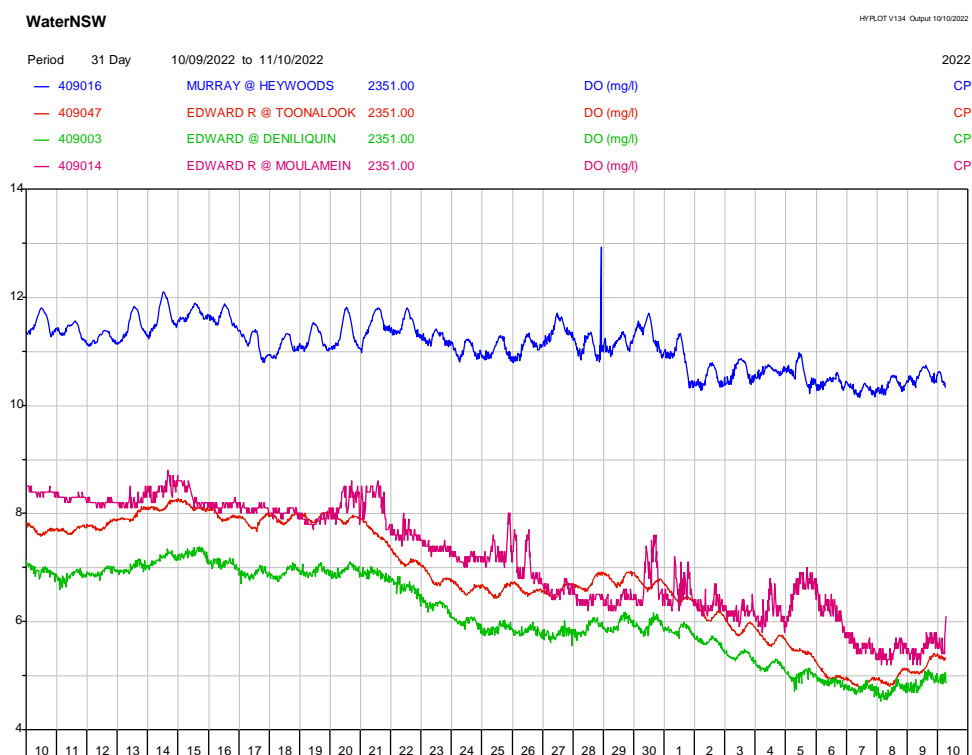


Figure 12: Continuous dissolved oxygen (mg/L) at Heywoods and the Edward River

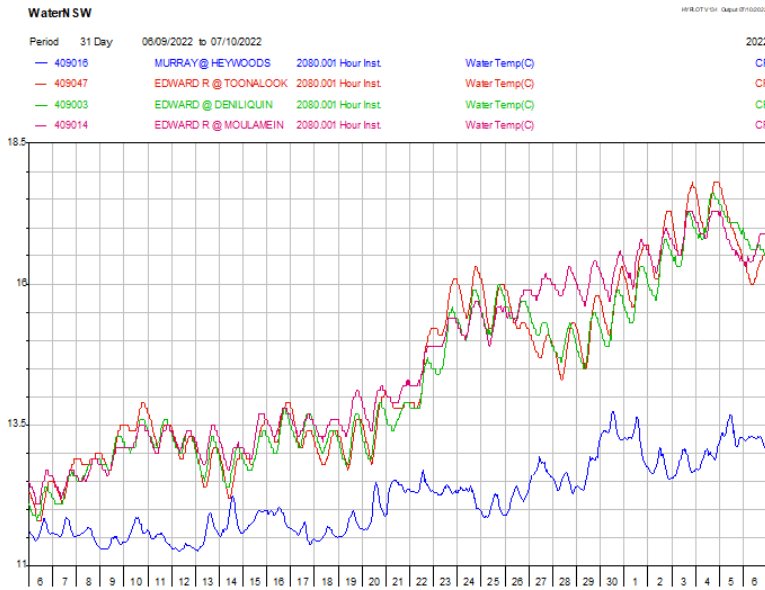


Figure 13: Water temperature (°C) at Heywoods and the Edward River

Wakool/Niemur Rivers

Floodwaters from the Murray River combined with floodwaters from the Edward River have caused minor flooding at Wakool Junction. The Wakool and Niemur rivers are currently flowing above 10,000 ML/day and rising. Conversely, dissolved oxygen has slowly been on the decline with both sites on the Wakool dropping below 4 mg/L (Figure 14).

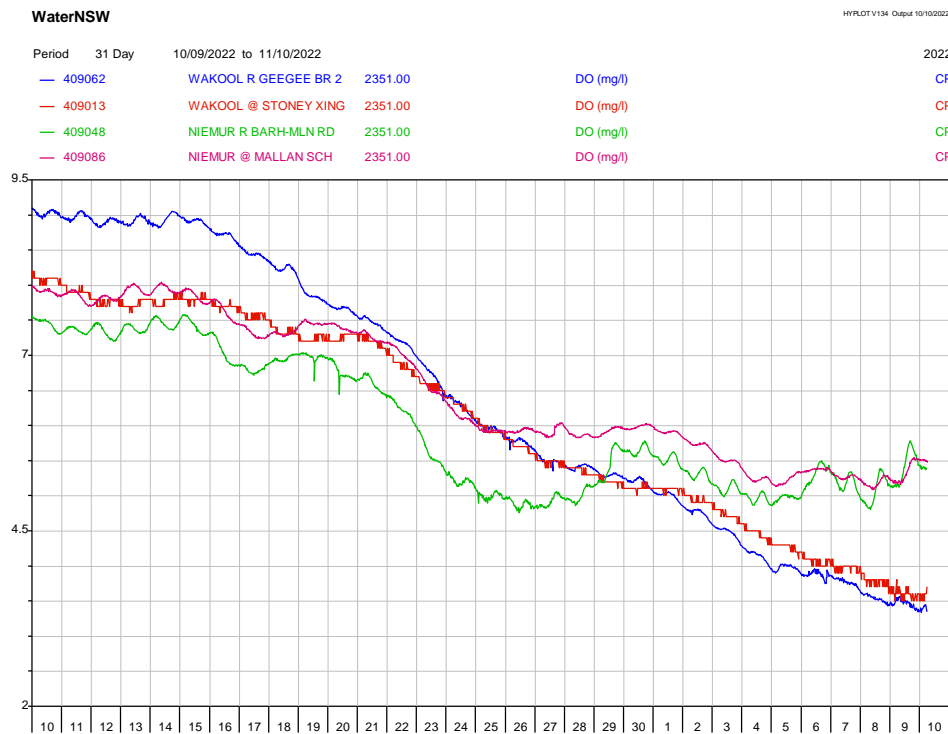


Figure 14: Continuous dissolved oxygen (mg/L) in the Wakool and Niemur Rivers

Murray, Merran, Thule and Barber

Figure 15 shows how dissolved oxygen levels have declined at a range of sites over the past month. Barbers Creek in particular, has experienced significant decline in dissolved oxygen with flooding and increased water temperatures (Figure 16).

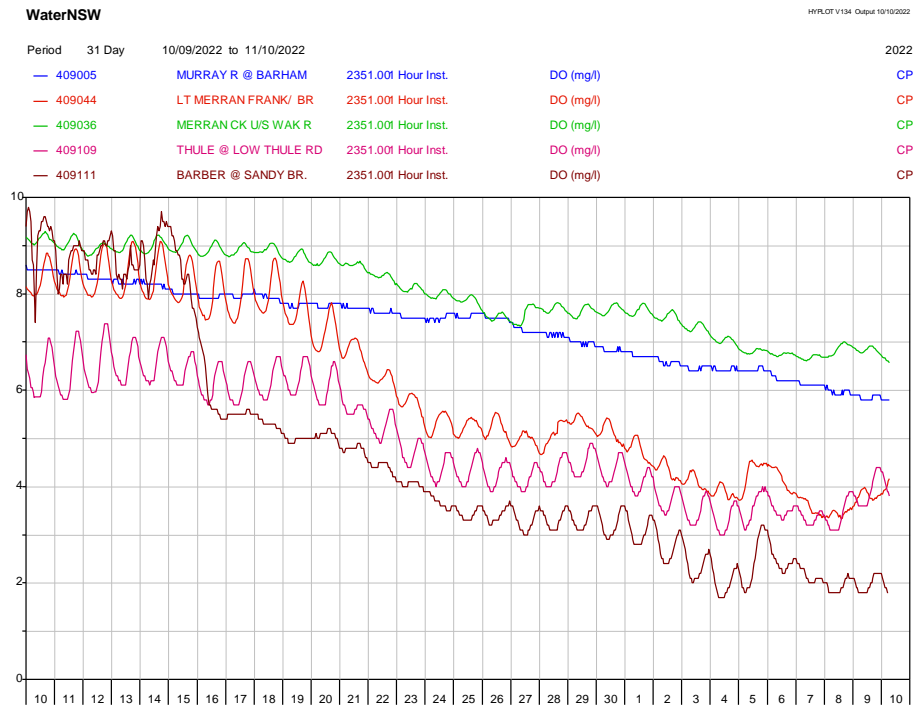


Figure 15: Continuous dissolved oxygen (mg/L) in the Murray River, Merran, Little Merran, Thule and Barber creeks

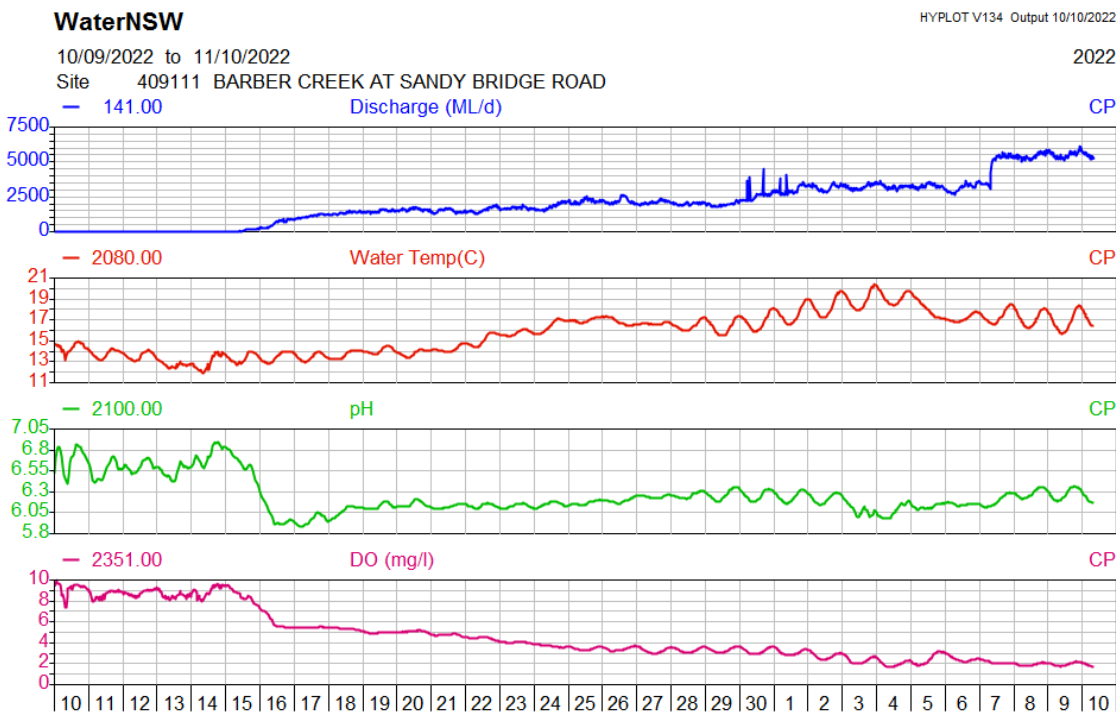
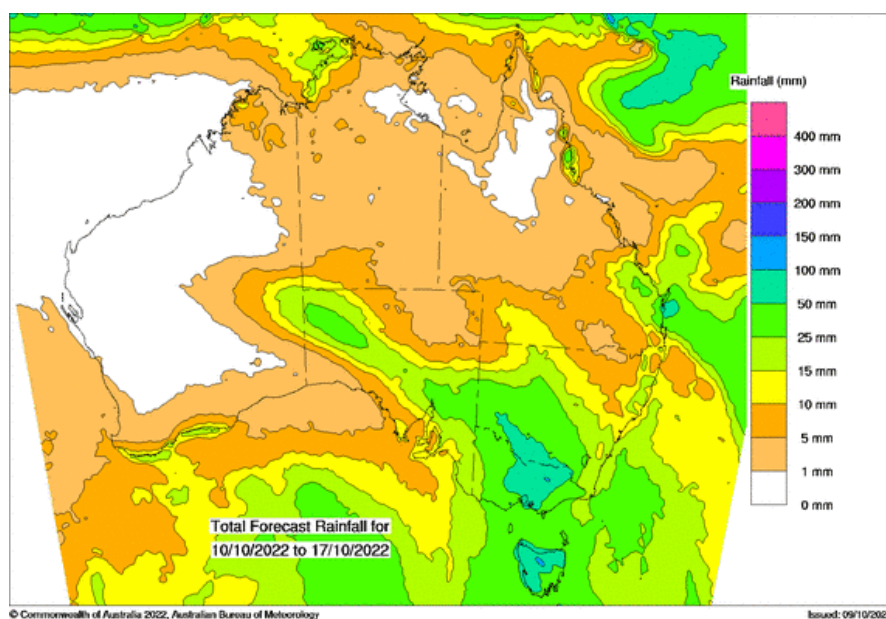


Figure 16: Water quality data for Barber Creek at Sandy Bridge Road

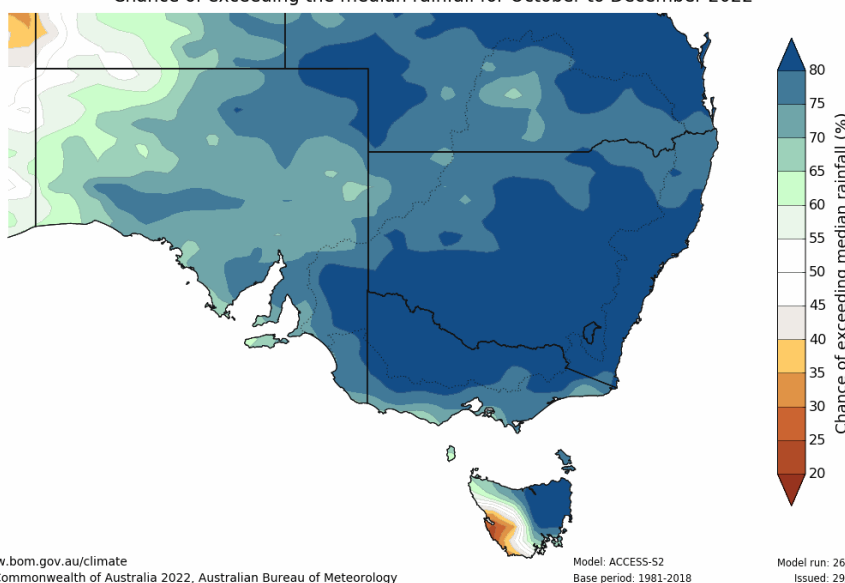
Weather Outlook

La Niña is underway in the Tropical Pacific, increasing the chance of above average rainfall for northern and eastern Australia during spring and summer. Models indicate the La Niña may peak during spring and return to neutral conditions early 2023. The negative Indian Ocean Dipole event continues. This typically increases the chance of above average spring rainfall for most of the eastern two thirds of Australia.

The Bureau of Meteorology 8-day total rain forecast (10 to 17 October) indicates widespread rainfall across NSW. The 3-month outlook from October to December is for 75-80% chance of above average rainfall for most of NSW. The daytime maximum air temperatures are expected to be below average.



Chance of exceeding the median rainfall for October to December 2022



Water quality update, Meeting No. 2 – 17 October 2022

Northern Basin

Barwon River

Discharge in the Barwon River at Walgett peaked at over 58,400 ML/day on Tuesday and is slowly starting to fall (Figure 17). Namoi River at Goangra is at a moderate flood level with major flooding upstream at Wee Waa. Flow is continuing to increase at Geera and Brewarrina.

Dissolved oxygen at Collarenebri remains at safe ecological levels. There has been a steady recovery in dissolved oxygen levels at Walgett over the past week. Levels at Geera and Brewarrina have stopped declining and will hopefully follow the same pattern as Walgett and start to improve over the coming weeks (Figure 18). There have been no reports of fish death or fish gasping at the surface.

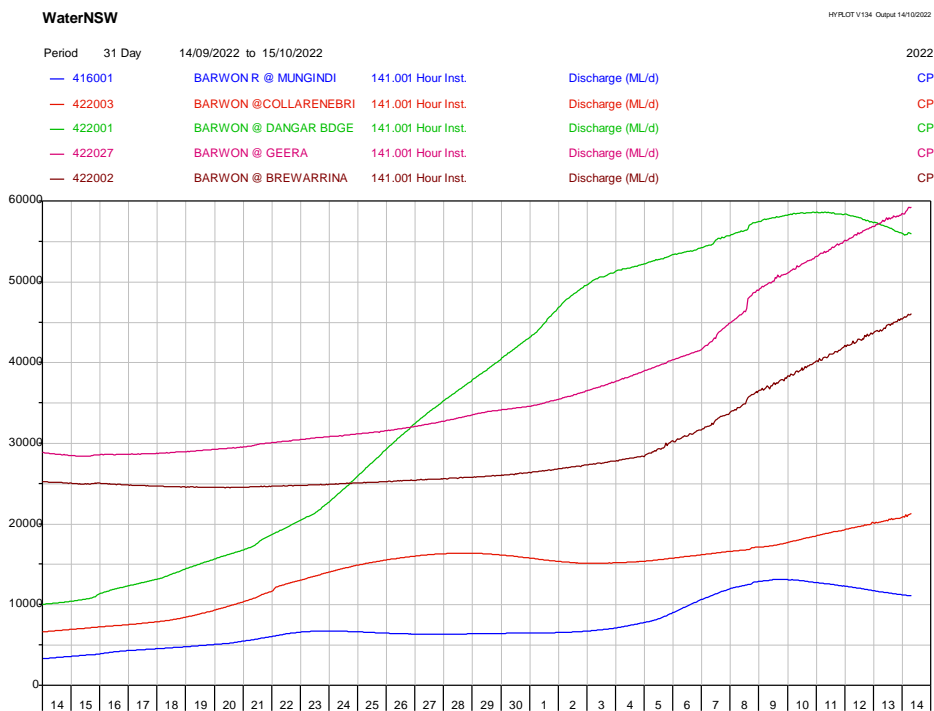


Figure 17: Discharge (ML/day) in the Barwon River

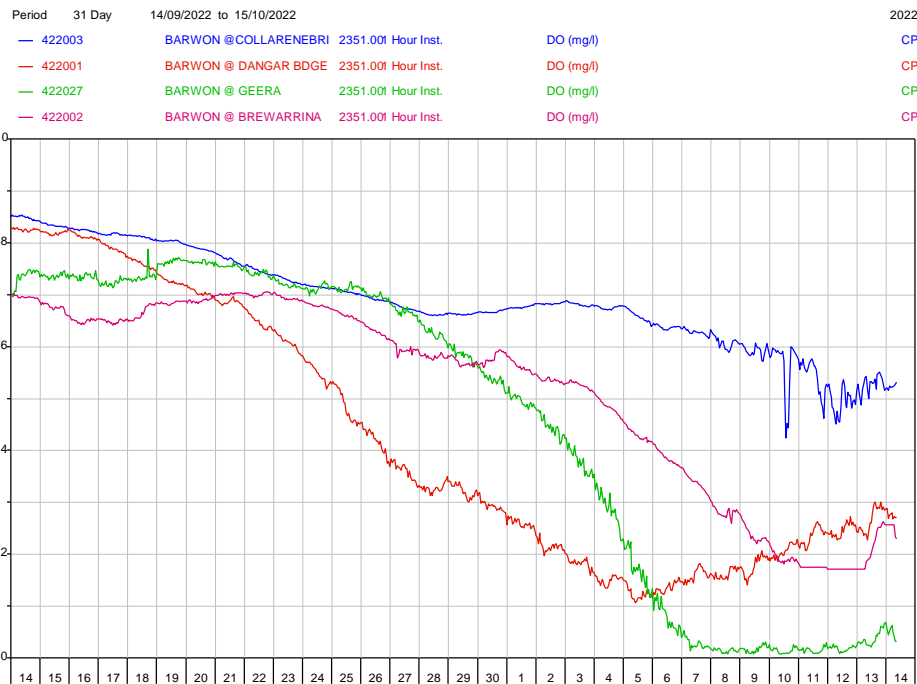


Figure 18: Continuous dissolved oxygen (mg/L) in the Barwon River

Darling River

Discharge is continuing to increase at Bourke and Louth and is over 28,000 ML/day at Wilcannia (Figure 19). Dissolved oxygen in the Darling River at Bourke has been declining as floodwaters arrive from upstream, but remains above safe ecological levels (Figure 20). Oxygen levels in the Darling River at Burtundy have also been declining.

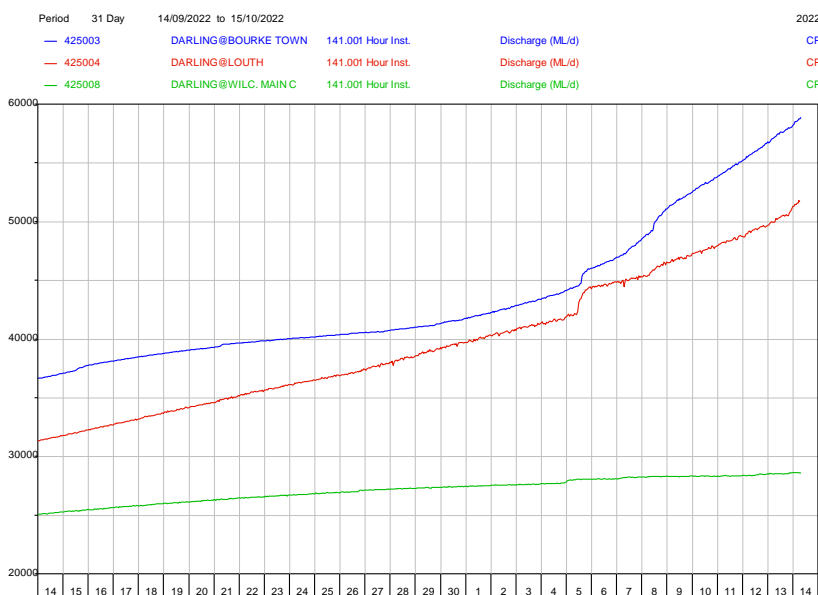


Figure 19: Discharge (ML/day) in the upper Darling River

Period	31 Day	14/09/2022 to 15/10/2022		2022
— 425003	DARLING@BOURKE TOWN	2351.00l Hour Inst.	DO (mg/l)	CP
— 425058	Darling R @ Moorabin	2351.00l Hour Inst.	DO (mg/l)	CP
— 425012	DARLING@US WEIR 32	2351.00l Hour Inst.	DO (mg/l)	CP
— 425007	DARLING@BURTUNDY	2351.00l Hour Inst.	DO (mg/l)	CP

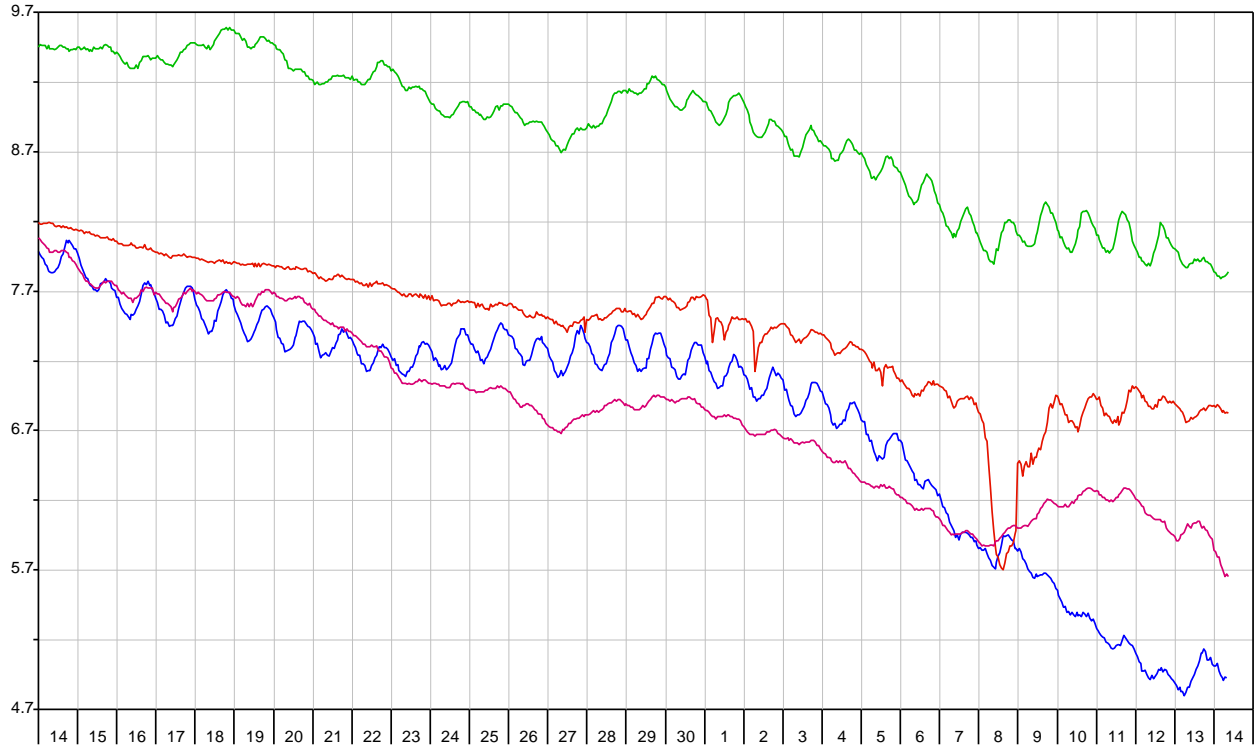


Figure 20: Continuous dissolved oxygen (mg/L) in the Darling River

Southern Basin

Lachlan

Heavy rainfall in the Lachlan catchment has resulted in major flooding at Forbes. Discharge is over 34,000 ML/day and will continue to increase to a peak this weekend (Figure 21). Floodwaters are expected reach the major flood level at Condobolin next week.

There is variability in dissolved oxygen levels both within and between sites in the Lachlan River. This most likely due to the multiple flood peaks moving down the Lachlan system and the water returning back into the main channel from the floodplains. At this stage dissolved oxygen levels remain above 4 mg/L (Figure 22).

Period 31 Day 14/09/2022 to 15/10/2022 2022

412004	LACHLAN FORBES CTNS	141.001 Hour Inst.	Discharge (ML/d)	CP
412006	LACHLAN CONDOBOLIN B	141.001 Hour Inst.	Discharge (ML/d)	CP
412011	LACHLAN LAKE C WEIR	141.001 Hour Inst.	Discharge (ML/d)	CP
412039	LACHLAN HILLSTON WR	141.001 Hour Inst.	Discharge (ML/d)	CP
412005	LACHLAN @ BOOLIGAL	141.001 Hour Inst.	Discharge (ML/d)	CP

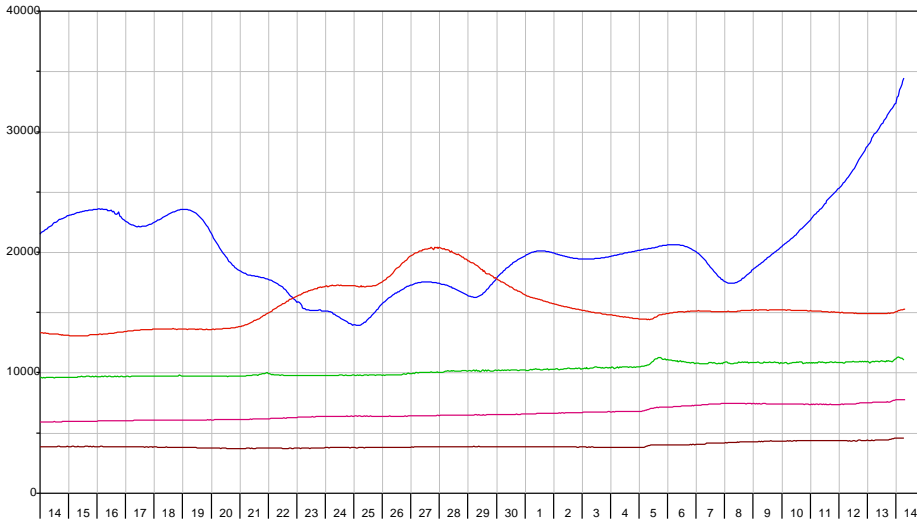


Figure 21: Discharge (ML/day) in the Lachlan River

Period 31 Day 14/09/2022 to 15/10/2022 2022

412006	LACHLAN CONDOBOLIN B	2351.001 Hour Inst.	DO (mg/l)	CP
412011	LACHLAN LAKE C WEIR	2351.001 Hour Inst.	DO (mg/l)	CP
412038	LACHLAN WILLANDRA WR	2351.001 Hour Inst.	DO (mg/l)	CP
412039	LACHLAN HILLSTON WR	2351.001 Hour Inst.	DO (mg/l)	CP
412005	LACHLAN @ BOOLIGAL	2351.001 Hour Inst.	DO (mg/l)	CP

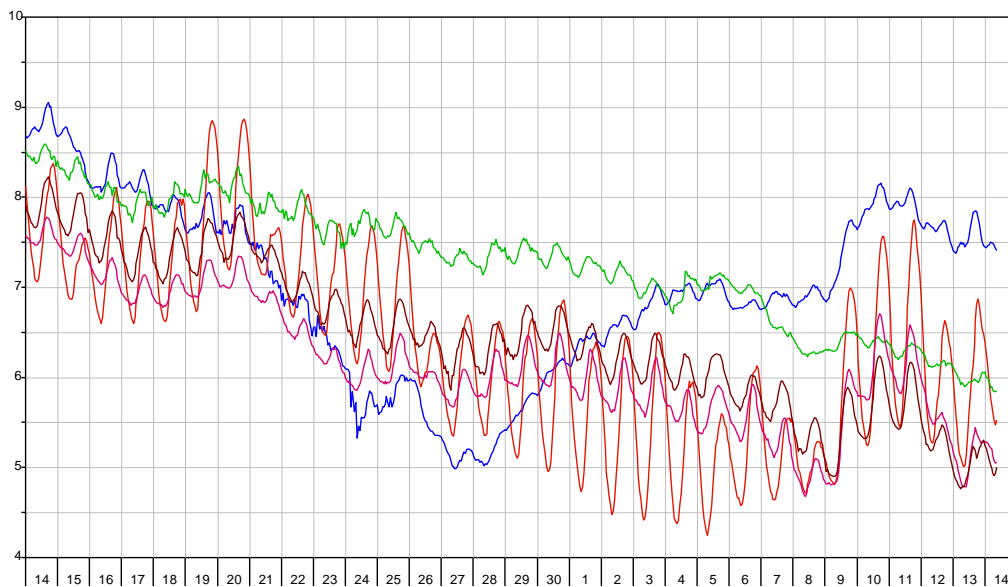


Figure 22: Continuous dissolved oxygen (mg/L) in the Lachlan River

Murrumbidgee

Moderate flooding is occurring along the Murrumbidgee where discharge has peaked at around 106,000 ML/day at Wagga Wagga. Major flooding is expected at Hay in late October. There is almost 35,000 ML/day at Gogeldrie Weir and rising. Flows are currently steady in the lower Murrumbidgee with over 25,000 ML/day at Balranald (Figure 23).

Dissolved oxygen has been declining most noticeably at Balranald due to the inundation of large areas of the lower Murrumbidgee floodplain. Levels have dropped below 4 mg/L, but are not declining further at this stage. Maude and Redbank Weir remain above 4 mg/L (Figure 24).

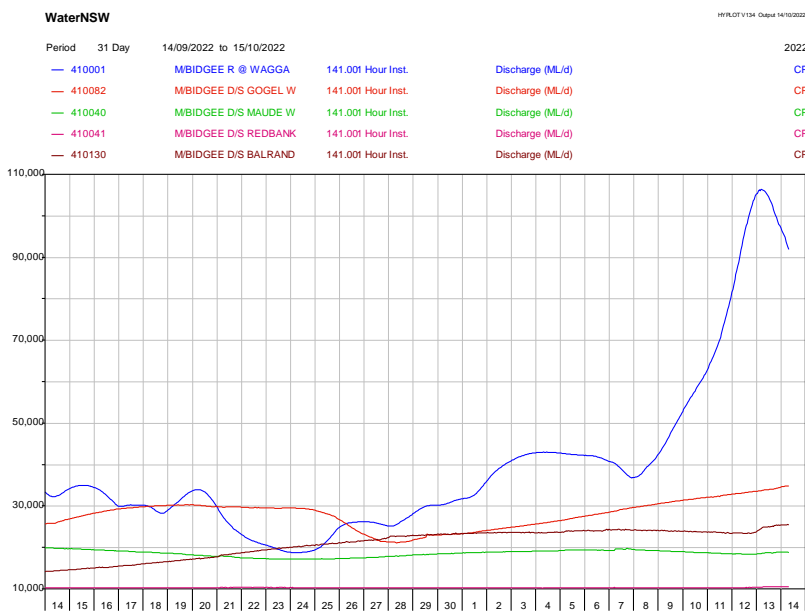


Figure 23: Discharge (ML/day) in the Murrumbidgee River

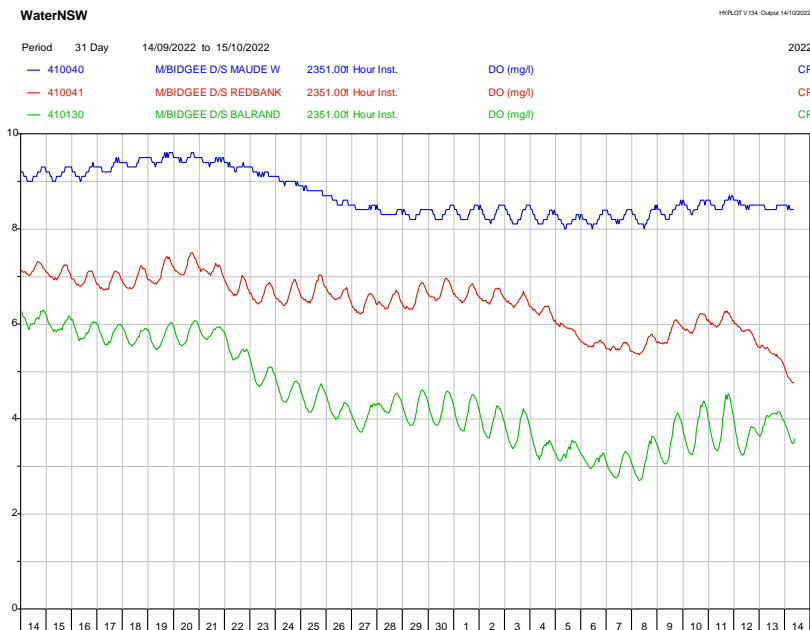


Figure 24: Continuous dissolved oxygen (mg/L) in the Murrumbidgee River

Kolety/Edward River

Along the Kolety/Edward River, dissolved oxygen was declining but has levelled off over the past week and remains above 4 mg/L (Figure 25). The river is experiencing minor to moderate flooding with over 21,500 ML/day at Toonalook over 35,000 ML/day at Deniliquin.

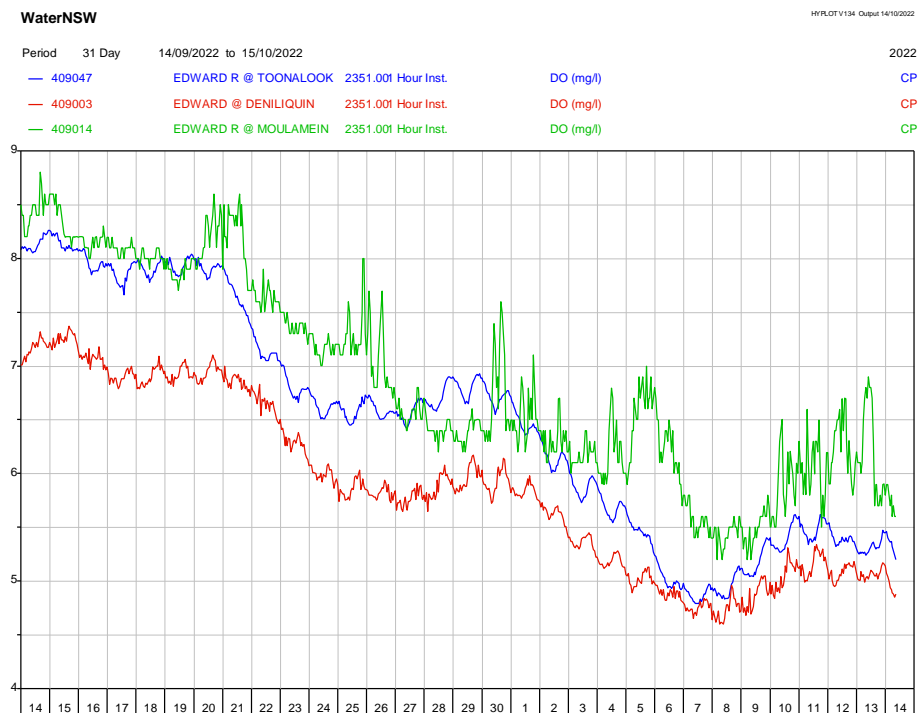


Figure 25: Continuous dissolved oxygen (mg/L) in the Kolety/Edward River

Wakool/Niemur Rivers

Both the Wakool River at Gee Gee Bridge and Niemur River at Barmah-Moolamein Road are flowing at above 15,000 ML/day and rising. Dissolved oxygen has slowly been on the decline with both sites on the Wakool dropping below 4 mg/L (Figure 26). Oxygen levels in the Niemur River are remaining steady between 5 and 6 mg/L.

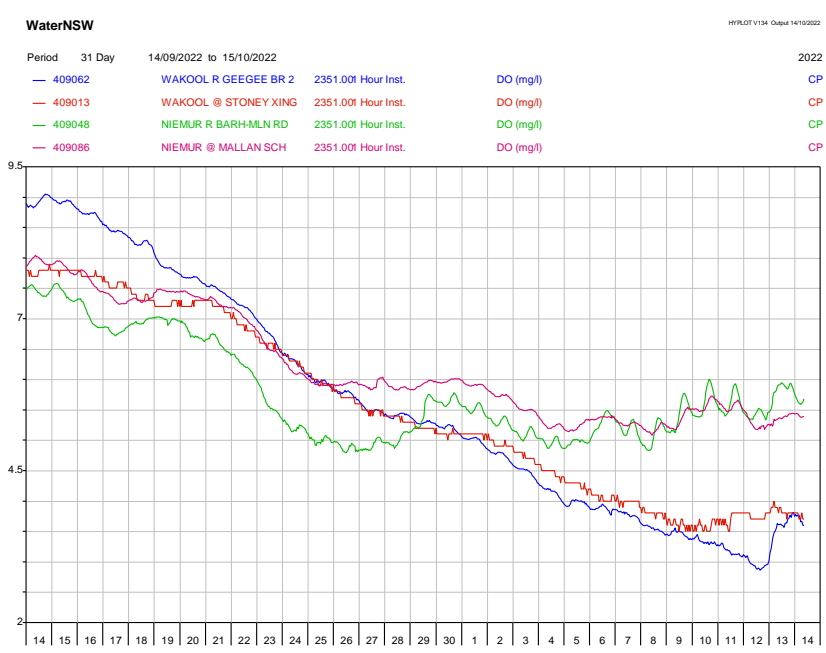


Figure 26: Continuous dissolved oxygen (mg/L) in the Wakool and Niemur Rivers

Murray, Merran, Thule and Barber

Monitoring by DELWP is showing the Murray River at Tocumwal, upstream of the Barmah Forest, is well oxygenated (Figure 27). Downstream of the forest at Barmah, dissolved oxygen levels in the Murray River had dropped below 4 mg/L this week but have improved back up above this threshold. Oxygen levels in Budgee Creek at War Plain are also at safe levels for fish health.

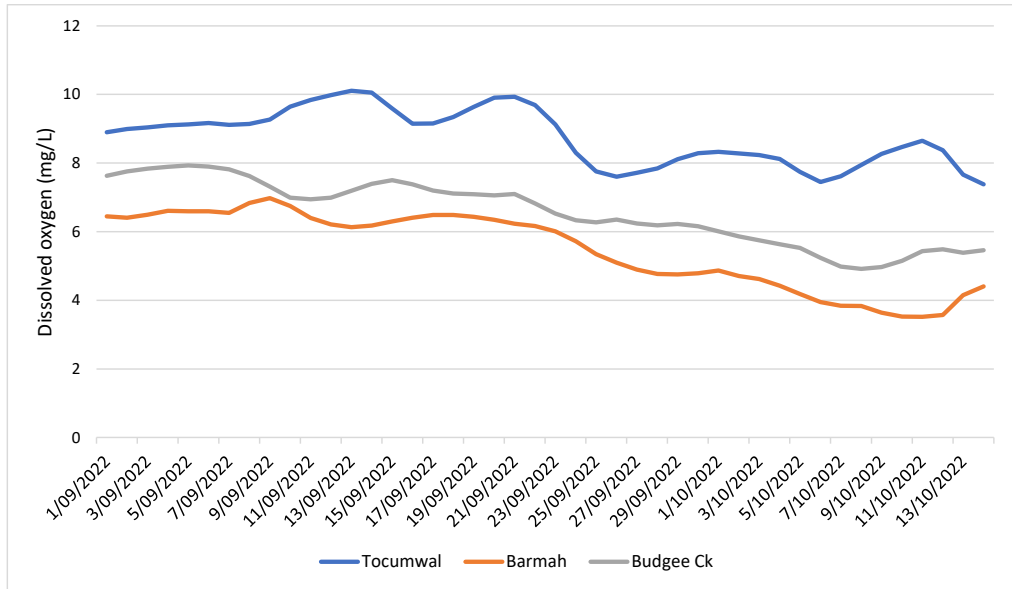


Figure 27: Continuous dissolved oxygen (mg/L) in the Murray River at Tocumwal and Barmah and Budgee Creek (data courtesy of DELWP)

Figure 28 shows how dissolved oxygen levels have declined at a range of sites in the mid Murray catchment over the past month. Barbers Creek in particular, has experienced a significant decline in dissolved oxygen in response to outflows from Koondrook-Perricoota Forest, but levels have

recovered in response to cooler weather conditions. Little Merran and Thule creeks are fluctuating around the 4 mg/L mark. The dissolved oxygen levels in the Murray River at Barham are showing minimal impact of any hypoxic outflows from Koondrook-Perricoota Forest.

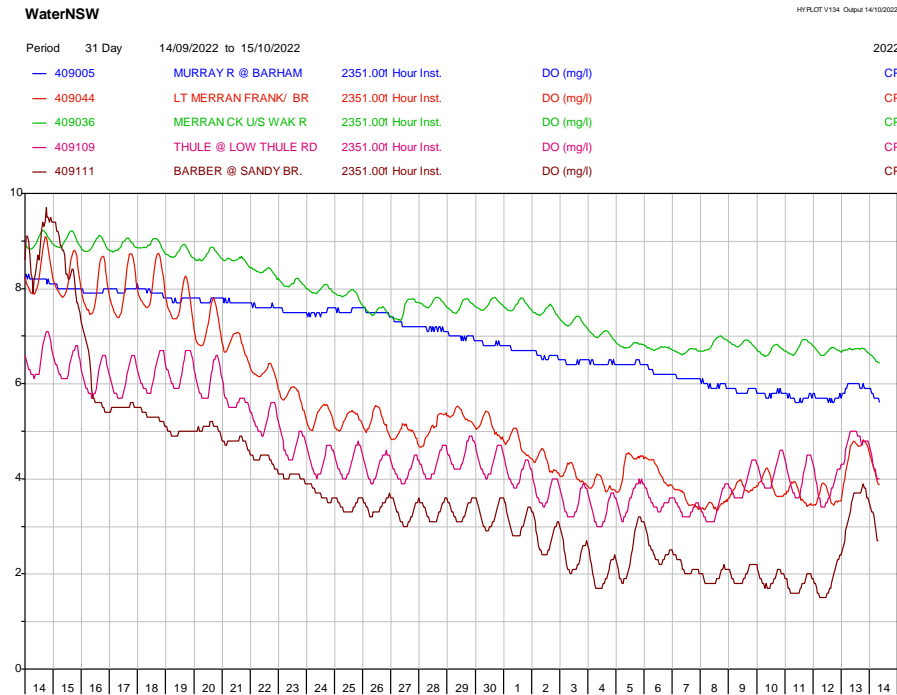


Figure 28: Continuous dissolved oxygen (mg/L) in the Murray River, Merran, Little Merran, Thule and Barber creeks

The Goulburn and Campaspe rivers are currently providing an oxygenated refuge area for fish to move into if required (Figure 29). Dissolved oxygen levels in the Murray River downstream of the Wakool Junction have been slowly declining and oxygen levels further down the Murray River at Colignan declined rapidly in the past week.

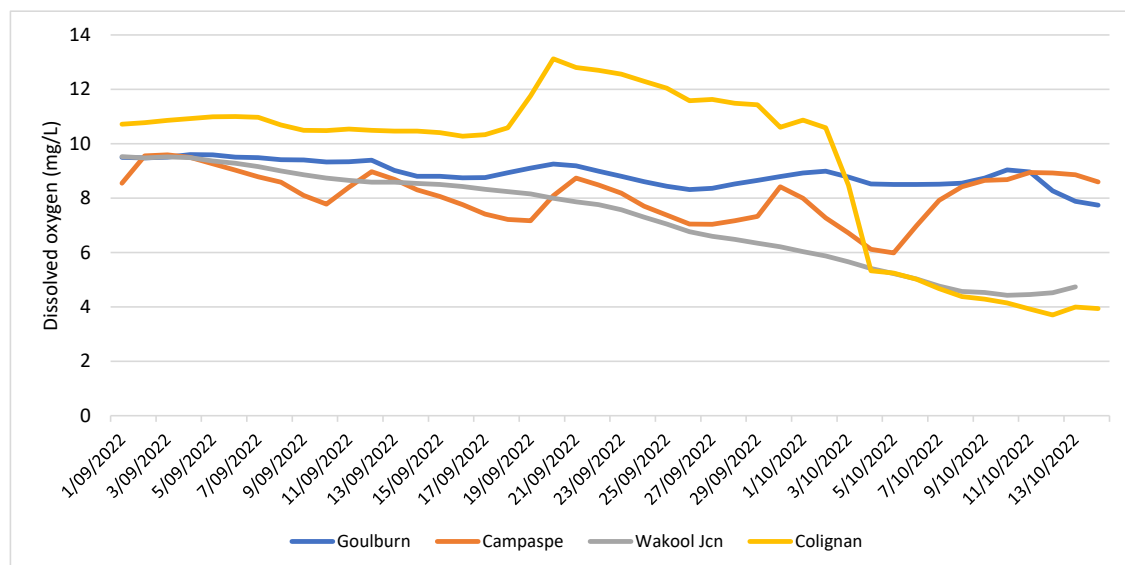


Figure 29: Continuous dissolved oxygen (mg/L) in the Goulburn and Campaspe rivers and Murray River below Wakool junction and Colignan (data courtesy of DELWP)

Weather Outlook

The Bureau of Meteorology 8-day total rain forecast (14 to 21 October) indicates widespread rainfall across NSW, with heavy falls predicted for the Northern Basin next week.

La Niña is underway in the Tropical Pacific, increasing the chance of above average rainfall for northern and eastern Australia during spring and summer. Models indicate the La Niña may peak during spring and return to neutral conditions early 2023. The negative Indian Ocean Dipole event continues. This typically increases the chance of above average spring rainfall for most of the eastern two thirds of Australia.

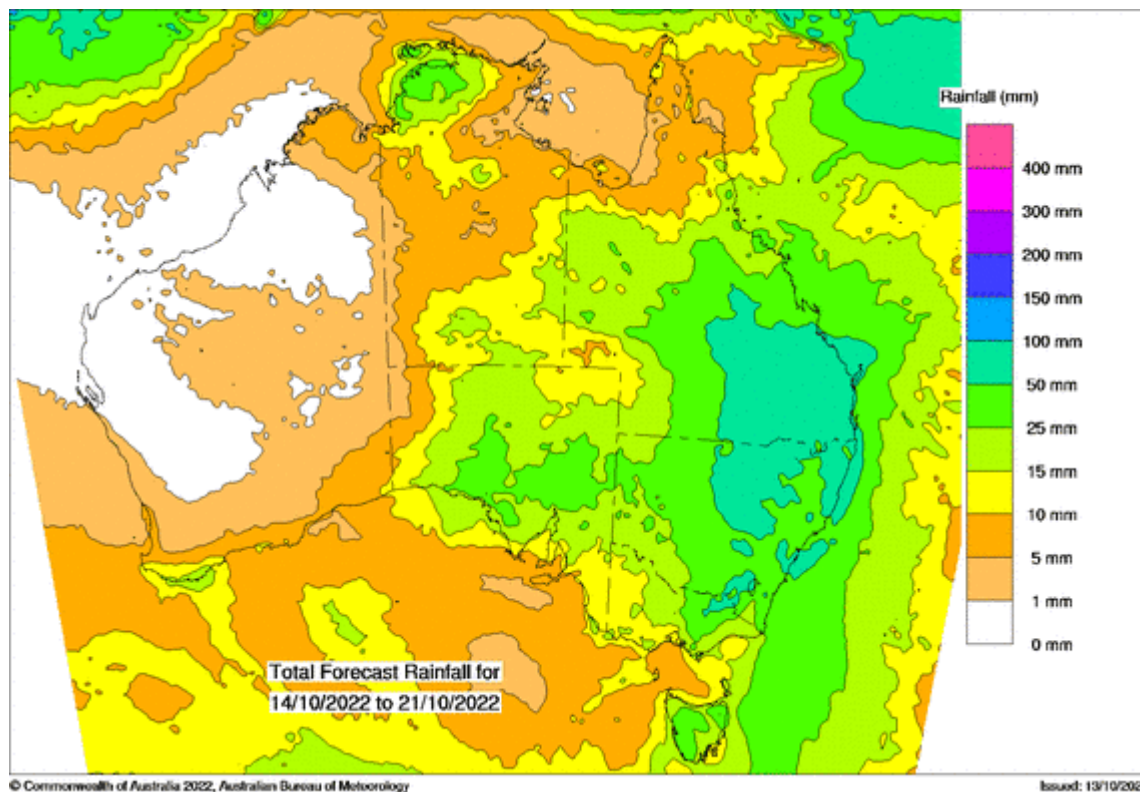


Figure 30: Bureau of Meteorology 8-day total rain forecast (14 to 21 October)

Water quality update, Meeting No. 3 – 24 October 2022

Northern Basin

Barwon River

Discharge in the Barwon River at Geera and Brewarrina is still increasing (Figure 31). Minor to major flood warnings in place for Northern Basin catchments.

Dissolved oxygen at Collarenebri remains at safe ecological levels. Dissolved oxygen levels at Walgett have continued to improve over the past week. Levels at Geera and Brewarrina were improving but have started to decline again possibly caused by inflows from the Macquarie River (Figure 32). There have been no reports of fish death or fish gasping at the surface.

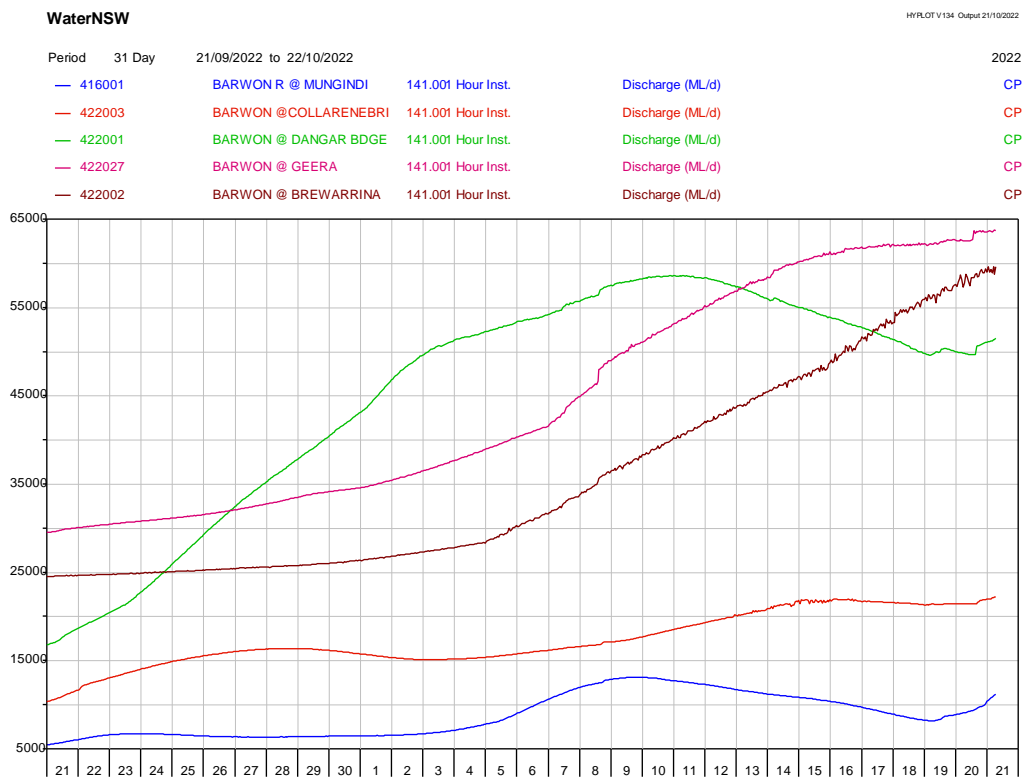


Figure 31: Discharge (ML/day) in the Barwon River

Period 31 Day 21/09/2022 to 22/10/2022 2022

— 422003	BARWON @COLLARENEBRI	2351.001 Hour Inst.	DO (mg/l)	CP
— 422001	BARWON @ DANGAR BDGE	2351.001 Hour Inst.	DO (mg/l)	CP
— 422027	BARWON @ GEERA	2351.001 Hour Inst.	DO (mg/l)	CP
— 422002	BARWON @ BREWARRINA	2351.001 Hour Inst.	DO (mg/l)	CP

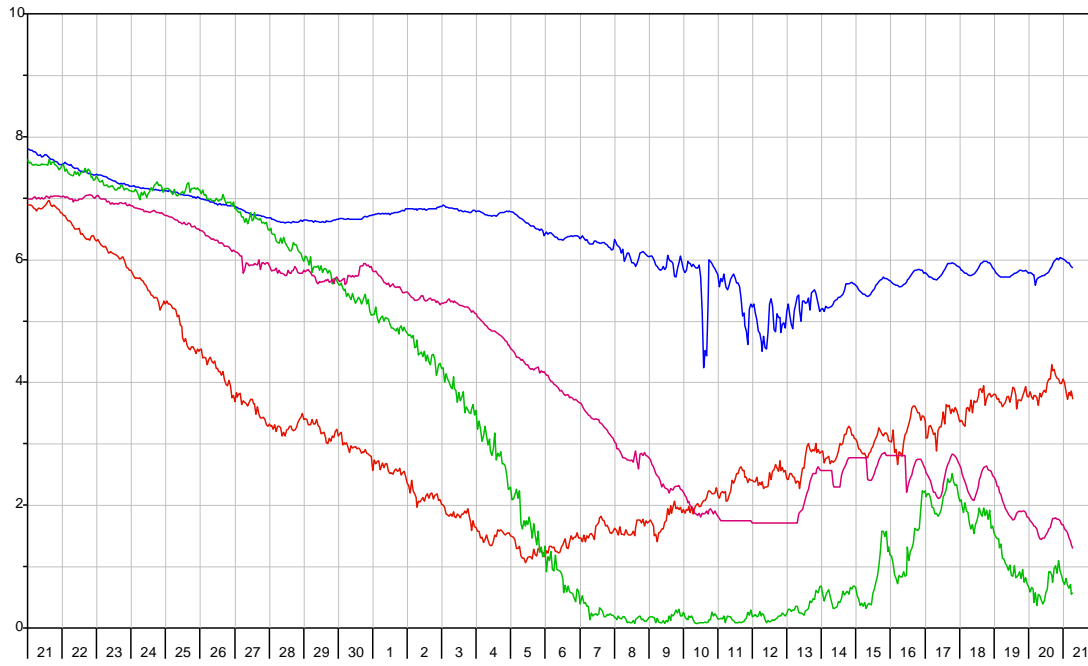


Figure 32: Continuous dissolved oxygen (mg/L) in the Barwon River

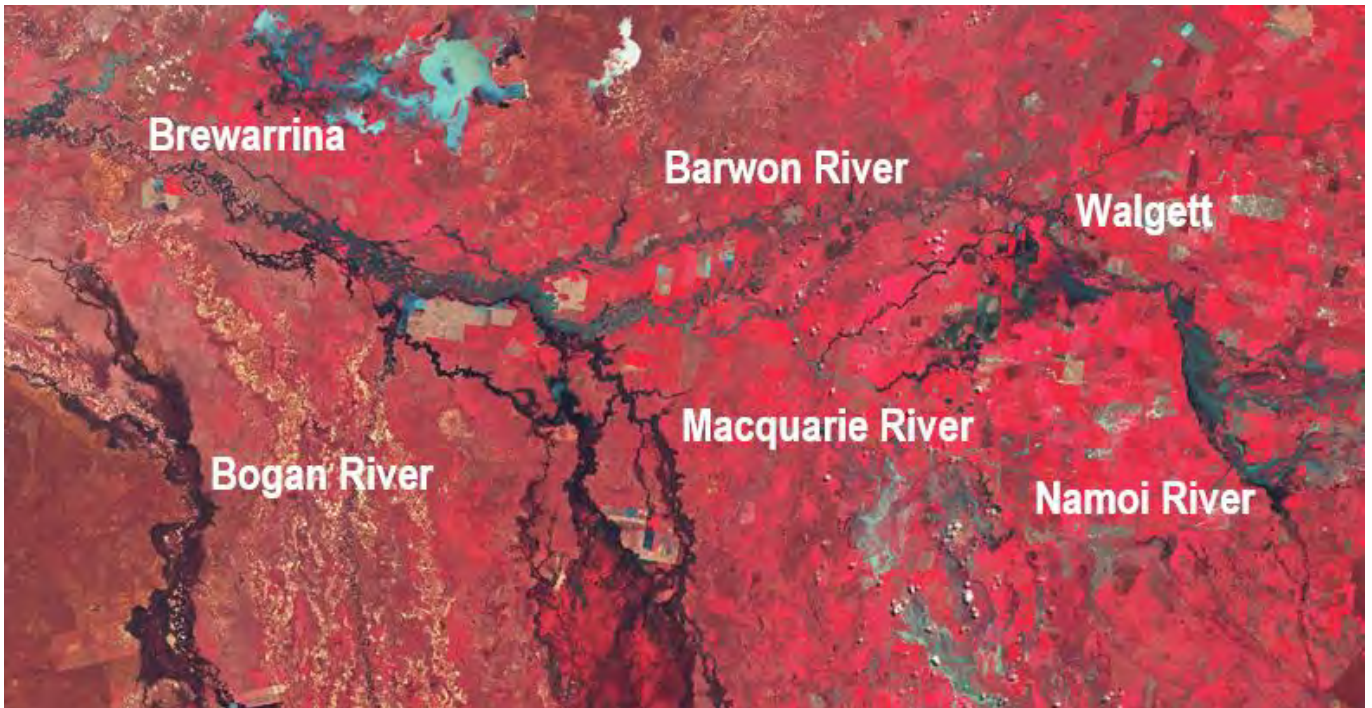


Figure 33: Satellite derived Sentinel colour infrared image (17 October) showing flooding in the Namoi, Macquarie, Bogan and Barwon rivers

Darling River

Discharge is continuing to increase at Bourke (75,000 ML/day) and Louth (62,000 ML/day) and is over 29,000 ML/day at Wilcannia (Figure 34). Dissolved oxygen in the Darling River at Bourke has continued to decline toward the 4 mg/L mark (Figure 35). Oxygen levels in the Darling River at Burtundy have also been declining.

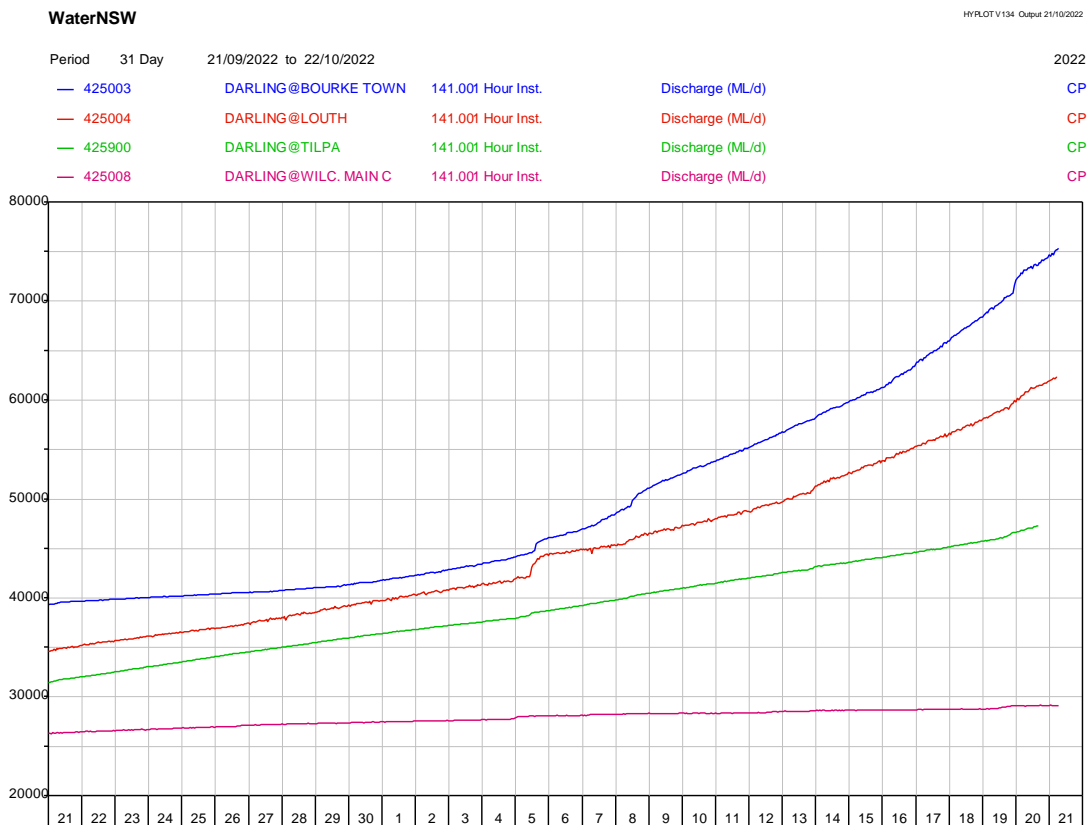


Figure 34: Discharge (ML/day) in the upper Darling River

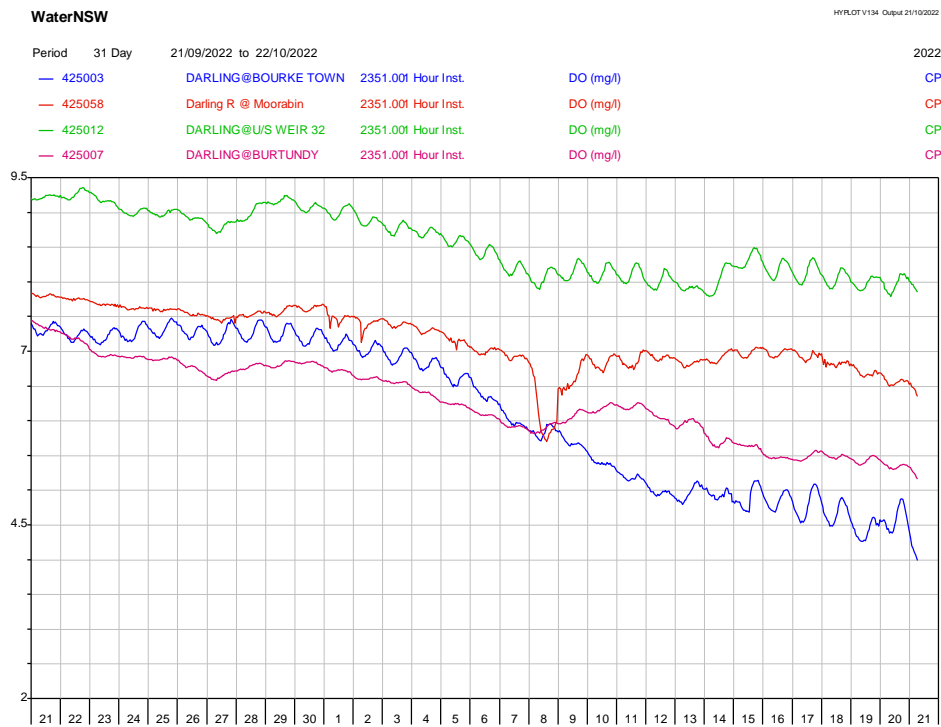


Figure 35: Continuous dissolved oxygen (mg/L) in the Darling River

Southern Basin

Lachlan

Heavy rainfall in the Lachlan catchment has resulted in major flooding at Forbes, peaking at over 38,000 ML/day (Figure 36). Floodwaters have just reached Condobolin.

At this stage, dissolved oxygen levels at the continuous monitoring sites is remaining above 4 mg/L (Figure 37). Handheld results from WaterNSW showed dissolved oxygen at Corrong on 18 October was 2.27 mg/L. Sentinel image shows floodwater may be draining back into the main channel off the floodplain (Figure 38). Due to distance down the system and volume of water on its way, not anticipating intervening with the use of the Lachlan water quality allowance.

Period	31 Day	21/09/2022 to 22/10/2022		2022
412004	LACHLAN FORBES CTNS	141.001 Hour Inst.	Discharge (ML/d)	CP
412006	LACHLAN CONDOBOLIN B	141.001 Hour Inst.	Discharge (ML/d)	CP
412011	LACHLAN LAKE C WEIR	141.001 Hour Inst.	Discharge (ML/d)	CP
412039	LACHLAN HILLSTON WR	141.001 Hour Inst.	Discharge (ML/d)	CP
412005	LACHLAN @ BOOLIGAL	141.001 Hour Inst.	Discharge (ML/d)	CP

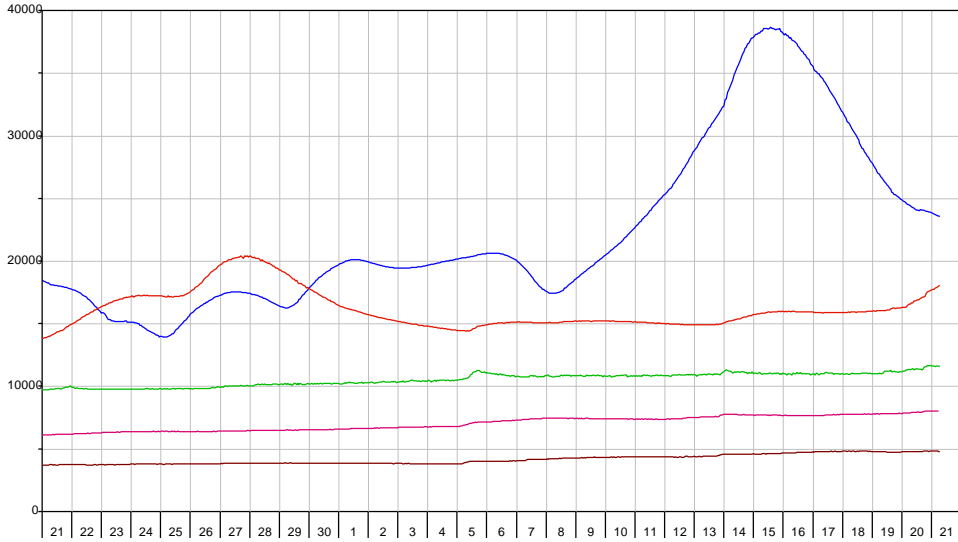


Figure 36: Discharge (ML/day) in the Lachlan River

Period	24 Day	27/09/2022 to 21/10/2022		2022
412004	LACHLAN FORBES CTNS	2351.001 Hour Inst.	DO (mg/l)	CP
412006	LACHLAN CONDOBOLIN B	2351.001 Hour Inst.	DO (mg/l)	CP
412011	LACHLAN LAKE C WEIR	2351.001 Hour Inst.	DO (mg/l)	CP
412039	LACHLAN HILLSTON WR	2351.001 Hour Inst.	DO (mg/l)	CP
412005	LACHLAN @ BOOLIGAL	2351.001 Hour Inst.	DO (mg/l)	CP

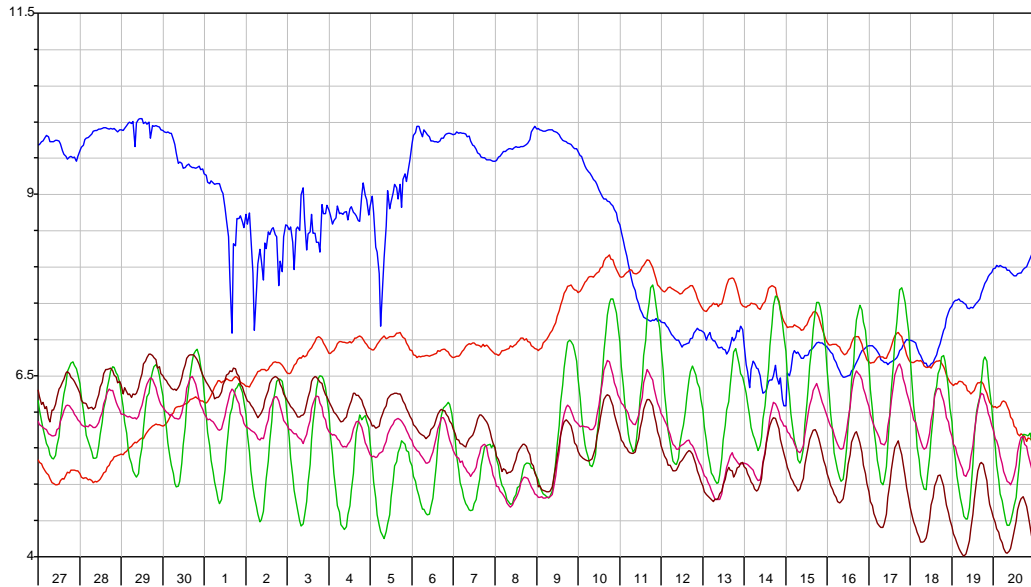


Figure 37: Continuous dissolved oxygen (mg/L) in the Lachlan River

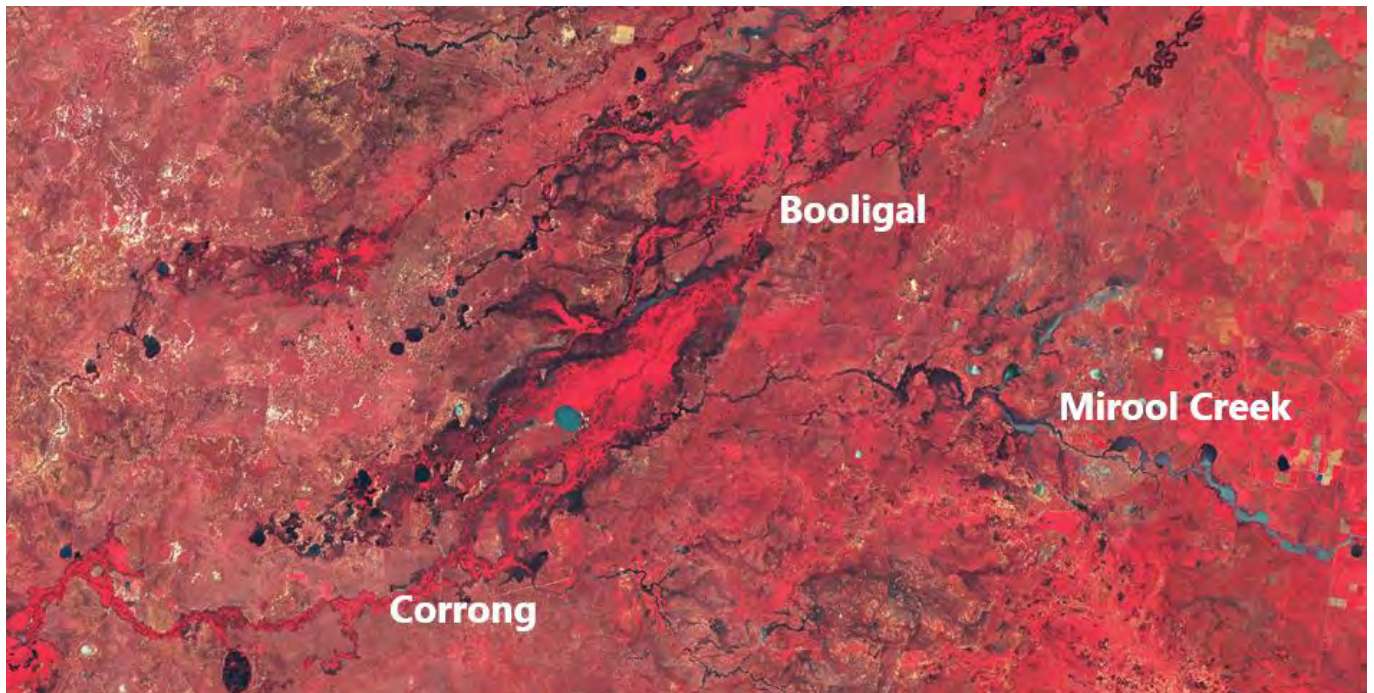


Figure 38: Satellite derived Sentinel colour infrared image (17 October) showing flooding in the lower Lachlan valley

Murrumbidgee

Moderate flooding is occurring along the Murrumbidgee where discharge has peaked at Gogeldrie Weir at around 70,000 ML/day. Major flooding is expected at Hay over the weekend. Flows are currently steady in the lower Murrumbidgee with over 27,000 ML/day at Balranald (Figure 39).

Dissolved oxygen has been declining most noticeably at Balranald due to the inundation of large areas of the lower Murrumbidgee floodplain. Levels have dropped below 3 mg/L. Maude and Redbank Weir remain above 4 mg/L (Figure 40). Handheld results collected by WaterNSW show oxygen levels in the mid Murrumbidgee River are at safe levels (Table 3).

WaterNSW

HYFLOT V134 Output 21/10/2022

Period	31 Day	21/09/2022 to 22/10/2022			2022
410001	M/BIDGEE R @ WAGGA	141.001 Hour Inst.	Discharge (ML/d)	CP	
410082	M/BIDGEE D/S GOGEL W	141.001 Hour Inst.	Discharge (ML/d)	CP	
410040	M/BIDGEE D/S MAUDE W	141.001 Hour Inst.	Discharge (ML/d)	CP	
410041	M/BIDGEE D/S REDBANK	141.001 Hour Inst.	Discharge (ML/d)	CP	
410130	M/BIDGEE D/S BALRAND	141.001 Hour Inst.	Discharge (ML/d)	CP	

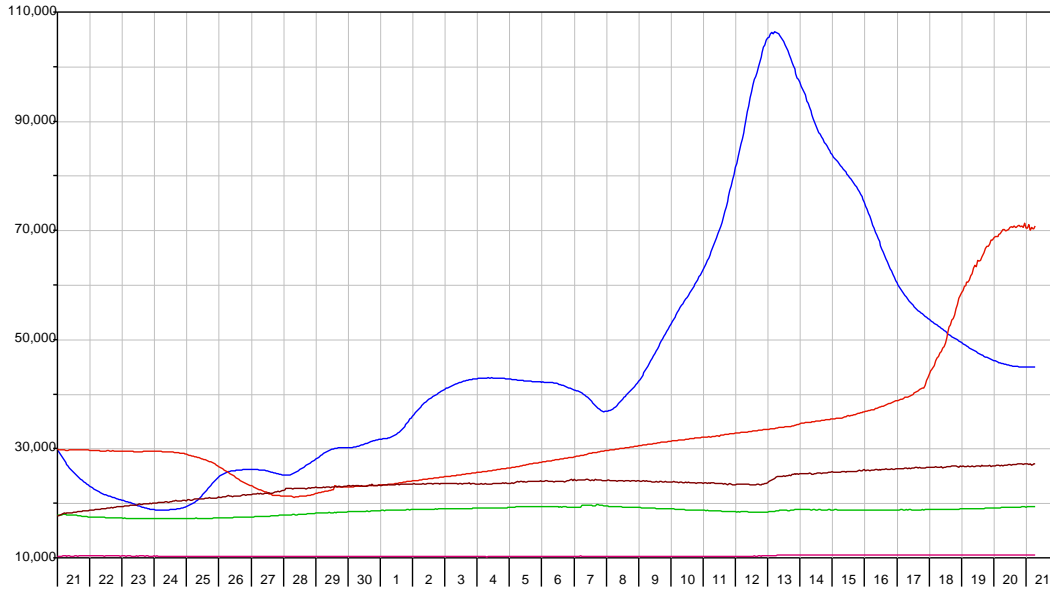


Figure 39: Discharge (ML/day) in the Murrumbidgee River

WaterNSW

HYFLOT V134 Output 21/10/2022

Period	31 Day	21/09/2022 to 22/10/2022			2022
410040	M/BIDGEE D/S MAUDE W	2351.001 Hour Inst.	DO (mg/l)	CP	
410041	M/BIDGEE D/S REDBANK	2351.001 Hour Inst.	DO (mg/l)	CP	
410130	M/BIDGEE D/S BALRAND	2351.001 Hour Inst.	DO (mg/l)	CP	

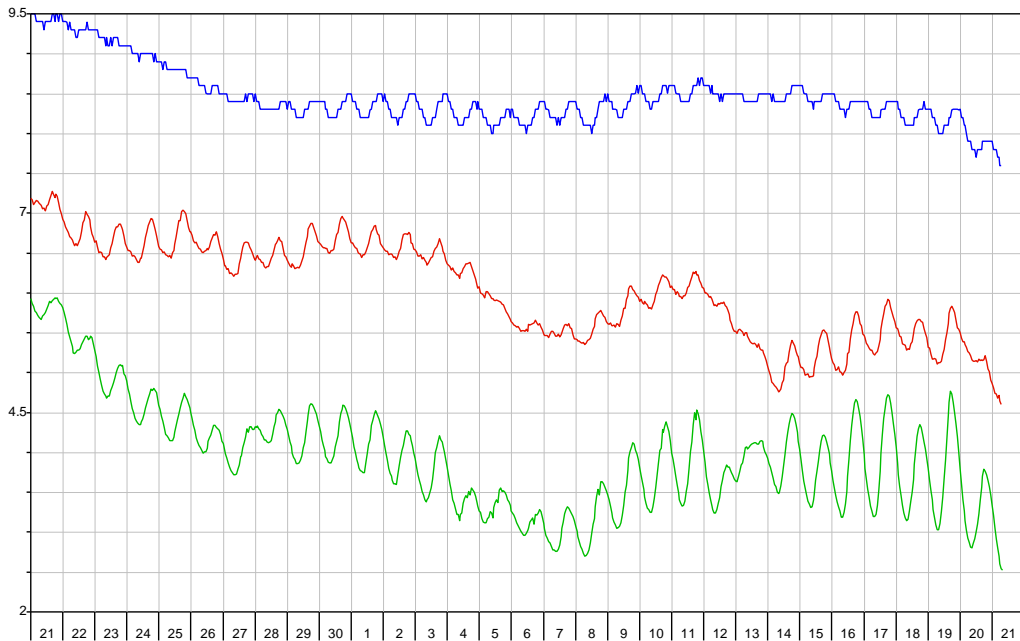


Figure 40: Continuous dissolved oxygen (mg/L) in the Murrumbidgee River

Table 3: Handheld dissolved oxygen results for the Murrumbidgee catchment

Site	Date	Dissolved oxygen (mg/L)
Murrumbidgee River at Gogeldrie Weir	19/10/2022 9:06	5.26
Murrumbidgee River at Carathool	18/10/2022 9:02	7.52
Murrumbidgee River D/S Hay Weir	18/10/2022 13:55	7.75
Murrumbidgee River D/S Maude Weir	18/10/2022 15:19	7.98
Murrumbidgee River at Balranald	17/10/2022 13:51	2.94
Yanco Creek at Morundah	19/10/2022 11:52	5.99
Colombo Creek at Morundah	19/10/2022 12:08	5.67

Kolety/Edward River

At all continuous monitoring sites along the Kolety/Edward River, dissolved oxygen has been declining towards 4 mg/L this week (Figure 41). Possible moderate flooding at Deniliquin and Moulamein. Currently over 22,000 ML/day at Toonalook and over 38,000 ML/day at Deniliquin.

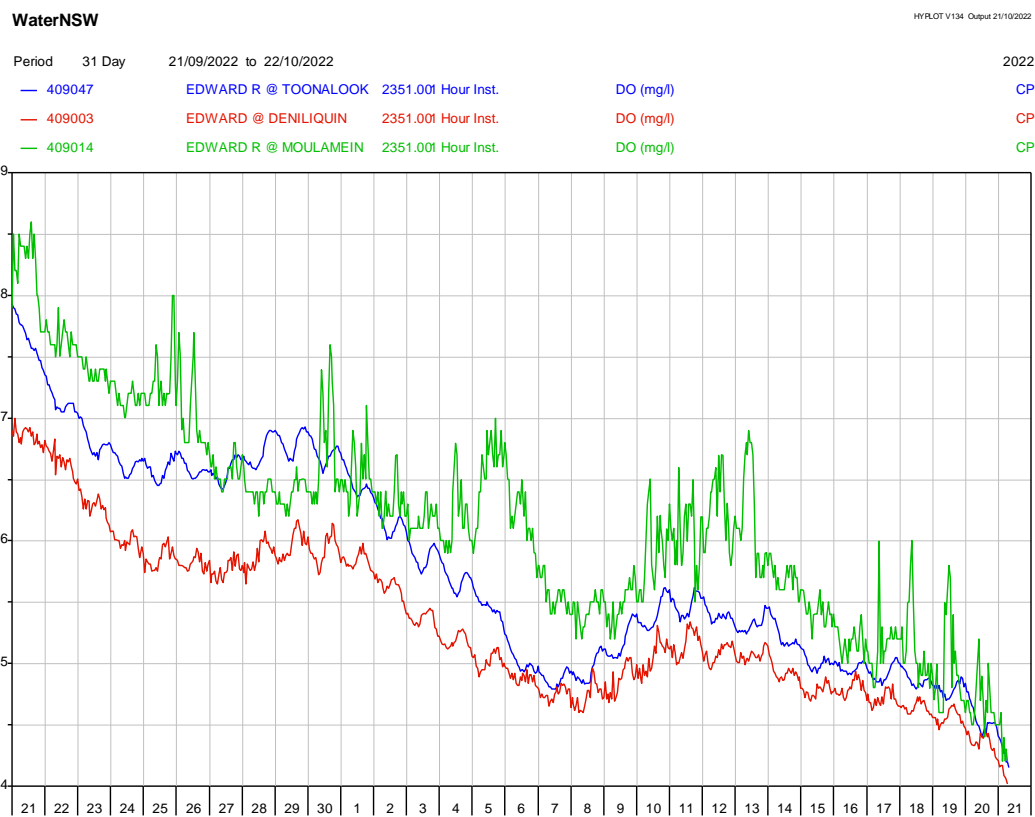


Figure 41: Continuous dissolved oxygen (mg/L) in the Kolety/Edward River

Wakool/Niemur Rivers

Discharge in the Wakool River at Gee Gee Bridge is over 24,000 ML/day and increasing. Niemur River at Barmah-Moulamein Road is flowing at under 15,000 ML/day. Dissolved oxygen has been continuing to decline at both sites on the Wakool River, dropping further below 4 mg/L (Figure 42). Oxygen levels in the Niemur River started to decline again this week.

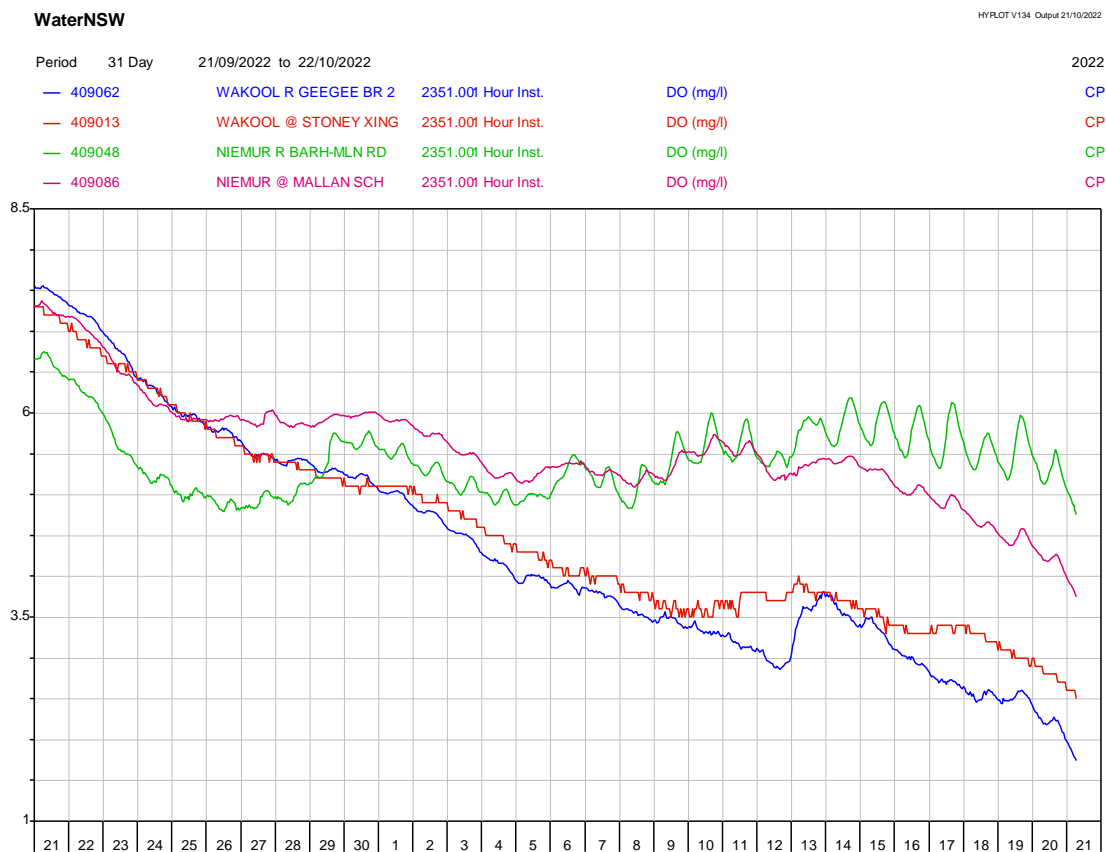


Figure 42: Continuous dissolved oxygen (mg/L) in the Wakool and Niemur Rivers

Murray, Merran, Thule and Barber

Monitoring by DELWP is showing the Murray River at Tocumwal, upstream of the Barmah Forest, is well oxygenated (Figure 43). In the Murray River downstream of the forest at Barmah, dissolved oxygen levels have dropped towards 2 mg/L. Oxygen levels in Budgee Creek at War Plain have also dropped below 4 mg/L.

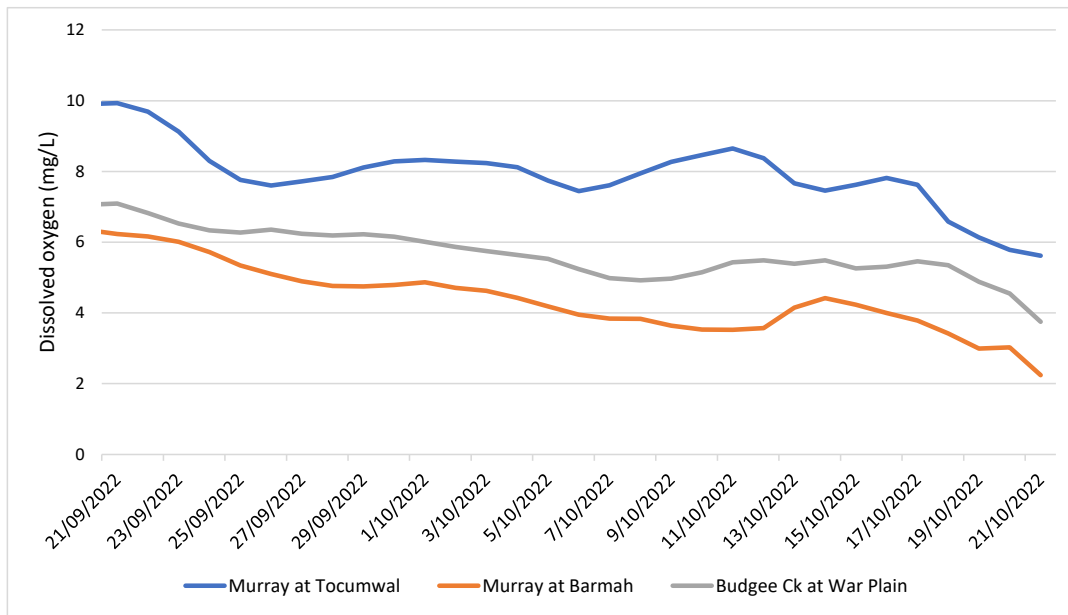


Figure 43: Continuous dissolved oxygen (mg/L) in the Murray River at Tocumwal and Barmah and Budgee Creek (data courtesy of DELWP)

Figure 44 shows dissolved oxygen levels are declining at all sites in the mid Murray catchment. Little Merran Creek is flatlining at 0 mg/L, which raises questions about the validity of the data. Barbers and Thule creeks are also below the 2 mg/L mark. The dissolved oxygen levels in the Murray River at Barham and Merran Creek upstream of the Wakool junction are declining but remaining above critical thresholds at this stage.

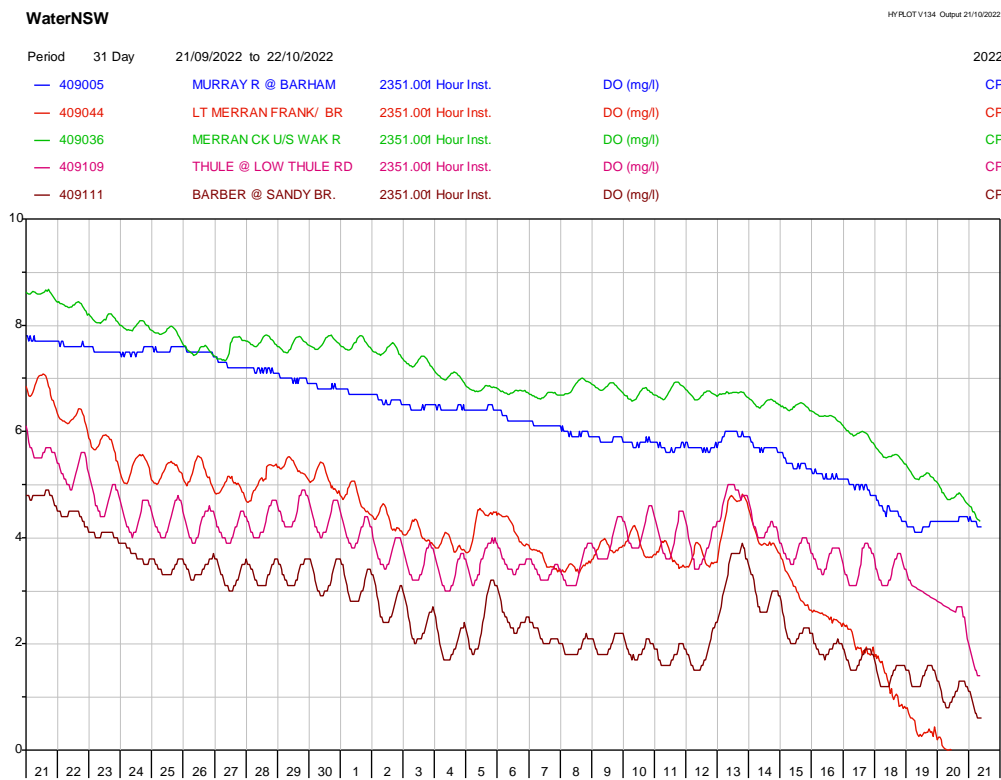


Figure 44: Continuous dissolved oxygen (mg/L) in the Murray River, Merran, Little Merran, Thule and Barber creeks

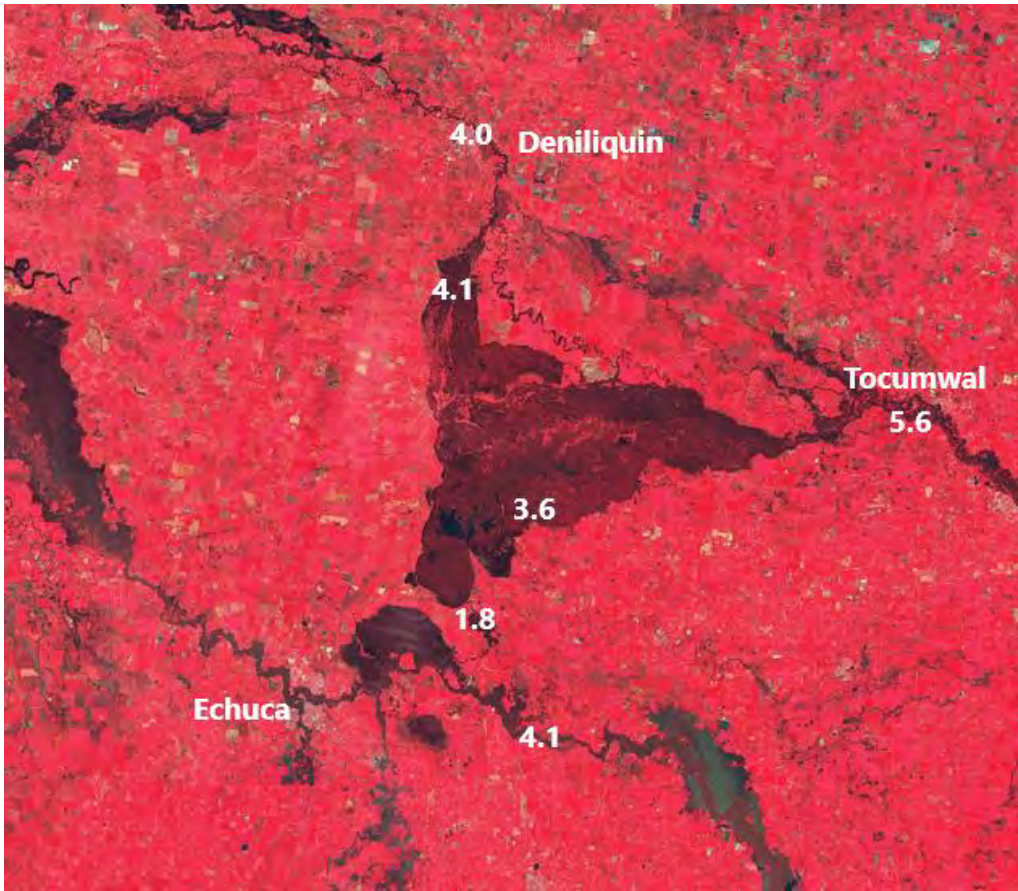


Figure 45: Satellite derived Sentinel colour infrared image (17 October) of Murray and Kolety/Edward rivers

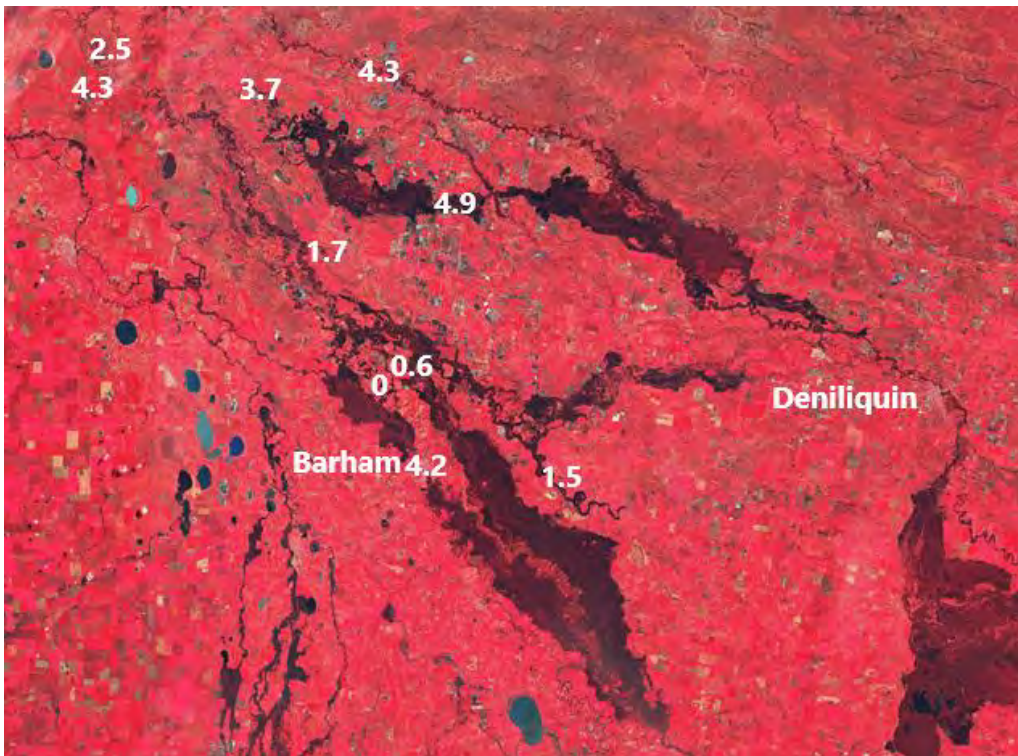


Figure 46: Satellite derived Sentinel colour infrared image (17 October) of the mid Murray catchment

Dissolved oxygen levels in the Goulburn River, Murray River downstream of the Wakool Junction and the Murray River further downstream at Colignan have continued to decline this week (Figure 47). The dissolved oxygen sensor in the Murray River downstream of Wentworth was installed by WaterNSW on 18 October (thanks Liz).

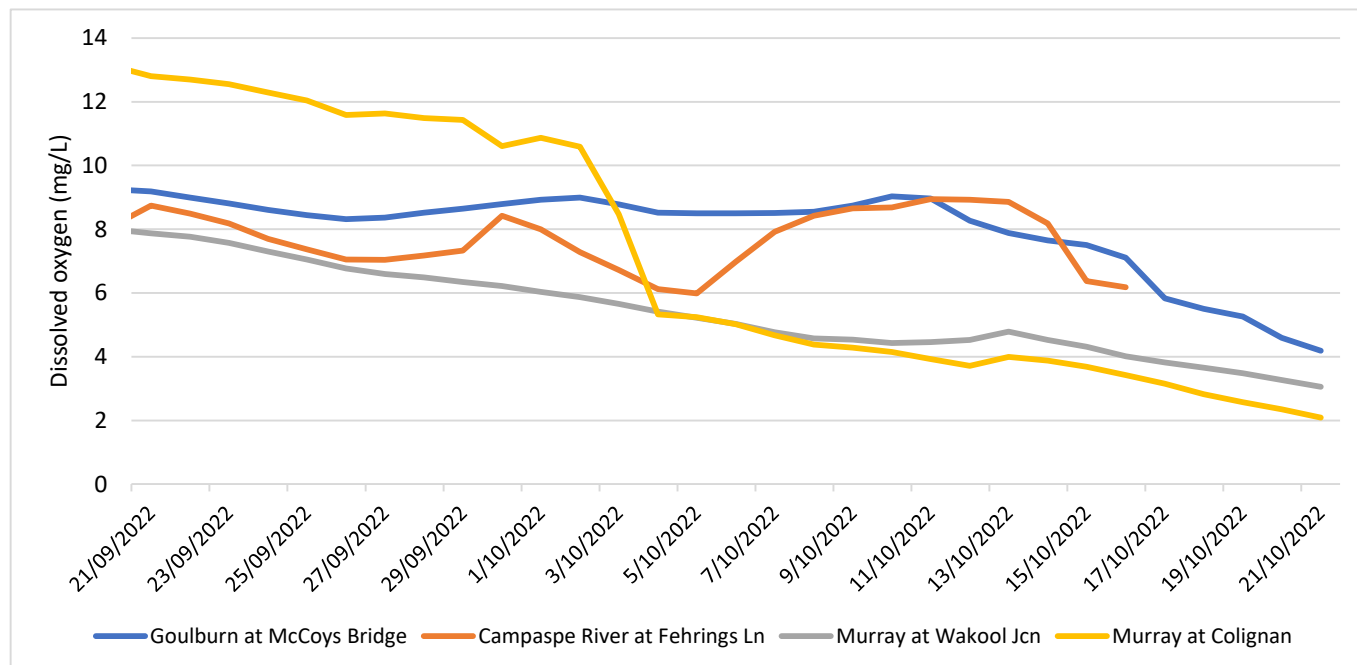


Figure 47: Continuous dissolved oxygen (mg/L) in the Goulburn and Campaspe rivers and Murray River below Wakool junction and Colignan (data courtesy of DELWP)

Weather Outlook

The Bureau of Meteorology 8-day total rain forecast (21 to 28 October) indicates widespread rainfall across NSW, with heavy falls predicted for the far North Coast and Tablelands (Figure 18).

La Niña is underway in the Tropical Pacific, increasing the chance of above average rainfall for northern and eastern Australia during spring and summer. Models indicate the La Niña may peak during spring and return to neutral conditions early 2023. The negative Indian Ocean Dipole event continues. This typically increases the chance of above average spring rainfall for most of the eastern two thirds of Australia.

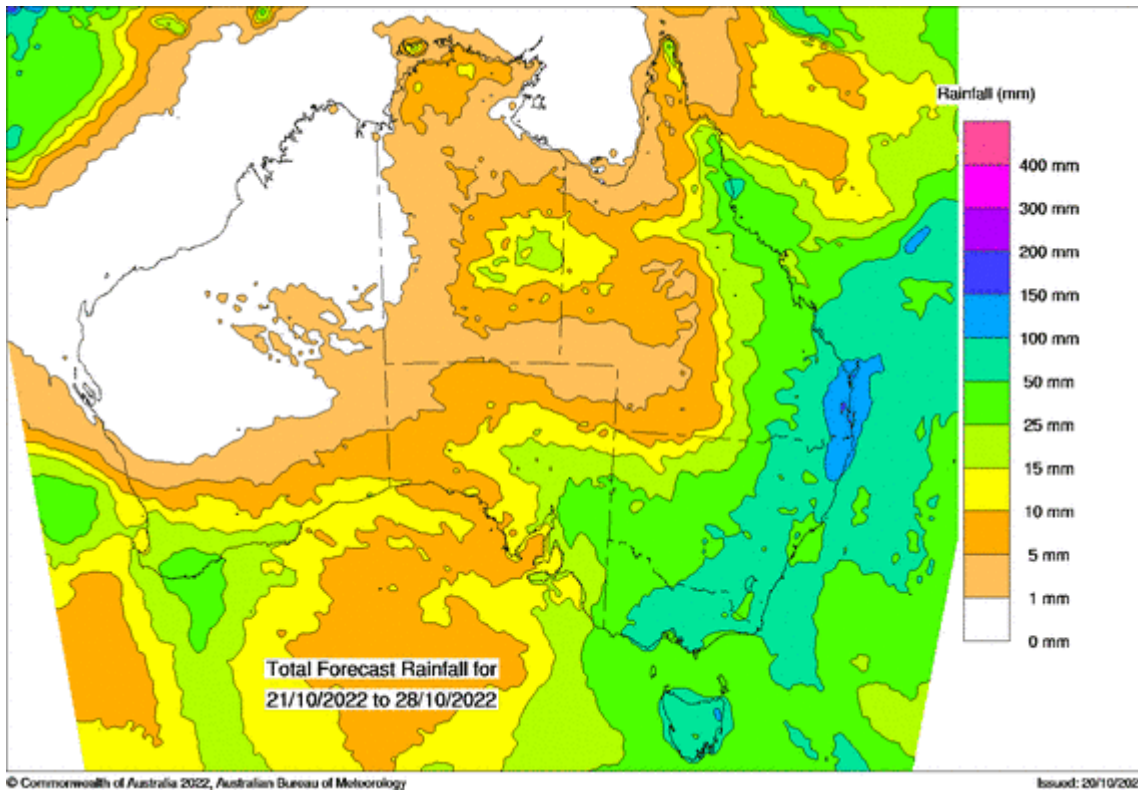


Figure 48: Bureau of Meteorology 8-day total rain forecast (21 to 28 October)

Water quality update, Meeting No. 4 – 31 October 2022

Northern Basin

Barwon River

Discharge in the Barwon River is increasing at all sites (Figure 1). Minor to major flood warnings in place for Northern Basin catchments.

Dissolved oxygen at Collarenebri and Walgett have declined as discharge and water temperature increases. Levels at Geera and Brewarrina are remaining less than 2 mg/L (Figure 50). There have been no reports of fish death or fish gasping at the surface.

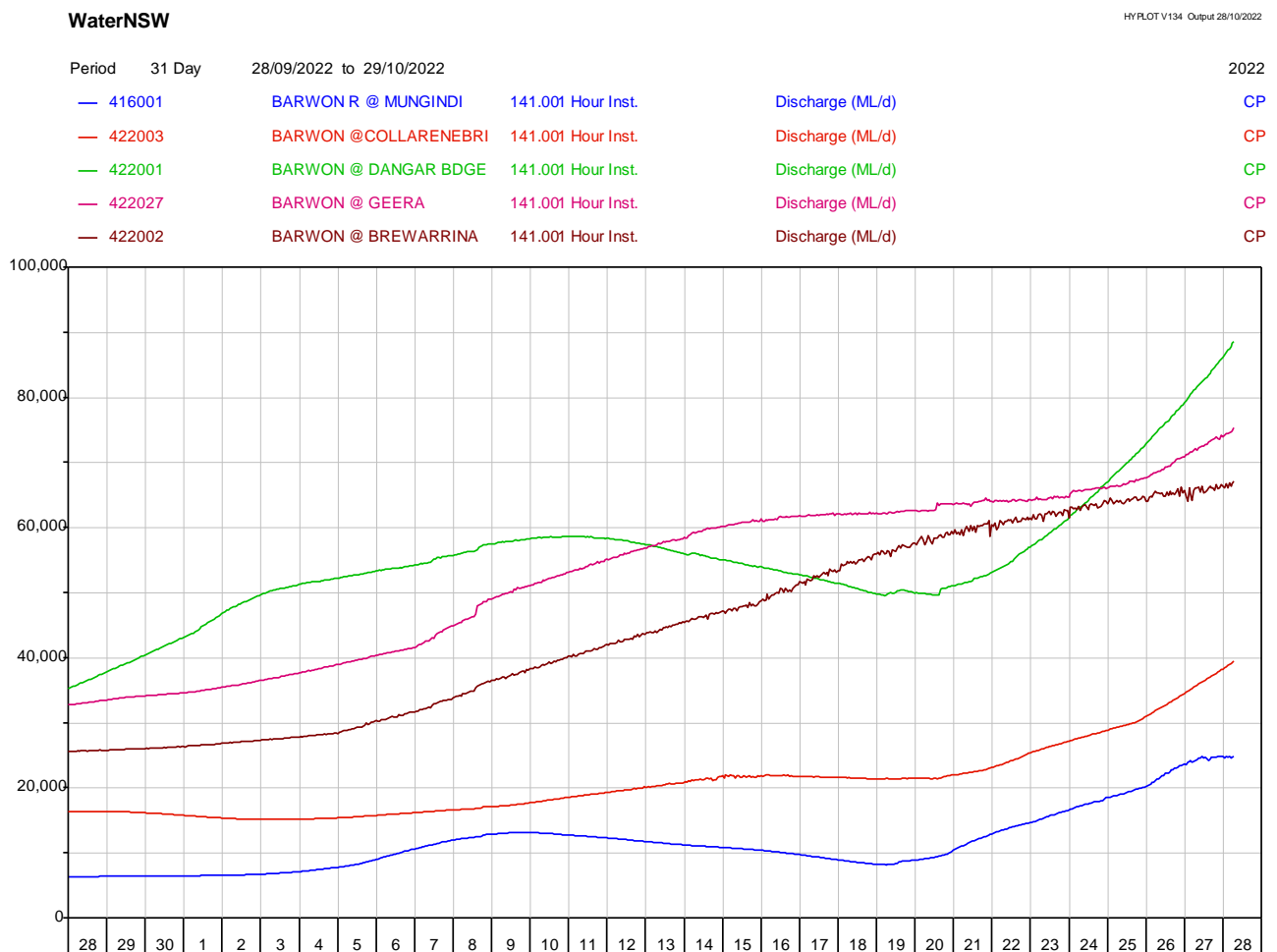


Figure 49: Discharge (ML/day) in the Barwon River

WaterNSW

HYFLOT V134 Output:28/10/2022

Period 31 Day 28/09/2022 to 29/10/2022 2022

422003	BARWON @COLLARENEBRI	2351.00l Hour Inst.	DO (mg/l)	CP
422001	BARWON @ DANGAR BDGE	2351.00l Hour Inst.	DO (mg/l)	CP
422027	BARWON @ GEERA	2351.00l Hour Inst.	DO (mg/l)	CP
422002	BARWON @ BREWARRINA	2351.00l Hour Inst.	DO (mg/l)	CP

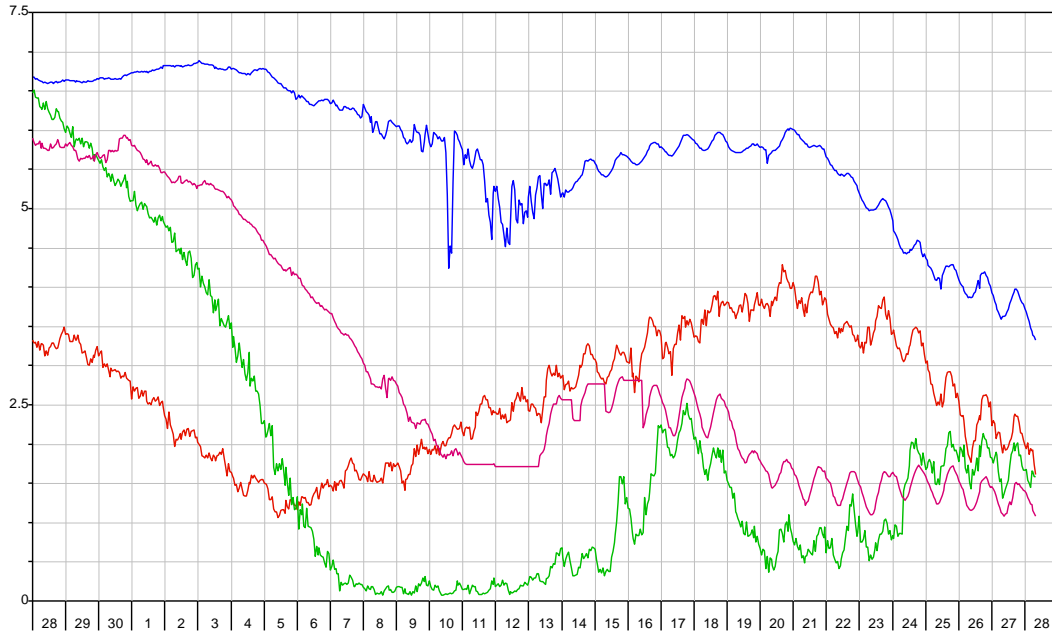


Figure 50: Continuous dissolved oxygen (mg/L) in the Barwon River

WaterNSW

HYFLOT V134 Output:28/10/2022

Period 31 Day 28/09/2022 to 29/10/2022 2022

422003	BARWON @COLLARENEBRI	2080.00l Hour Inst.	Water Temp(C)	CP
422001	BARWON @ DANGAR BDGE	2080.00l Hour Inst.	Water Temp(C)	CP
422027	BARWON @ GEERA	2080.00l Hour Inst.	Water Temp(C)	CP
422002	BARWON @ BREWARRINA	2080.00l Hour Inst.	Water Temp(C)	CP

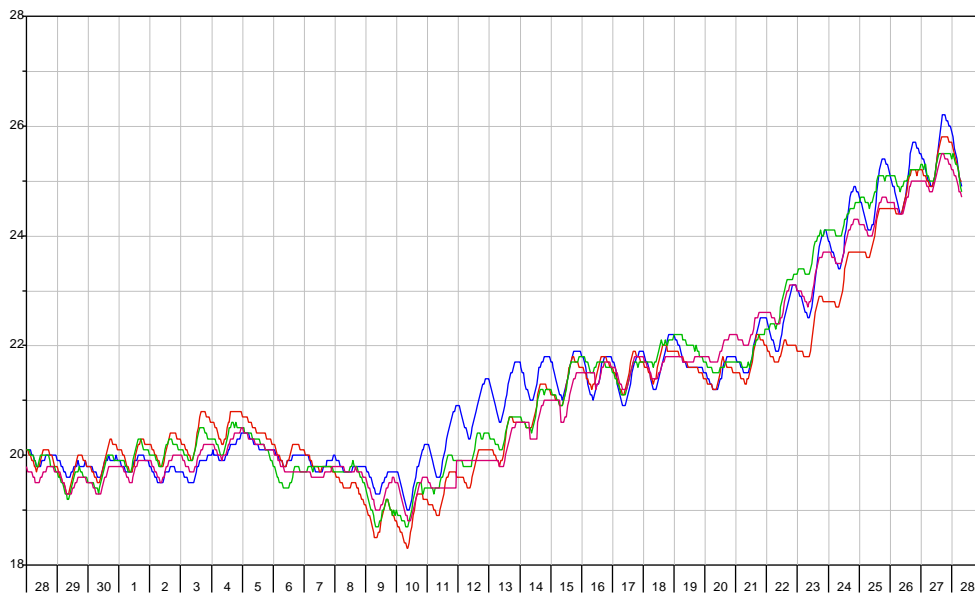


Figure 51: Continuous water temperature (°C) in the Barwon River

Darling River

Discharge is continuing to increase at Bourke (91,000 ML/day) and Louth (75,000 ML/day) and is over 35,000 ML/day at Wilcannia (Figure 52). Dissolved oxygen in the Darling River at Bourke has improved back above 4 mg/L mark (Figure 53). Oxygen levels in the Darling River at Burtundy were declining but have stabilised in the last few days. Discharge at Weir 32 is just under 23,500ML/day and just over 17,000 ML/day at Burtundy. Handheld result from the Darling River at Burtundy 24/10/22 12:47 was 5.22mg/L

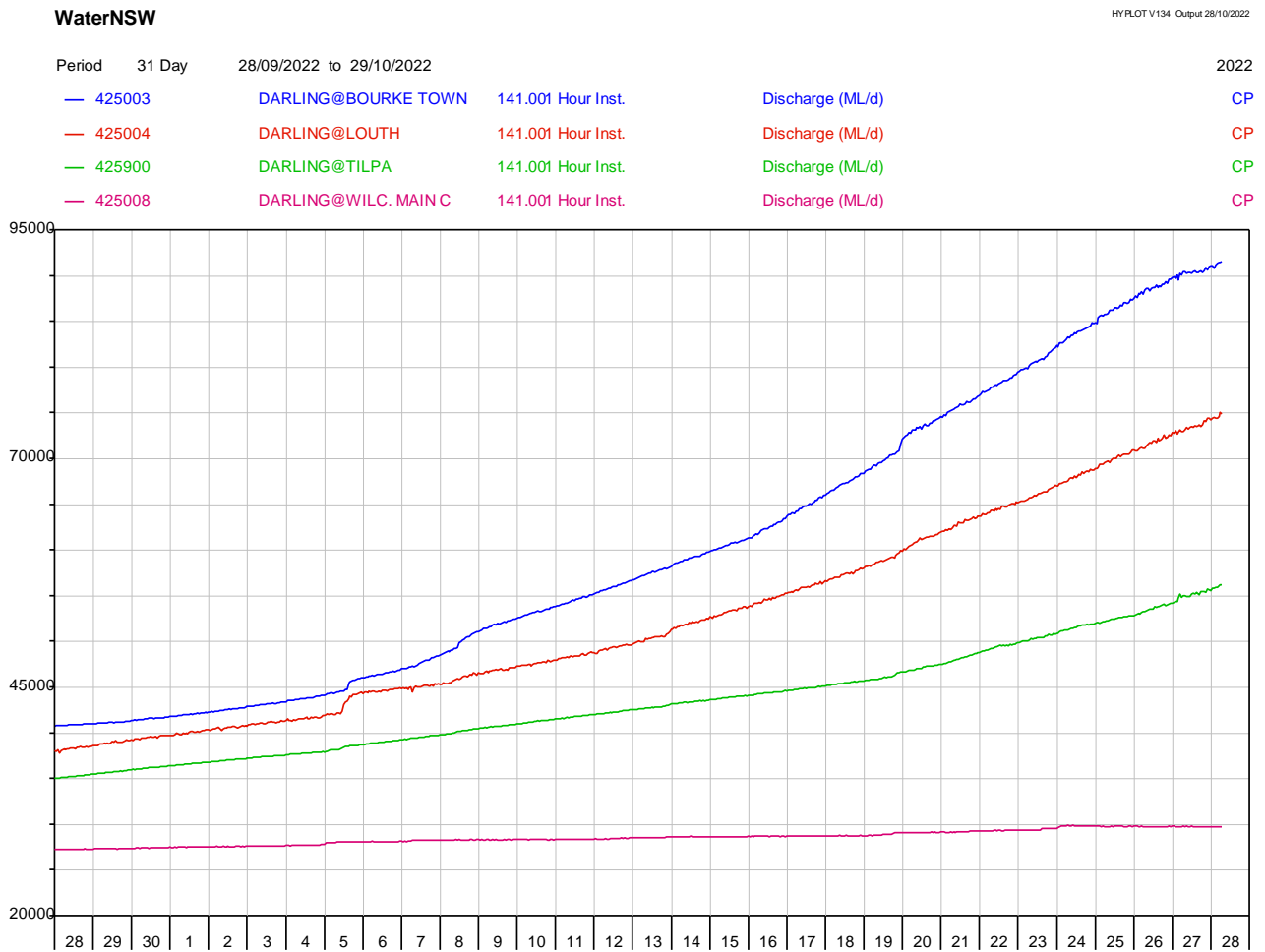


Figure 52: Discharge (ML/day) in the upper Darling River

WaterNSW

HYPLOT V134 Output 28/10/2022

Period 31 Day 28/09/2022 to 29/10/2022 2022

— 425003	DARLING@BOURKE TOWN	2351.001 Hour Inst.	DO (mg/l)	CP
— 425058	Darling R @ Moorabin	2351.001 Hour Inst.	DO (mg/l)	CP
— 425012	DARLING@U/S WEIR 32	2351.001 Hour Inst.	DO (mg/l)	CP
— 425007	DARLING@BURTUNDY	2351.001 Hour Inst.	DO (mg/l)	CP

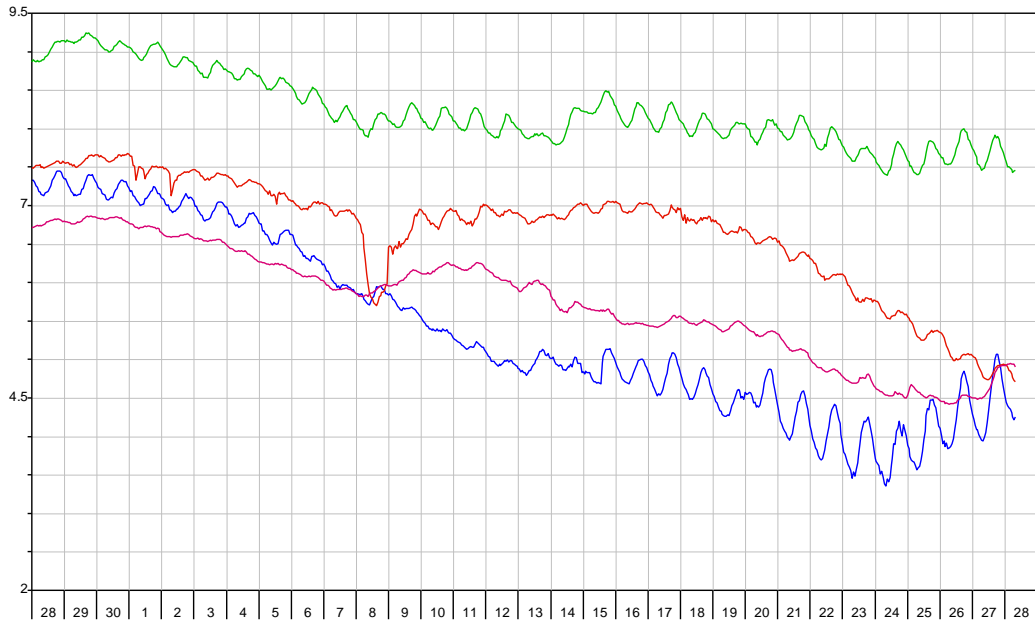


Figure 53: Continuous dissolved oxygen (mg/L) in the Darling River

WaterNSW

HYPLOT V134 Output 28/10/2022

Period 31 Day 28/09/2022 to 29/10/2022 2022

— 425003	DARLING@BOURKE TOWN	2080.001 Hour Inst.	Water Temp(C)	CP
— 425058	Darling R @ Moorabin	2080.001 Hour Inst.	Water Temp(C)	CP
— 425012	DARLING@U/S WEIR 32	2080.001 Hour Inst.	Water Temp(C)	CP
— 425007	DARLING@BURTUNDY	2080.001 Hour Inst.	Water Temp(C)	CP

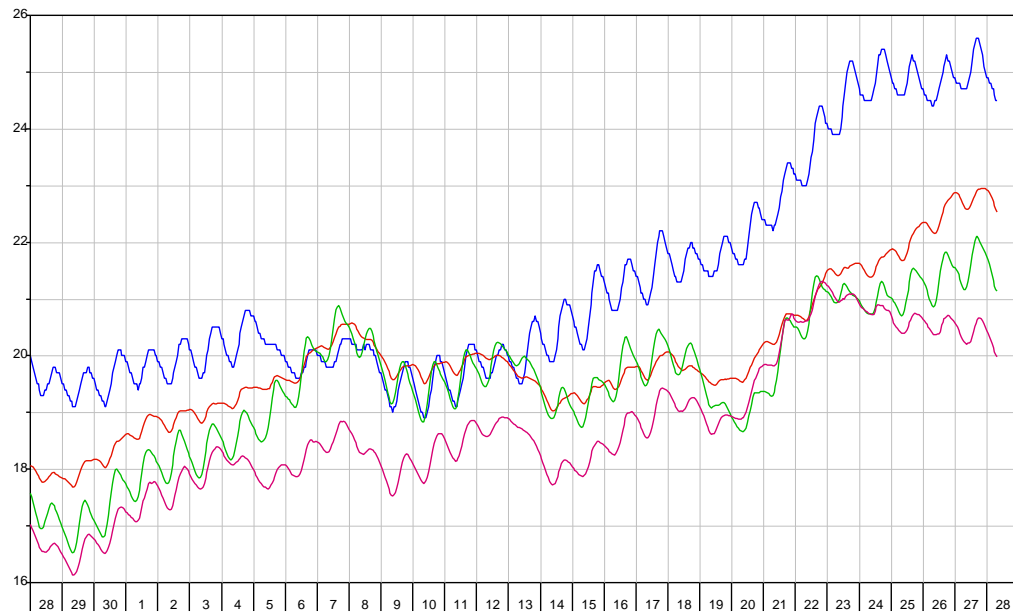


Figure 54: Continuous water temperature (°C) in the Darling River

Data from the Menindee Lake water quality monitoring program collected by WaterNSW shows dissolved oxygen is at safe levels for fish health across at all sites (Table 4). No profile data was collected. Site locations shown in Figure 7.

Table 4: Handheld dissolved oxygen results for Menindee Lakes

Site number	Site name	Sample date	Dissolved oxygen (mg/L)	Water temperature (°C)
N1087	Lake Wetherell Site 1	26/10/2022 10:17	7.1	21.6
N1088	Lake Wetherell Site 2	26/10/2022 11:20	6.9	21.6
N1089	Lake Wetherell Site 3	26/10/2022 12:24	6.1	21.4
N1090	Lake Wetherell Site 4/Main weir	26/10/2022 15:48	7.8	21.7
N1091	Lake Tandure	26/10/2022 15:15	8.2	22.3
N1092	Lake Pamamaroo inlet	26/10/2022 15:31	7.6	22.5
N1129	Lake Pamamaroo centre	27/10/2022 8:34	8.29	19.5
N1093	Lake Pamamaroo outlet	26/10/2022 16:00	8.7	23.0
N1094	Menindee Lakes at Copi Hollow	27/10/2022 8:52	8.99	19.5
N1130	Lake Menindee	27/10/2022 9:19	8.98	20.2
N1128	Lake Cawndilla outlet	26/10/2022 14:06	11.5	20.4
N1095	Darling River at BHWB pumping station Menindee	26/10/2022 13:07	7.6	21.5
	Darling River at Menindee town	27/10/2022 10:20	7.81	21.3
N1086	Darling River at Weir 32	27/10/2022 10:46	7.22	21.2
	Darling River at Burtundy	24/10/2022 12:47	5.22	20.8

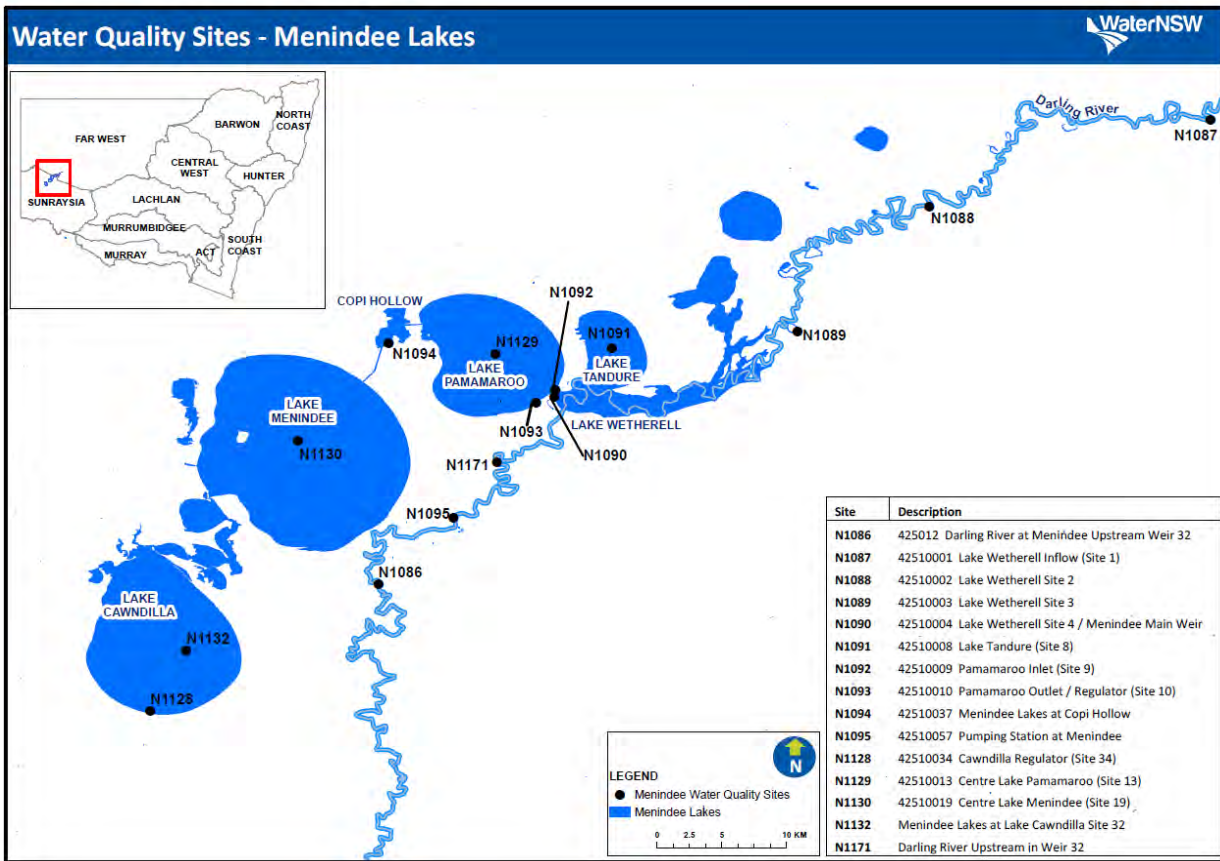


Figure 55: Location of Menindee Lakes water quality monitoring sites

Southern Basin

Lachlan

Heavy rainfall in the Lachlan catchment has resulted in a second flooding event at Forbes (Figure 56). Floodwaters have reached Condobolin and peaked this week at over 25,000 ML/day.

Dissolved oxygen levels at Forbes and Condobolin have decreased with increased flows and water temperatures (Figure 57 and Figure 58). Sites in the lower Lachlan valley are fluctuating around 4 mg/L.

WaterNSW

HYFLOT V134 Output 28/10/2022

Period	31 Day	28/09/2022 to 29/10/2022		2022
— 412004	LACHLAN FORBES CTTNS	141.001 Hour Inst.	Discharge (ML/d)	CP
— 412006	LACHLAN CONDOBOLIN B	141.001 Hour Inst.	Discharge (ML/d)	CP
— 412011	LACHLAN LAKE C WEIR	141.001 Hour Inst.	Discharge (ML/d)	CP
— 412039	LACHLAN HILLSTON WR	141.001 Hour Inst.	Discharge (ML/d)	CP
— 412005	LACHLAN @ BOOLIGAL	141.001 Hour Inst.	Discharge (ML/d)	CP

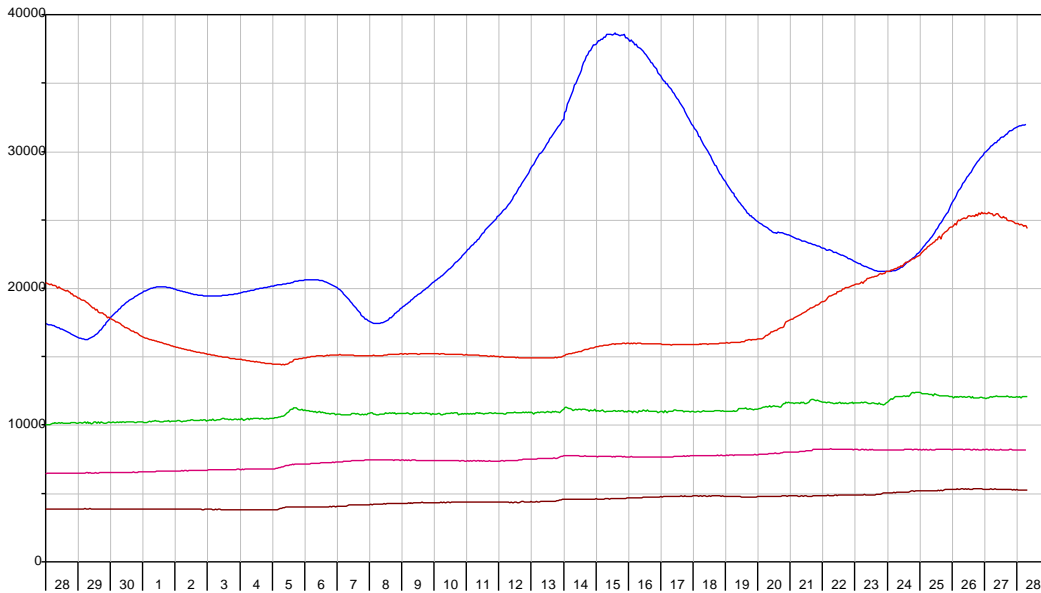


Figure 56: Discharge (ML/day) in the Lachlan River

WaterNSW

HYFLOT V134 Output 28/10/2022

Period	31 Day	28/09/2022 to 29/10/2022		2022
— 412004	LACHLAN FORBES CTTNS	2351.001 Hour Inst.	DO (mg/l)	CP
— 412006	LACHLAN CONDOBOLIN B	2351.001 Hour Inst.	DO (mg/l)	CP
— 412011	LACHLAN LAKE C WEIR	2351.001 Hour Inst.	DO (mg/l)	CP
— 412039	LACHLAN HILLSTON WR	2351.001 Hour Inst.	DO (mg/l)	CP
— 412005	LACHLAN @ BOOLIGAL	2351.001 Hour Inst.	DO (mg/l)	CP

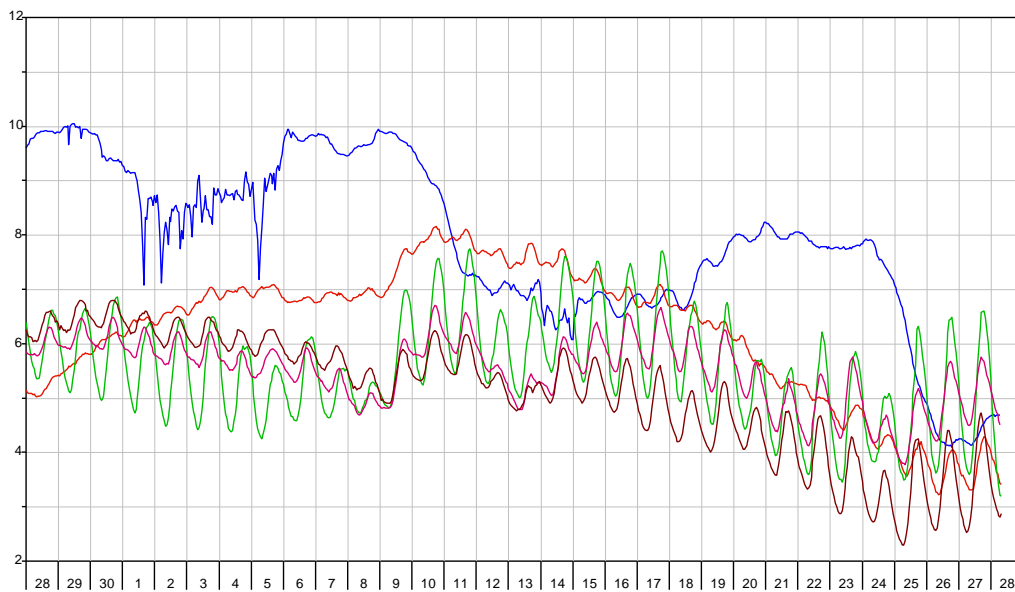


Figure 57: Continuous dissolved oxygen (mg/L) in the Lachlan River

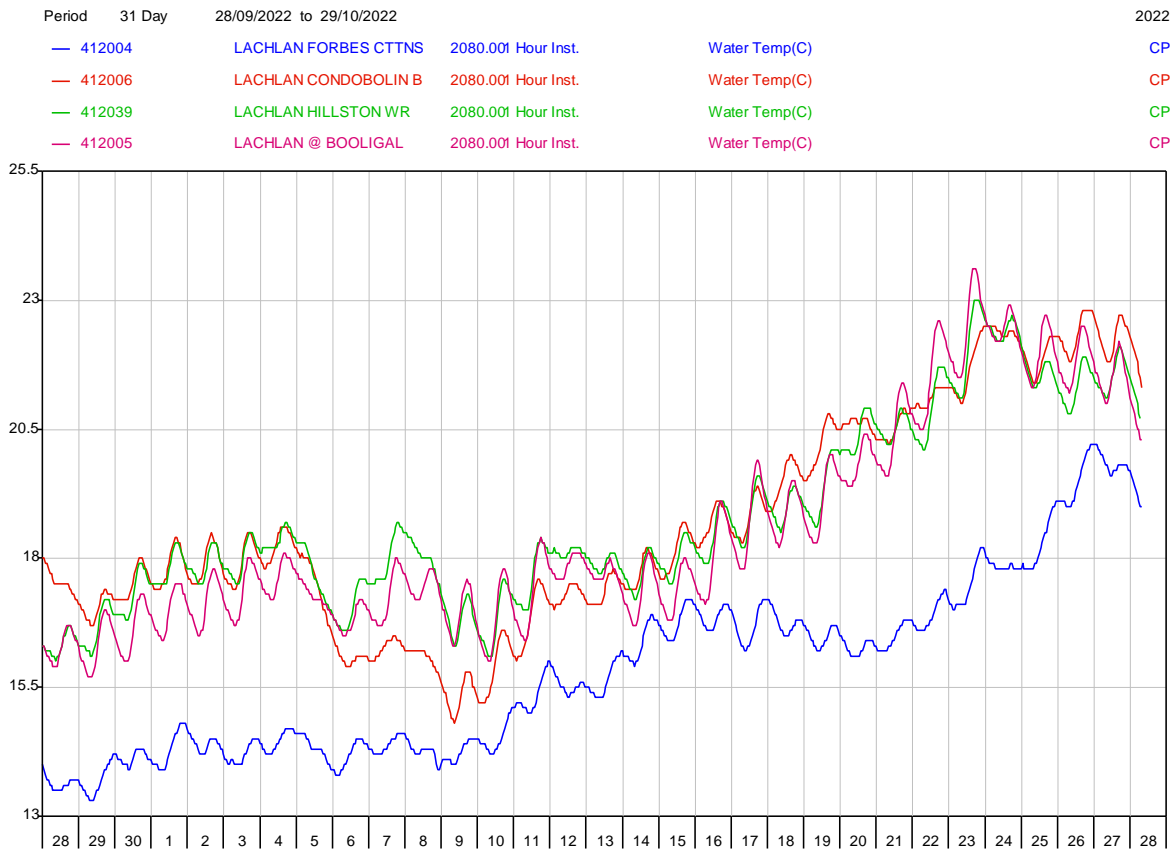


Figure 58: Continuous water temperature (°C) in the Lachlan River

Murrumbidgee River

The Bureau of Meteorology have issued a minor flood warning for Wagga Wagga and a major flood warning for Hay. Discharge at Hay has almost peaked at just over 71,000 ML/day. Flows are currently steady in the lower Murrumbidgee with almost 30,000 ML/day at Balranald (Figure 59).

Dissolved oxygen has been declining at all three monitoring sites (Figure 60). Levels at Redbank weir have dropped below 4 mg/L this week and at Balranald are fluctuating between 2 and 3 mg/L. Large areas of the lower Murrumbidgee floodplain have already been inundated with more floodwater yet to arrive. Levels have dropped below 3 mg/L. Handheld result collected at Balranald by WaterNSW on 27 October was 1.46 mg/L which is slightly less than that recorded by the sensor at the gauging station.

WaterNSW

HYPLOT V134 Output 28/10/2022

Period	31 Day	28/09/2022 to 29/10/2022			2022
— 410001	MBIDGEE R @ WAGGA	141.001 Hour Inst.	Discharge (ML/d)	CP	
— 410082	MBIDGEE D/S GOGEL W	141.001 Hour Inst.	Discharge (ML/d)	CP	
— 410136	MBIDGEE DS HAY WEIR	141.001 Hour Inst.	Discharge (ML/d)	CP	
— 410040	MBIDGEE D/S MAUDE W	141.001 Hour Inst.	Discharge (ML/d)	CP	
— 410130	MBIDGEE D/S BALRAND	141.001 Hour Inst.	Discharge (ML/d)	CP	

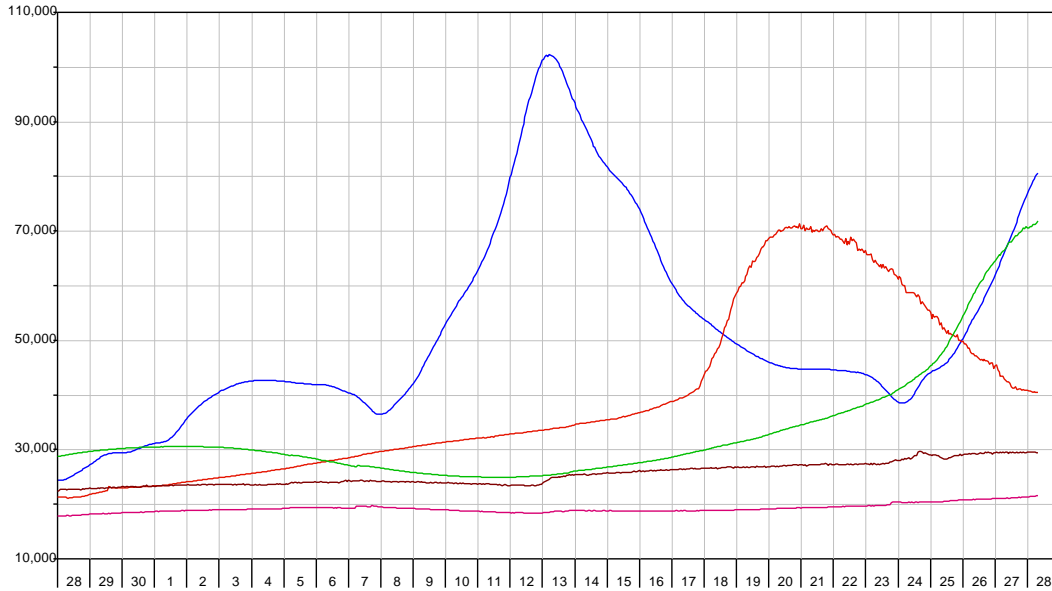


Figure 59: Discharge (ML/day) in the Murrumbidgee River

WaterNSW

HYPLOT V134 Output 28/10/2022

Period	31 Day	28/09/2022 to 29/10/2022			2022
— 410040	MBIDGEE D/S MAUDE W	2351.001 Hour Inst.	DO (mg/l)	CP	
— 410041	MBIDGEE D/S REDBANK	2351.001 Hour Inst.	DO (mg/l)	CP	
— 410130	MBIDGEE D/S BALRAND	2351.001 Hour Inst.	DO (mg/l)	CP	

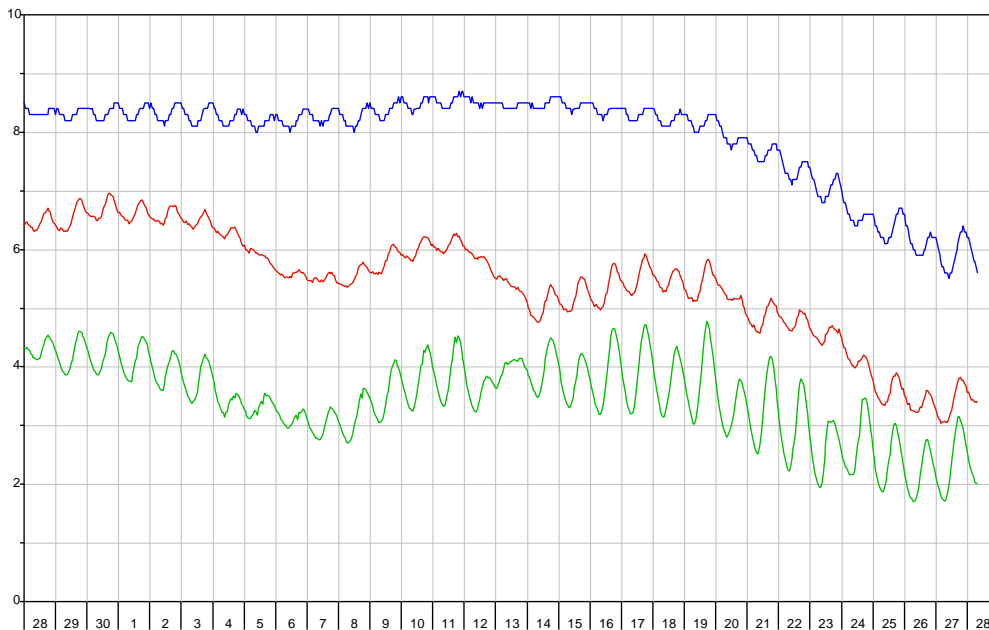


Figure 60: Continuous dissolved oxygen (mg/L) in the Murrumbidgee River

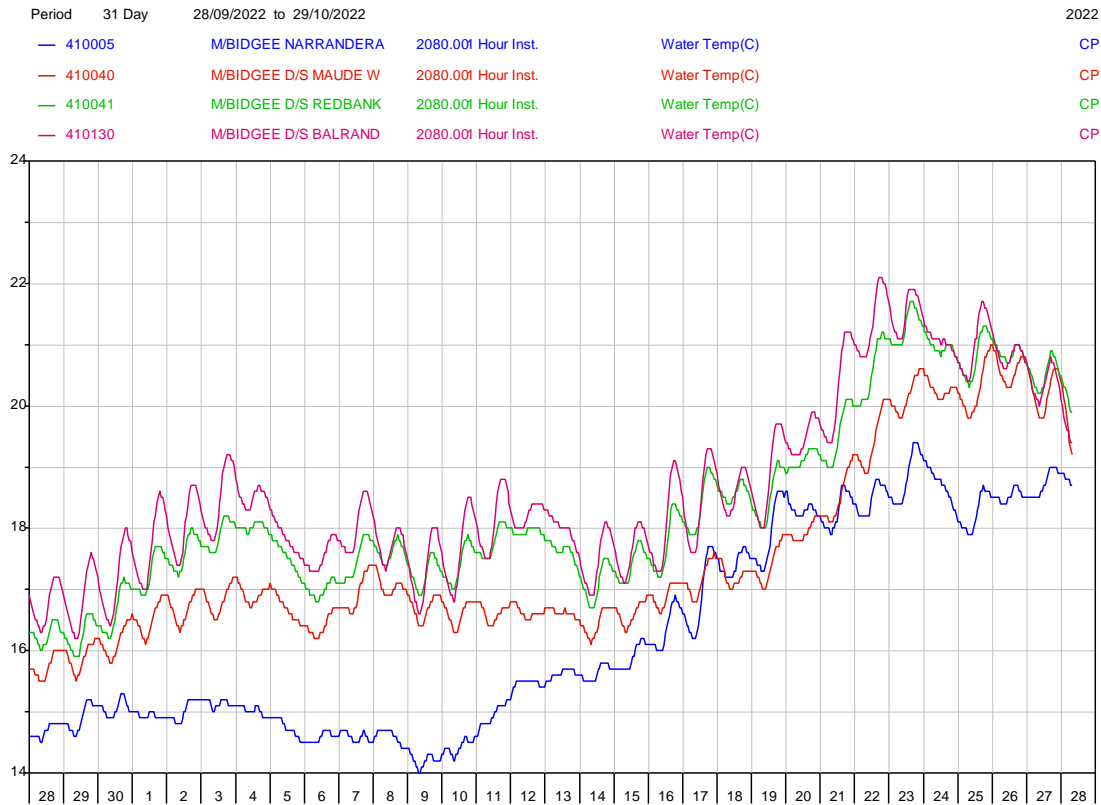


Figure 61: Continuous water temperature (°C) in the Murrumbidgee River

Kolety/Edward River

Increasing flow (Figure 62) and water temperatures (Figure 64) has resulted in a sudden drop in dissolved oxygen levels at all three continuous monitoring sites along the Kolety/Edward River, most markedly at Toonalook (Figure 63). Dissolved oxygen at Toonalook has dropped to 0 mg/L and Deniliquin to less than 2 mg/L.

WaterNSW

HYPLOT V134 Output 28/10/2022

Period 31 Day 28/09/2022 to 29/10/2022 2022

— 409047	EDWARD R @ TOONALOOK	141.001 Hour Inst.	Discharge (ML/d)	CP
— 409003	EDWARD @ DENILIKUIN	141.001 Hour Inst.	Discharge (ML/d)	CP
— 409014	EDWARD R @ MOULAMEIN	141.001 Hour Inst.	Discharge (ML/d)	CP

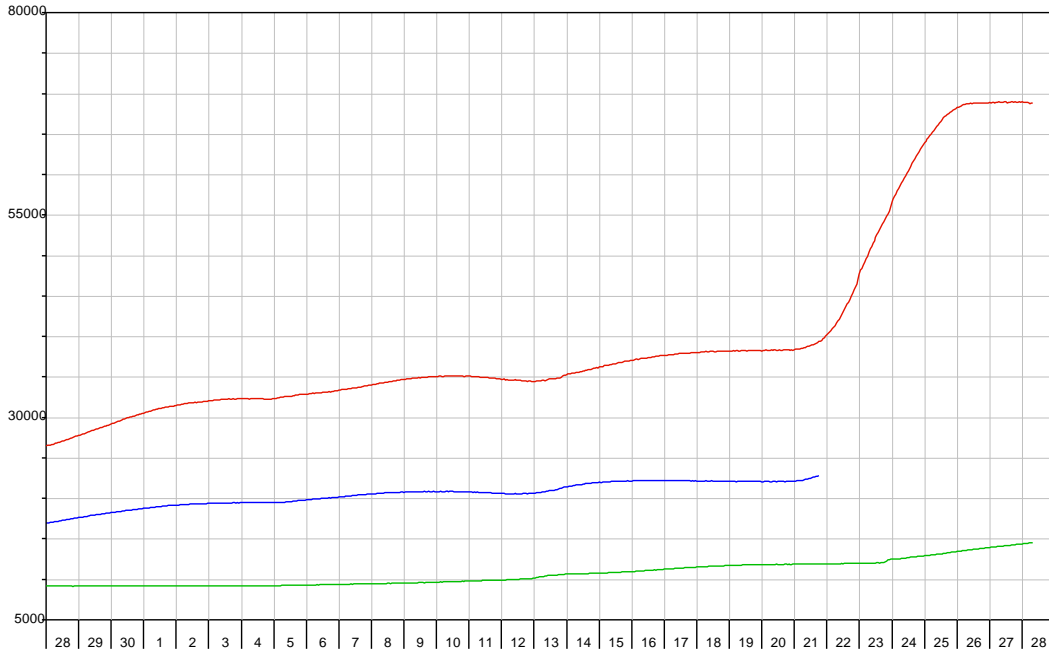


Figure 62: Discharge (ML/day) in the Koley/Edward River

WaterNSW

HYPLOT V134 Output 28/10/2022

Period 31 Day 28/09/2022 to 29/10/2022 2022

— 409047	EDWARD R @ TOONALOOK	2351.001 Hour Inst.	DO (mg/l)	CP
— 409003	EDWARD @ DENILIKUIN	2351.001 Hour Inst.	DO (mg/l)	CP
— 409014	EDWARD R @ MOULAMEIN	2351.001 Hour Inst.	DO (mg/l)	CP

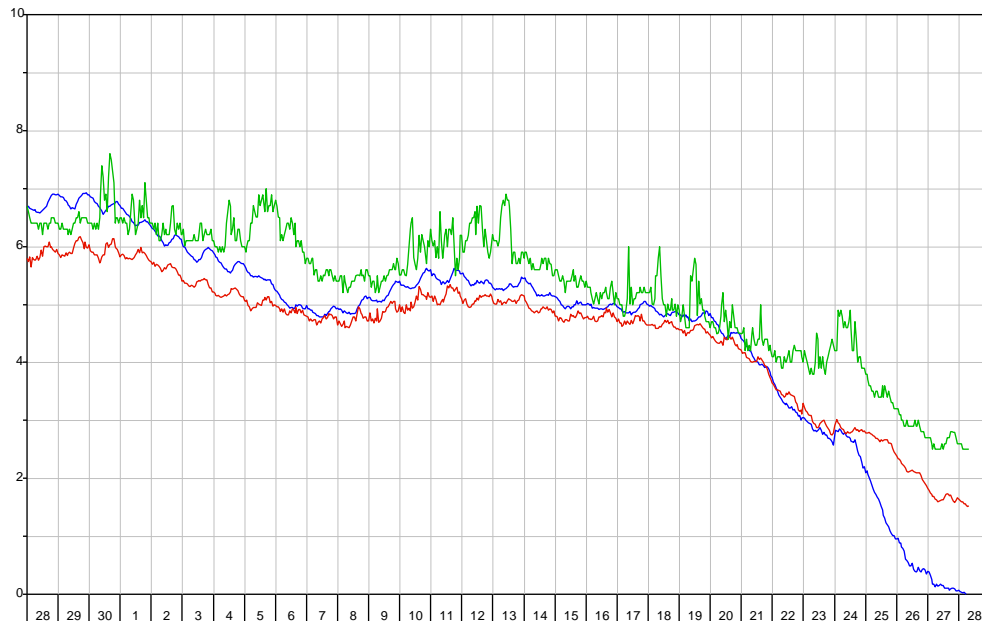


Figure 63: Continuous dissolved oxygen (mg/L) in the Koley/Edward River

WaterNSW

HYPLOT V134 Output 28/10/2022

Period 31 Day 28/09/2022 to 29/10/2022 2022

— 409047	EDWARD R @ TOONALOOK	2080.00l Hour Inst.	Water Temp(C)	CP
— 409003	EDWARD @ DENILQUIN	2080.00l Hour Inst.	Water Temp(C)	CP
— 409014	EDWARD R @ MOULAMEIN	2080.00l Hour Inst.	Water Temp(C)	CP

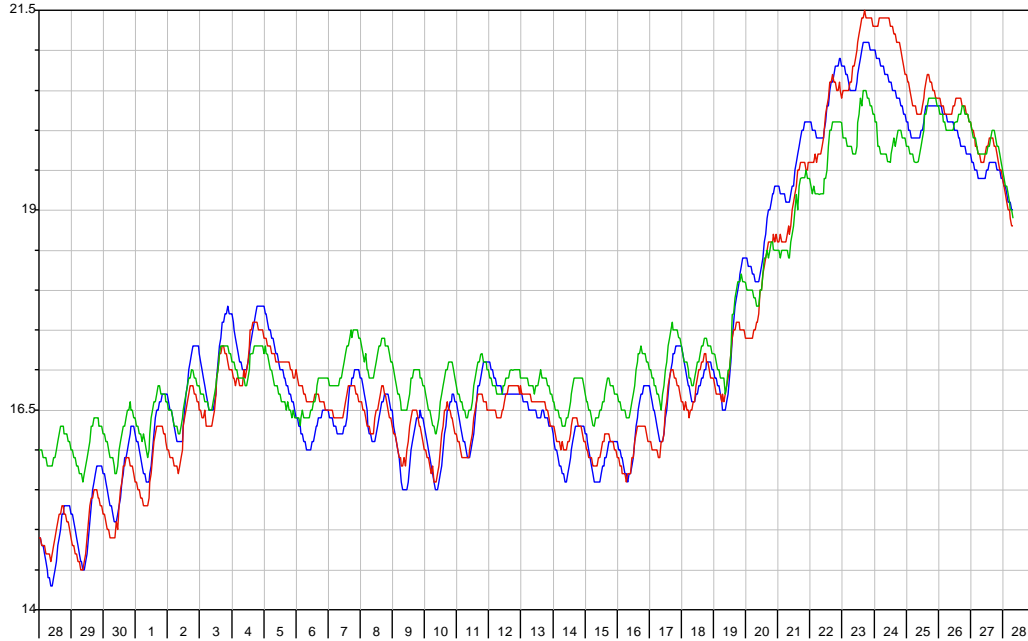


Figure 64: Continuous water temperature (°C) in the Kolety/Edward River

Wakool and Niemur rivers

Discharge in the Wakool River at Coonambit Bridge is almost 60,000 ML/day and increasing. The Niemur River at Barham-Moulamein Road is flowing at under 25,000 ML/day (Figure 65). Dissolved oxygen in the Wakool River has declined to less than 1 mg/L (Figure 66). Oxygen levels in the Niemur River have also been declining with the Mallan school site reading less than 3 mg/L. Oxygen levels have stabilised slightly with the cooler water temperatures this week (Figure 67).

WaterNSW

HYFLOT V134 Output 28/10/2022

Period 31 Day 28/09/2022 to 29/10/2022 2022

409062	WAKOOL R GEEGEE BR 2	141.001 Hour Inst.	Discharge (ML/d)	CP
409061	WAKOOL R COONAMIT BR	141.001 Hour Inst.	Discharge (ML/d)	CP
409048	NIEMUR R BARH-MLN RD	141.001 Hour Inst.	Discharge (ML/d)	CP
409086	NIEMUR @ MALLAN SCH	141.001 Hour Inst.	Discharge (ML/d)	CP

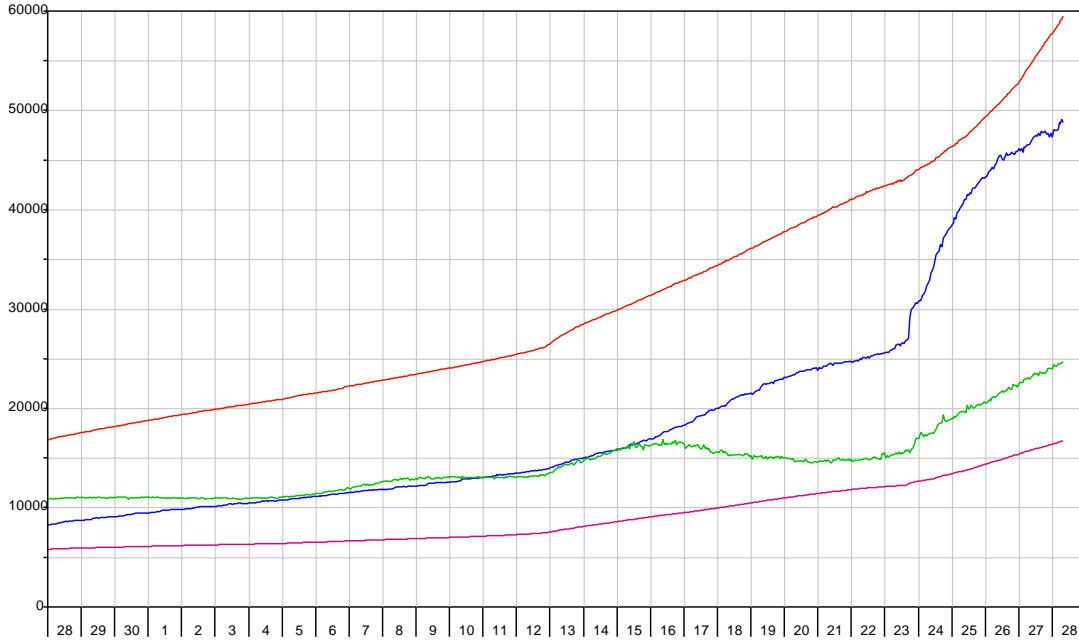


Figure 65: Discharge (ML/day) in the Wakool and Niemur rivers

WaterNSW

HYFLOT V134 Output 28/10/2022

Period 31 Day 28/09/2022 to 29/10/2022 2022

409062	WAKOOL R GEEGEE BR 2	2351.001 Hour Inst.	DO (mg/l)	CP
409013	WAKOOL @ STONEY XING	2351.001 Hour Inst.	DO (mg/l)	CP
409048	NIEMUR R BARH-MLN RD	2351.001 Hour Inst.	DO (mg/l)	CP
409086	NIEMUR @ MALLAN SCH	2351.001 Hour Inst.	DO (mg/l)	CP

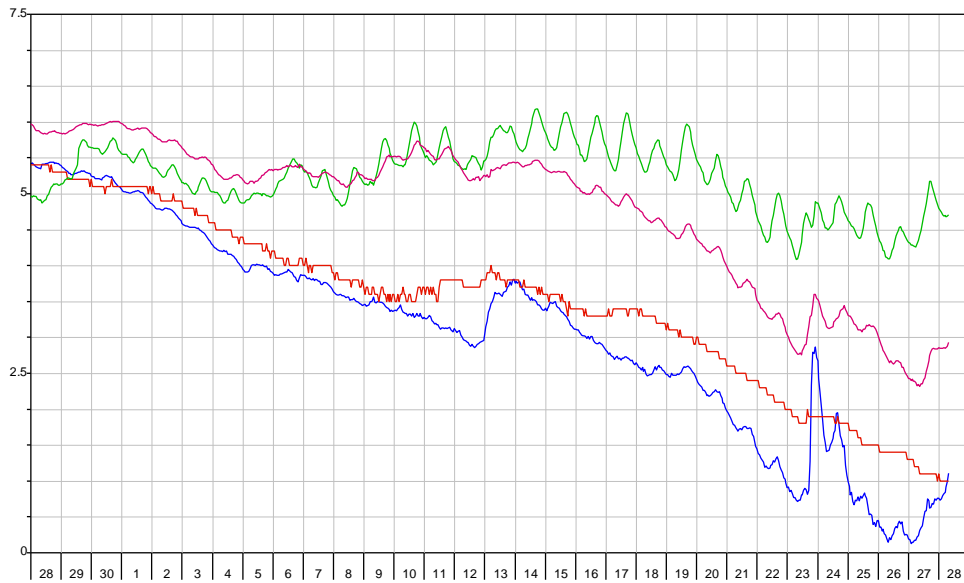


Figure 66: Continuous dissolved oxygen (mg/L) in the Wakool and Niemur rivers

WaterNSW

HYPLOT V134 Output 28/10/2022

Period	31 Day	28/09/2022 to 29/10/2022	2022
409062	WAKOOL R GEEGEE BR 2	2080.001 Hour Inst.	Water Temp(C) CP
409013	WAKOOL @ STONEY XING	2080.001 Hour Inst.	Water Temp(C) CP
409048	NIEMUR R BARH-MLN RD	2080.001 Hour Inst.	Water Temp(C) CP
409086	NIEMUR @ MALLAN SCH	2080.001 Hour Inst.	Water Temp(C) CP

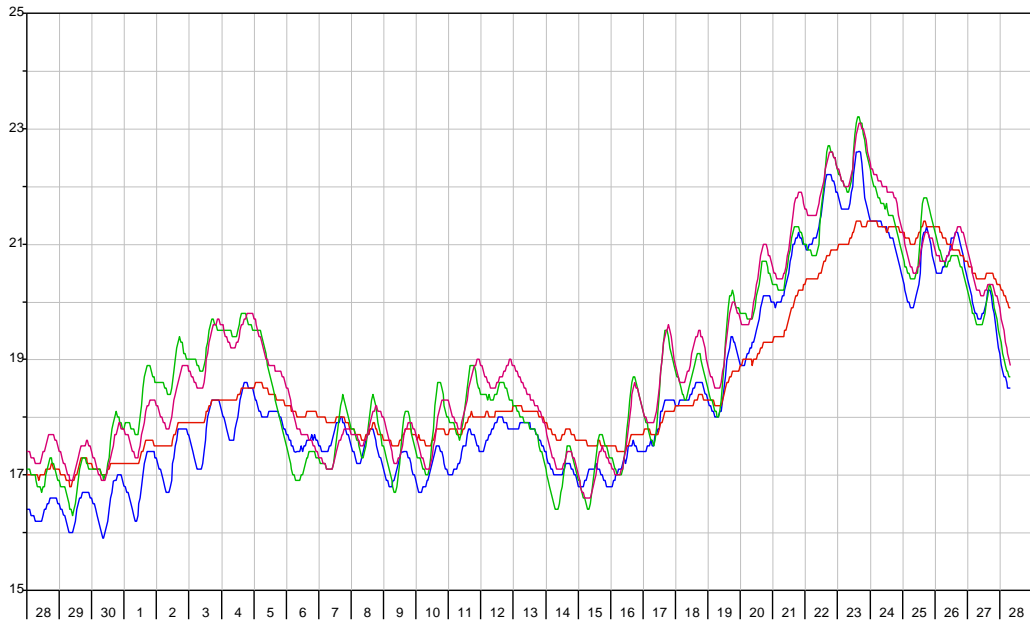


Figure 67: Continuous water temperature (°C) in the Wakool and Niemur rivers

Merran, Thule and Barber creeks

Figure 68 shows dissolved oxygen levels in Little Merran, Barbers and Thule creeks have all dropped to around 0 mg/L. This coincides with Fisheries confirming reports of fish deaths in the Little Murray River which flows through Campbells Island State Forest. The dissolved oxygen levels in Merran Creek upstream of the Wakool junction have declined to below 3 mg/L this week. Water temperatures have declined but this has not resulted in improved dissolved oxygen levels (Figure 69).

WaterNSW

HYPL0T V134 Output 28/10/2022

Period 31 Day 28/09/2022 to 29/10/2022 2022

409044	LT MERRAN FRANK/ BR	2351.001 Hour Inst.	DO (mg/l)	CP
409036	MERRAN CK U/S WAK R	2351.001 Hour Inst.	DO (mg/l)	CP
409109	THULE @ LOW THULE RD	2351.001 Hour Inst.	DO (mg/l)	CP
409111	BARBER @ SANDY BR.	2351.001 Hour Inst.	DO (mg/l)	CP

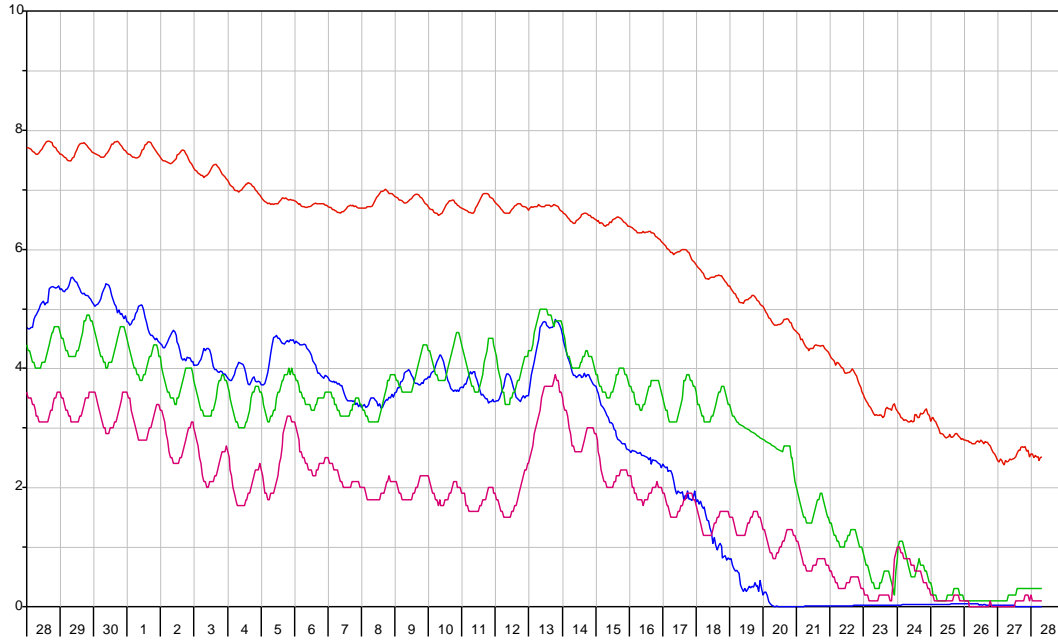


Figure 68: Continuous dissolved oxygen (mg/L) in the Merran, Little Merran, Thule and Barber creeks

WaterNSW

HYPL0T V134 Output 28/10/2022

Period 31 Day 28/09/2022 to 29/10/2022 2022

409044	LT MERRAN FRANK/ BR	2080.001 Hour Inst.	Water Temp(C)	CP
409036	MERRAN CK U/S WAK R	2080.001 Hour Inst.	Water Temp(C)	CP
409109	THULE @ LOW THULE RD	2080.001 Hour Inst.	Water Temp(C)	CP
409111	BARBER @ SANDY BR.	2080.001 Hour Inst.	Water Temp(C)	CP

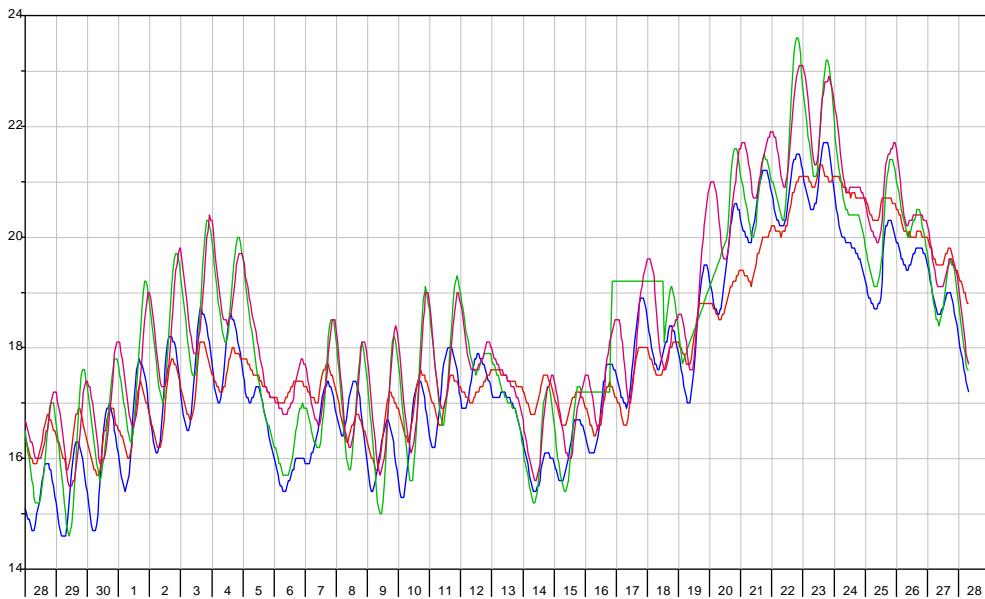


Figure 69: Continuous water temperature (°C) in the Merran, Little Merran, Thule and Barber creeks

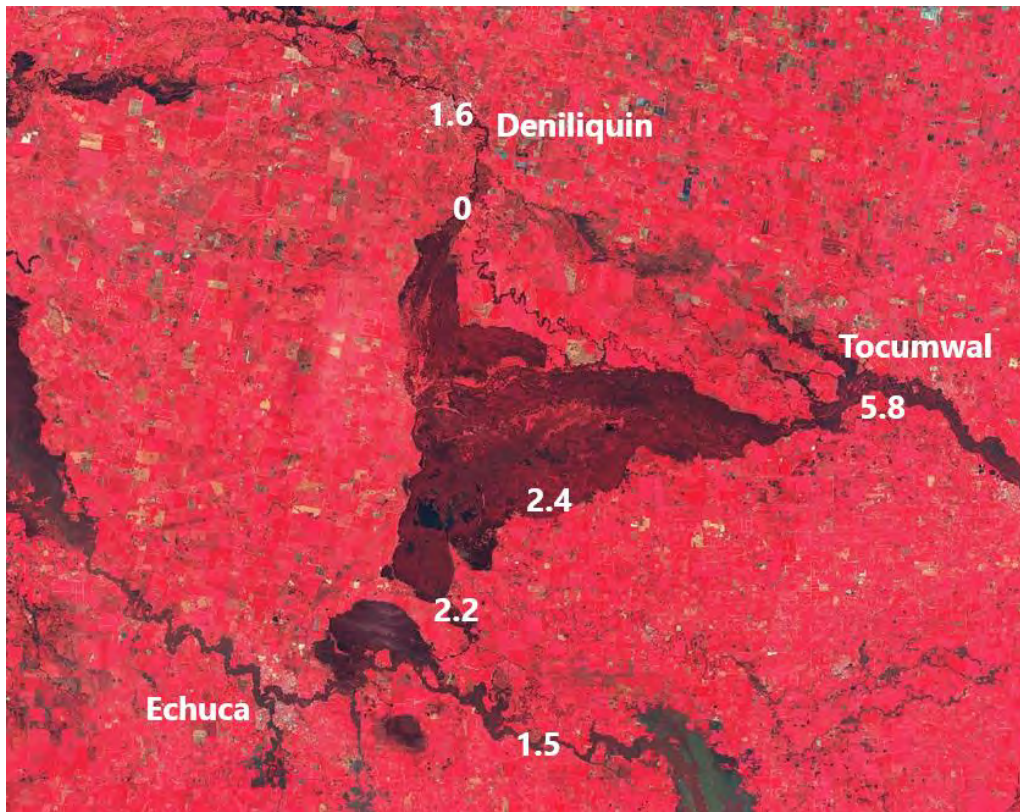


Figure 70: Satellite derived Sentinel colour infrared image (17 October) of Murray and Kolety/Edward rivers

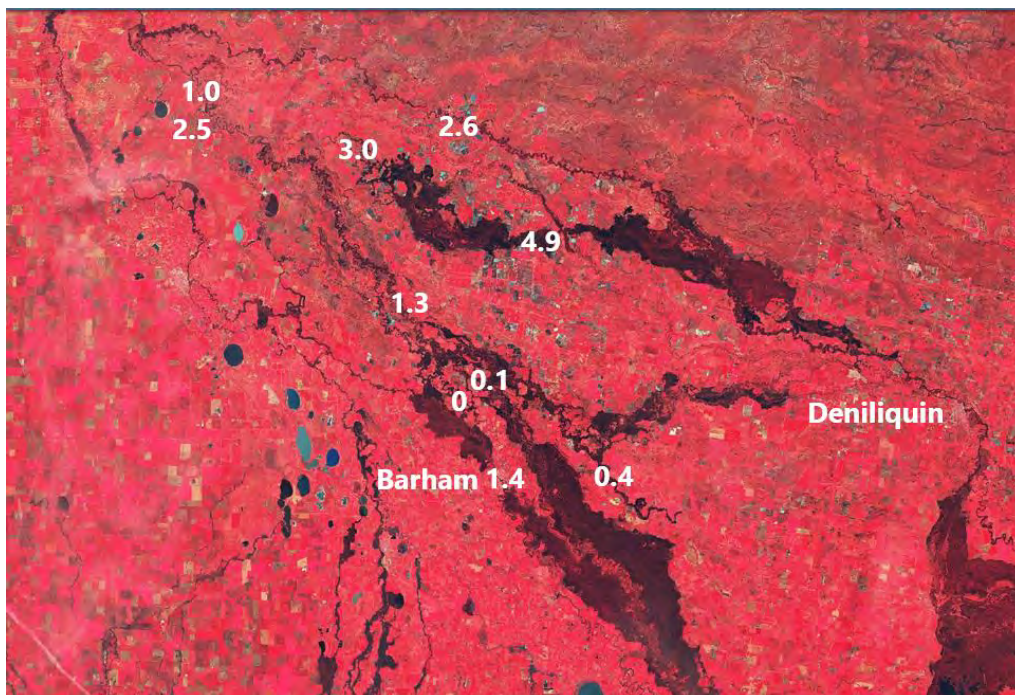


Figure 71: Satellite derived Sentinel colour infrared image (17 October) of the mid Murray catchment

Murray River

Monitoring by DELWP is showing the Murray River at Tocumwal, upstream of the Barmah/Millewa Forest, is oxygenated (Figure 72). In the Murray River downstream of the forest at Barmah, dissolved oxygen levels had also dropped below 2 mg/ before improving this week. Oxygen levels in Budgee Creek at War Plain had also dropped below 2 mg/L before the sensor malfunctioned.

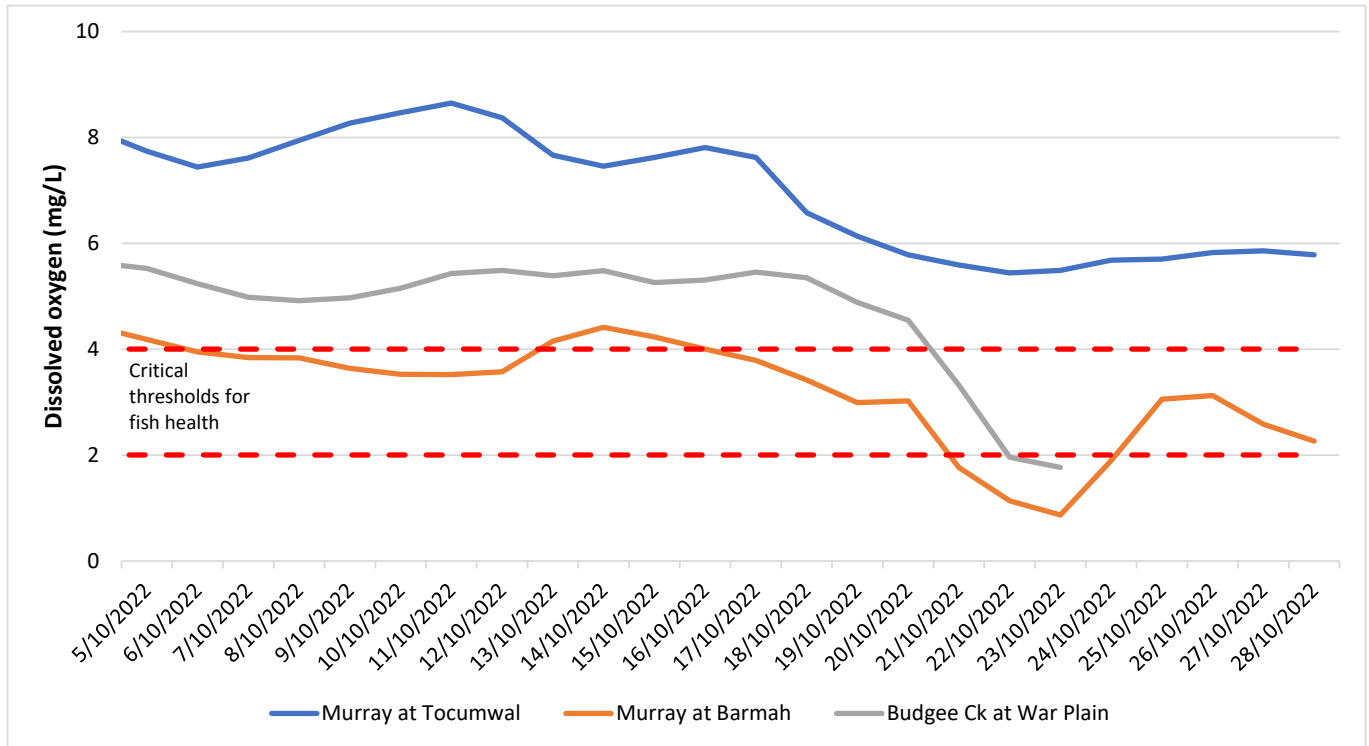


Figure 72: Continuous dissolved oxygen (mg/L) in the Murray River at Tocumwal and Barmah and Budgee Creek (data courtesy of DELWP)

Dissolved oxygen levels in the Goulburn River and the Murray River at Barham, downstream of the Wakool Junction and Colignan have all continued to decline this week and appear to be stabilising at between 1 and 2 mg/L (Figure 73). The results from the temporary monitoring site installed in the Murray River downstream of Wentworth are slightly better but still less than the 4 mg/L ecological threshold. Water temperatures have declined slightly during the week (Figure 74). A handheld reading collected on 24 October at Murray River at Merbein was 4.55 mg/L.

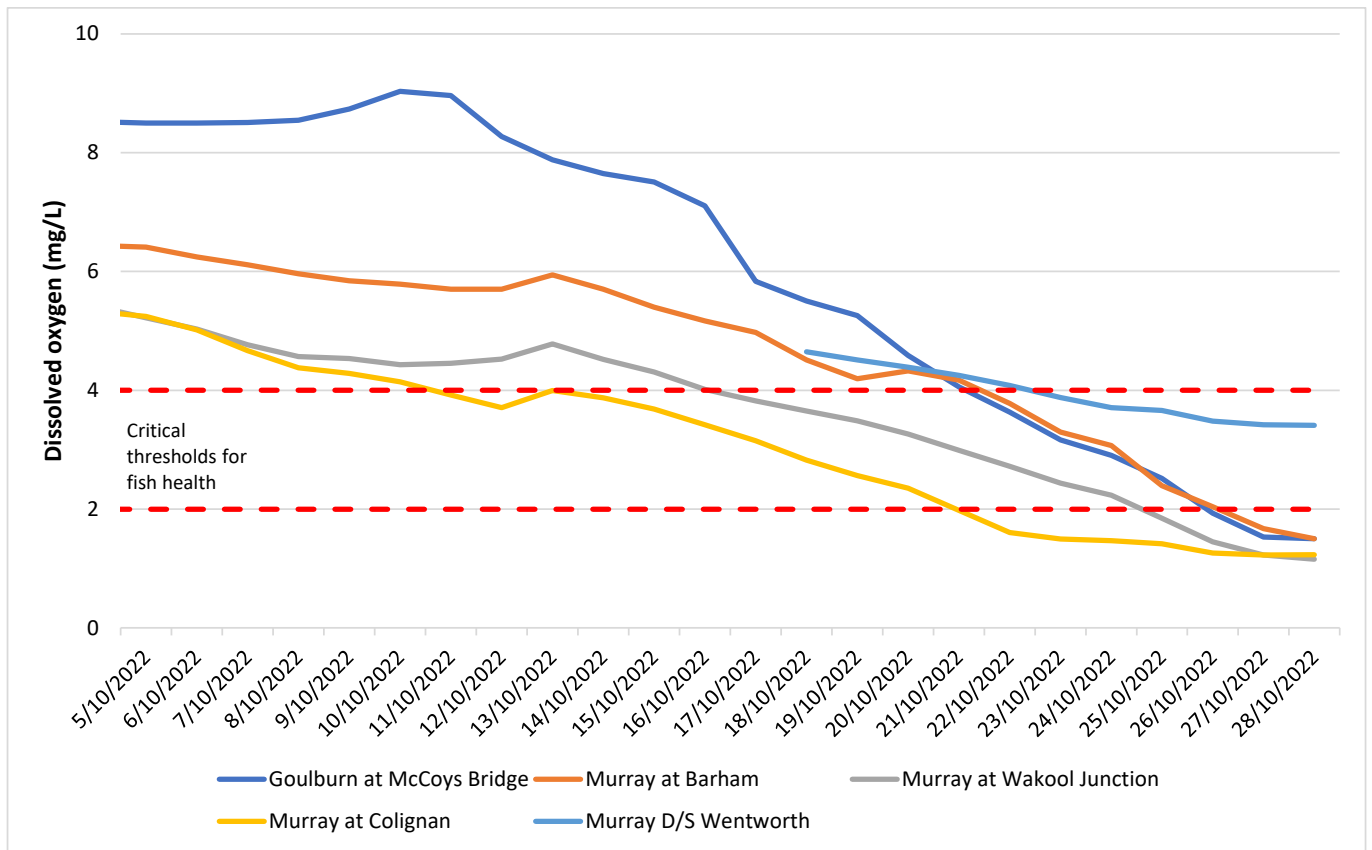


Figure 73: Continuous dissolved oxygen (mg/L) in the Goulburn River and Murray River at Barham, below Wakool junction, Colignan and downstream of Wentworth

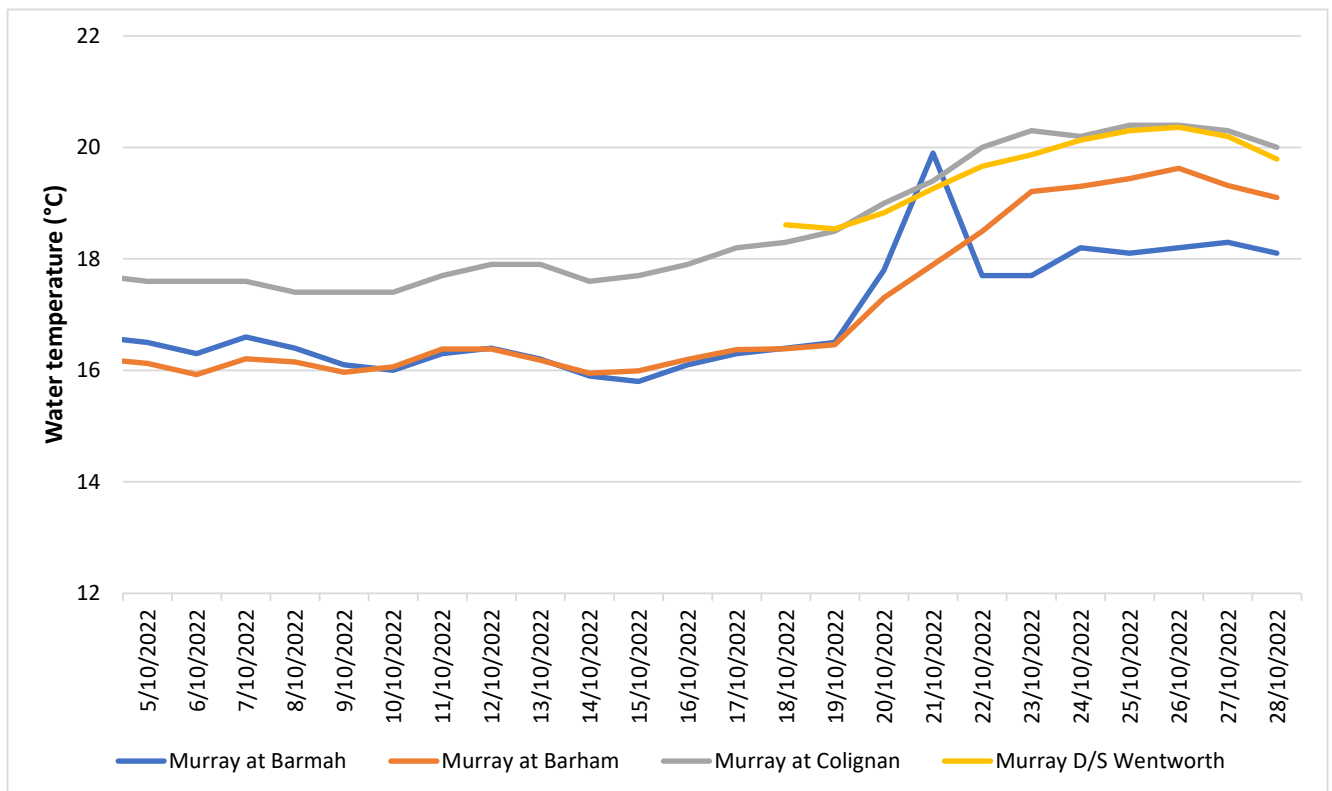


Figure 74: Continuous water temperature (°C) in the Murray River

WaterNSW staff at Lock 10 collected handheld dissolved oxygen readings on 27 October. The results collected downstream of Lock 10 confirm those from the temporary sensor and that dissolved oxygen levels in the are better than those in the Murray and may provide a more oxygenated refuge area for fish to move into.

Table 5: Handheld dissolved oxygen results for Wentworth (Lock 10)

Site	Sample date	Dissolved oxygen (mg/L)	Water temperature (°C)
Darling River Wentworth town bridge	27/10/2022	4.46	20.2
Murray River at Broken Hill pipeline station (2.5km U/S Lock 10)	27/10/2022	3.00	20.0
Murray River 100m D/S Lock 10, NSW side	27/10/2022	3.76	20.1
Murray River 100m D/S Lock 10, Vic side	27/10/2022	3.06	20.0
Murray River 3km D/S Lock 10 (turkey farm)	27/10/2022	3.26	20.0



Figure 75: Sentinel image showing the junction of the Darling and Murray Rivers at Wentworth

Weather Outlook

The Bureau of Meteorology 8-day total rain forecast (28 October to 4 November) indicates widespread rainfall across NSW, with heavy falls predicted for the Tablelands and the Southern Alps (Figure 76). Forecast is for cooler air temperatures for Moama and Mildura next week.

La Niña is underway in the Tropical Pacific, increasing the chance of above average rainfall for northern and eastern Australia during spring and summer. Models indicate the La Niña may peak during spring and return to neutral conditions early 2023. The negative Indian Ocean Dipole event continues. This typically increases the chance of above average spring rainfall for most of the eastern two thirds of Australia.

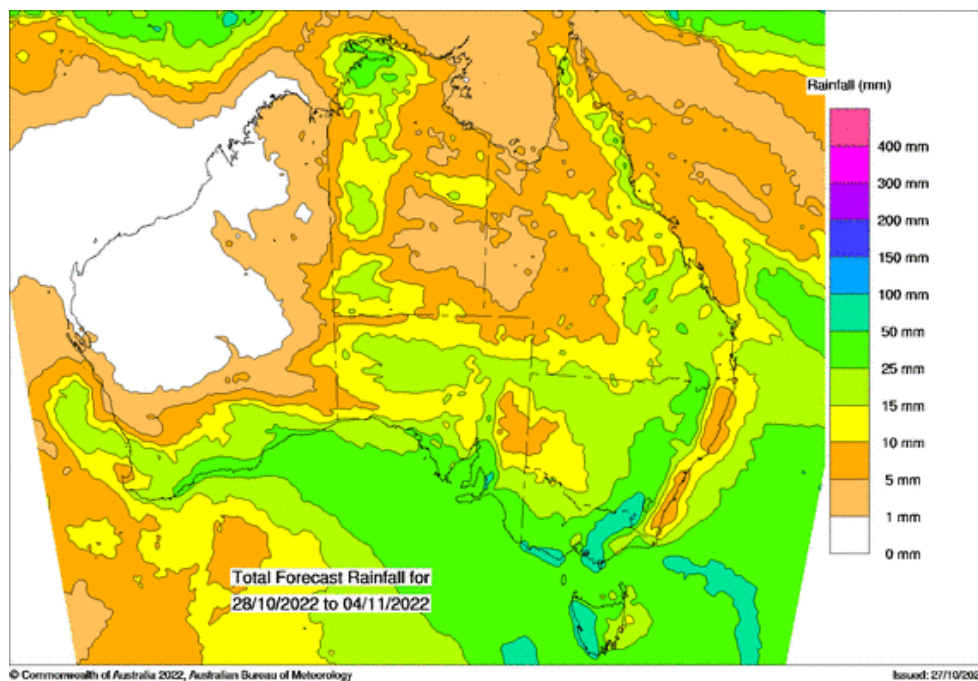


Figure 76: Bureau of Meteorology 8-day total rain forecast (28 October – 4 November)

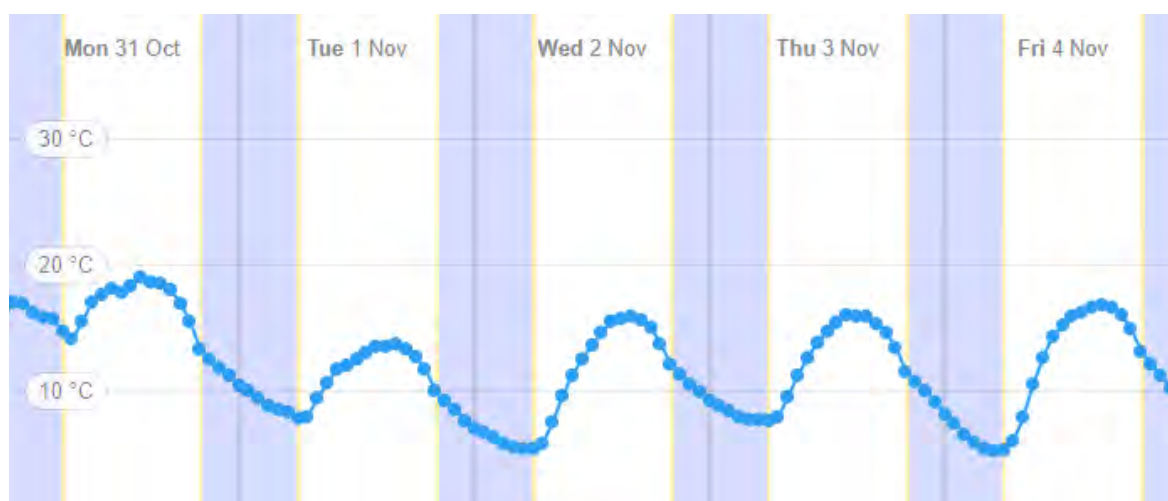


Figure 77: Forecast air temperatures for Moama 31 October to 4 November

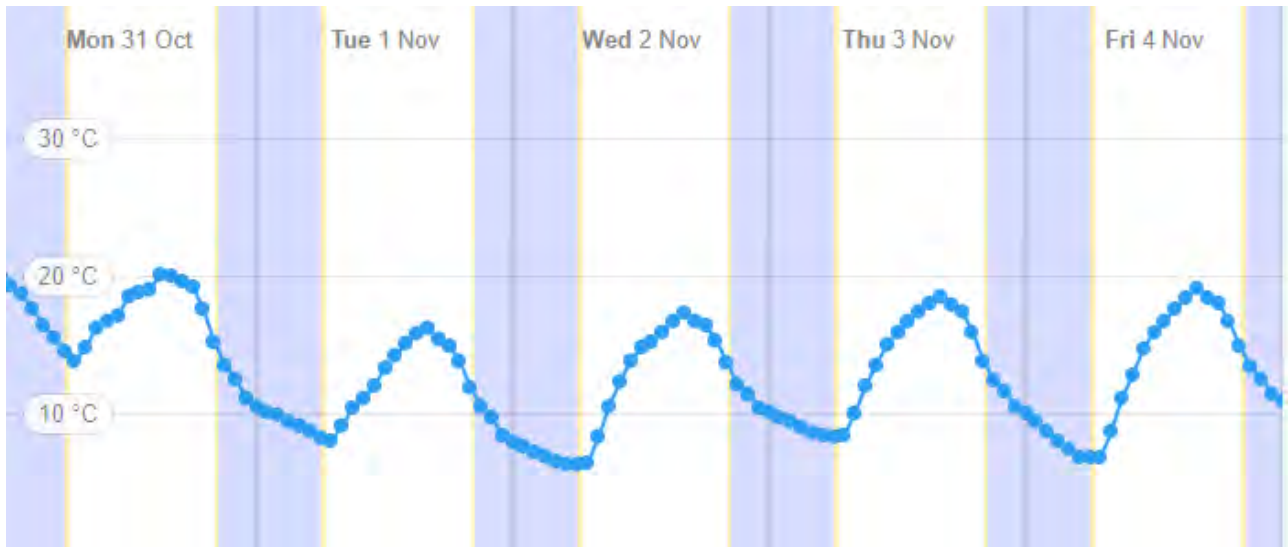


Figure 78: Forecast air temperatures for Mildura 31 October to 4 November

Water quality update, Meeting No. 5 – 8 November 2022

Northern Basin

Barwon River

Discharge in the Barwon River at Collarenebri peaked at over 141,000 ML/day last week and at Dangar Bridge (Walgett) peaked at almost 233,000 ML/day over the weekend (Figure 79). There are still minor to major flood warnings in place for Northern Basin catchments.

Dissolved oxygen at Walgett and Geera have declined to less than 0.5 mg/L as discharge increased. Levels at Collarenebri and Brewarrina are remaining above 3 mg/L (Figure 80). There have been no reports of fish death or fish gasping at the surface.

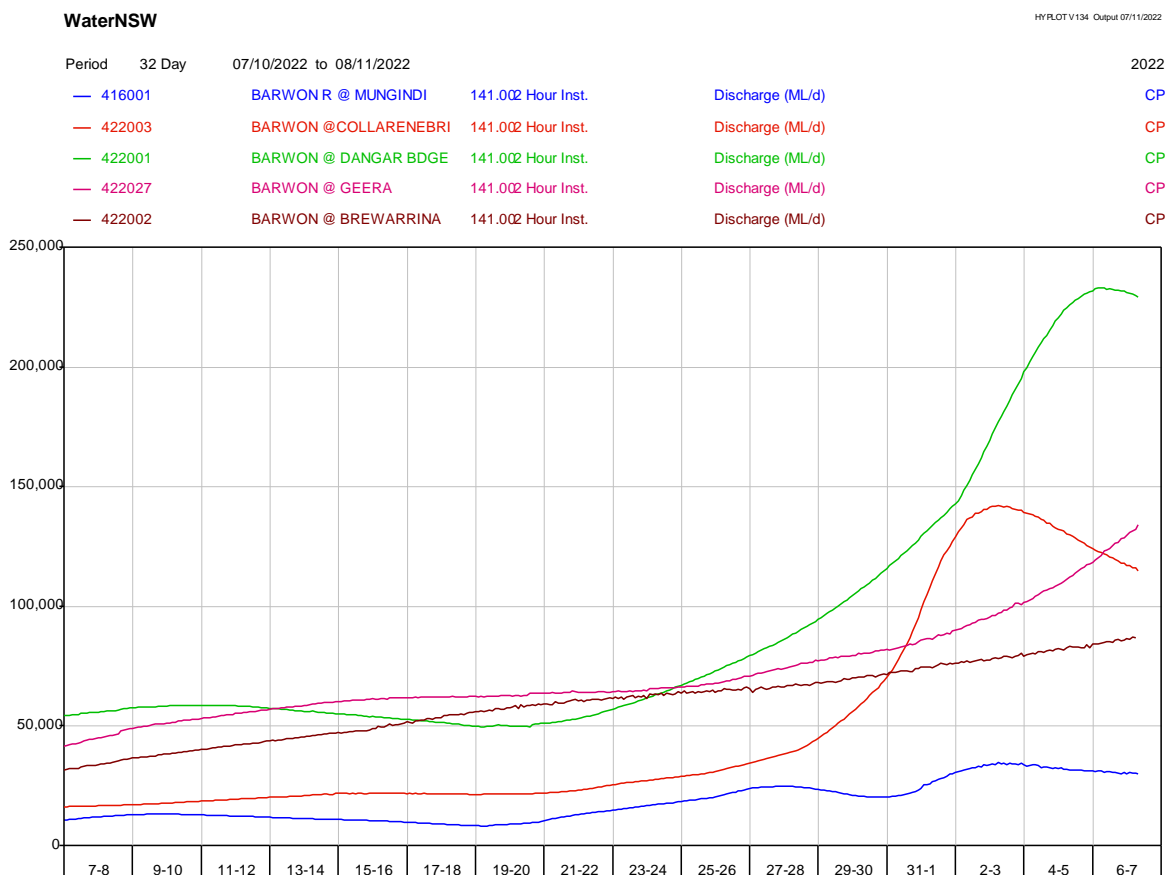


Figure 79: Discharge (ML/day) in the Barwon River

WaterNSW

HYFLOT V134 Output 07/11/2022

Period 32 Day 07/10/2022 to 08/11/2022 2022

- 422003 BARWON @ COLLARENEBRI 2351.00 Hour Inst. DO (mg/l) CP
- 422001 BARWON @ DANGAR BDGE 2351.00 Hour Inst. DO (mg/l) CP
- 422027 BARWON @ GEERA 2351.00 Hour Inst. DO (mg/l) CP
- 422002 BARWON @ BREWARRINA 2351.00 Hour Inst. DO (mg/l) CP

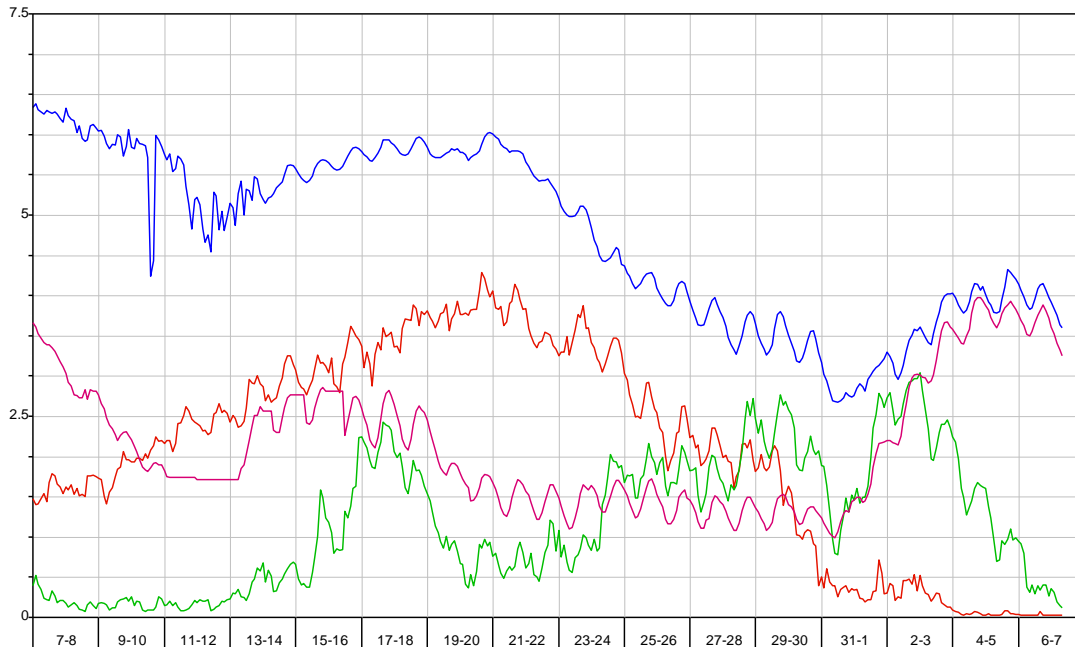


Figure 80: Continuous dissolved oxygen (mg/L) in the Barwon River

WaterNSW

HYFLOT V134 Output 07/11/2022

Period 32 Day 07/10/2022 to 08/11/2022 2022

- 422003 BARWON @ COLLARENEBRI 2080.00 Hour Inst. Water Temp(C) CP
- 422001 BARWON @ DANGAR BDGE 2080.00 Hour Inst. Water Temp(C) CP
- 422027 BARWON @ GEERA 2080.00 Hour Inst. Water Temp(C) CP
- 422002 BARWON @ BREWARRINA 2080.00 Hour Inst. Water Temp(C) CP

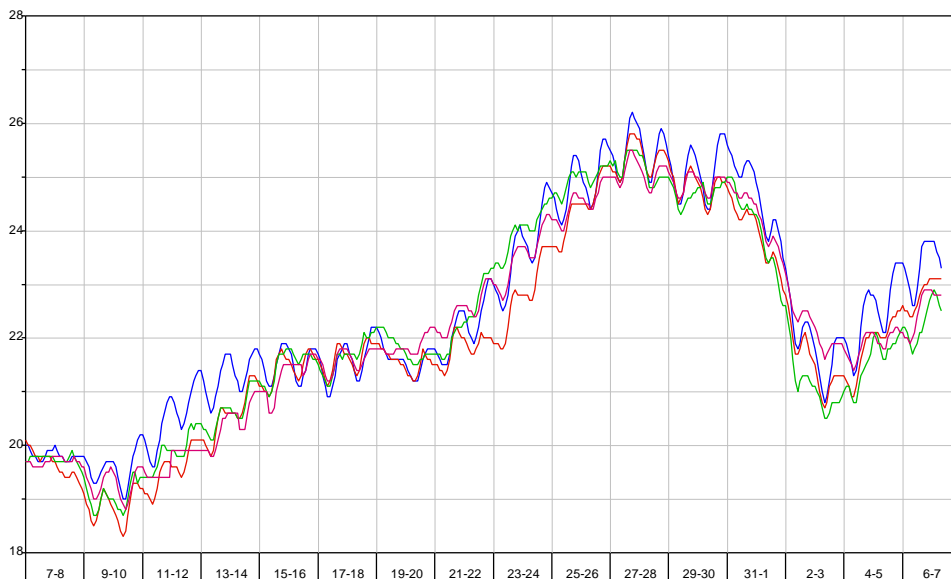


Figure 81: Continuous water temperature (°C) in the Barwon River

Darling River

Discharge is continuing to increase at Bourke (110,000 ML/day) and Louth (96,000 ML/day) and is over 30,000 ML/day at Wilcannia (Figure 82). Dissolved oxygen in the Darling River at Bourke, Wilcannia and Burtundy improved following the cooler weather last week (Figure 83 and Figure 84). Discharge at Weir 32 is just under 26,000 ML/day and just over 17,000 ML/day at Burtundy. Handheld result from the Darling River at Burtundy 31/10/22 11:30 was 5.59 mg/L.

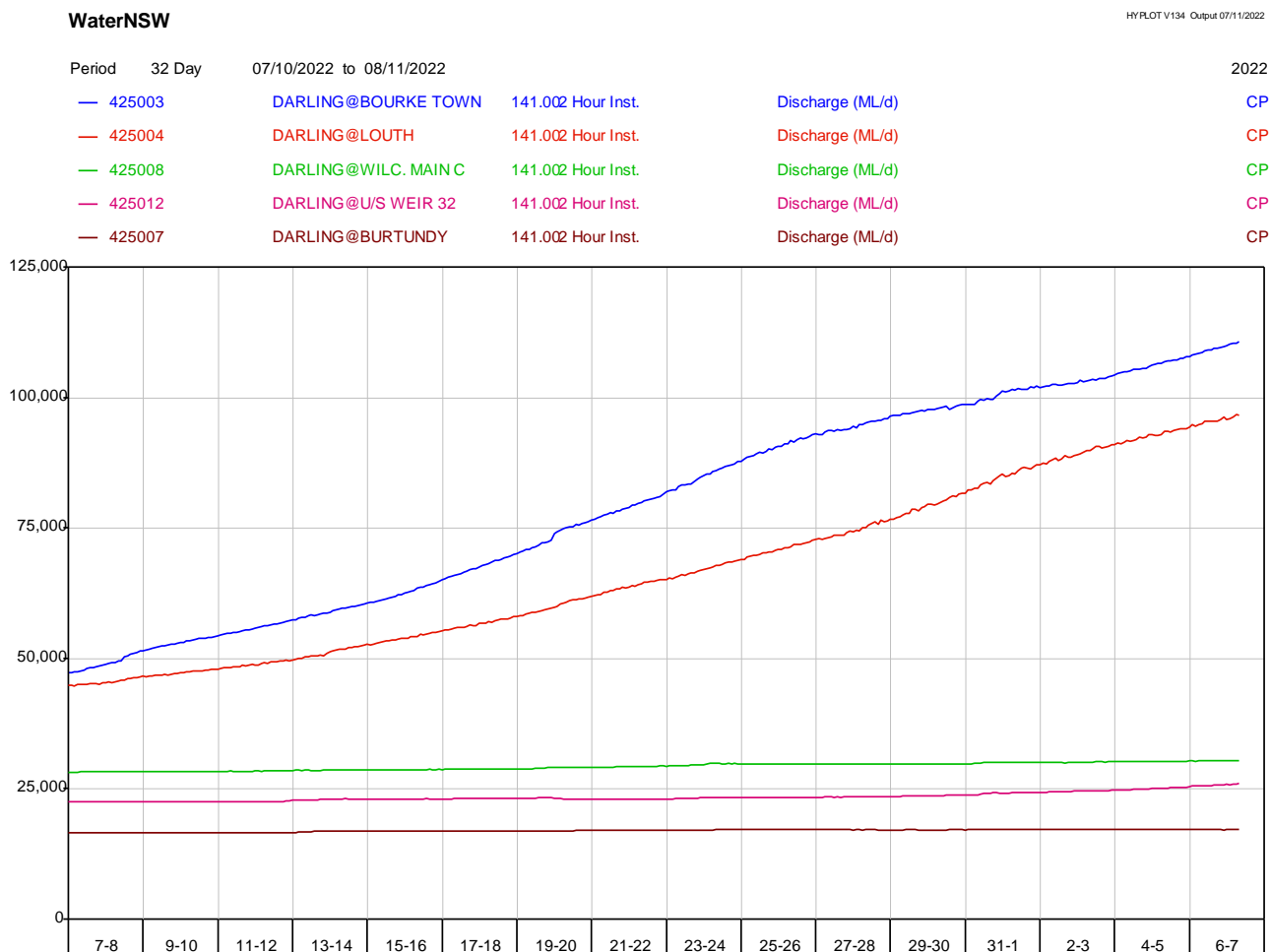


Figure 82: Discharge (ML/day) in the upper Darling River

WaterNSW

HYFLOT V134 Output 07/11/2022

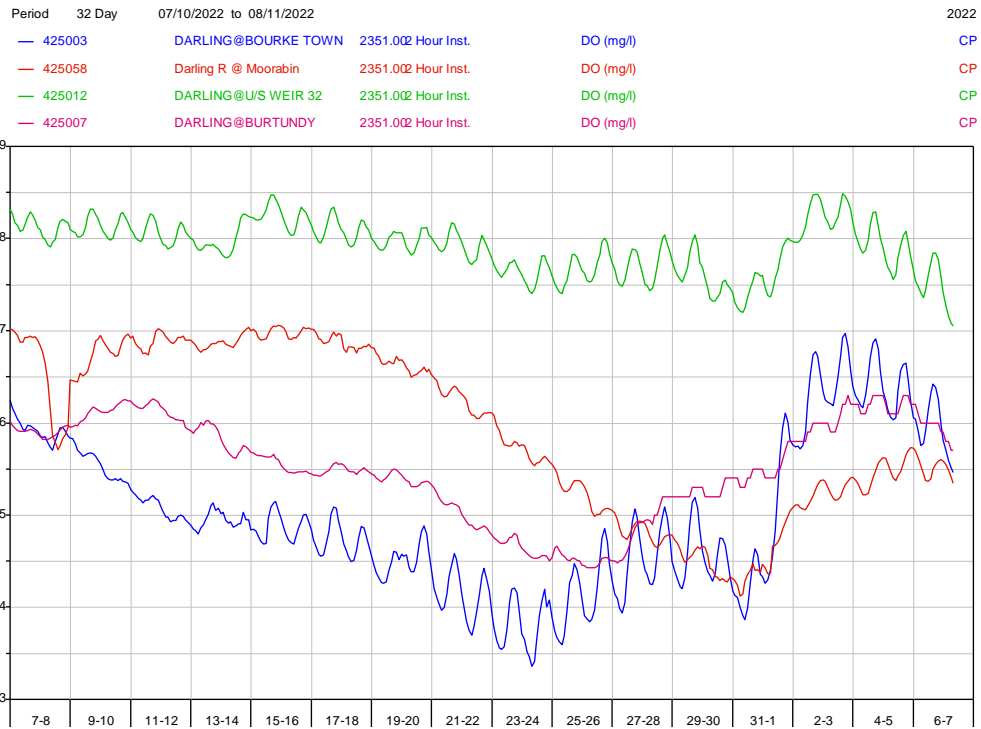


Figure 83: Continuous dissolved oxygen (mg/L) in the Darling River

WaterNSW

HYFLOT V134 Output 07/11/2022

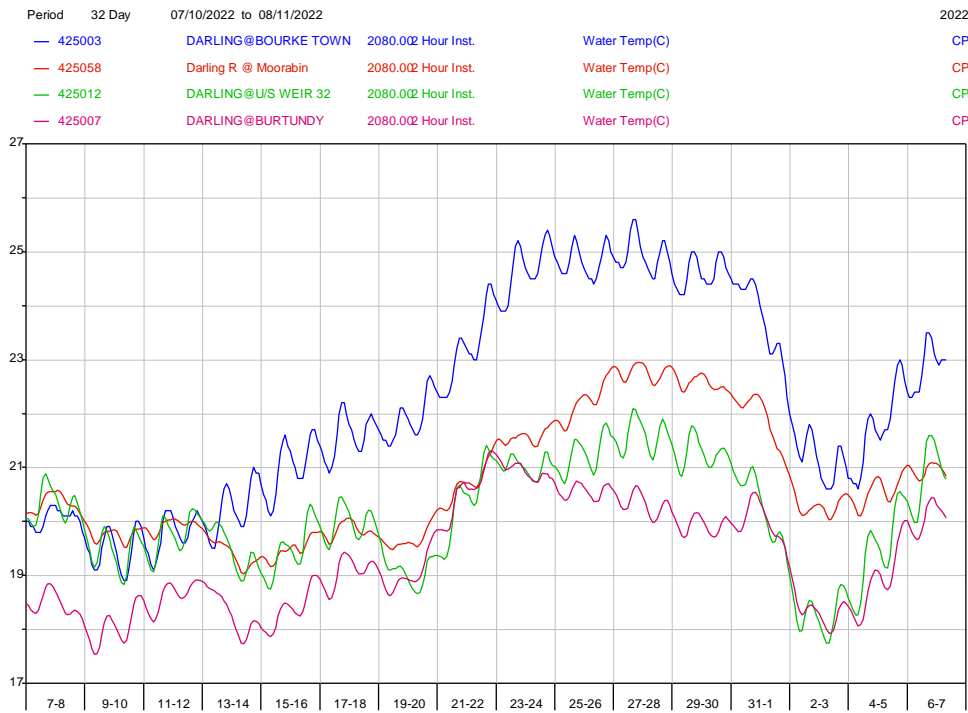


Figure 84: Continuous water temperature (°C) in the Darling River

Southern Basin

Lachlan River

Heavy rainfall in the Lachlan catchment has resulted in major flooding at Forbes peaking at over 88,000 ML/day (Figure 85). Floodwaters are expected to peak at Condobolin early next week.

Despite the major flooding, dissolved oxygen levels at Forbes are remaining above 4 mg/L. Dissolved oxygen at other sites, apart from Lake Cargelligo Weir, is also remaining above 4 mg/L (Figure 86 and Figure 87).

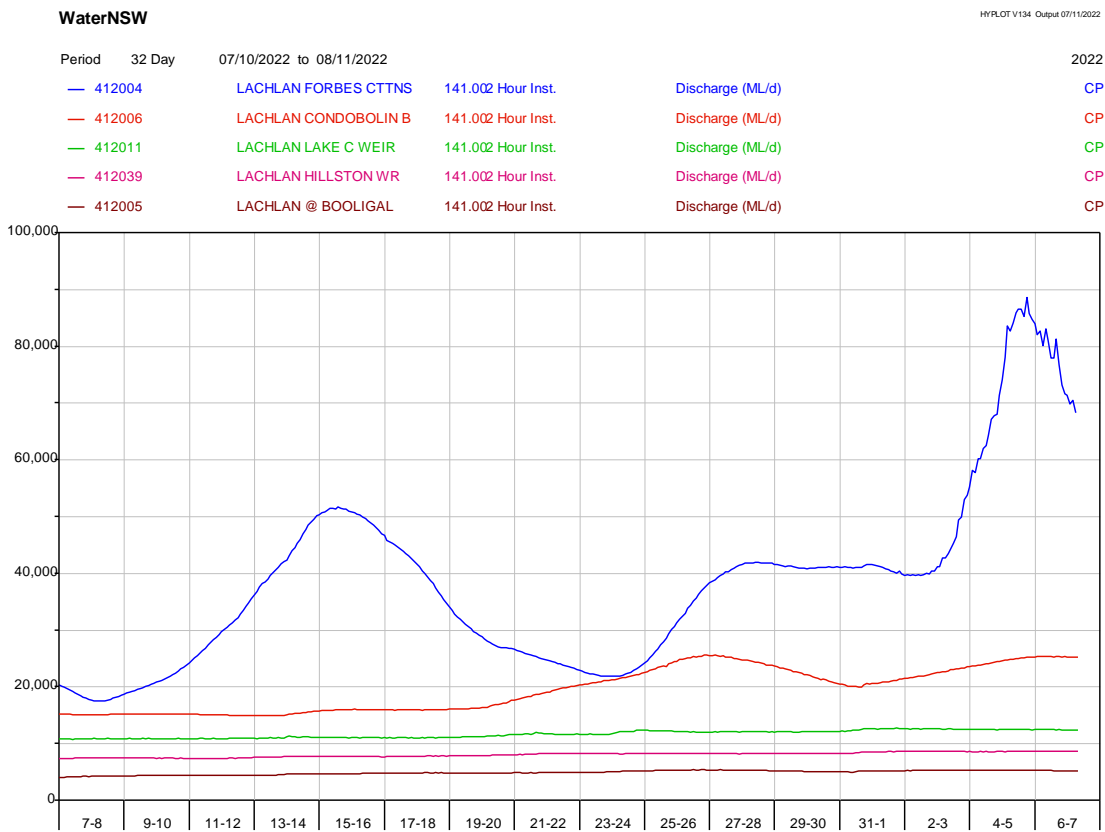


Figure 85: Discharge (ML/day) in the Lachlan River

WaterNSW

HYPLOT V134 Output 07/11/2022

Period	32 Day	07/10/2022 to 08/11/2022			2022
— 412004	LACHLAN FORBES CTTNS	2351.002 Hour Inst.	DO (mg/l)	CP	
— 412006	LACHLAN CONDOBOLIN B	2351.002 Hour Inst.	DO (mg/l)	CP	
— 412011	LACHLAN LAKE C WEIR	2351.002 Hour Inst.	DO (mg/l)	CP	
— 412039	LACHLAN HILLSTON WR	2351.002 Hour Inst.	DO (mg/l)	CP	
— 412005	LACHLAN @ BOOLIGAL	2351.002 Hour Inst.	DO (mg/l)	CP	

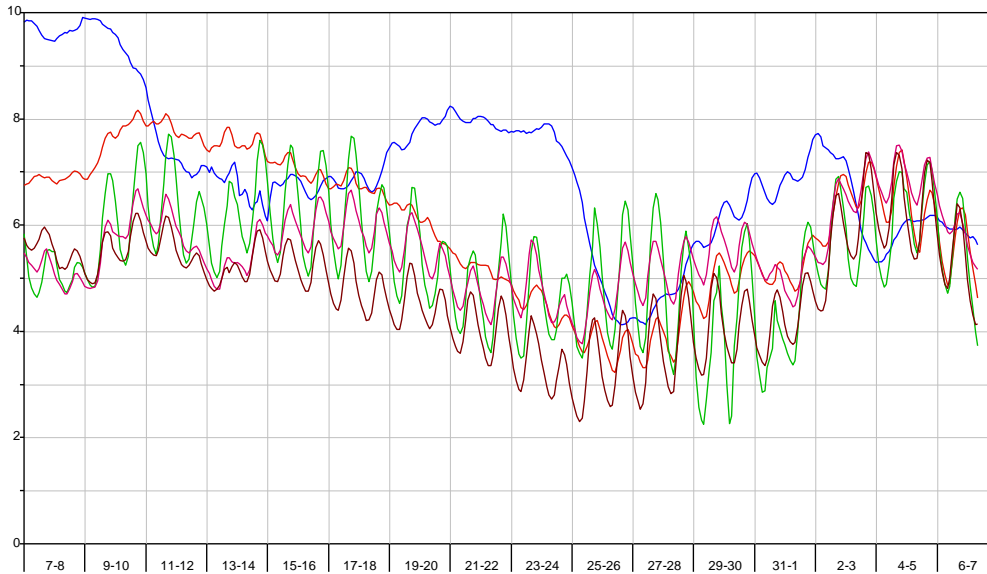


Figure 86: Continuous dissolved oxygen (mg/L) in the Lachlan River

WaterNSW

HYPLOT V134 Output 07/11/2022

Period	32 Day	07/10/2022 to 08/11/2022			2022
— 412004	LACHLAN FORBES CTTNS	2080.002 Hour Inst.	Water Temp(C)	CP	
— 412006	LACHLAN CONDOBOLIN B	2080.002 Hour Inst.	Water Temp(C)	CP	
— 412011	LACHLAN LAKE C WEIR	2080.002 Hour Inst.	Water Temp(C)	CP	
— 412039	LACHLAN HILLSTON WR	2080.002 Hour Inst.	Water Temp(C)	CP	
— 412005	LACHLAN @ BOOLIGAL	2080.002 Hour Inst.	Water Temp(C)	CP	

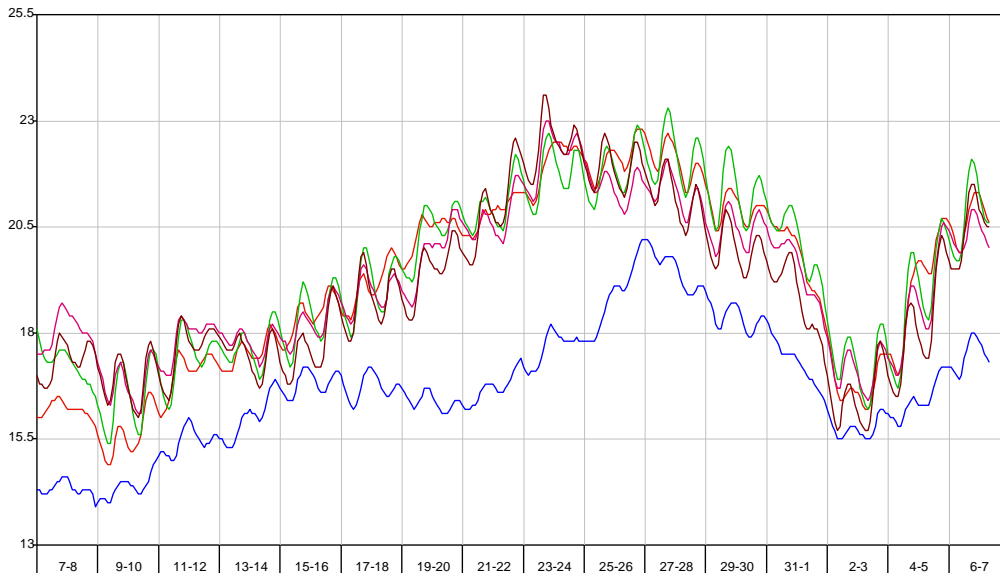


Figure 87: Continuous water temperature (°C) in the Lachlan River

Murrumbidgee River

River levels in the Murrumbidgee River at Wagga Wagga are falling after a peak of over 152,000 ML/day last week. This will result in major flooding at Hay around 20 November. Flows are currently steady in the lower Murrumbidgee with almost 30,000 ML/day at Balranald (Figure 9).

Dissolved oxygen improved at all three sites with the cooler temperatures last week, though Redbank and Balranald have dropped back below the 4 mg/L threshold (Figure 89). Large areas of the lower Murrumbidgee floodplain have already been inundated with more floodwater yet to arrive. Handheld result collected at Balranald by WaterNSW on 31 October was 2.57 mg/L which is slightly less than that recorded by the sensor at the gauging station.

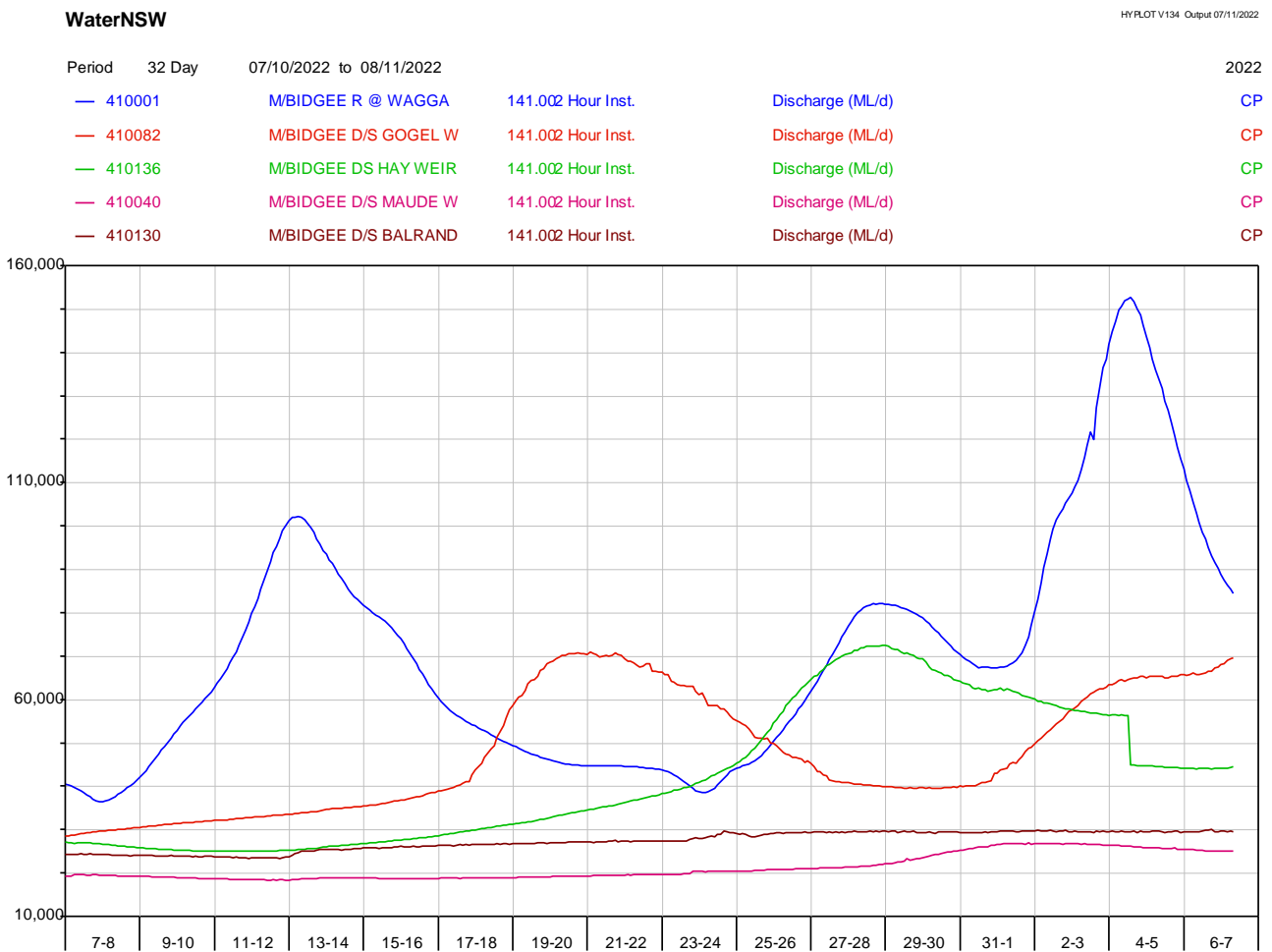


Figure 88: Discharge (ML/day) in the Murrumbidgee River

WaterNSW

HYFLOT V134 Output 07/11/2022

Period 32 Day 07/10/2022 to 08/11/2022 2022

— 410040	M/BIDGEE D/S MAUDE W	2351.00 Hour Inst.	DO (mg/l)	CP
— 410041	M/BIDGEE D/S REDBANK	2351.00 Hour Inst.	DO (mg/l)	CP
— 410130	M/BIDGEE D/S BALRAND	2351.00 Hour Inst.	DO (mg/l)	CP

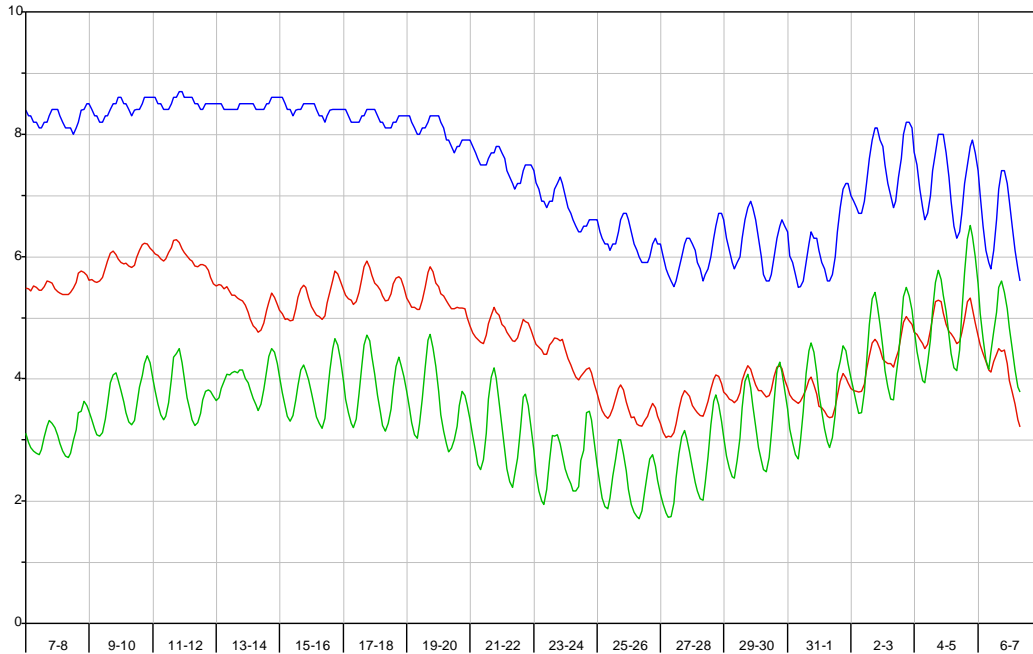


Figure 89: Continuous dissolved oxygen (mg/L) in the Murrumbidgee River

WaterNSW

HYFLOT V134 Output 07/11/2022

Period 32 Day 07/10/2022 to 08/11/2022 2022

— 410040	M/BIDGEE D/S MAUDE W	2080.00 Hour Inst.	Water Temp(C)	CP
— 410041	M/BIDGEE D/S REDBANK	2080.00 Hour Inst.	Water Temp(C)	CP
— 410130	M/BIDGEE D/S BALRAND	2080.00 Hour Inst.	Water Temp(C)	CP

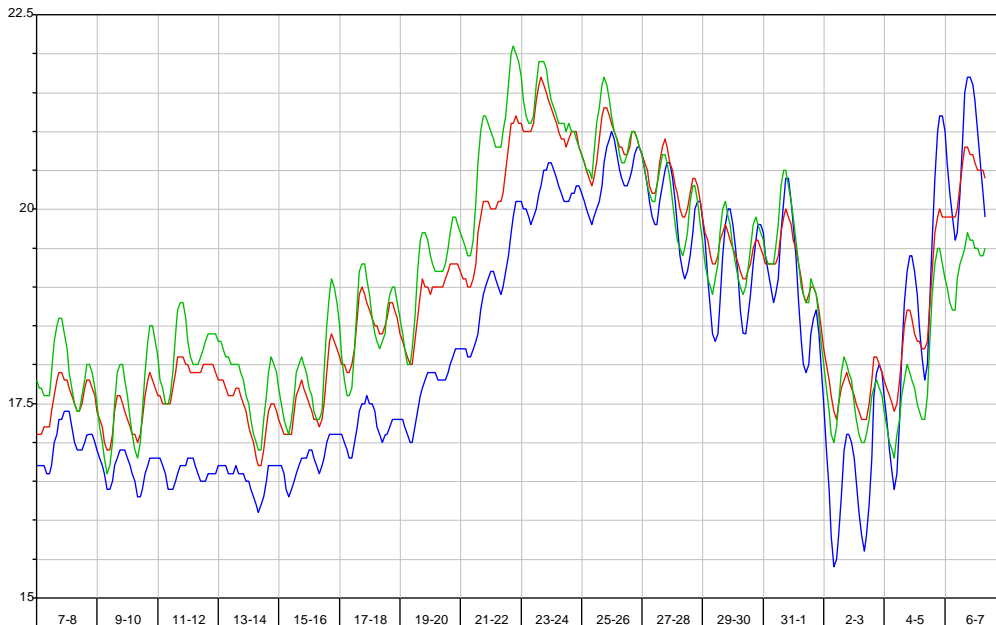


Figure 90: Continuous water temperature (°C) in the Murrumbidgee River

Kolety/Edward River

Discharge in the Kolety/Edward River at Deniliquin peaked at almost 69,000 ML/day (Figure 91). The cooled temperatures allowed dissolved oxygen at Toonalook to improve up to almost 1 mg/L (Figure 92), but it has started to decline again with the return of warmer air temperatures (Figure 93s).

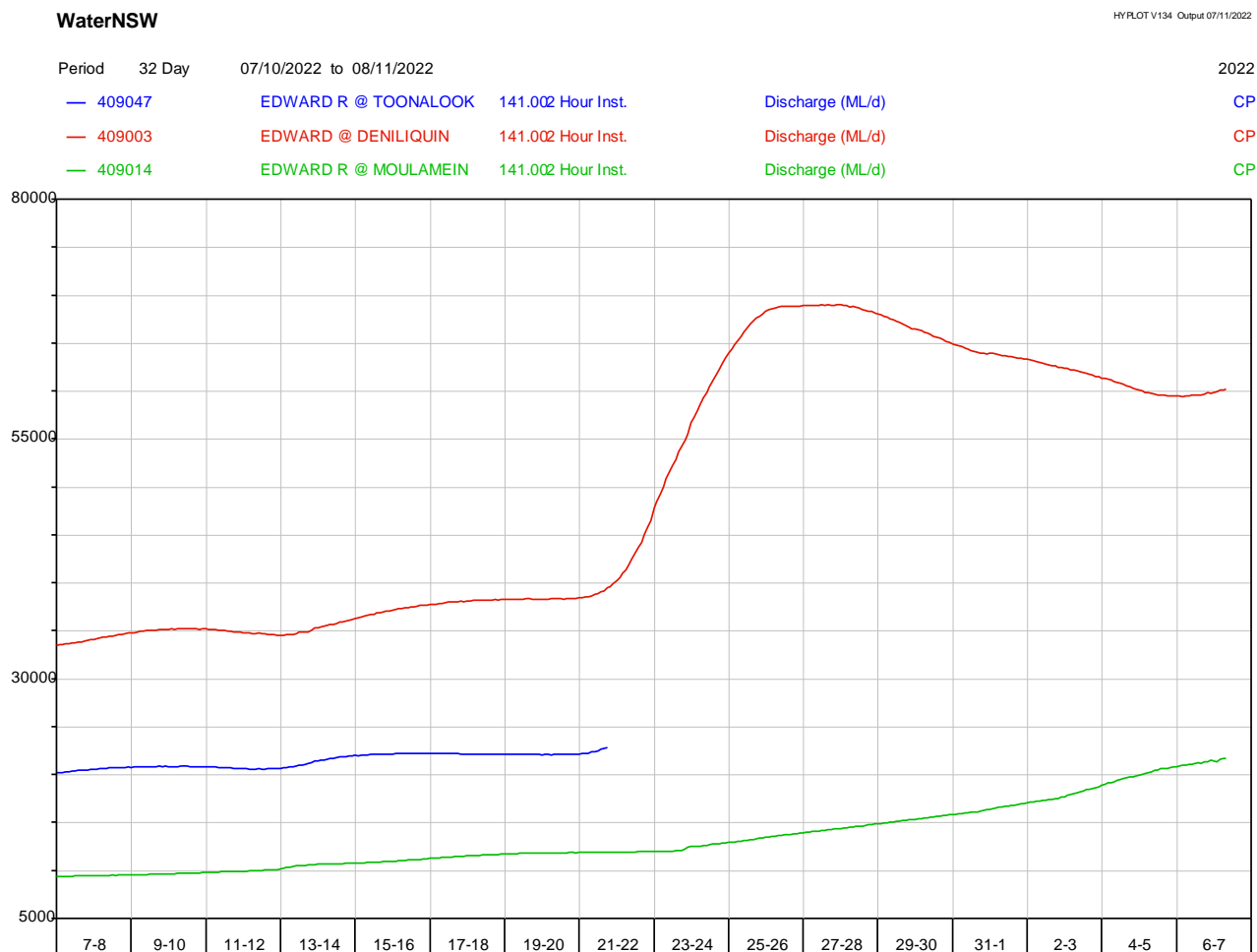


Figure 91: Discharge (ML/day) in the Kolety/Edward River

WaterNSW

HYFLOT V134 Output 07/11/2022

Period 32 Day 07/10/2022 to 08/11/2022 2022

409047	EDWARD R @ TOONALOOK	2351.00 Hour Inst.	DO (mg/l)	CP
409003	EDWARD @ DENLIQUIN	2351.00 Hour Inst.	DO (mg/l)	CP
409014	EDWARD R @ MOULAMEIN	2351.00 Hour Inst.	DO (mg/l)	CP

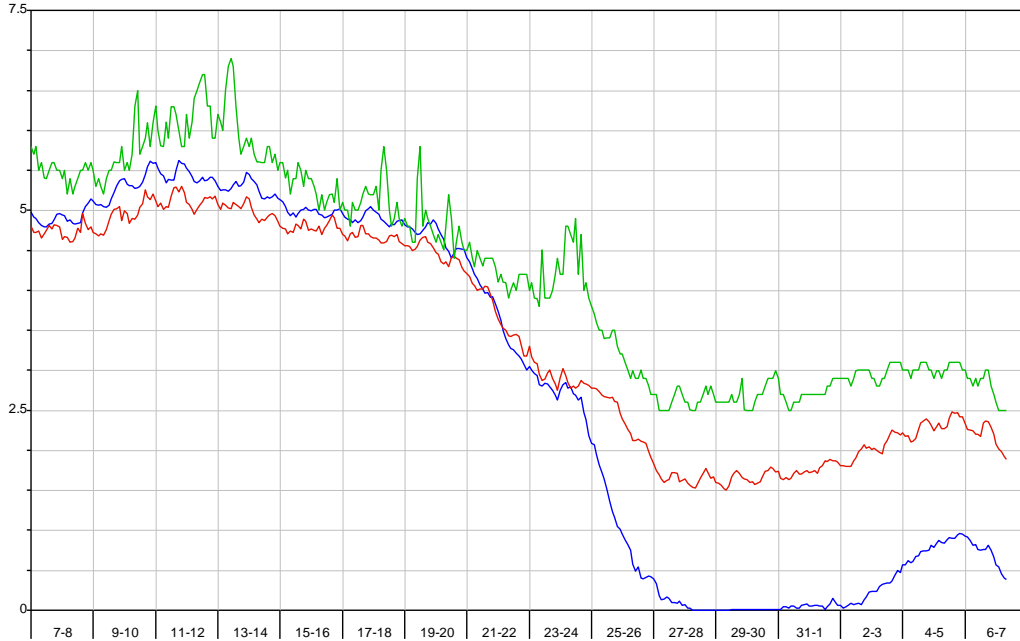


Figure 92: Continuous dissolved oxygen (mg/L) in the Kolety/Edward River

WaterNSW

HYFLOT V134 Output 07/11/2022

Period 32 Day 07/10/2022 to 08/11/2022 2022

409047	EDWARD R @ TOONALOOK	2080.00 Hour Inst.	Water Temp(C)	CP
409003	EDWARD @ DENLIQUIN	2080.00 Hour Inst.	Water Temp(C)	CP
409014	EDWARD R @ MOULAMEIN	2080.00 Hour Inst.	Water Temp(C)	CP

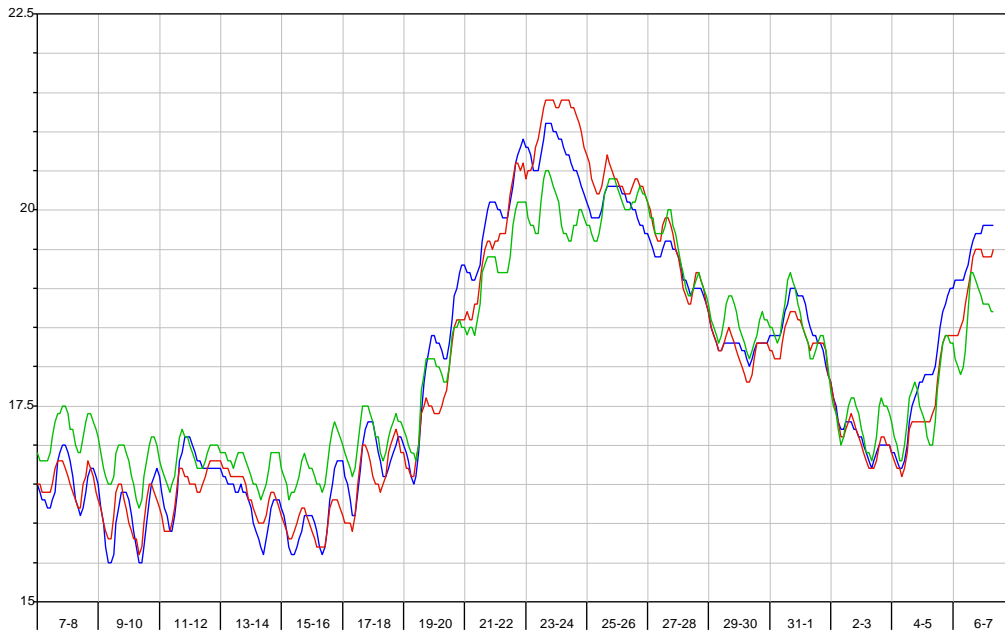


Figure 93: Continuous water temperature (°C) in the Kolety/Edward River

Wakool and Niemur rivers

Discharge in the Wakool River at Coonambit Bridge is over 108,000 ML/day and continuing to rise. The Niemur River at Barham-Moulamein Road is flowing at over 27,000 ML/day (Figure 94). Dissolved oxygen had improved last week, but the Wakool River has now declined to less than 1 mg/L again (Figure 95). Oxygen levels in the Niemur River have also been declining as air temperatures increase with the Mallan school site reading less than 3 mg/L.

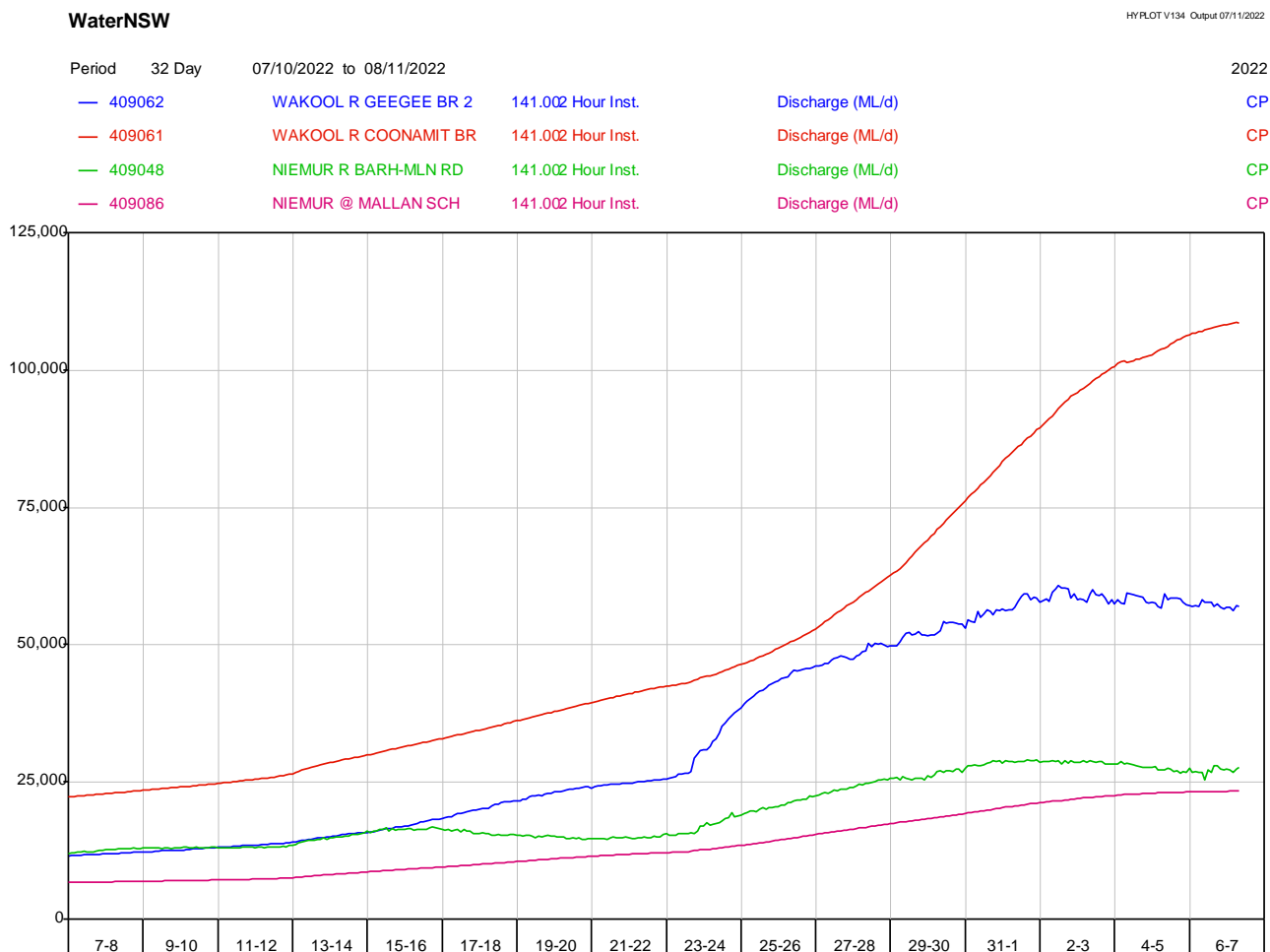


Figure 94: Discharge (ML/day) in the Wakool and Niemur rivers

WaterNSW

HYFLOT V134 Output 07/11/2022

Period	32 Day	07/10/2022 to 08/11/2022		2022
409062	WAKOOL R GEEGEE BR 2	2351.00 Hour Inst.	DO (mg/l)	CP
409013	WAKOOL @ STONEY XING	2351.00 Hour Inst.	DO (mg/l)	CP
409048	NIEMUR R BARH-MLN RD	2351.00 Hour Inst.	DO (mg/l)	CP
409086	NIEMUR @ MALLAN SCH	2351.00 Hour Inst.	DO (mg/l)	CP

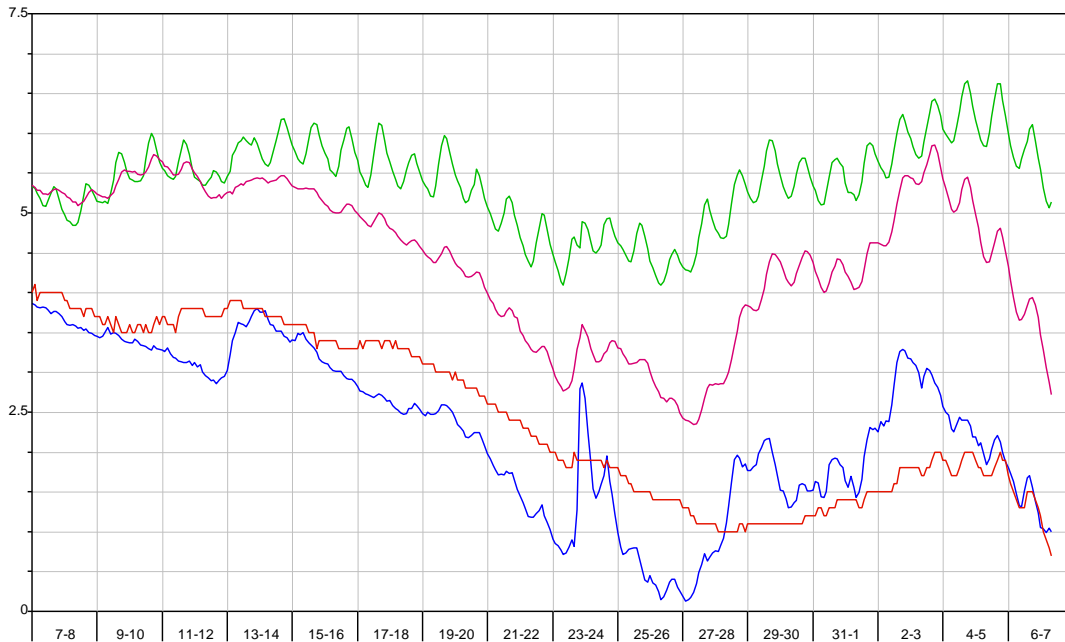


Figure 95: Continuous dissolved oxygen (mg/L) in the Wakool and Niemur rivers

WaterNSW

HYFLOT V134 Output 07/11/2022

Period	32 Day	07/10/2022 to 08/11/2022		2022
409062	WAKOOL R GEEGEE BR 2	2080.00 Hour Inst.	Water Temp(C)	CP
409013	WAKOOL @ STONEY XING	2080.00 Hour Inst.	Water Temp(C)	CP
409048	NIEMUR R BARH-MLN RD	2080.00 Hour Inst.	Water Temp(C)	CP
409086	NIEMUR @ MALLAN SCH	2080.00 Hour Inst.	Water Temp(C)	CP

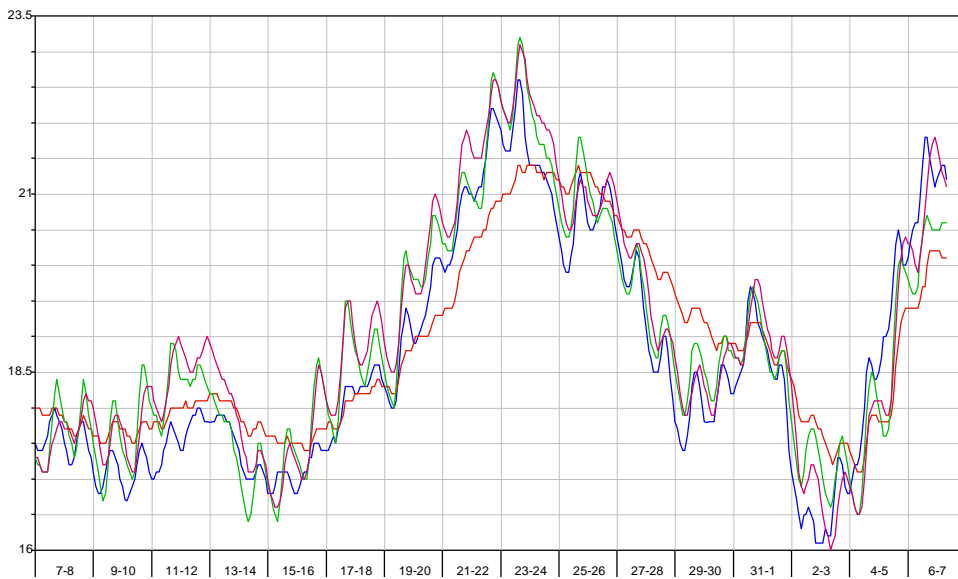


Figure 96: Continuous water temperature (°C) in the Wakool and Niemur rivers

Merran, Thule and Barber creeks

Figure 97 shows dissolved oxygen levels in Little Merran, Barbers and Thule creeks had all dropped to around 0 mg/L but improved with the cooler air temperatures last week (Figure 98). The dissolved oxygen levels in Merran Creek upstream of the Wakool junction have declined to around 1 mg/L this week with all other sites reading less than 1 mg/L.

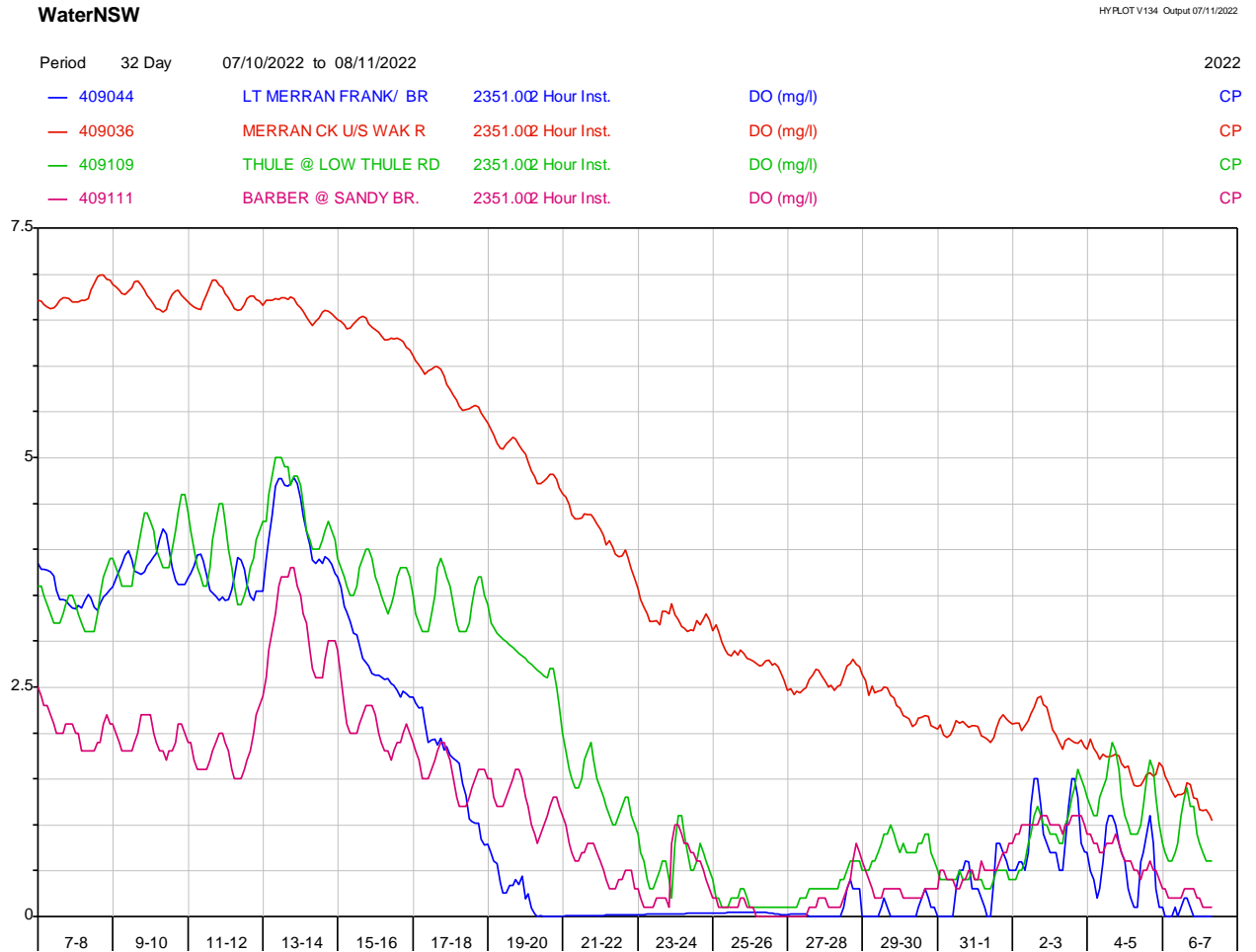


Figure 97: Continuous dissolved oxygen (mg/L) in the Merran, Little Merran, Thule and Barber creeks

WaterNSW

HYPL01 V134 Output 07/11/2022

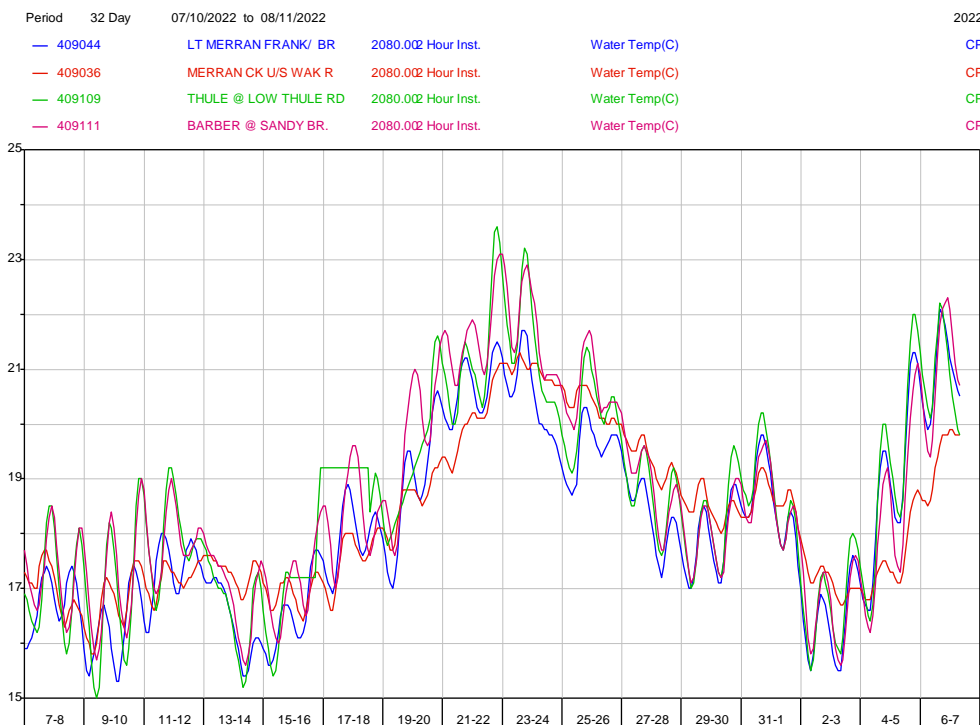


Figure 98: Continuous water temperature (°C) in the Merran, Little Merran, Thule and Barber creeks

Murray River

Monitoring by DELWP is showing the Murray River at Tocumwal, upstream of the Barmah/Millewa Forest, is oxygenated (Figure 99). In the Murray River downstream of the forest at Barmah, dissolved oxygen levels have dropped to 0.5 mg/L.

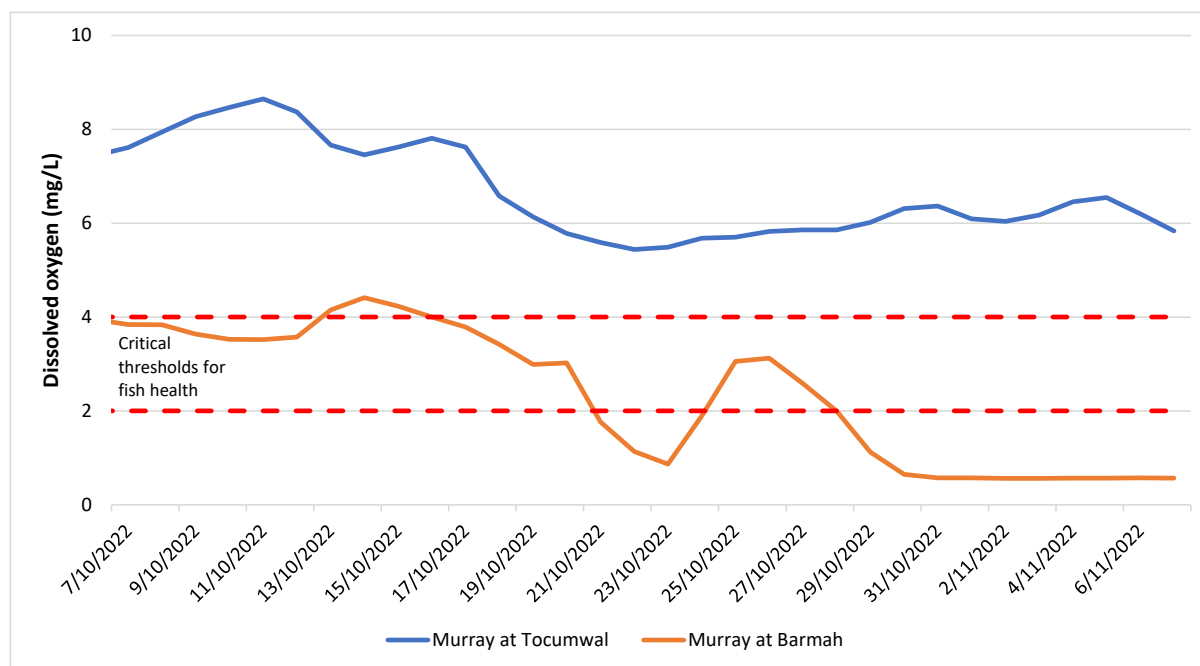


Figure 99: Continuous dissolved oxygen (mg/L) in the Murray River at Tocumwal and Barmah (data courtesy of DELWP)

Dissolved oxygen in the Goulburn River at McCoys Bridge has improved above 4 mg/L. The Murray River at Barham has improved above the 2 mg/L threshold, while further downstream at the Wakool Junction and Colignan levels are less than 2 mg/L (Figure 100). The results from the temporary monitoring site installed in the Murray River downstream of Wentworth are stable, but remaining below the 4 mg/L ecological threshold. Water temperatures have started to increase again after the cooler temperatures last week (Figure 101).

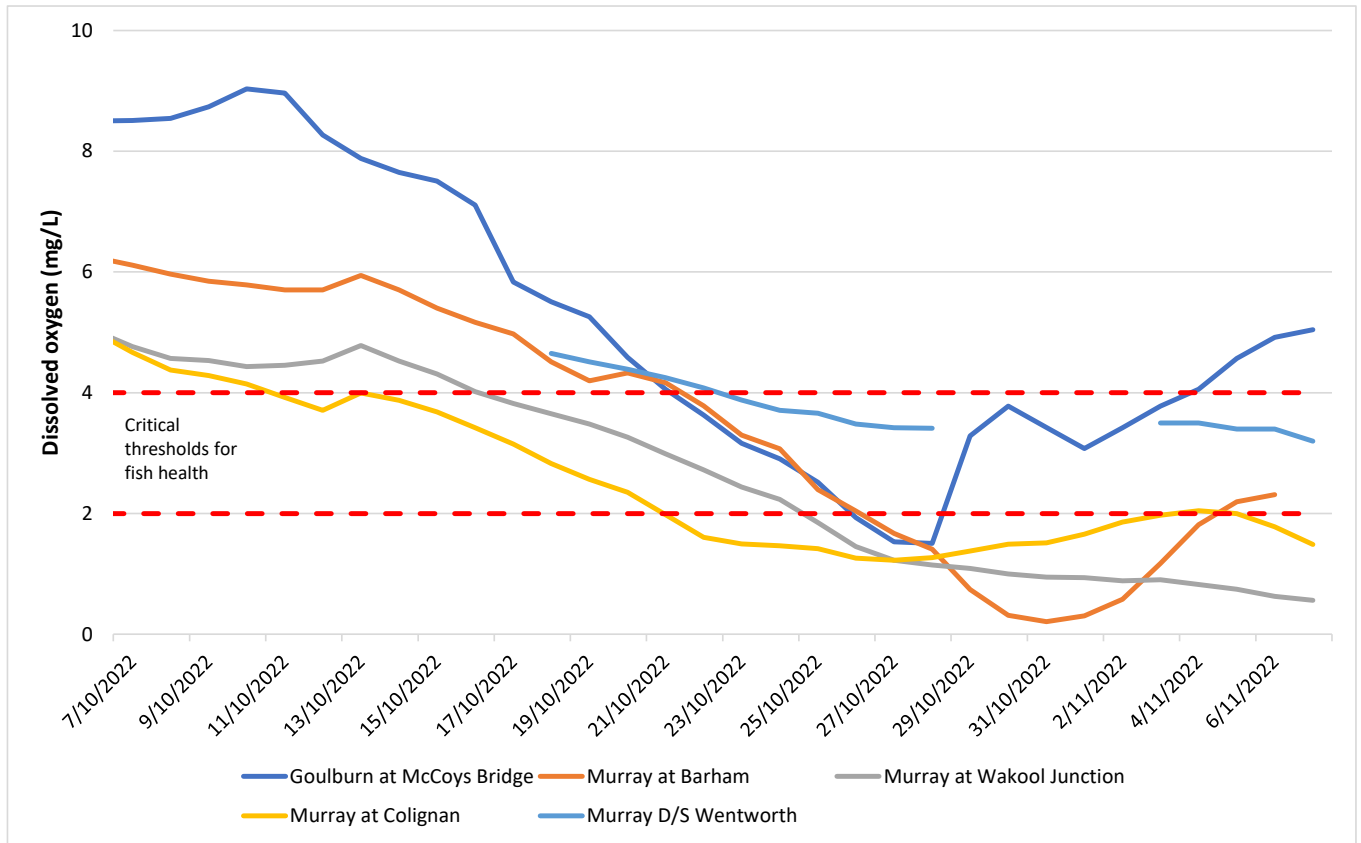


Figure 100: Continuous dissolved oxygen (mg/L) in the Goulburn River and Murray River at Barham, below Wakool junction, Colignan and downstream of Wentworth

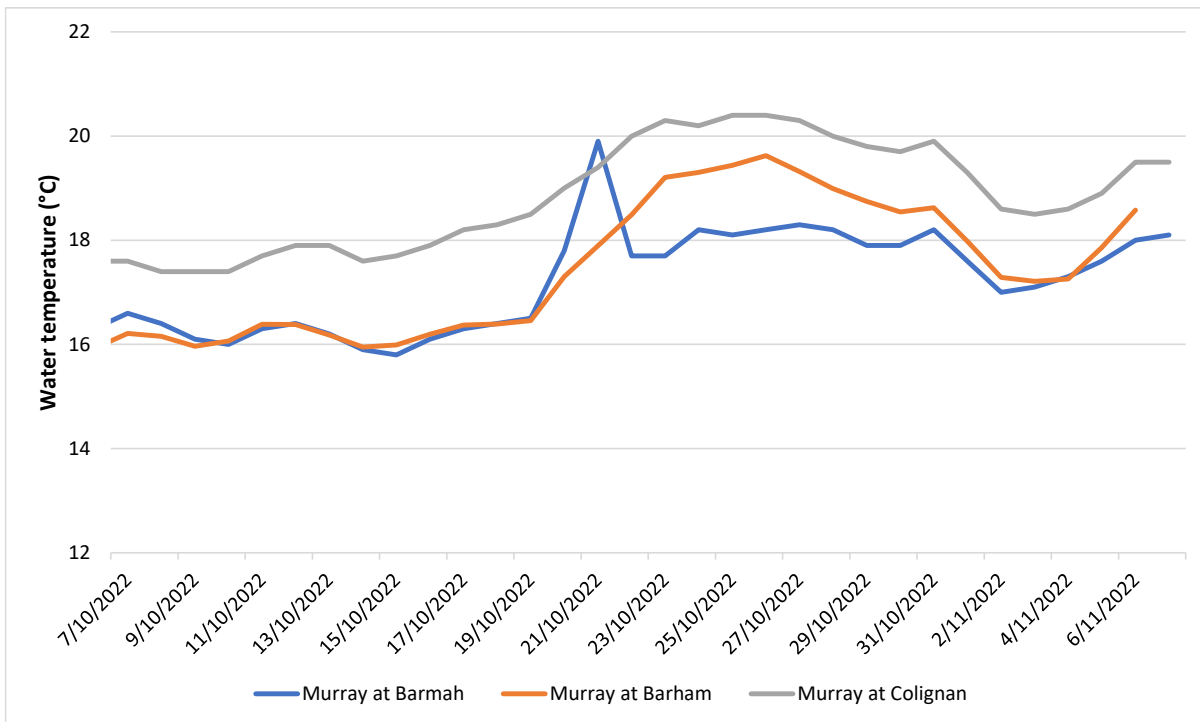


Figure 101: Continuous water temperature (°C) in the Murray River

Weather Outlook

The Bureau of Meteorology 8-day total rain forecast (7 to 14 November) indicates widespread rainfall across NSW, with heavy falls predicted for the Southern Alps late in the week (Figure 102). Forecast is for warmer air temperatures for Moama and Mildura next week (Figure 103 and Figure 104).

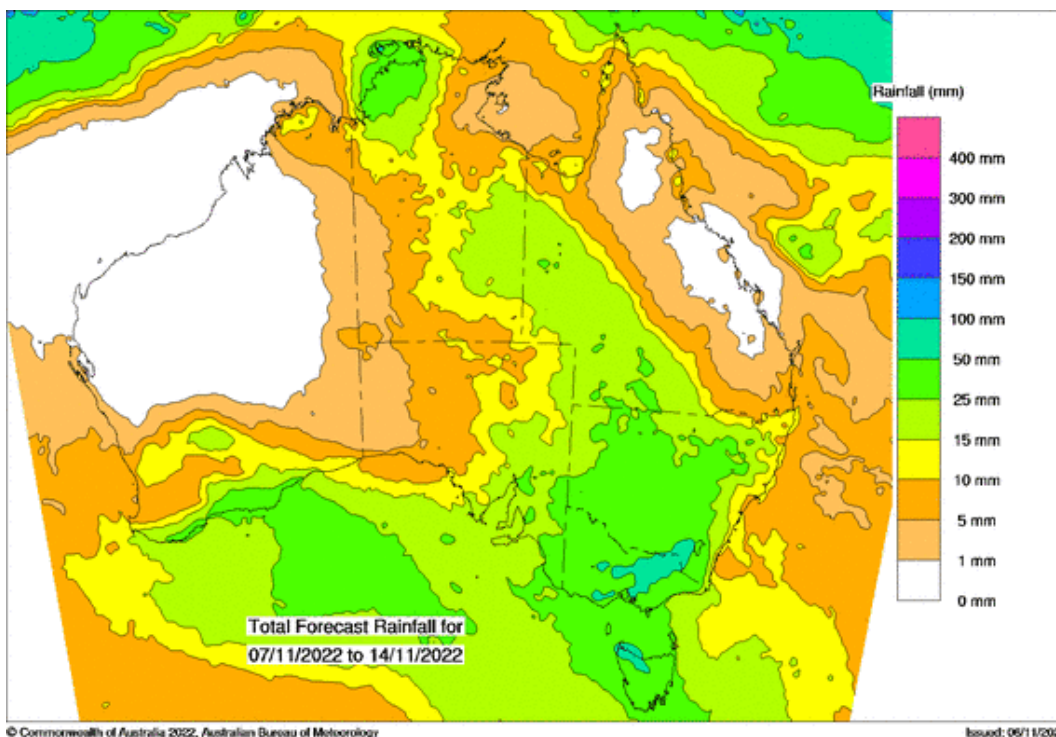


Figure 102: Bureau of Meteorology 8-day total rain forecast (7 to 14 November)

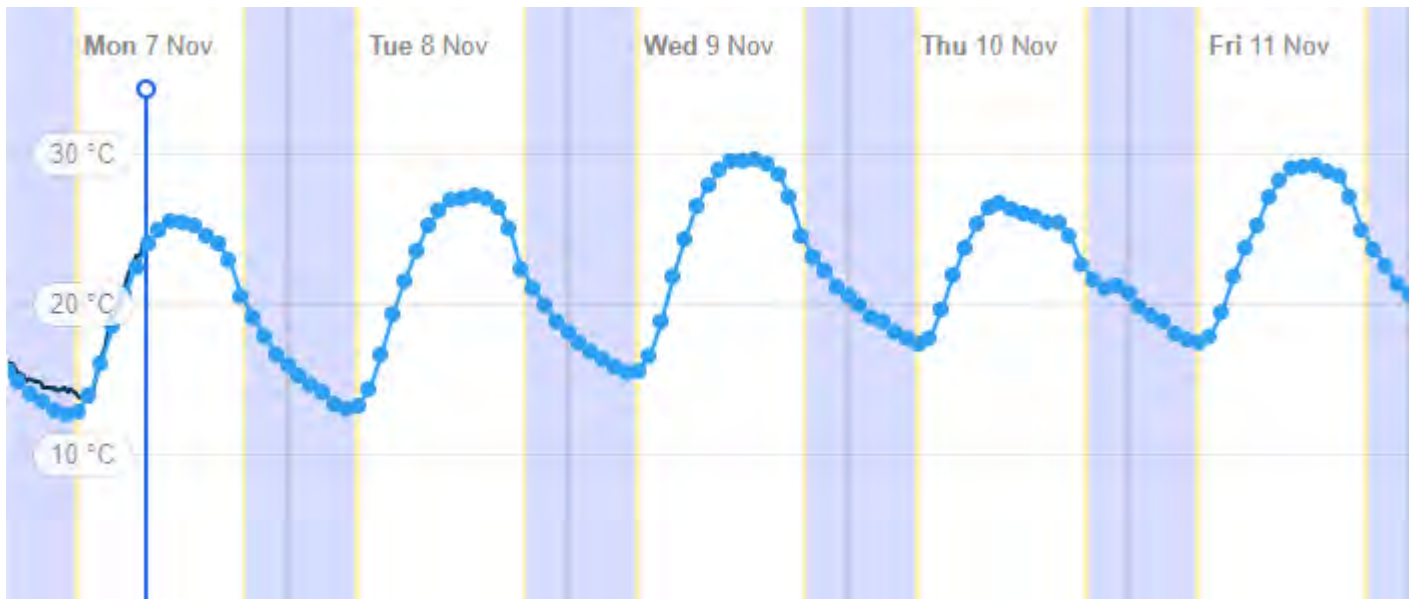


Figure 103: Forecast air temperatures for Moama 7 to 11 November

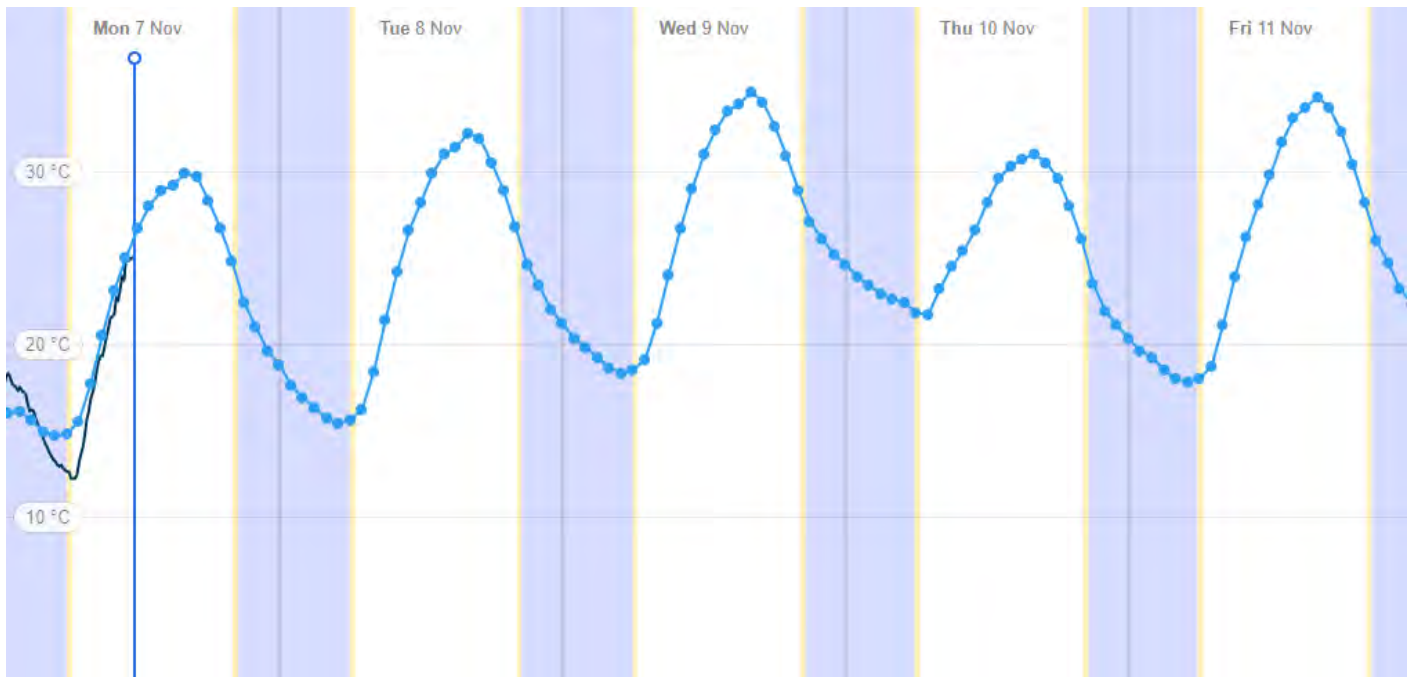


Figure 104: Forecast air temperatures for Mildura 7 to 11 November

Water quality update, Meeting No. 6 – 14 November 2022

Northern Basin

Barwon River

Flooding in the Barwon River has peaked at Collarenebri and Walgett, though continuing flooding in the Namoi River is maintaining high flows at Walgett. Discharge in the Barwon River at Geera is over 173,000 ML/day (Figure 105).

Dissolved oxygen at Walgett and Geera has declined to less than 0.5 mg/L. Levels at Collarenebri are remaining above 3 mg/L while Brewarrina has dropped to 2 mg/L (Figure 106). There have been no reports of fish death or fish gasping at the surface.

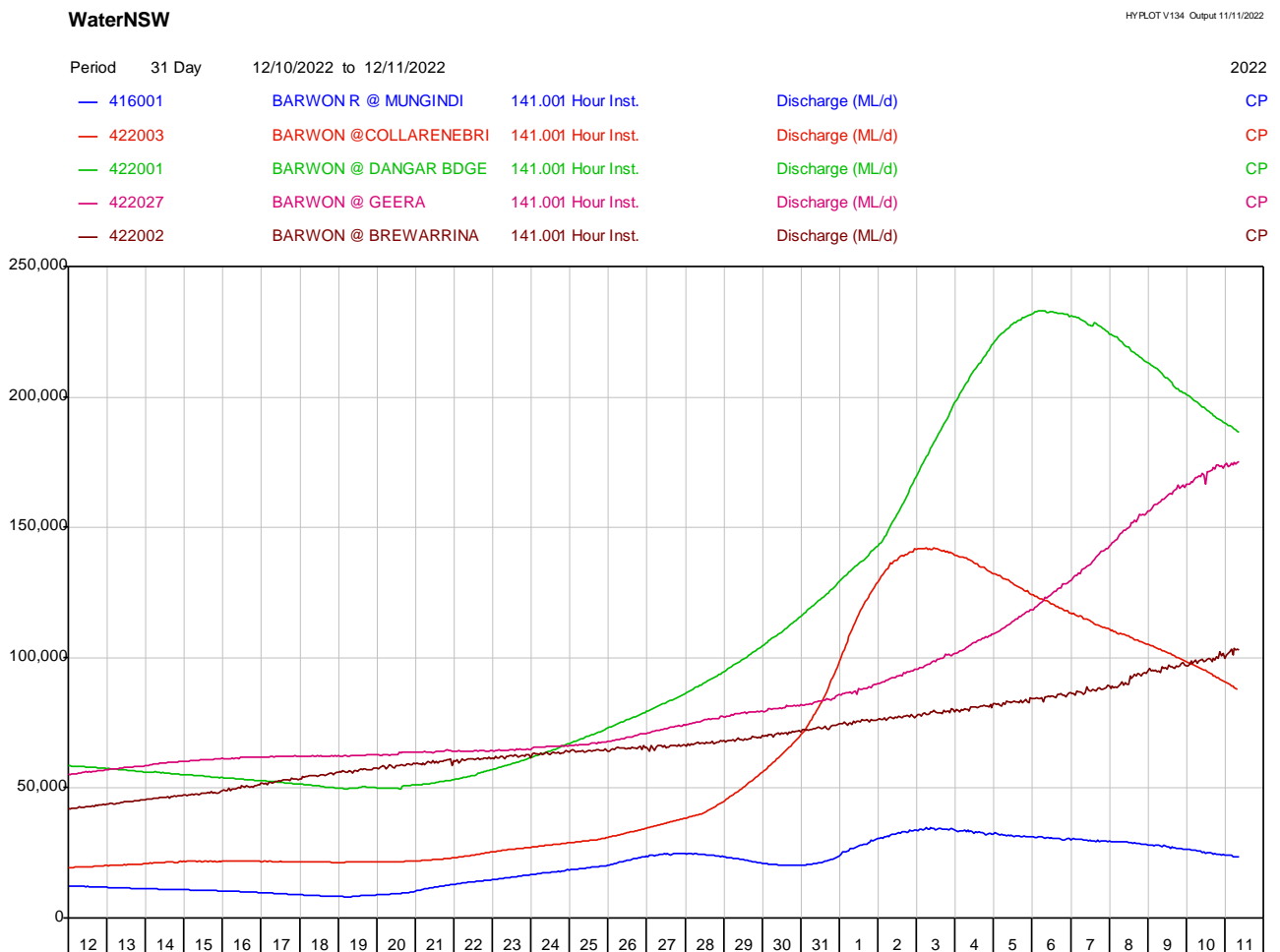


Figure 105: Discharge (ML/day) in the Barwon River

WaterNSW

HYPLOT V134 Output 11/11/2022

Period 31 Day 12/10/2022 to 12/11/2022 2022

— 422003	BARWON @ COLLARENEBRI	2351.001 Hour Inst.	DO (mg/l)	CP
— 422001	BARWON @ DANGAR BDGE	2351.001 Hour Inst.	DO (mg/l)	CP
— 422027	BARWON @ GEERA	2351.001 Hour Inst.	DO (mg/l)	CP
— 422002	BARWON @ BREWARRINA	2351.001 Hour Inst.	DO (mg/l)	CP

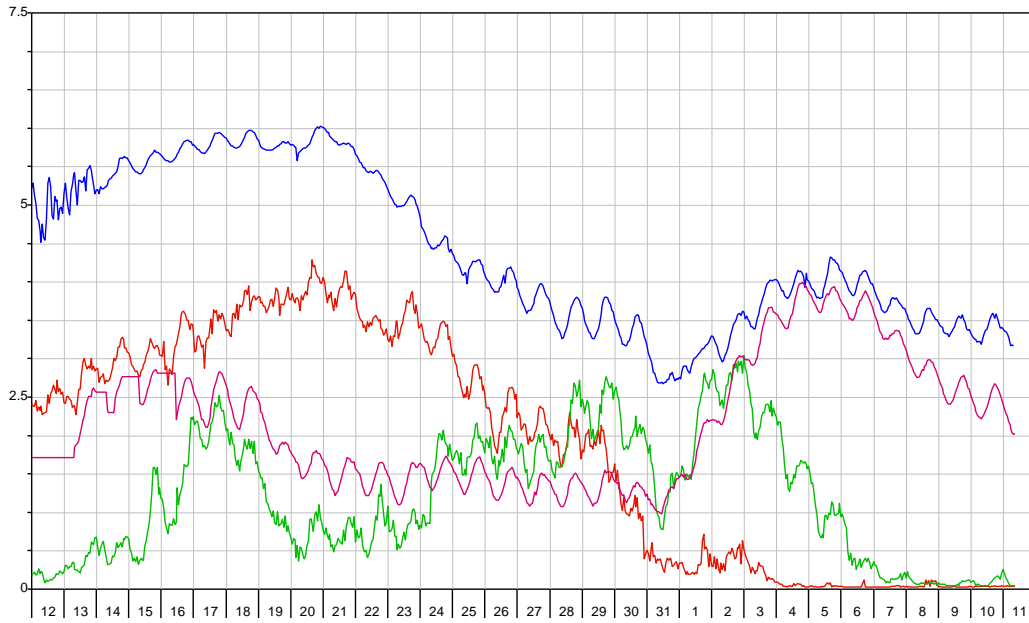


Figure 106: Continuous dissolved oxygen (mg/L) in the Barwon River

WaterNSW

HYPLOT V134 Output 11/11/2022

Period 31 Day 12/10/2022 to 12/11/2022 2022

— 422003	BARWON @ COLLARENEBRI	2080.001 Hour Inst.	Water Temp(C)	CP
— 422001	BARWON @ DANGAR BDGE	2080.001 Hour Inst.	Water Temp(C)	CP
— 422027	BARWON @ GEERA	2080.001 Hour Inst.	Water Temp(C)	CP
— 422002	BARWON @ BREWARRINA	2080.001 Hour Inst.	Water Temp(C)	CP

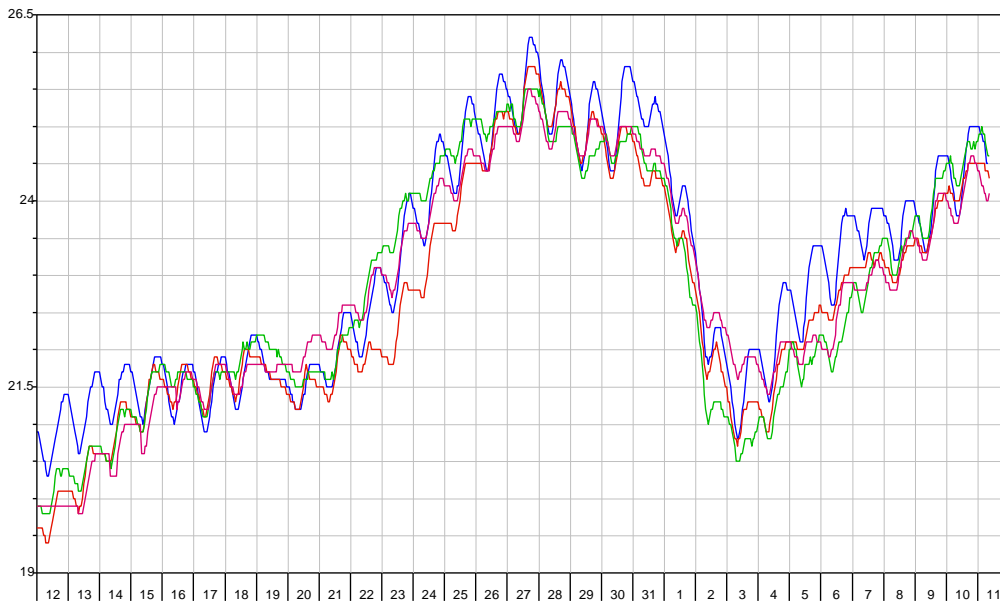


Figure 107: Continuous water temperature (°C) in the Barwon River

Darling River

Discharge is continuing to increase at Bourke (126,000 ML/day) and Louth (102,000 ML/day) and is over 30,000 ML/day at Wilcannia (Figure 108). Discharge at Weir 32 is just over 27,500 ML/day and just over 17,000 ML/day at Burtundy.

Dissolved oxygen at all sites has been declining with the increasing water temperatures. In the Darling River at Bourke dissolved oxygen has dropped below 4 mg/L and below 5 mg/L at Wilcannia and Burtundy (Figure 109 and Figure 110).

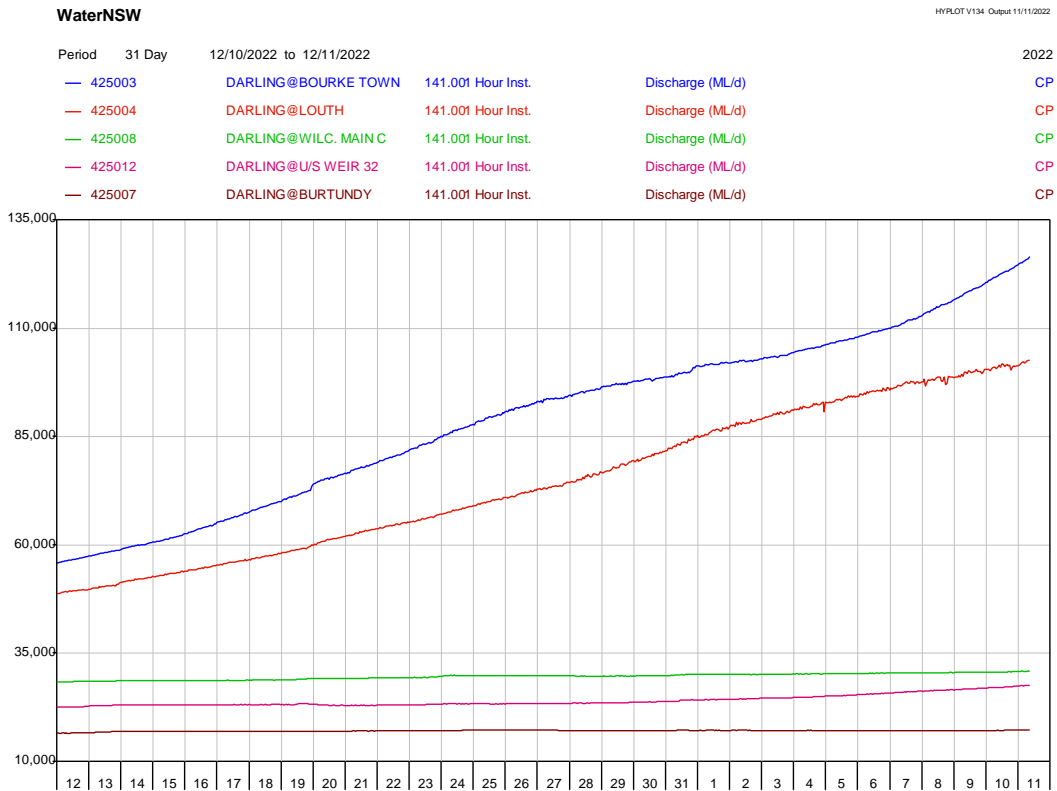


Figure 108: Discharge (ML/day) in the upper Darling River

WaterNSW

HYFLOT V134 Output 11/11/2022

Period	31 Day	12/10/2022 to 12/11/2022			2022
— 425003	DARLING@BOURKE TOWN	2351.00f Hour Inst.	DO (mg/l)	CP	
— 425058	Darling R @ Moorabin	2351.00f Hour Inst.	DO (mg/l)	CP	
— 425012	DARLING@US WEIR 32	2351.00f Hour Inst.	DO (mg/l)	CP	
— 425007	DARLING@BURTUNDY	2351.00f Hour Inst.	DO (mg/l)	CP	

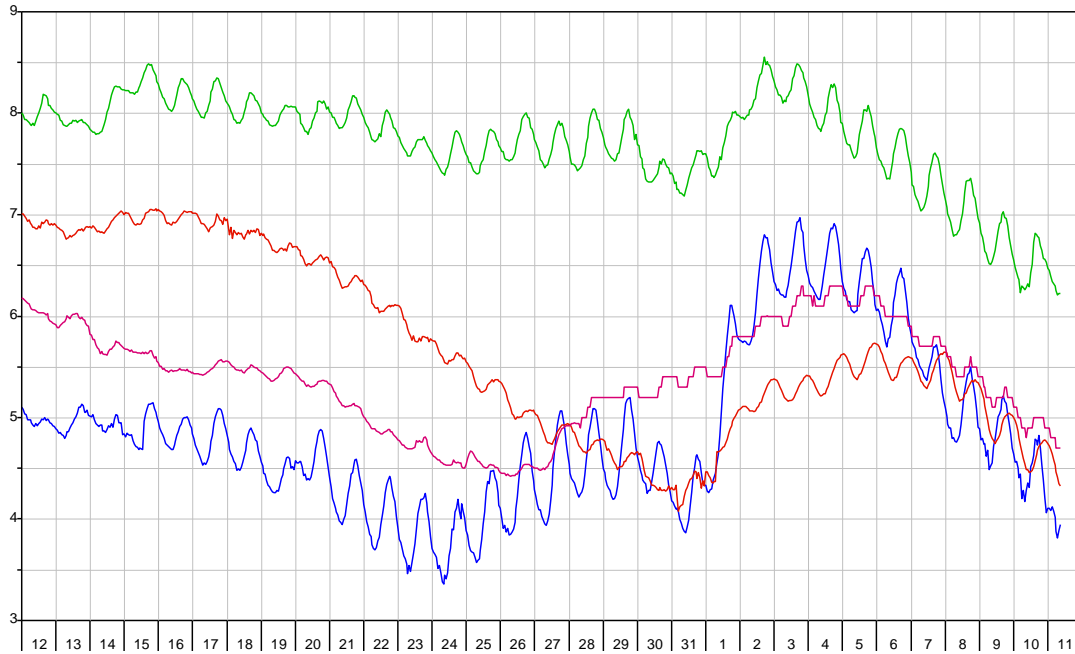


Figure 109: Continuous dissolved oxygen (mg/L) in the Darling River

Handheld result from the Darling River at Burtundy 8/11/22 12:39 was 5.67 mg/L.

WaterNSW

HYFLOT V134 Output 11/11/2022

Period	31 Day	12/10/2022 to 12/11/2022			2022
— 425003	DARLING@BOURKE TOWN	2080.00f Hour Inst.	Water Temp(C)	CP	
— 425058	Darling R @ Moorabin	2080.00f Hour Inst.	Water Temp(C)	CP	
— 425012	DARLING@US WEIR 32	2080.00f Hour Inst.	Water Temp(C)	CP	
— 425007	DARLING@BURTUNDY	2080.00f Hour Inst.	Water Temp(C)	CP	

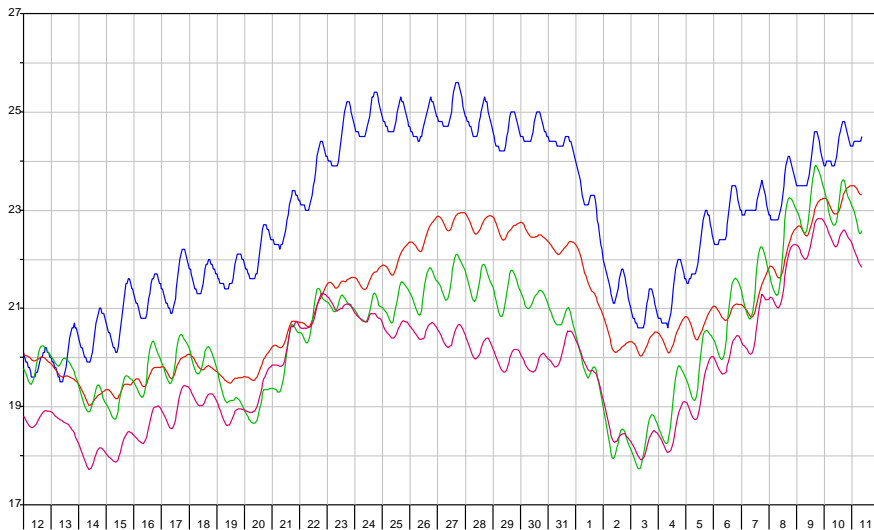


Figure 110: Continuous water temperature (°C) in the Darling River

Southern Basin

Lachlan River

Moderate flooding continues in the Lachlan River at Forbes with major flooding in the Lachlan River downstream (Figure 111).

Despite the major flooding, dissolved oxygen at Forbes is above 7 mg/L. Dissolved oxygen at other sites have been showing large diurnal fluctuations. The results from Lake Cargelligo Weir have declined dramatically to almost 1 mg/L (Figure 112 and Figure 113).

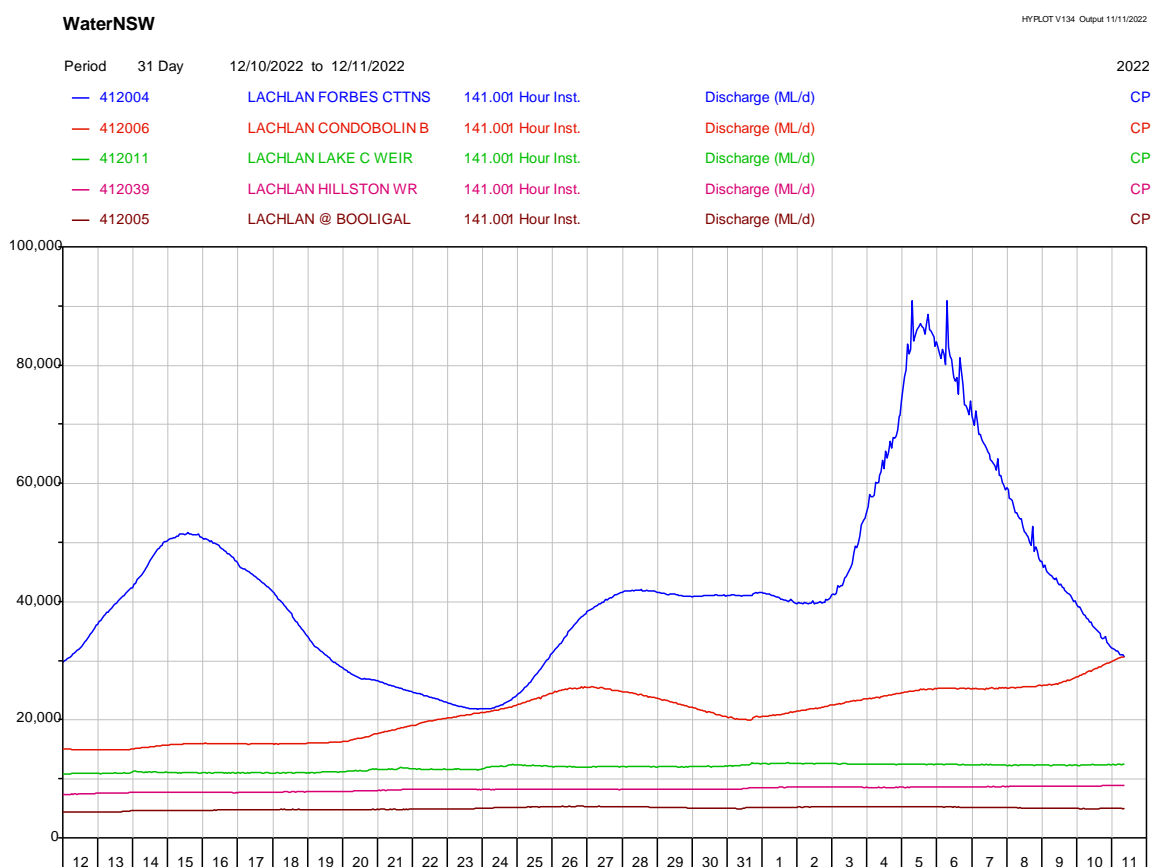


Figure 111: Discharge (ML/day) in the Lachlan River

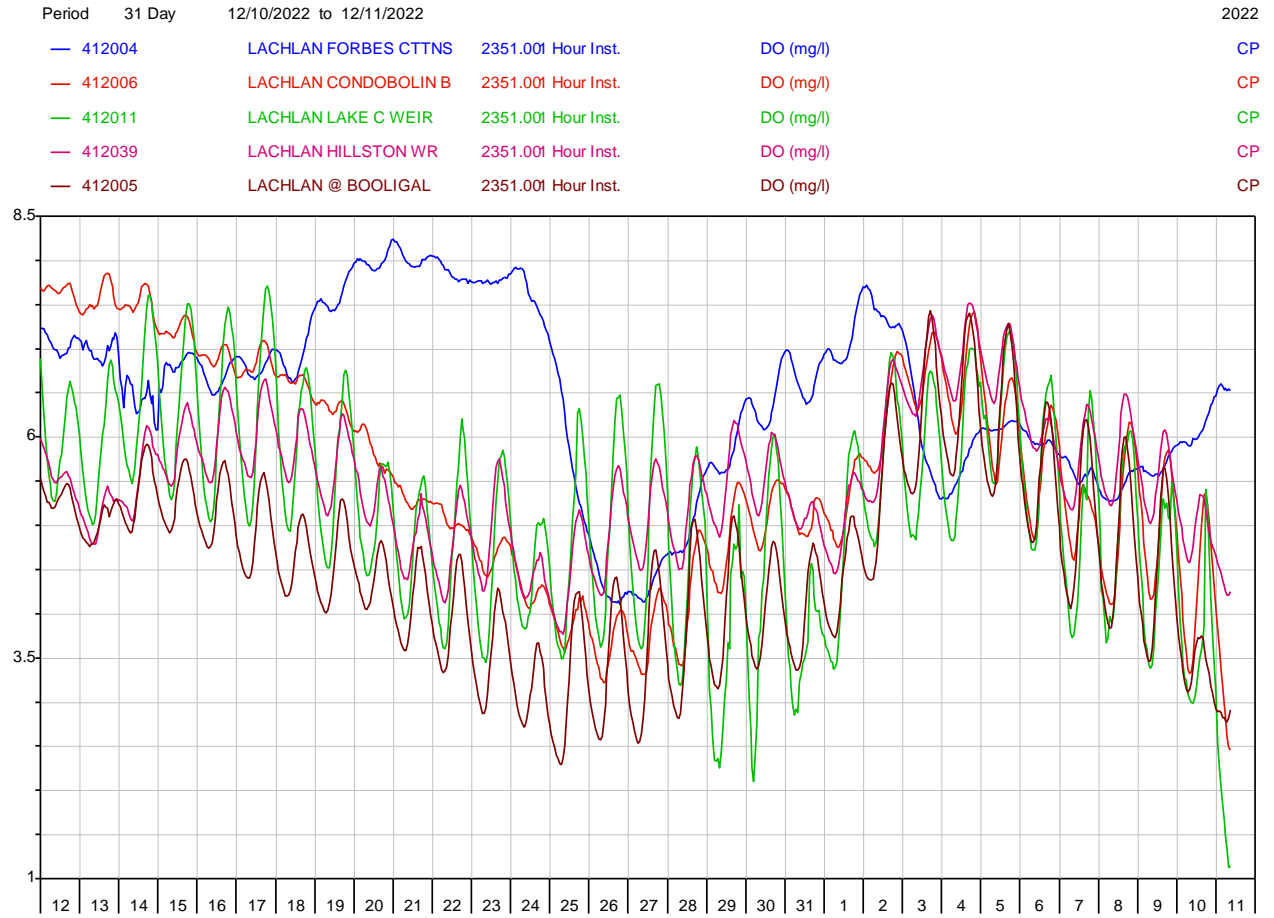


Figure 112: Continuous dissolved oxygen (mg/L) in the Lachlan River

Site	Sample date	Dissolved oxygen (mg/L)
Belubula River at Canowindra	08/11/2022 9:35	8.24
Lachlan River at Forbes	09/11/2022 11:05	6.94
Lachlan River at Condobolin	09/11/2022 16:50	5.66
Lachlan River at Lake Cargelligo Weir	09/11/2022 8:50	5.18
Lachlan River at Hillston	08/11/2022 8:55	5.09

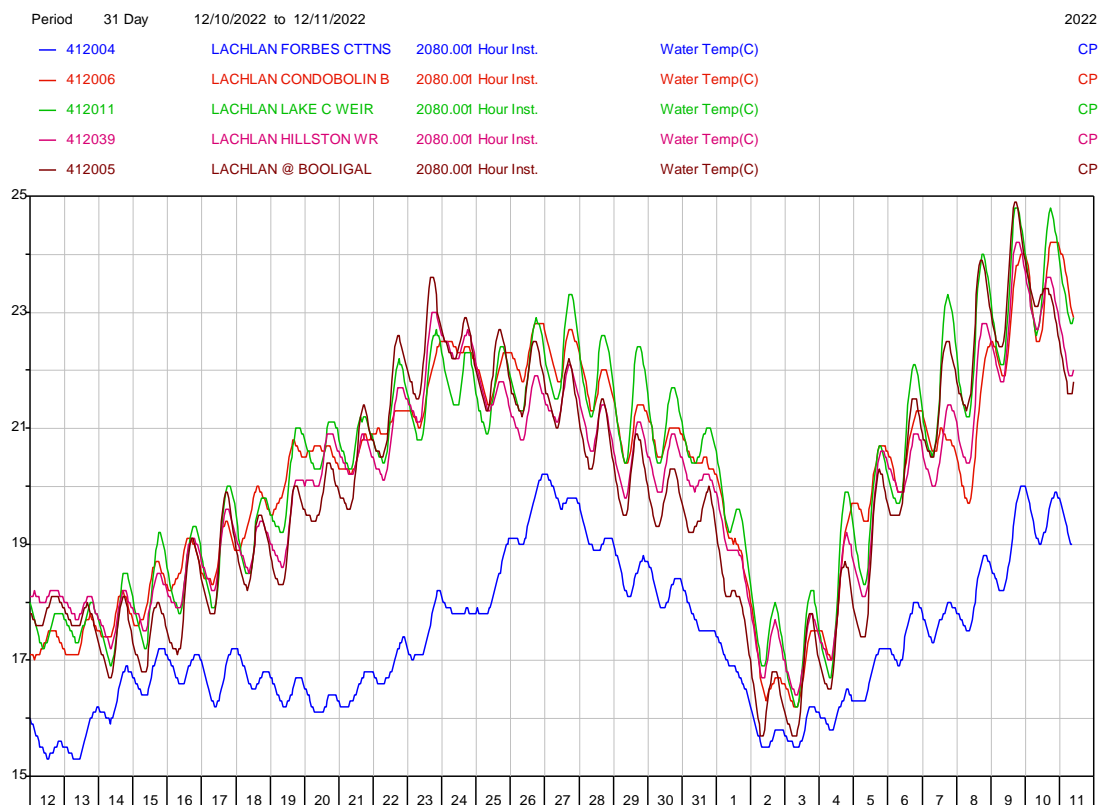


Figure 113: Continuous water temperature (°C) in the Lachlan River

Murrumbidgee River

River levels in the Murrumbidgee River at Wagga Wagga and Gogeldrie Weir are falling. Discharge at Hay is over 57,000 ML/day which is at the major flood level. Flows are currently steady in the lower Murrumbidgee with over 30,000 ML/day at Balranald (Figure 114).

Dissolved oxygen improved at all three sites with the cooler temperatures last week, though Redbank and Balranald have now dropped back below the 4 mg/L threshold (Figure 115). Large areas of the lower Murrumbidgee floodplain have already been inundated with more floodwater yet to arrive.

WaterNSW

HYFLOT V134 Output 11/11/2022

Period	31 Day	12/10/2022 to 12/11/2022		2022
410001	MBIDGEE R @ WAGGA	141.001 Hour Inst.	Discharge (ML/d)	CP
410082	MBIDGEE D/S GOGEL W	141.001 Hour Inst.	Discharge (ML/d)	CP
410136	MBIDGEE DS HAY WEIR	141.001 Hour Inst.	Discharge (ML/d)	CP
410040	MBIDGEE D/S MAUDE W	141.001 Hour Inst.	Discharge (ML/d)	CP
410130	MBIDGEE D/S BALRAND	141.001 Hour Inst.	Discharge (ML/d)	CP

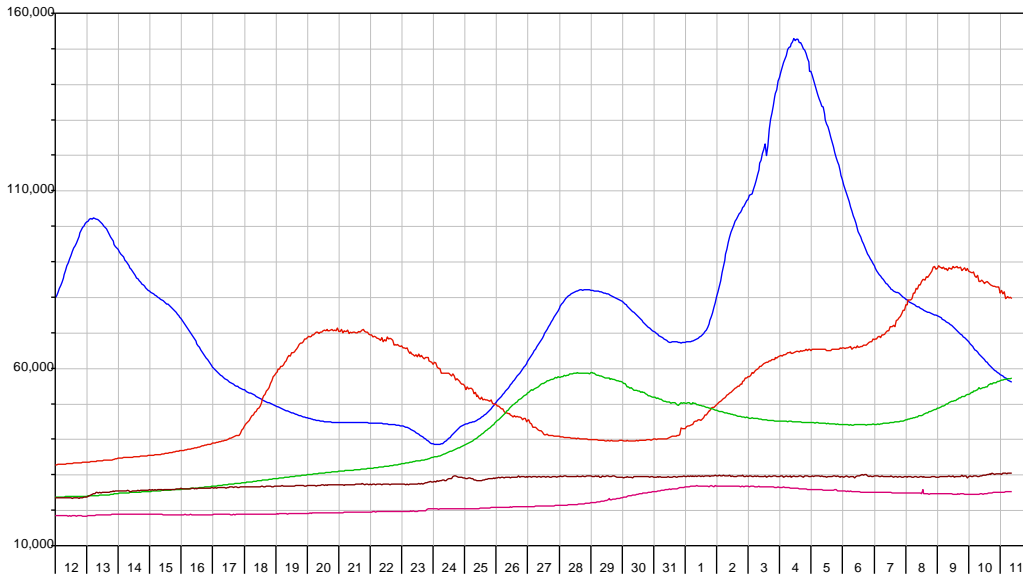


Figure 114: Discharge (ML/day) in the Murrumbidgee River

WaterNSW

HYFLOT V134 Output 11/11/2022

Period	31 Day	12/10/2022 to 12/11/2022		2022
410040	MBIDGEE D/S MAUDE W	2351.001 Hour Inst.	DO (mg/l)	CP
410041	MBIDGEE D/S REDBANK	2351.001 Hour Inst.	DO (mg/l)	CP
410130	MBIDGEE D/S BALRAND	2351.001 Hour Inst.	DO (mg/l)	CP

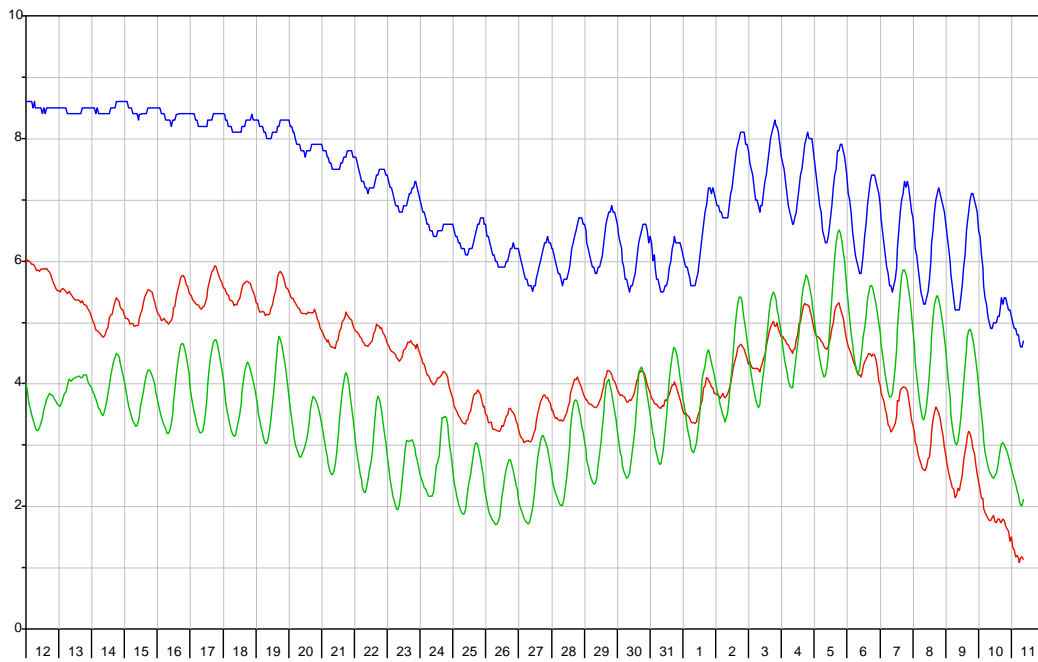


Figure 115: Continuous dissolved oxygen (mg/L) in the Murrumbidgee River

Site	Sample date	Dissolved oxygen (mg/L)
Murrumbidgee River at Wagga Wagga	07/11/2022 9:15	6.78
Billabong Creek at Walbundrie	07/11/2022 14:00	7.61
Billabong Creek at Jerilderie	07/11/2022 10:23	2.74
Billabong Creek at Darlot	08/11/2022 9:04	2.00
Yanco Creek at Yanco Bridge	07/11/2022 9:46	3.59

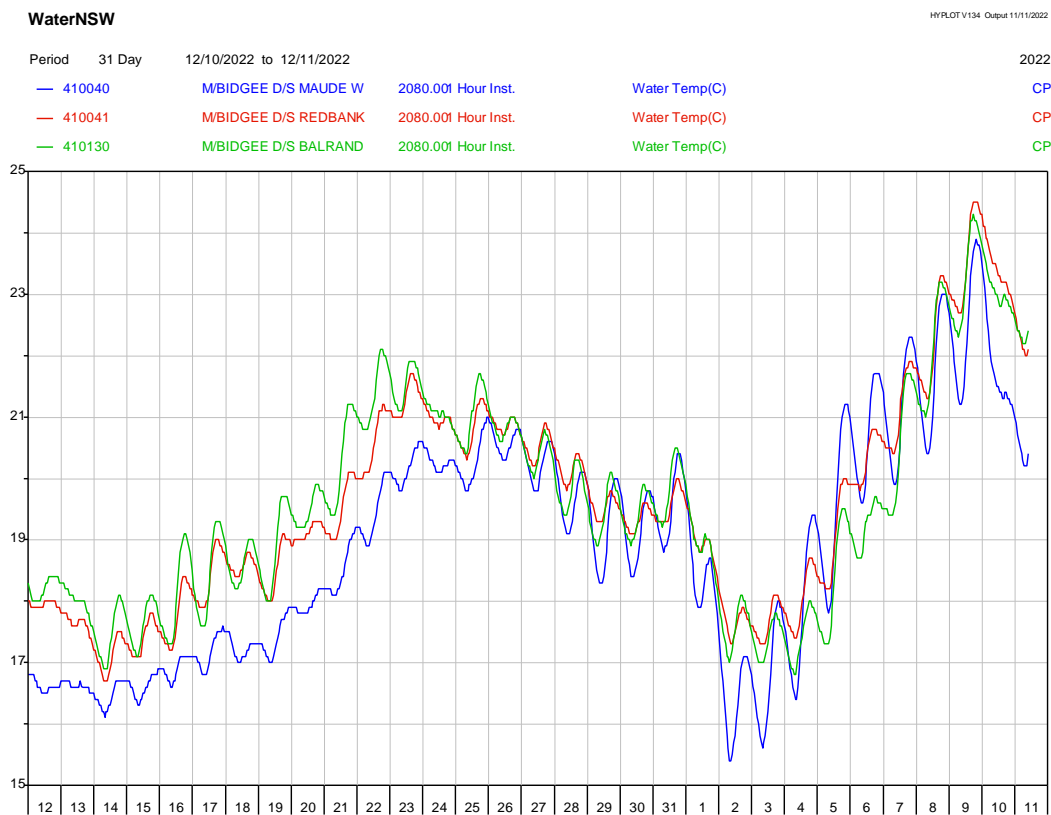


Figure 116: Continuous water temperature (°C) in the Murrumbidgee River

Kolety/Edward River

Discharge in the Kolety/Edward River at Deniliquin had peaked but has increased again up to around 73,000 ML/day (Figure 117). The cooler temperatures allowed dissolved oxygen at Toonalook to improve up to almost 1 mg/L (Figure 118), but it has declined to 0 mg/L with the return of warmer air temperatures (Figure 119).

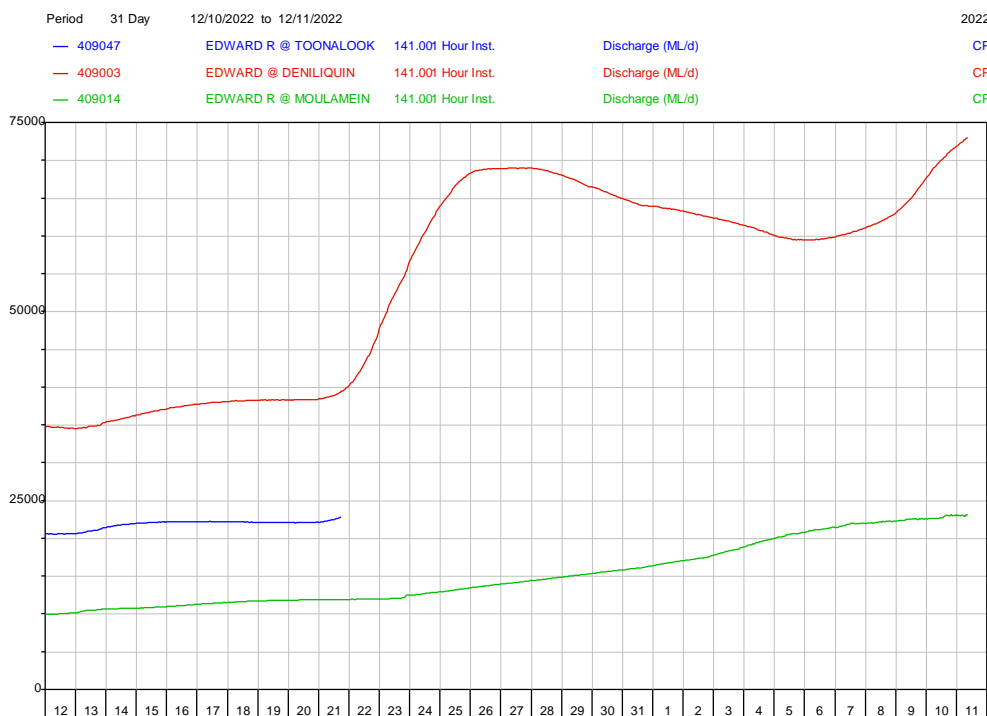


Figure 117: Discharge (ML/day) in the Kolety/Edward River

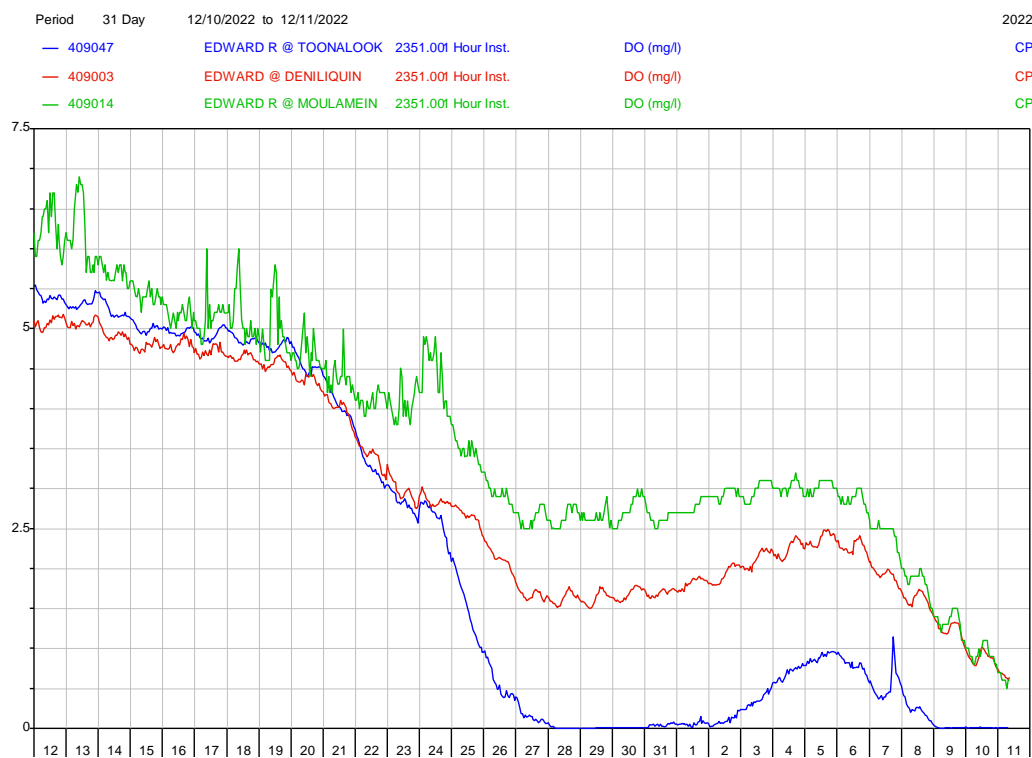


Figure 118: Continuous dissolved oxygen (mg/L) in the Kolety/Edward River

Handheld reading from Edward River at Deniliquin on 7/11/2022 11:43 was 2.77 mg/L.

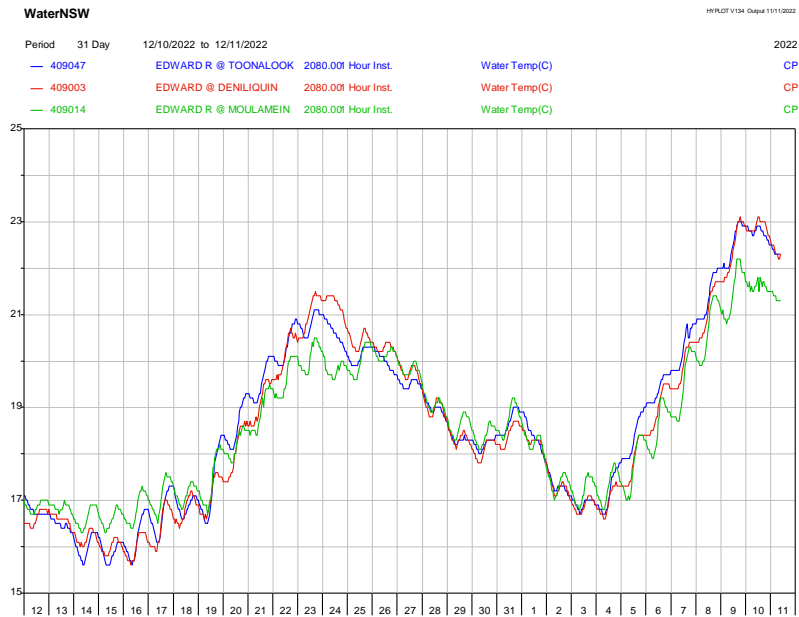


Figure 119: Continuous water temperature (°C) in the Kolety/Edward River

Wakool and Niemur rivers

Discharge in the Wakool River at Coonambit Bridge has peaked at over 111,000 ML/day. The Niemur River at Barham-Moulamein Road is flowing at over 25,000 ML/day (Figure 120). Dissolved oxygen had improved last week, but the Wakool River has now declined to less than 1 mg/L again (Figure 121). Oxygen levels in the Niemur River have also been declining as air temperatures increase with the Mallan school site reading less than 3 mg/L.

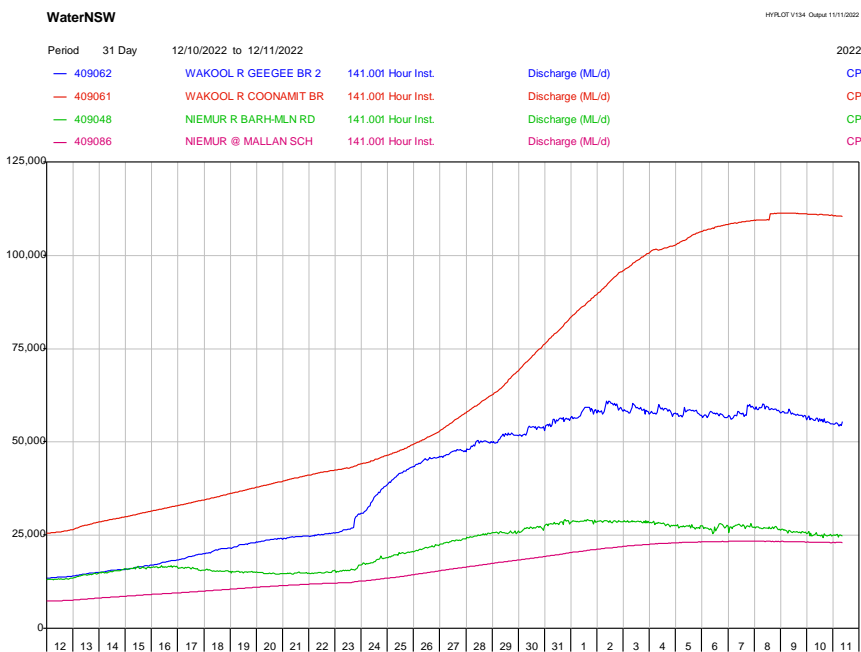


Figure 120: Discharge (ML/day) in the Wakool and Niemur rivers

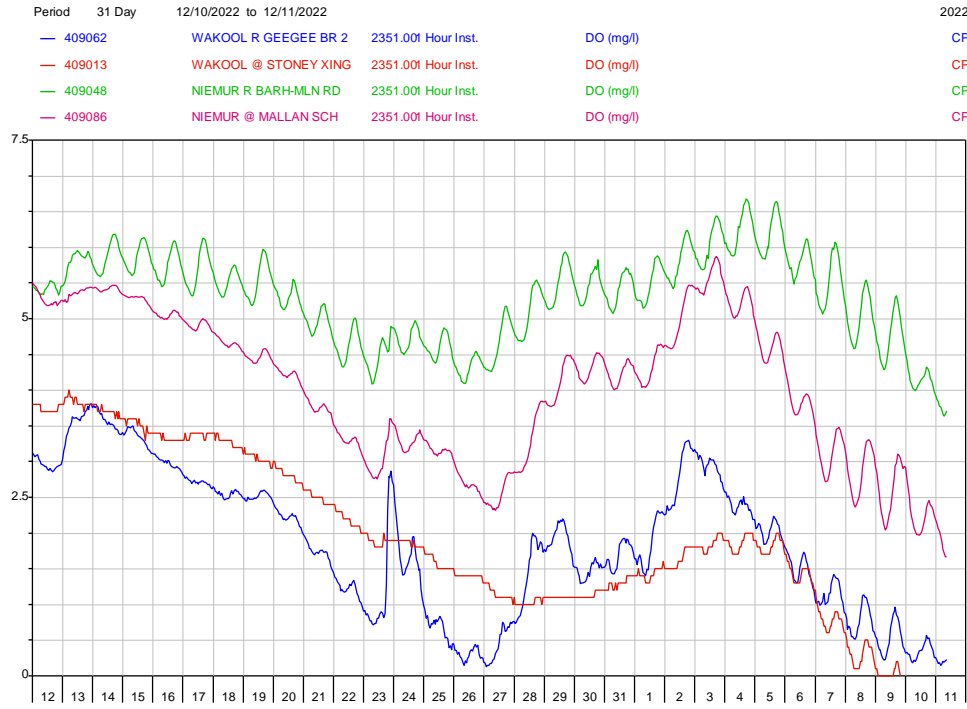


Figure 121: Continuous dissolved oxygen (mg/L) in the Wakool and Niemur rivers

Site	Sample date	Dissolved oxygen (mg/L)
Wakool River at Stoney Crossing	08/11/2022 12:07	1.1
Wakool River at Kyalite	08/11/2022 10:43	1.03

WaterNSW

HYDROT V134 Output 11/11/2022

Period	31 Day	12/10/2022 to 12/11/2022		2022
—	409062	WAKOOL R GEEGEE BR 2	2080.001 Hour Inst.	Water Temp(C) CP
—	409013	WAKOOL @ STONEY XING	2080.001 Hour Inst.	Water Temp(C) CP
—	409048	NIEMUR R BARH-MLN RD	2080.001 Hour Inst.	Water Temp(C) CP
—	409086	NIEMUR @ MALLAN SCH	2080.001 Hour Inst.	Water Temp(C) CP

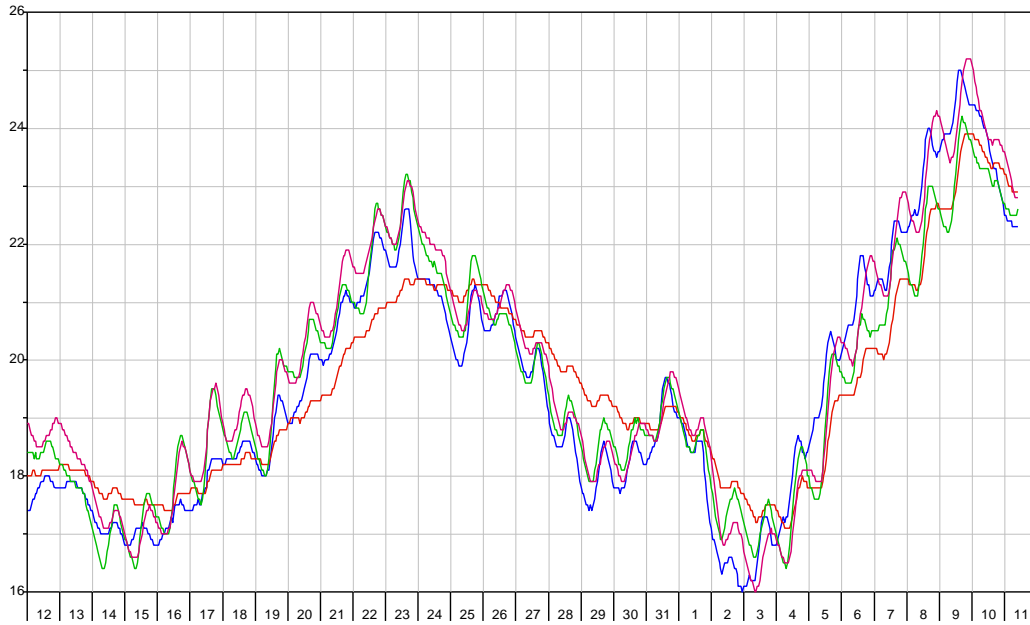


Figure 122: Continuous water temperature (°C) in the Wakool and Niemur rivers

Merran, Thule and Barber creeks

Figure 123 shows dissolved oxygen levels in Little Merran, Barbers and Thule creeks had all dropped to around 0 mg/L but improved with the cooler air temperatures last week (Figure 124). The dissolved oxygen levels at all sites have dropped to less than 1 mg/L.

WaterNSW

HYPLOT V134 Output 11/11/2022

Period	31 Day	12/10/2022 to 12/11/2022		2022
409044	LT MERRAN FRANK/ BR	2351.001 Hour Inst.	DO (mg/l)	CP
409036	MERRAN CK U/S WAK R	2351.001 Hour Inst.	DO (mg/l)	CP
409109	THULE @ LOW THULE RD	2351.001 Hour Inst.	DO (mg/l)	CP
409111	BARBER @ SANDY BR.	2351.001 Hour Inst.	DO (mg/l)	CP

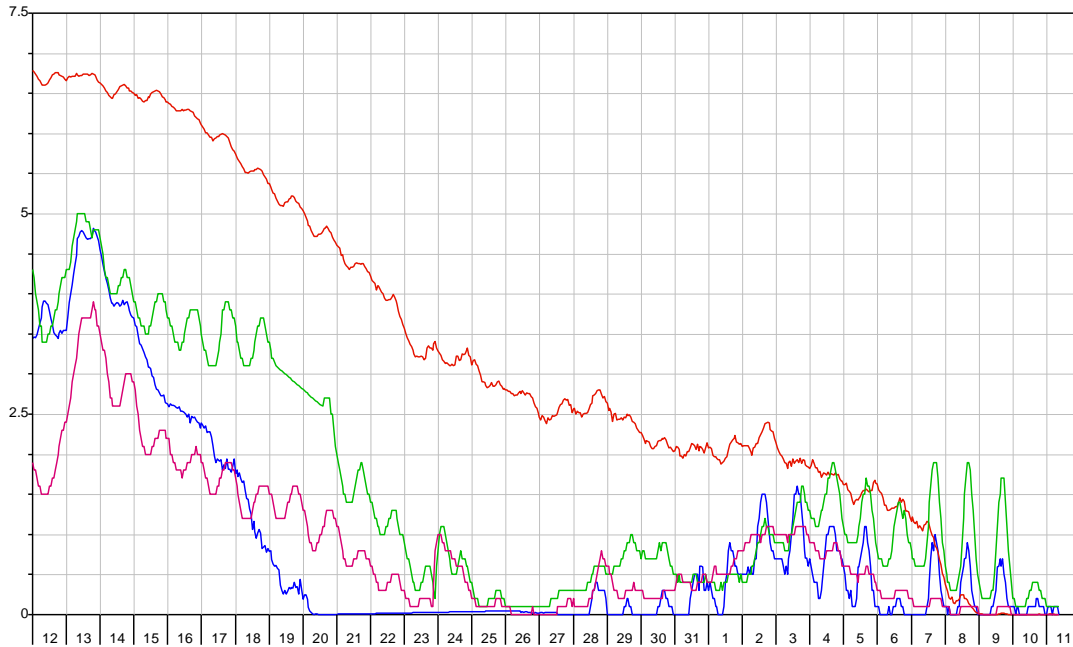


Figure 123: Continuous dissolved oxygen (mg/L) in the Merran, Little Merran, Thule and Barber creeks

WaterNSW

HYPLOT V134 Output 11/11/2022

Period	31 Day	12/10/2022 to 12/11/2022		2022
409044	LT MERRAN FRANK/ BR	2080.001 Hour Inst.	Water Temp(C)	CP
409036	MERRAN CK U/S WAK R	2080.001 Hour Inst.	Water Temp(C)	CP
409109	THULE @ LOW THULE RD	2080.001 Hour Inst.	Water Temp(C)	CP
409111	BARBER @ SANDY BR.	2080.001 Hour Inst.	Water Temp(C)	CP

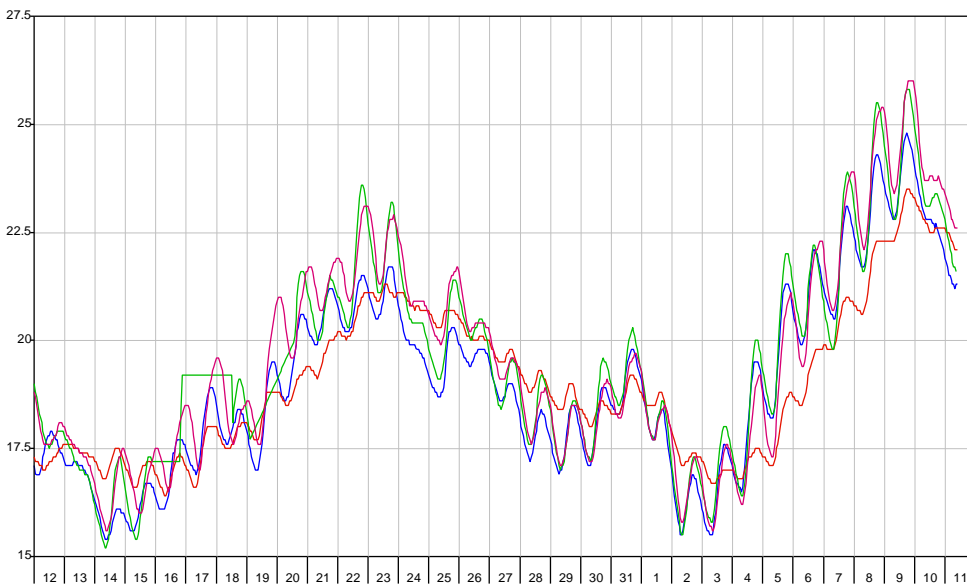


Figure 124: Continuous water temperature (°C) in the Merran, Little Merran, Thule and Barber creeks

Murray River

Flooding in the Murray River peaked at Swan Hill on 8 November. The Bureau of Meteorology has predicted major flooding for the Murray River at the Wakool River junction next week on 15 to 17 November and at Wentworth in early December.

Monitoring by DELWP is showing the Murray River at Tocumwal, upstream of the Barmah/Millewa Forest, is oxygenated (Figure 125). In the Murray River downstream of the forest at Barmah, dissolved oxygen levels have been the same for over a week (0.5 mg/L).

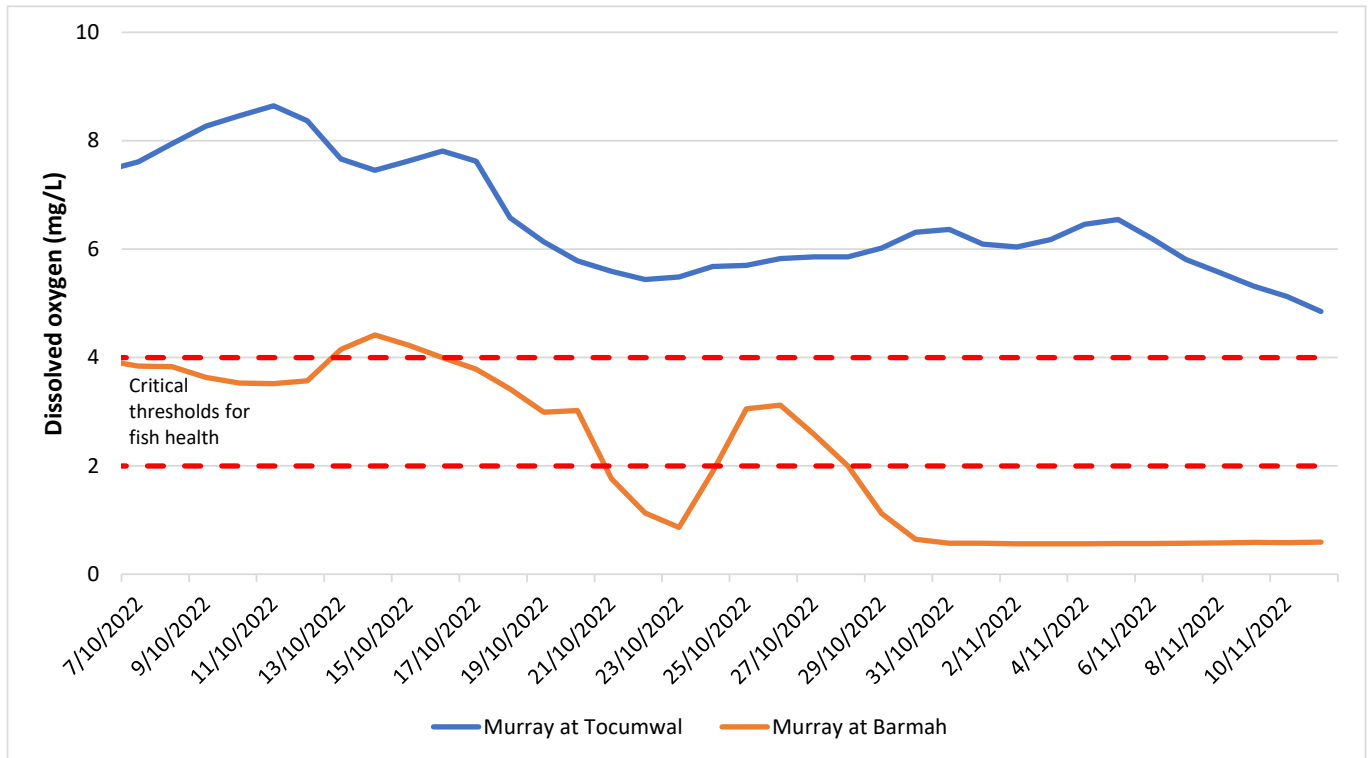


Figure 125: Continuous dissolved oxygen (mg/L) in the Murray River at Tocumwal and Barmah (data courtesy of DELWP)

Site	Sample date	Dissolved oxygen (mg/L)
Murray River D/S Yarrawonga Weir	07/11/2022 9:20	6.71
Murray River at Moama	07/11/2022 13:34	0.79

Dissolved oxygen in the Goulburn River at McCoys Bridge has improved above 4 mg/L. The Murray River at Barham has improved above the 2 mg/L threshold, while further downstream at the Wakool Junction and Colignan levels are less than 2 mg/L (Figure 126). The results from the temporary monitoring site installed in the Murray River downstream of Wentworth have been slowly declining and have just dropped below the 2 mg/L ecological threshold. Water temperatures have increased again after the cooler temperatures last week (Figure 127).

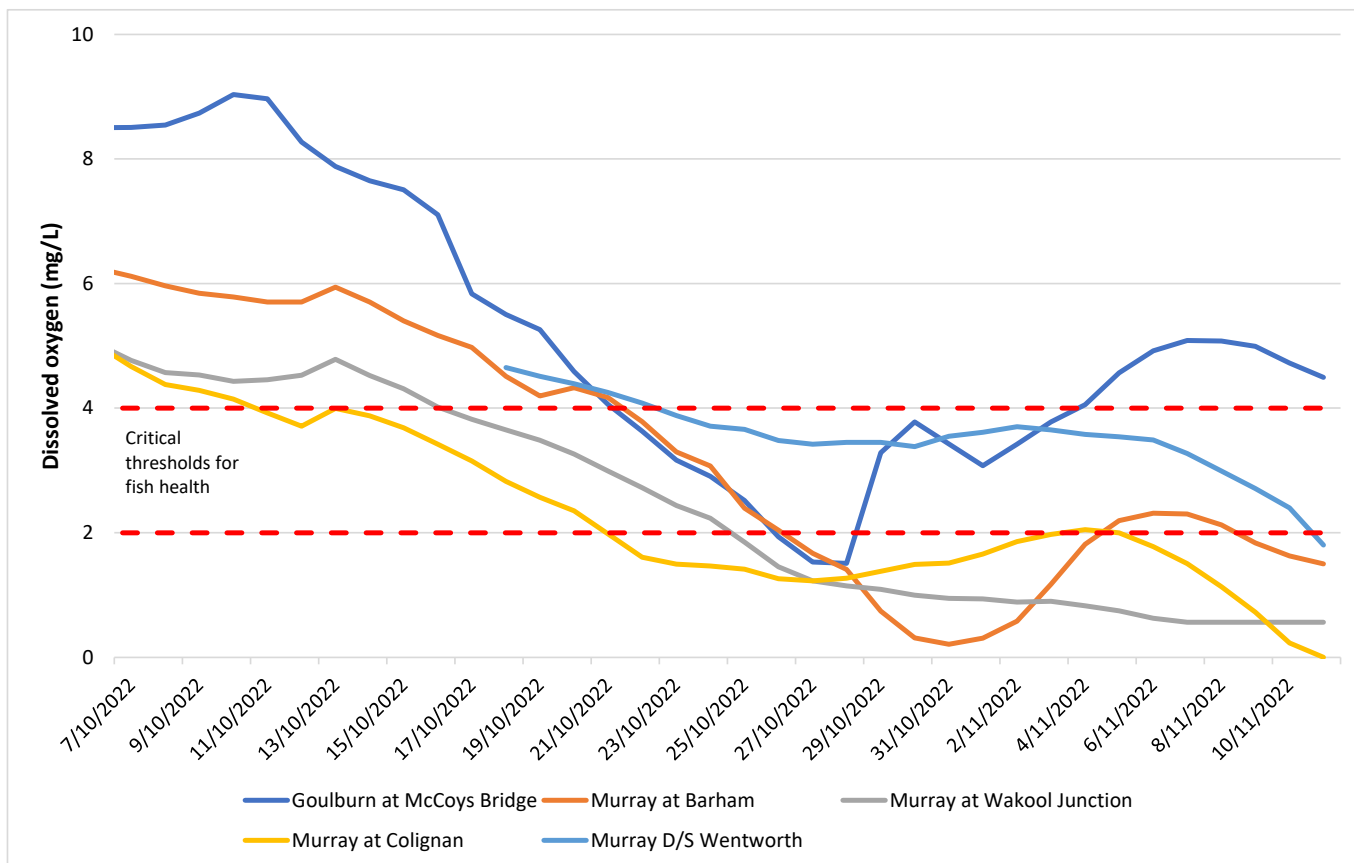


Figure 126: Continuous dissolved oxygen (mg/L) in the Goulburn River and Murray River at Barham, below Wakool junction, Colignan and downstream of Wentworth

Site	Sample date	Dissolved oxygen (mg/L)
Murray River at Barham	09/11/2022 8:41	2.4
Murray River at Euston Weir	07/11/2022 10:28	2.83
Murray River at Merbein	07/11/2022 13:23	3.03

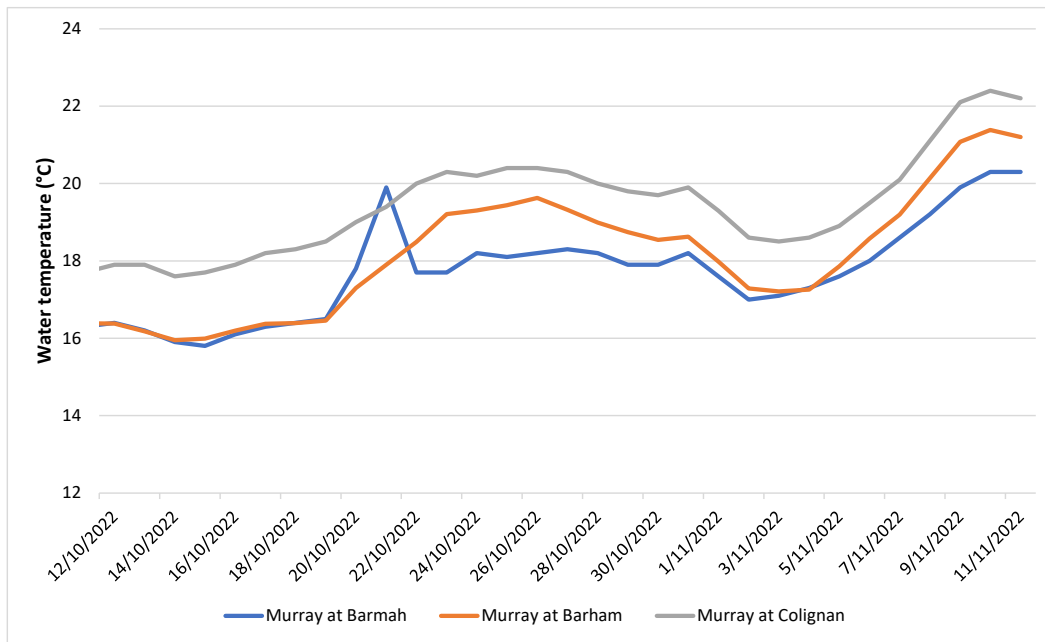


Figure 127: Continuous water temperature (°C) in the Murray River

Weather Outlook

The Bureau of Meteorology 8-day total rain forecast (11 to 18 November) indicates widespread rainfall across NSW, with heaviest falls predicted for the Southern Alps over the weekend (Figure 128). Forecast is for warmer air temperatures for Echuca and Mildura over the weekend before a low and cold front brings cooler air temperatures during the week (Figure 129 and Figure 130).

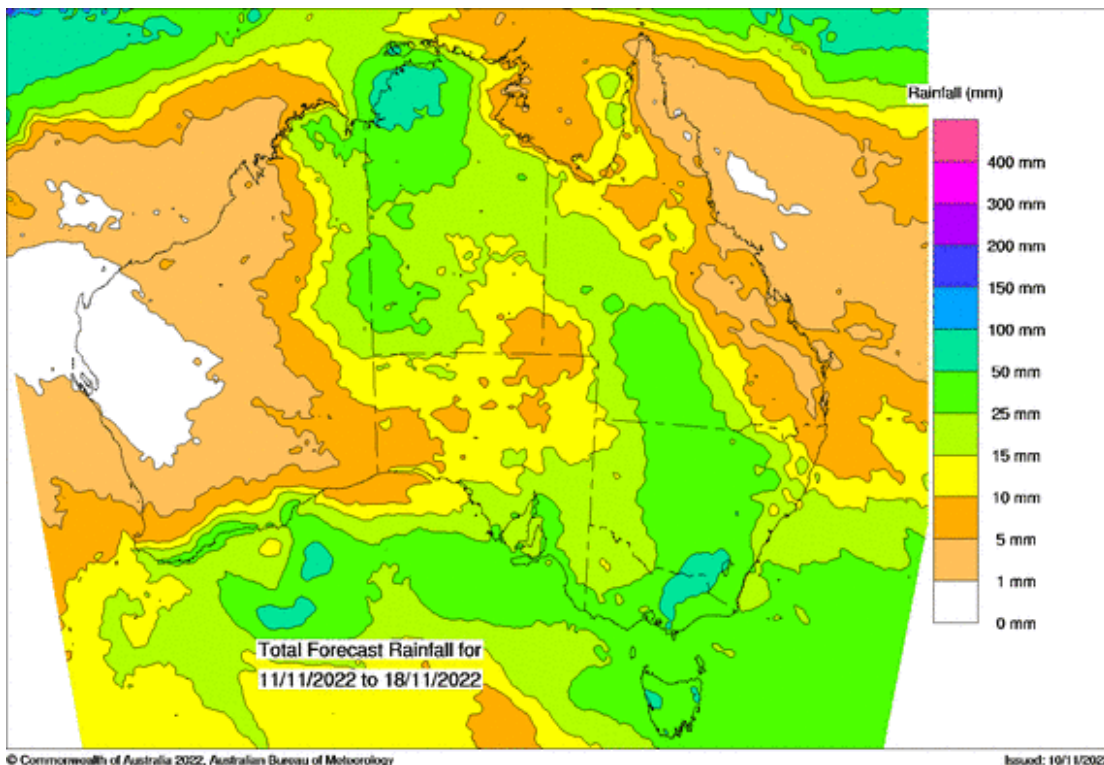


Figure 128: Bureau of Meteorology 8-day total rain forecast (11 to 18 November)

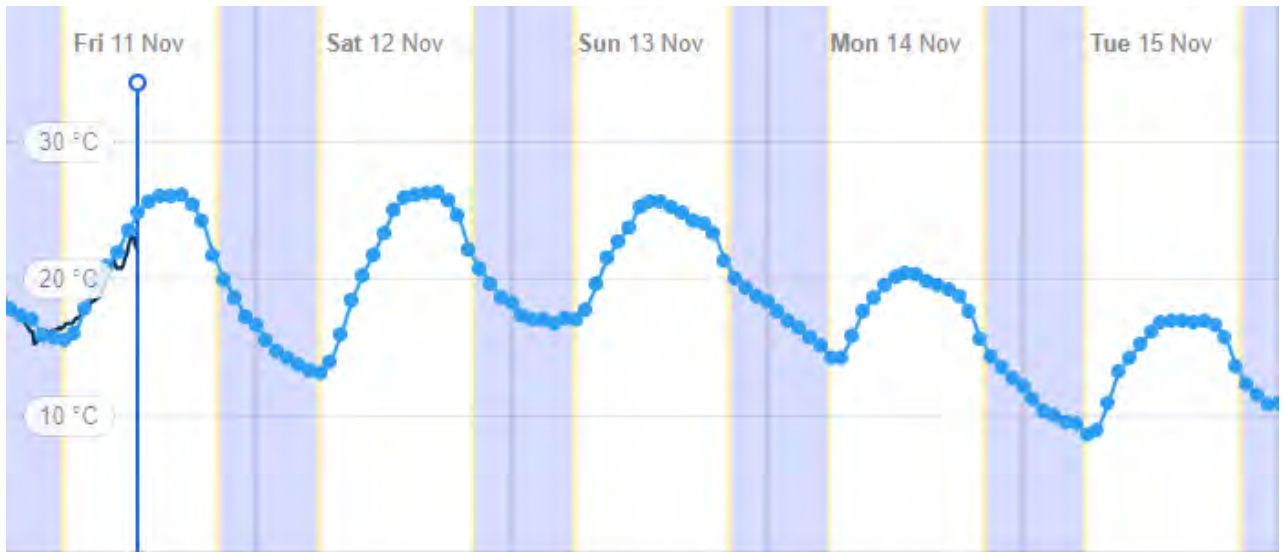


Figure 129: Forecast air temperatures for Echuca 11 to 15 November

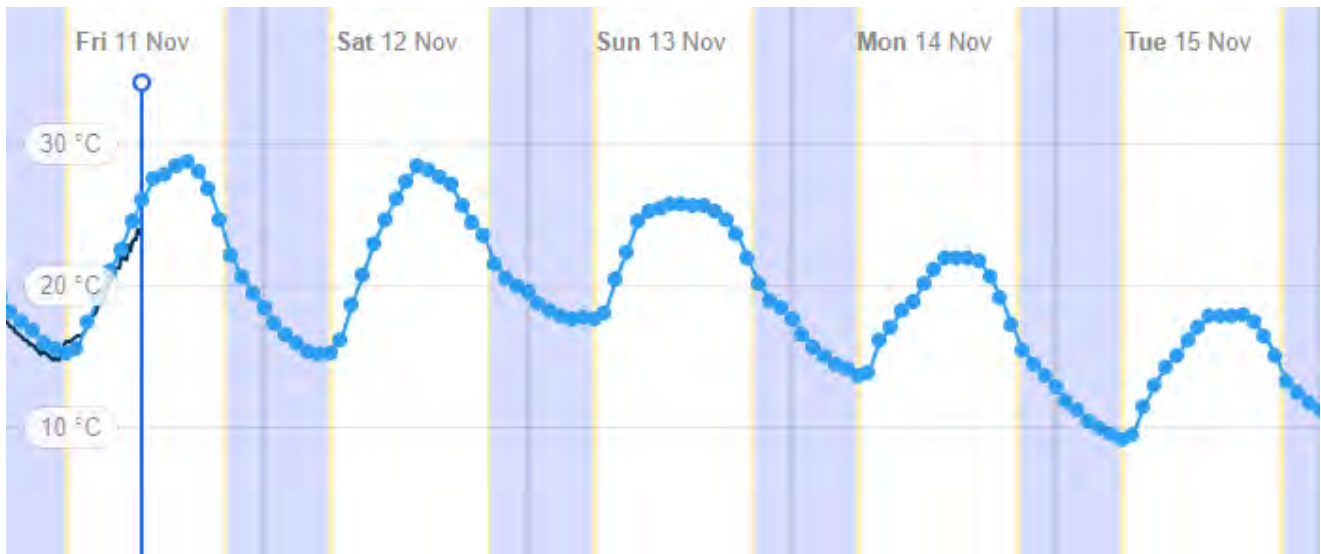


Figure 130: Forecast air temperatures for Mildura 11 to 15 November

Water quality update, Meeting No. 7 – 21 November 2022

Northern Basin

Barwon River

Discharge is slowly decreasing in the Barwon River at Mungindi, Collarenebri and Walgett. Flooding at Brewarrina has peaked at around 128,000 ML/day (Figure 131).

Dissolved oxygen in the Barwon River at Walgett and Geera had declined to less than 0.5 mg/L but have improved slowly with the cooler air temperatures this week. Levels at Collarenebri have recovered above 4 mg/L, while Brewarrina is above 3 mg/L (Figure 132). There have been no reports of fish deaths or fish gasping at the surface.

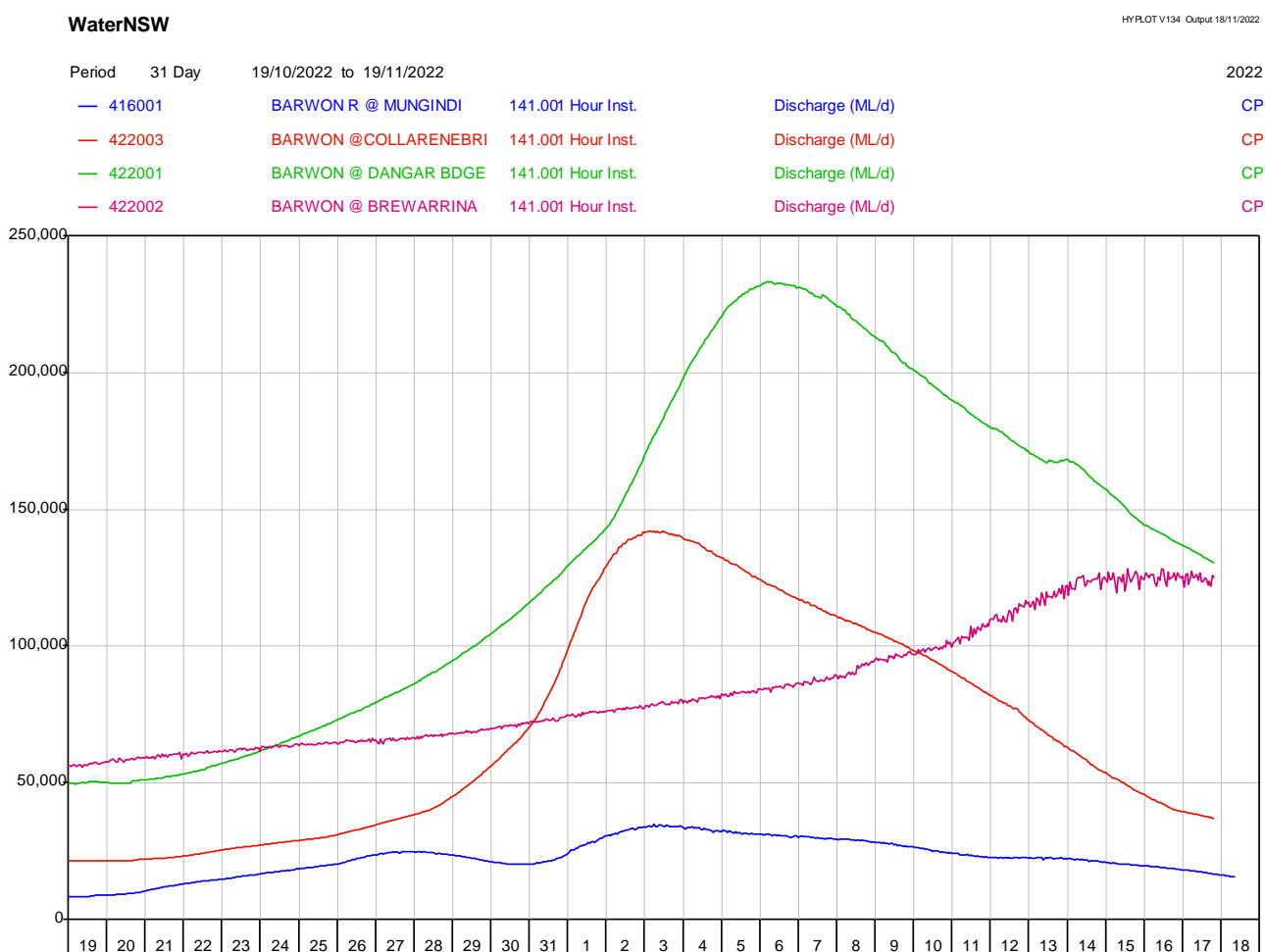


Figure 131: Discharge (ML/day) in the Barwon River

WaterNSW

HYFLOT V134 Output 18/11/2022

Period 31 Day 19/10/2022 to 19/11/2022 2022

— 422003	BARWON @ COLLARENEBRI	2351.001 Hour Inst.	DO (mg/l)	CP
— 422001	BARWON @ DANGAR BDGE	2351.001 Hour Inst.	DO (mg/l)	CP
— 422027	BARWON @ GEERA	2351.001 Hour Inst.	DO (mg/l)	CP
— 422002	BARWON @ BREWARRINA	2351.001 Hour Inst.	DO (mg/l)	CP

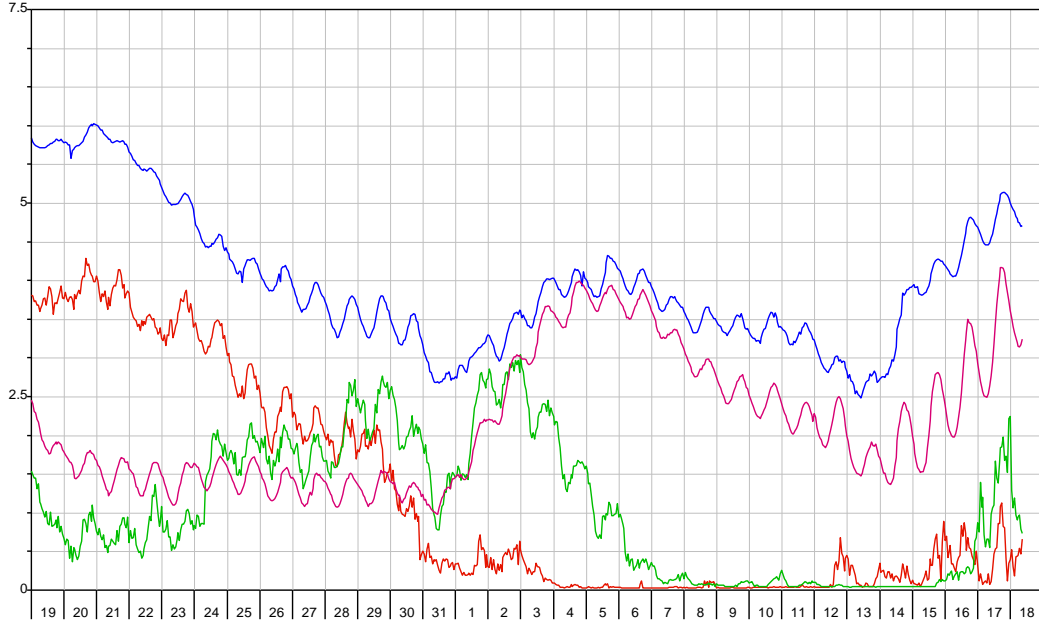


Figure 132: Continuous dissolved oxygen (mg/L) in the Barwon River

WaterNSW

HYFLOT V134 Output 18/11/2022

Period 31 Day 19/10/2022 to 19/11/2022 2022

— 422003	BARWON @ COLLARENEBRI	2080.001 Hour Inst.	Water Temp(C)	CP
— 422001	BARWON @ DANGAR BDGE	2080.001 Hour Inst.	Water Temp(C)	CP
— 422027	BARWON @ GEERA	2080.001 Hour Inst.	Water Temp(C)	CP
— 422002	BARWON @ BREWARRINA	2080.001 Hour Inst.	Water Temp(C)	CP

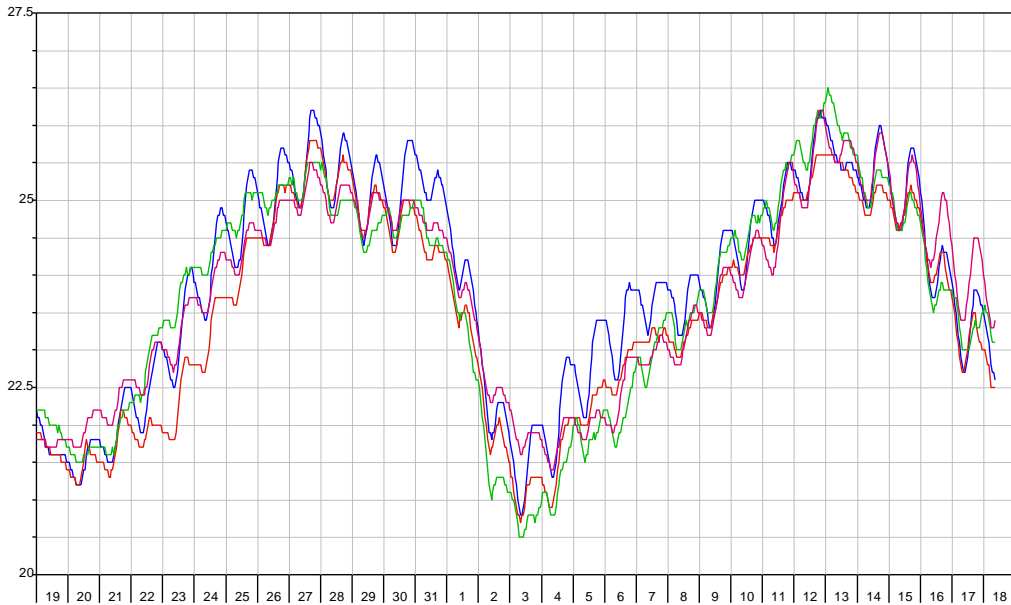


Figure 133: Continuous water temperature (°C) in the Barwon River

Darling River

Discharge is continuing to increase at Bourke (170,000 ML/day) and Louth (120,000 ML/day) and is over 31,000 ML/day at Wilcannia (Figure 134). Discharge at Weir 32 is around 31,000 ML/day and over 17,000 ML/day at Burtundy.

Dissolved oxygen at all sites has been improving with the cooler water temperatures this week. In the Darling River at Bourke and Wilcannia dissolved oxygen had dropped below 3 mg/L and below 4.5 mg/L at Burtundy. The readings from Bourke are now fluctuating around 4 mg/L (Figure 135 and Figure 136).

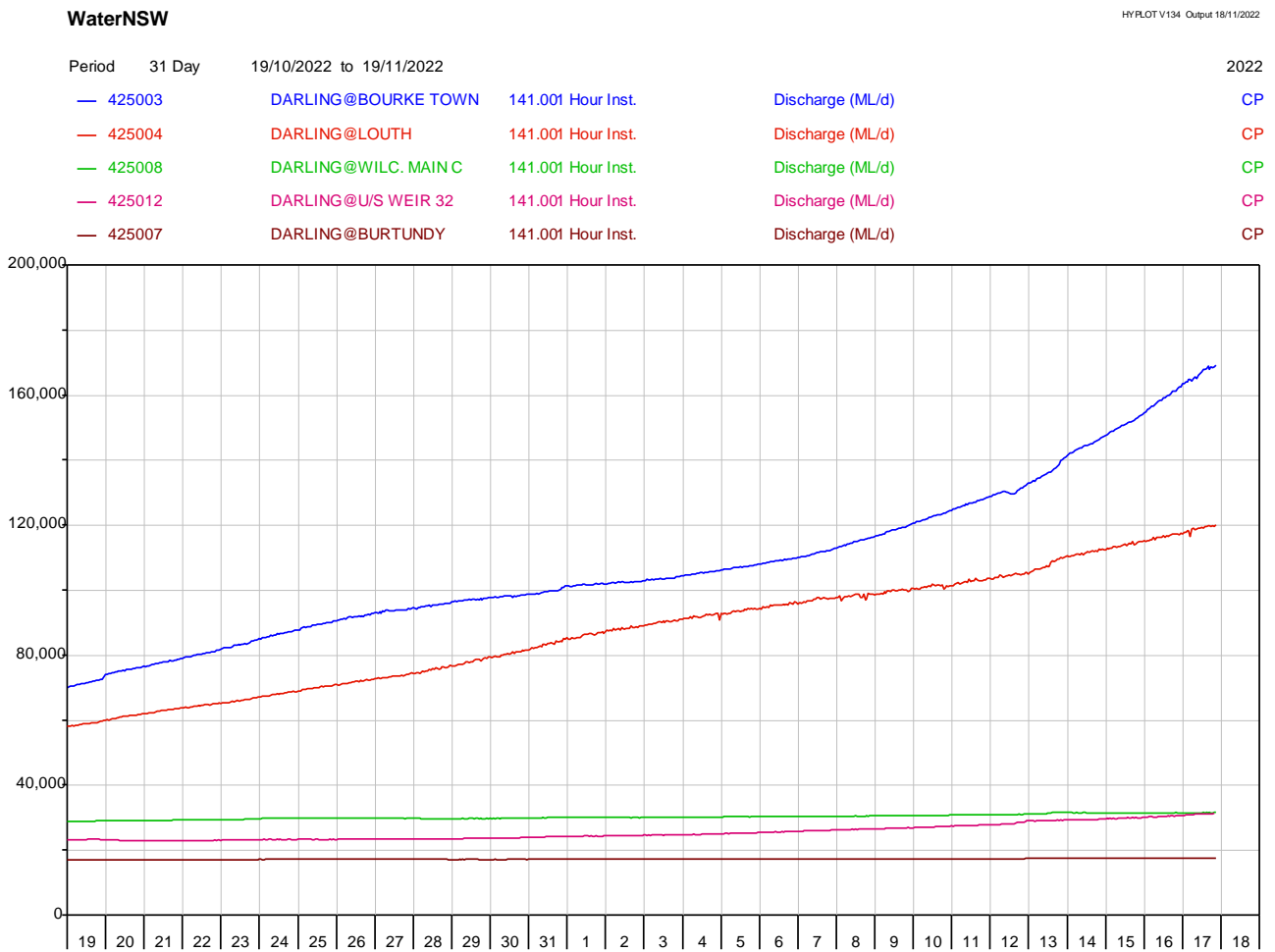


Figure 134: Discharge (ML/day) in the upper Darling River

WaterNSW

HRPLOT V134 Output 18/11/2022

Period	31 Day	19/10/2022 to 19/11/2022	2022
425003	DARLING@BOURKE TOWN	2351.00f Hour Inst.	DO (mg/l) CP
425058	Darling R @ Moorabin	2351.00f Hour Inst.	DO (mg/l) CP
425012	DARLING@U/S WEIR 32	2351.00f Hour Inst.	DO (mg/l) CP
425007	DARLING@BURTUNDY	2351.00f Hour Inst.	DO (mg/l) CP

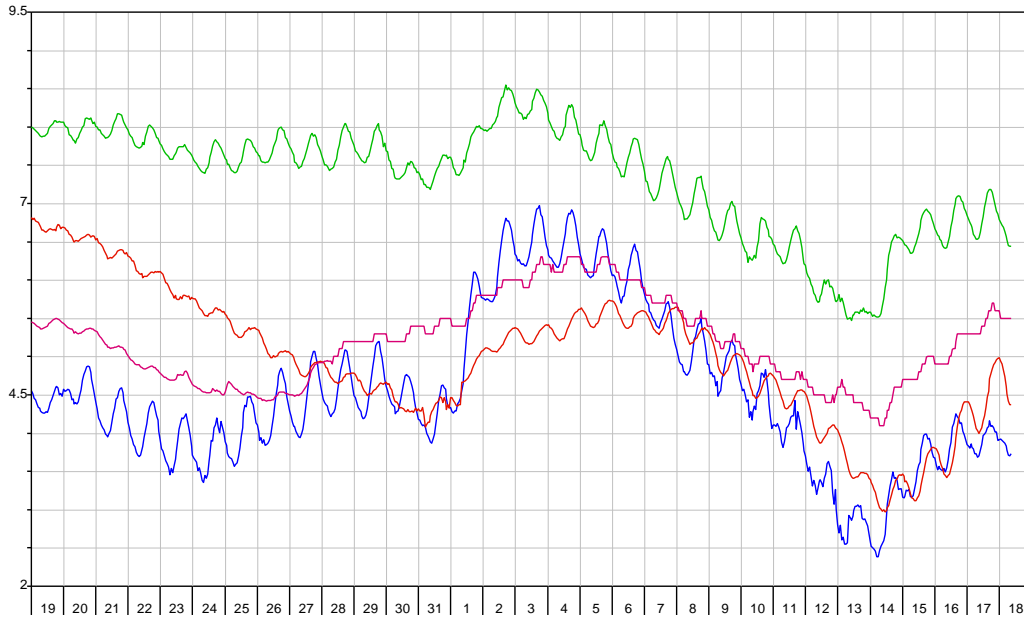


Figure 135: Continuous dissolved oxygen (mg/L) in the Darling River

Handheld result from the Darling River at Burtundy 14/11/22 11:19 was 4.22 mg/L.

WaterNSW

HRPLOT V134 Output 18/11/2022

Period	31 Day	19/10/2022 to 19/11/2022	2022
425003	DARLING@BOURKE TOWN	2080.00f Hour Inst.	Water Temp(C) CP
425058	Darling R @ Moorabin	2080.00f Hour Inst.	Water Temp(C) CP
425012	DARLING@U/S WEIR 32	2080.00f Hour Inst.	Water Temp(C) CP
425007	DARLING@BURTUNDY	2080.00f Hour Inst.	Water Temp(C) CP

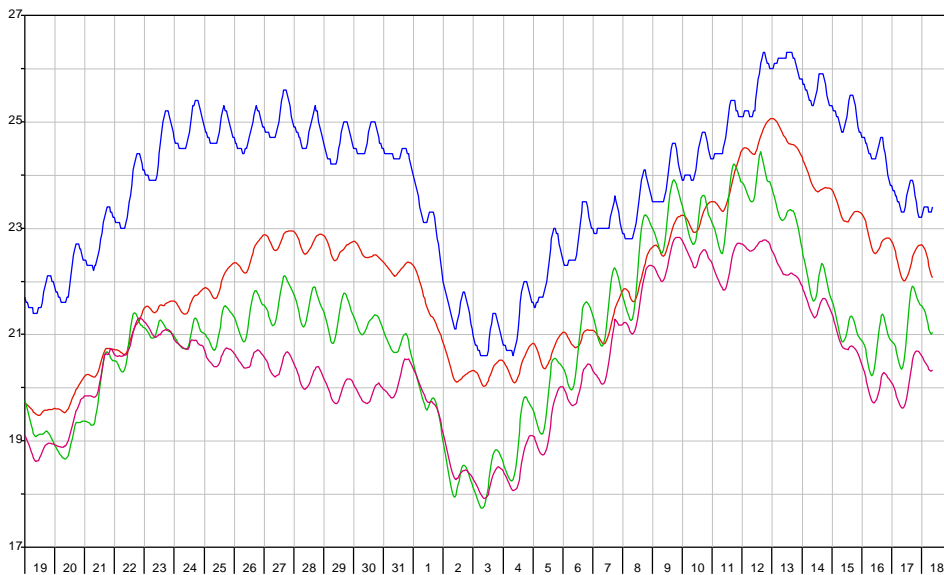


Figure 136: Continuous water temperature (°C) in the Darling River

Southern Basin

Lachlan River

Flooding continues in the Lachlan River. The latest flood peaked at Forbes during the week at over 104,000 ML/day (Figure 137). Flooding at Condobolin is expected to continue for some weeks.

Despite the major flooding, dissolved oxygen readings at Forbes remained above 4 mg/L. Dissolved oxygen at other sites have been showing large diurnal fluctuations. The Lachlan River at Condobolin is the only site recording results less than 4 mg/L (Figure 138).

WaterNSW

HYPLOT V134 Output 18/11/2022

Period	31 Day	19/10/2022 to 19/11/2022			2022
—	412004	LACHLAN FORBES CTTNS	141.001 Hour Inst.	Discharge (ML/d)	CP
—	412006	LACHLAN CONDOBOLIN B	141.001 Hour Inst.	Discharge (ML/d)	CP
—	412038	LACHLAN WILLANDRA WR	141.001 Hour Inst.	Discharge (ML/d)	CP
—	412039	LACHLAN HILLSTON WR	141.001 Hour Inst.	Discharge (ML/d)	CP
—	412005	LACHLAN @ BOOLIGAL	141.001 Hour Inst.	Discharge (ML/d)	CP

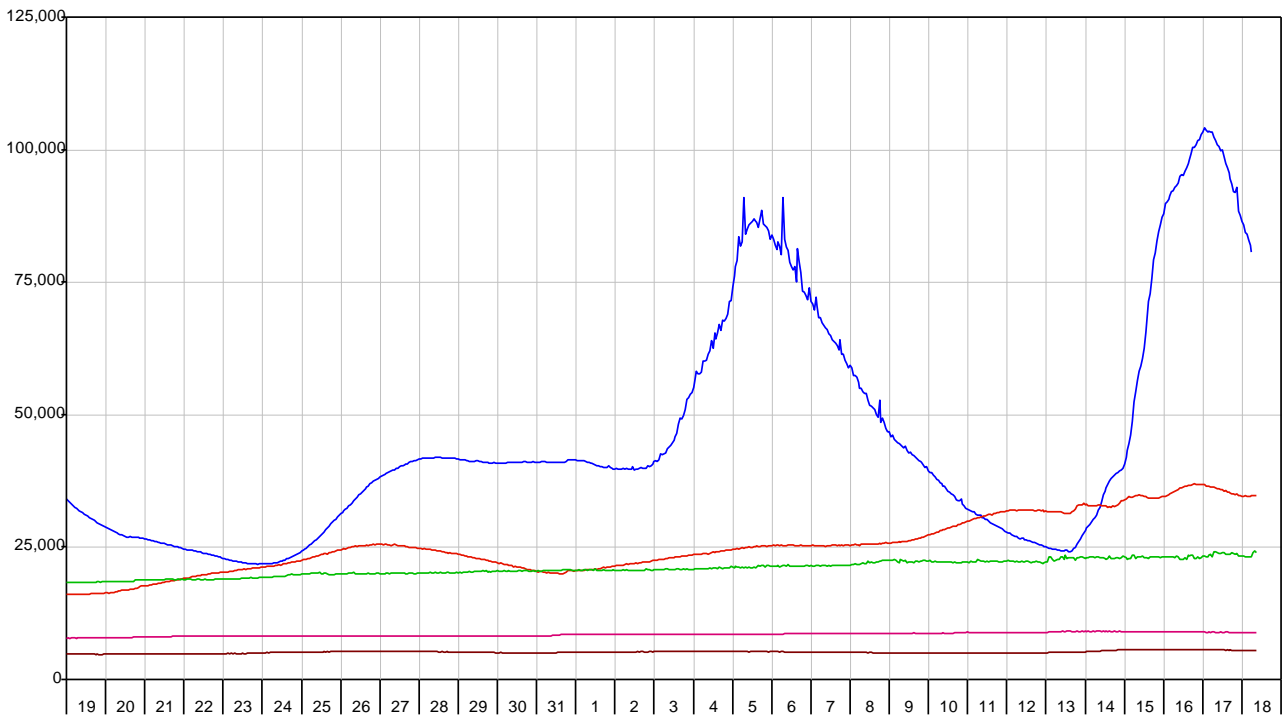


Figure 137: Discharge (ML/day) in the Lachlan River

WaterNSW

HYPLOT V134 Output 18/11/2022

Period	31 Day	19/10/2022 to 19/11/2022	2022
— 412004	LACHLAN FORBES CTTNS	2351.00l Hour Inst.	DO (mg/l) CP
— 412006	LACHLAN CONDOBOLIN B	2351.00l Hour Inst.	DO (mg/l) CP
— 412011	LACHLAN LAKE C WEIR	2351.00l Hour Inst.	DO (mg/l) CP
— 412039	LACHLAN HILLSTON WR	2351.00l Hour Inst.	DO (mg/l) CP
— 412005	LACHLAN @ BOOLIGAL	2351.00l Hour Inst.	DO (mg/l) CP

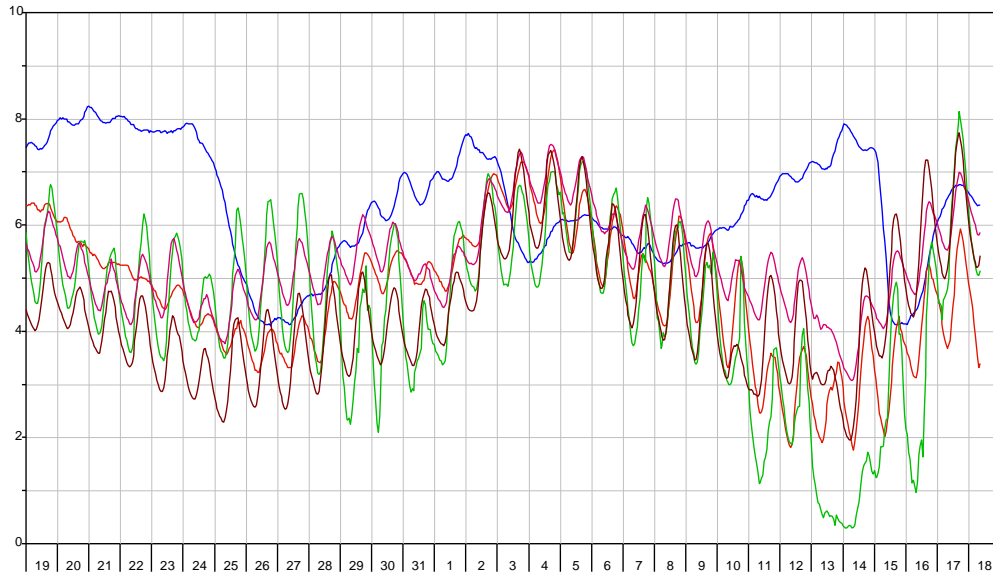


Figure 138: Continuous dissolved oxygen (mg/L) in the Lachlan River

WaterNSW

HYPLOT V134 Output 18/11/2022

Period	31 Day	19/10/2022 to 19/11/2022	2022
— 412004	LACHLAN FORBES CTTNS	2080.00l Hour Inst.	Water Temp(C) CP
— 412006	LACHLAN CONDOBOLIN B	2080.00l Hour Inst.	Water Temp(C) CP
— 412011	LACHLAN LAKE C WEIR	2080.00l Hour Inst.	Water Temp(C) CP
— 412038	LACHLAN WILLANDRA WR	2080.00l Hour Inst.	Water Temp(C) CP
— 412005	LACHLAN @ BOOLIGAL	2080.00l Hour Inst.	Water Temp(C) CP

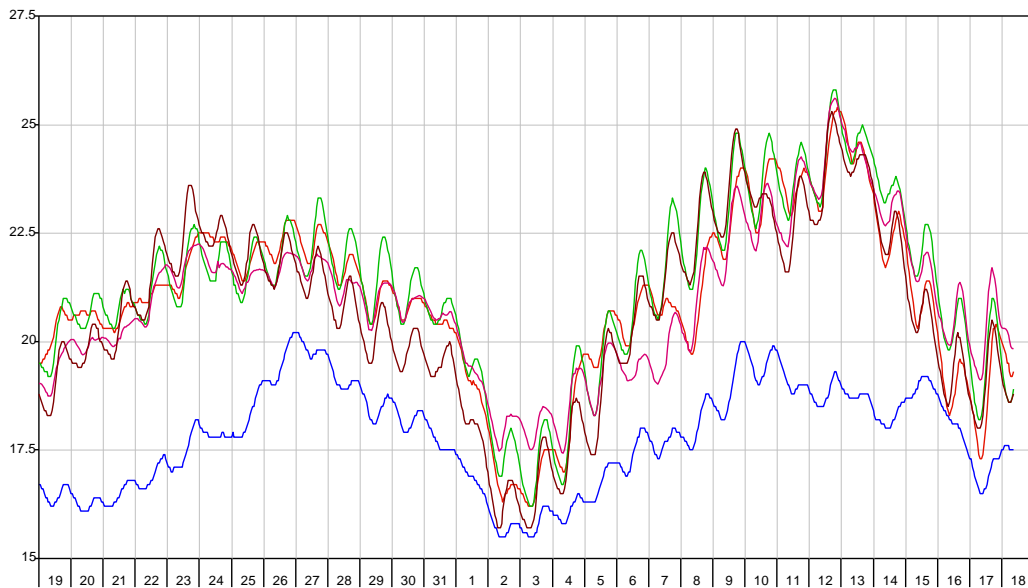


Figure 139: Continuous water temperature (°C) in the Lachlan River

Murrumbidgee River

River levels in the Murrumbidgee River at Wagga Wagga, Gogeldrie Weir and Hay are falling. Flows are slowly increasing in the lower Murrumbidgee with over 38,000 ML/day at Balranald (Figure 140).

Dissolved oxygen improved at all three monitoring sites in response to the cooler temperatures during the week. The Murrumbidgee River at Redbank and Balranald are both fluctuating around the 4 mg/L threshold (Figure 141).

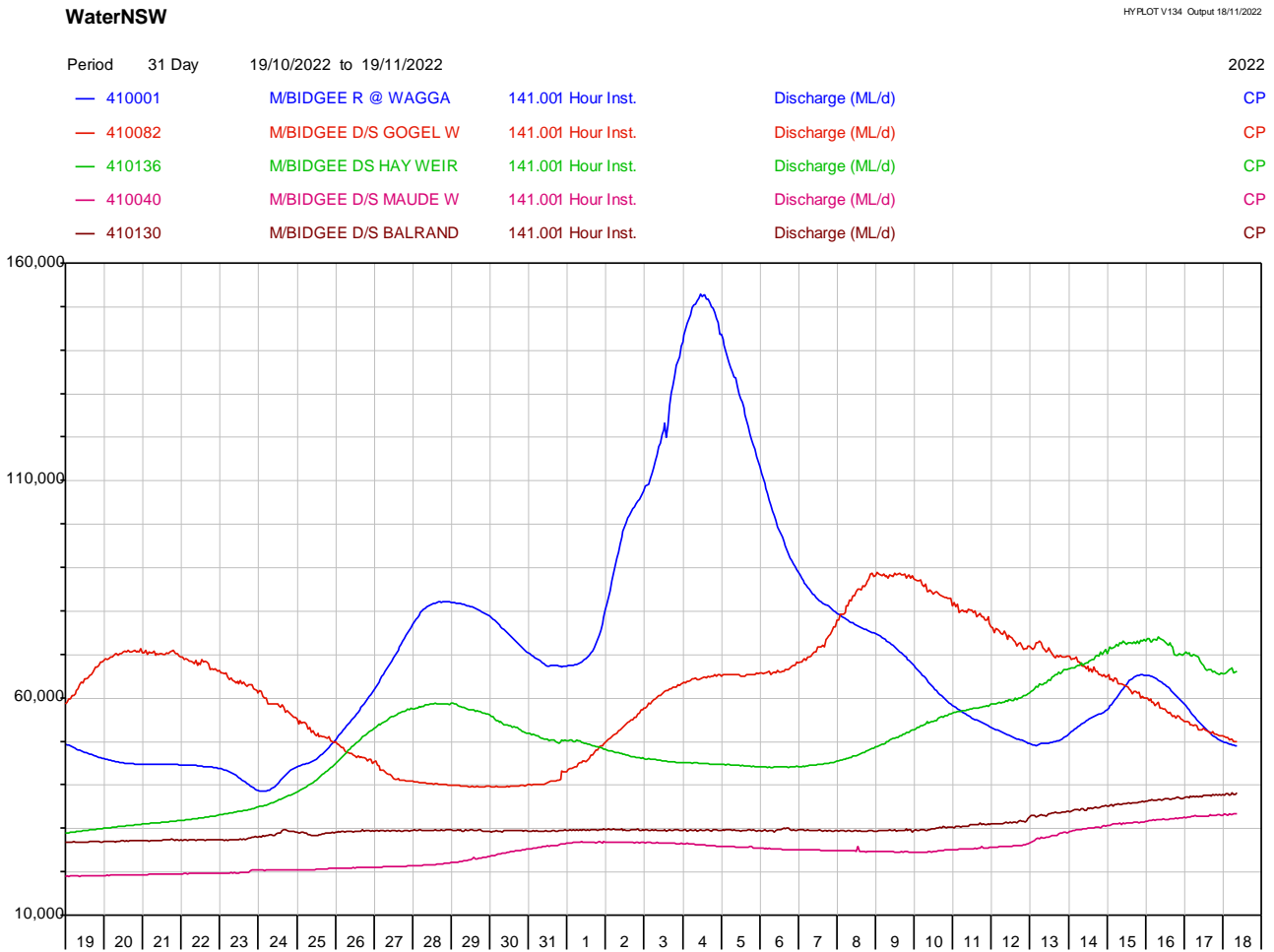


Figure 140: Discharge (ML/day) in the Murrumbidgee River

WaterNSW

HYPLOT V134 Output 18/11/2022

Period	31 Day	19/10/2022 to 19/11/2022	2022
— 410040	M/BIDGEE D/S MAUDE W	2351.00f Hour Inst.	DO (mg/l) CP
— 410041	M/BIDGEE D/S REDBANK	2351.00f Hour Inst.	DO (mg/l) CP
— 410130	M/BIDGEE D/S BALRAND	2351.00f Hour Inst.	DO (mg/l) CP

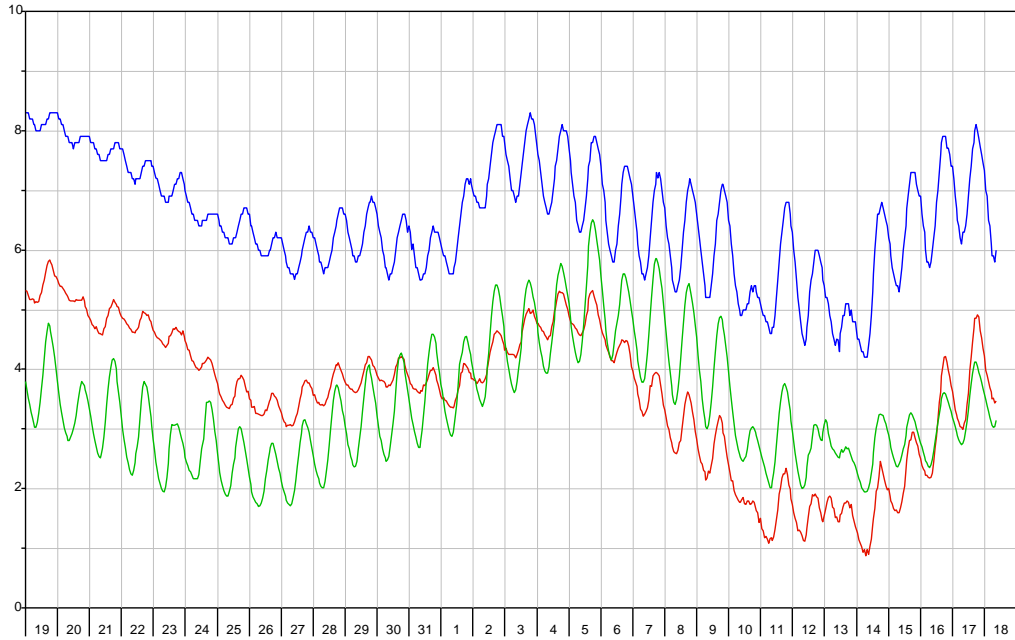


Figure 141: Continuous dissolved oxygen (mg/L) in the Murrumbidgee River

Handheld result from the Murrumbidgee River at Balranald 14/11/22 13:20 was 2.11 mg/L.

WaterNSW

HYPLOT V134 Output 18/11/2022

Period	31 Day	19/10/2022 to 19/11/2022	2022
— 410040	M/BIDGEE D/S MAUDE W	2080.00f Hour Inst.	Water Temp(C) CP
— 410041	M/BIDGEE D/S REDBANK	2080.00f Hour Inst.	Water Temp(C) CP
— 410130	M/BIDGEE D/S BALRAND	2080.00f Hour Inst.	Water Temp(C) CP

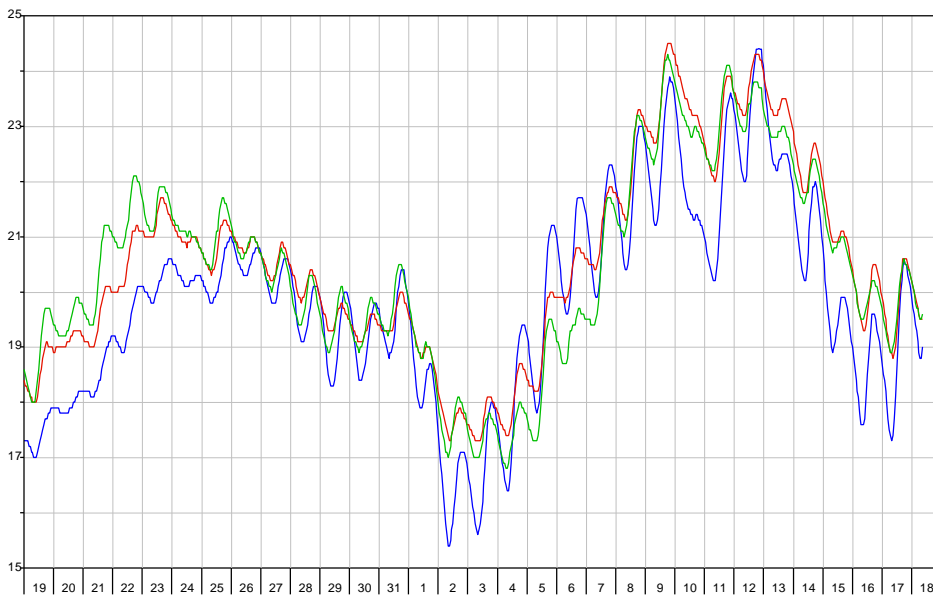


Figure 142: Continuous water temperature (°C) in the Murrumbidgee River

Kolety/Edward River

Discharge in the Kolety/Edward River at Deniliquin is continuing to increase above 81,000 ML/day (Figure 143). The cooler temperatures allowed dissolved oxygen at Deniliquin and Moulamein to improve up to around 1 mg/L (Figure 144). The Toonalook dissolved sensor had been reading 0 mg/L, but has ceased recording, suggesting a sensor malfunction.

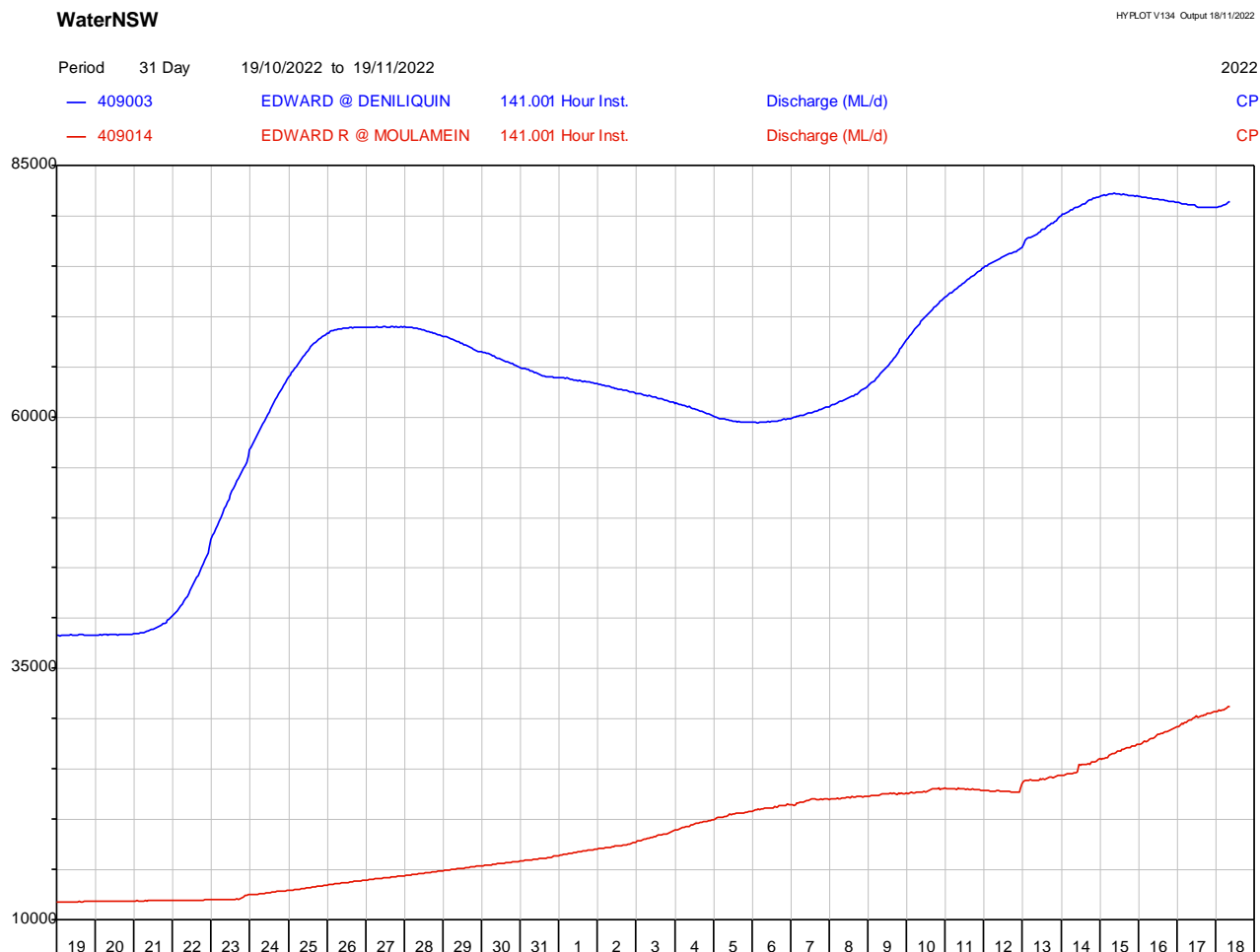


Figure 143: Discharge (ML/day) in the Kolety/Edward River

WaterNSW

HYPLOT V134 Output 18/11/2022

Period 31 Day 19/10/2022 to 19/11/2022 2022

— 409047	EDWARD R @ TOONALOOK	2351.001 Hour Inst.	DO (mg/l)	CP
— 409003	EDWARD @ DENILQUIN	2351.001 Hour Inst.	DO (mg/l)	CP
— 409014	EDWARD R @ MOULAMEIN	2351.001 Hour Inst.	DO (mg/l)	CP

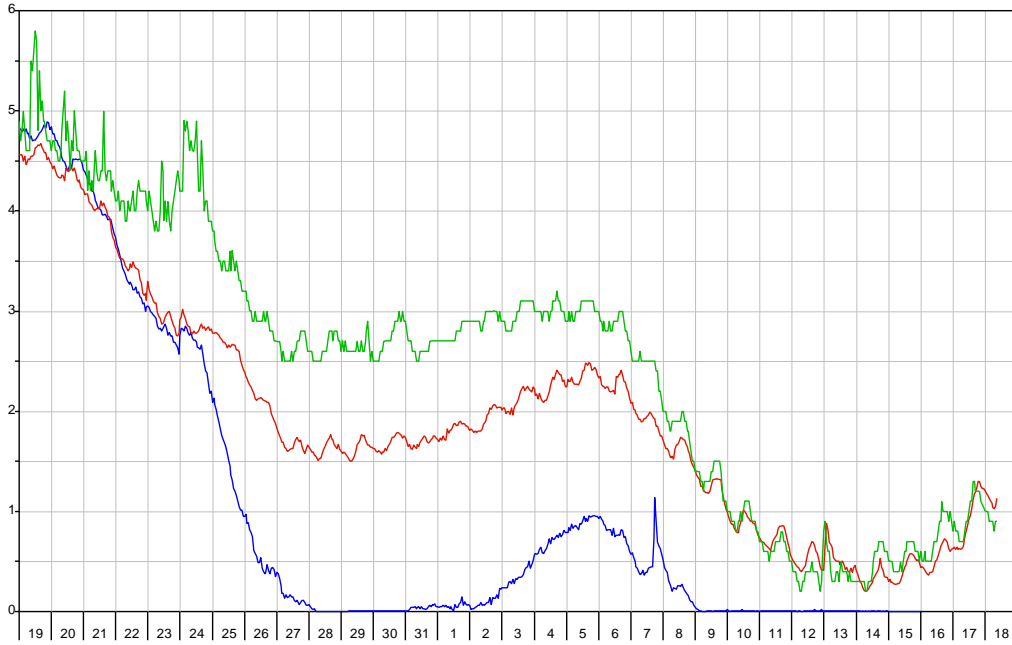


Figure 144: Continuous dissolved oxygen (mg/L) in the Kolety/Edward River

WaterNSW

HYPLOT V134 Output 18/11/2022

Period 31 Day 19/10/2022 to 19/11/2022 2022

— 409047	EDWARD R @ TOONALOOK	2080.001 Hour Inst.	Water Temp(C)	CP
— 409003	EDWARD @ DENILQUIN	2080.001 Hour Inst.	Water Temp(C)	CP
— 409014	EDWARD R @ MOULAMEIN	2080.001 Hour Inst.	Water Temp(C)	CP

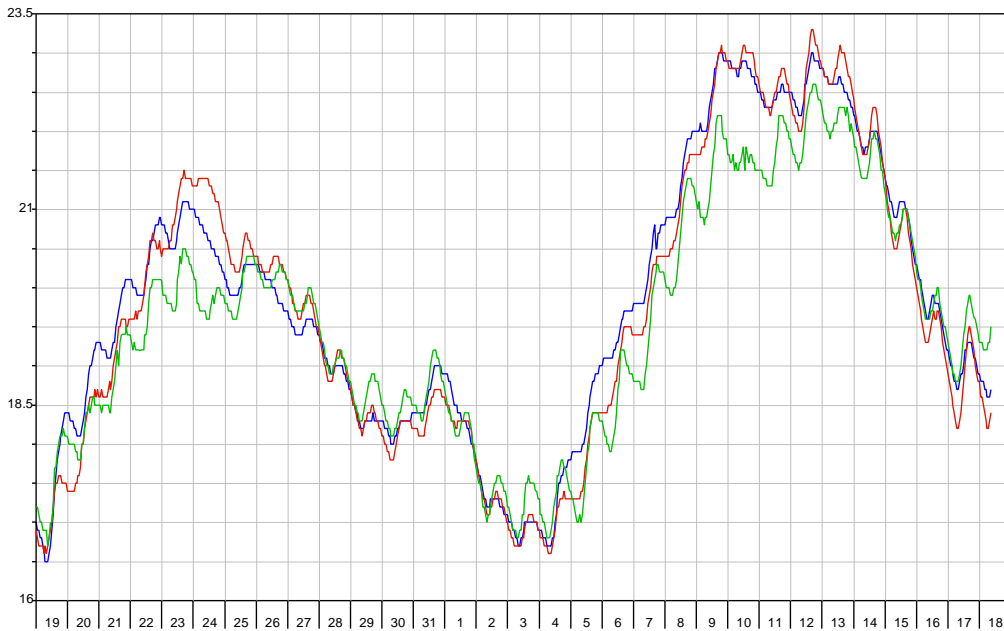


Figure 145: Continuous water temperature (°C) in the Kolety/Edward River

Wakool and Niemur rivers

Discharge in the Wakool River at Coonambit Bridge has peaked and starting to decline. The Niemur River at Barham-Moulamein Road is flowing at over 31,000 ML/day (Figure 146). Dissolved oxygen levels improved during the week, at all fast week, but the Wakool River has now declined to less than 1 mg/L again (Figure 147). Oxygen levels in the Niemur River have also been declining as air temperatures increase with the Mallan school site reading less than 3 mg/L.

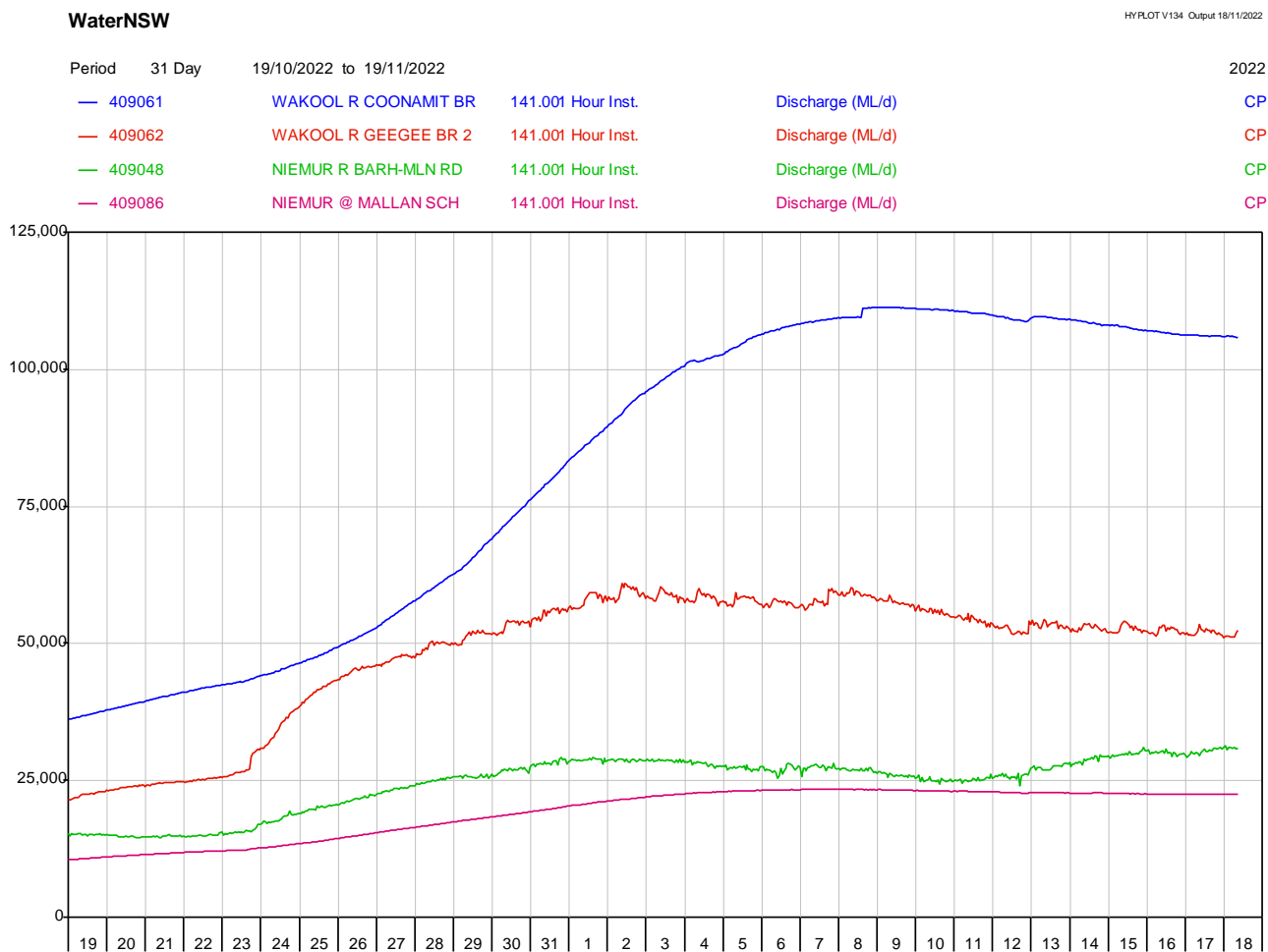


Figure 146: Discharge (ML/day) in the Wakool and Niemur rivers

WaterNSW

HYFLOT V134 Output 18/11/2022

Period 31 Day 19/10/2022 to 19/11/2022 2022

409062	WAKOOL R GEEGEE BR 2	2351.001 Hour Inst.	DO (mg/l)	CP
409013	WAKOOL @ STONEY XING	2351.001 Hour Inst.	DO (mg/l)	CP
409048	NIEMUR R BARH-MLN RD	2351.001 Hour Inst.	DO (mg/l)	CP
409086	NIEMUR @ MALLAN SCH	2351.001 Hour Inst.	DO (mg/l)	CP

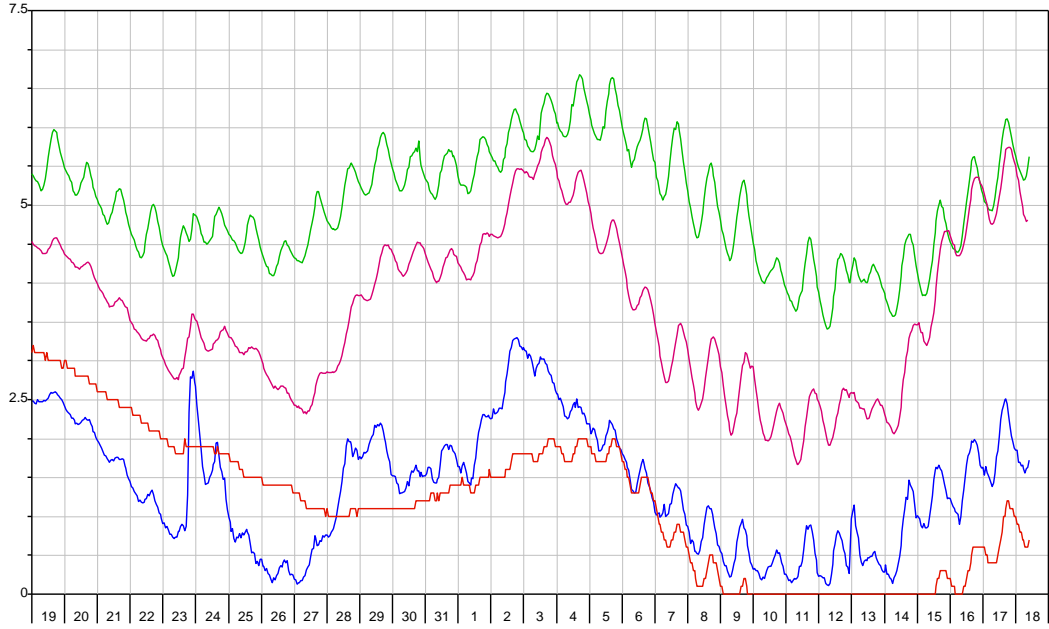


Figure 147: Continuous dissolved oxygen (mg/L) in the Wakool and Niemur rivers

WaterNSW

HYFLOT V134 Output 18/11/2022

Period 31 Day 19/10/2022 to 19/11/2022 2022

409062	WAKOOL R GEEGEE BR 2	2080.001 Hour Inst.	Water Temp(C)	CP
409013	WAKOOL @ STONEY XING	2080.001 Hour Inst.	Water Temp(C)	CP
409048	NIEMUR R BARH-MLN RD	2080.001 Hour Inst.	Water Temp(C)	CP
409086	NIEMUR @ MALLAN SCH	2080.001 Hour Inst.	Water Temp(C)	CP

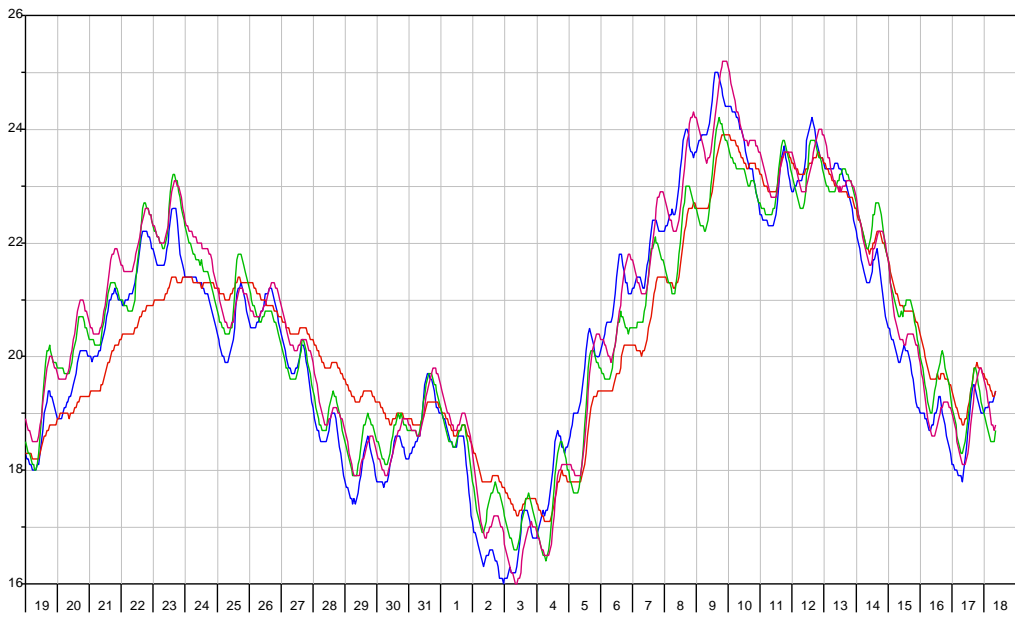


Figure 148: Continuous water temperature (°C) in the Wakool and Niemur rivers

Merran, Thule and Barber creeks

Figure 149 shows dissolved oxygen levels in Little Merran, Barbers and Thule creeks had all dropped to around 0 mg/L but improved with the cooler air temperatures last week (Figure 150). The dissolved oxygen levels at all sites are between 1 and 2.5 mg/L.

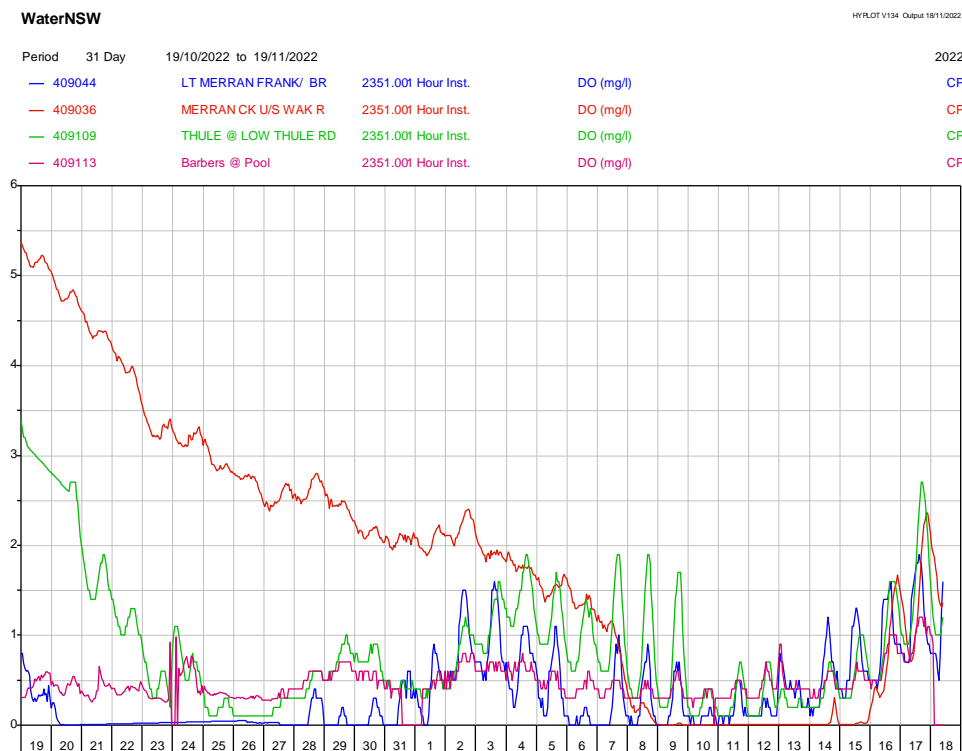


Figure 149: Continuous dissolved oxygen (mg/L) in the Merran, Little Merran, Thule and Barber creeks

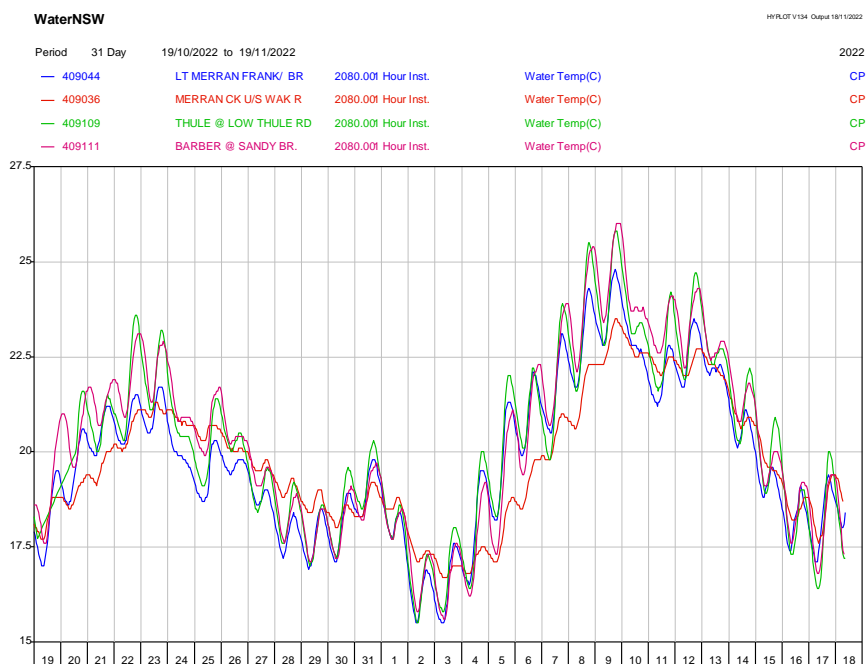


Figure 150: Continuous water temperature (°C) in the Merran, Little Merran, Thule and Barber creeks

Murray River

The Bureau of Meteorology has predicted flooding in the Murray River at Euston to peak over the weekend and to peak near the major flood level at Mildura late next week (25-27 November). River levels will continue to rise at Wentworth into early December.

Monitoring by DELWP is showing the Murray River at Tocumwal, upstream of the Barmah/Millewa Forest, is oxygenated (Figure 151). In the Murray River downstream of the forest at Barmah, dissolved oxygen levels have been the same for all of November (~0.5 mg/L).

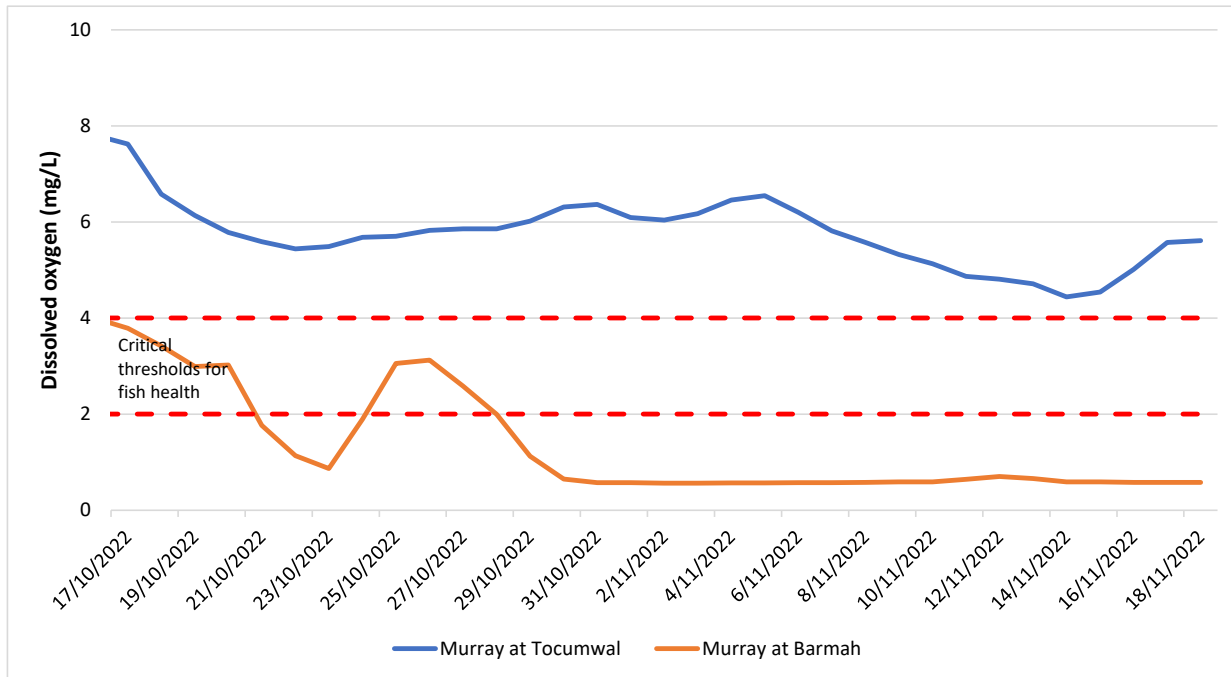


Figure 151: Continuous dissolved oxygen (mg/L) in the Murray River at Tocumwal and Barmah (data courtesy of DELWP)

Dissolved oxygen in the Goulburn River at McCoys Bridge has improved above 4 mg/L and the Campaspe River at Fehrings Lane to over 6 mg/L. The Murray River at Barham had dropped below 1 mg/L but has improved slightly, while further downstream at the Wakool Junction and Colignan levels are less than 2 mg/L (Figure 152). The results from the temporary monitoring site installed in the Murray River downstream of Wentworth have been slowly declining and dropped below the 1 mg/L. Water temperatures have decreased again after the warmer temperatures last week (Figure 153).

Three dissolved oxygen monitoring sites have been added to the DELWP real time data web page. They are on the Murray River at Pental Island pumps 409214 (downstream of Barham), Boundary Bend 414201 (Murrumbidgee junction) and Wemen 414219 (between Boundary Bend and Colignan). On 18 November they were reading 0.06 mg/L, 1.3 mg/L and 2.1 mg/L respectively.

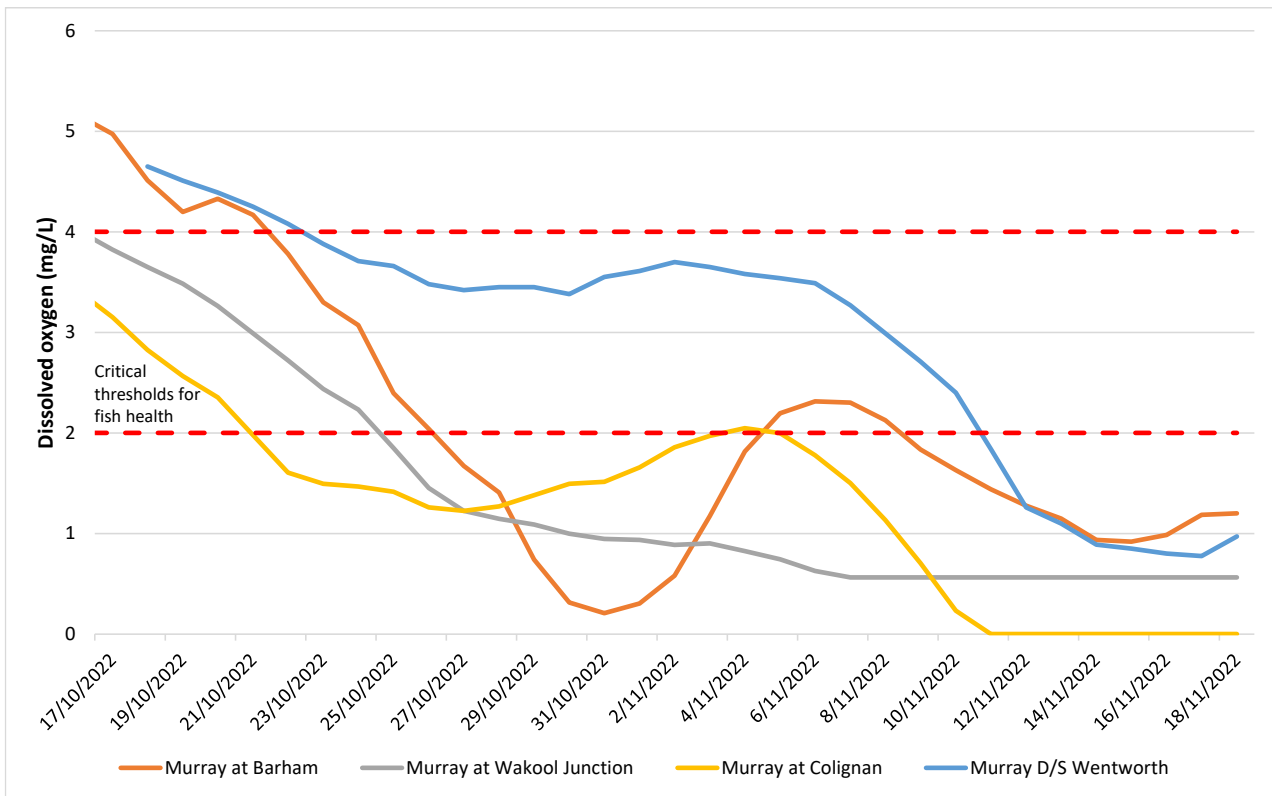


Figure 152: Continuous dissolved oxygen (mg/L) in the Murray River at Barham, below Wakool junction, Colignan and downstream of Wentworth

Handheld reading from Murray River at Merbein 14/11/2022 9:08 was 1.19 mg/L

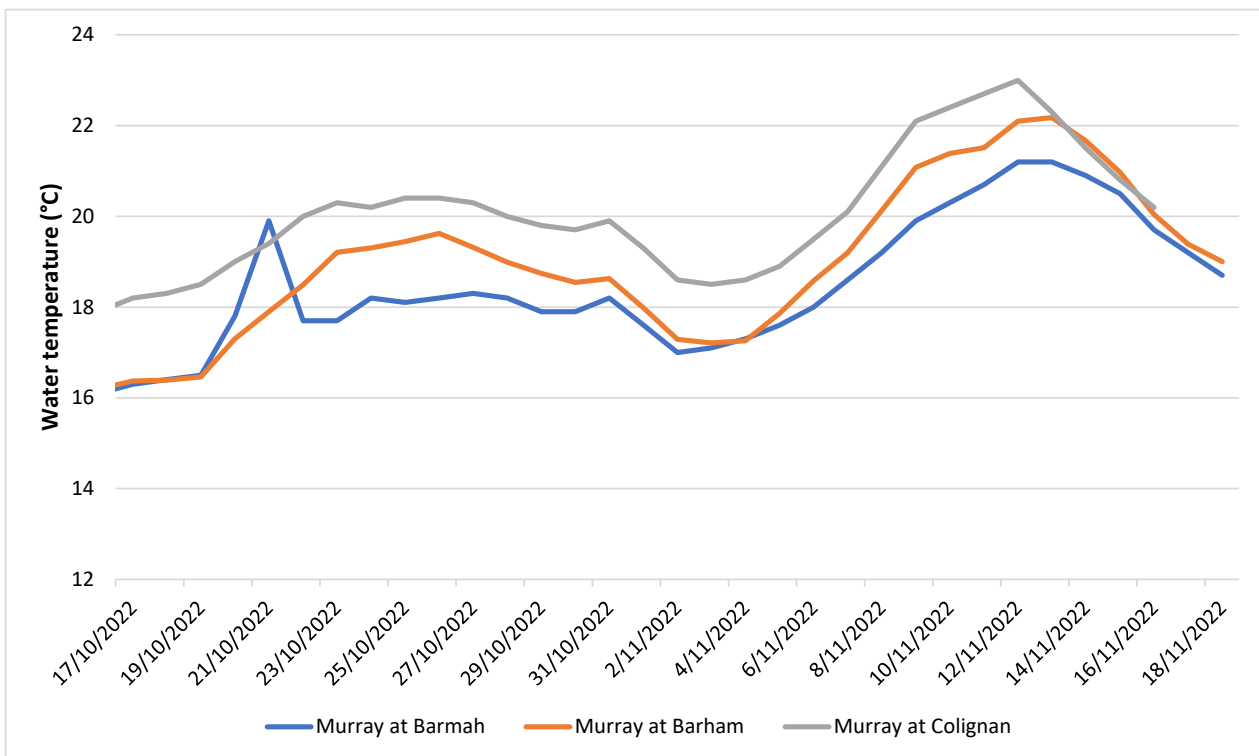


Figure 153: Continuous water temperature (°C) in the Murray River

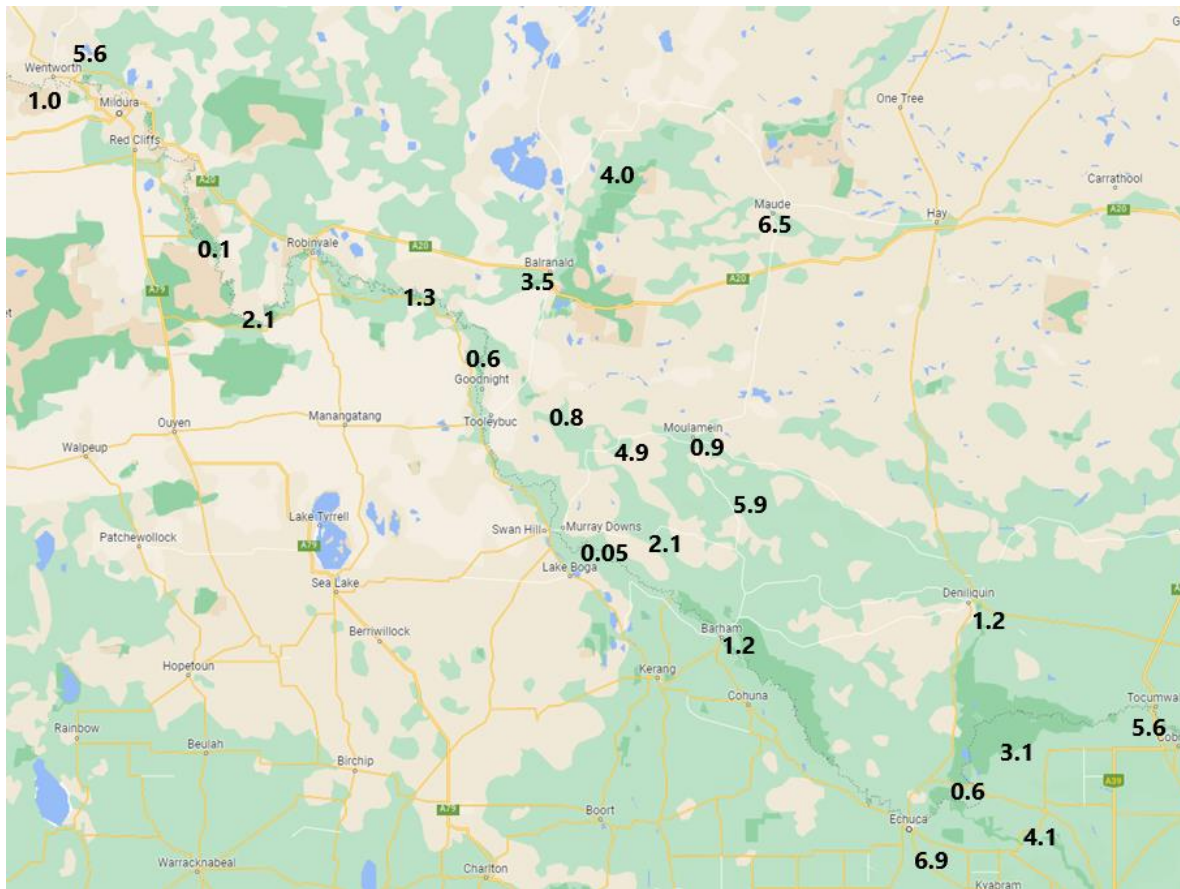


Figure 154: Summary of Southern Basin dissolved oxygen results - 18 November 2022

Weather Outlook

The Bureau of Meteorology 8-day total rain forecast (18 to 25 November) indicates light falls across the north of the state and heavier falls along the NSW/Victorian border and the Southern Alps (Figure 155). The rain will mostly fall over the weekend. Forecast is for warmer air temperatures for Echuca and Mildura over the weekend before another low and cold front brings showers and cooler air temperatures during the week (Figure 156 and Figure 157).

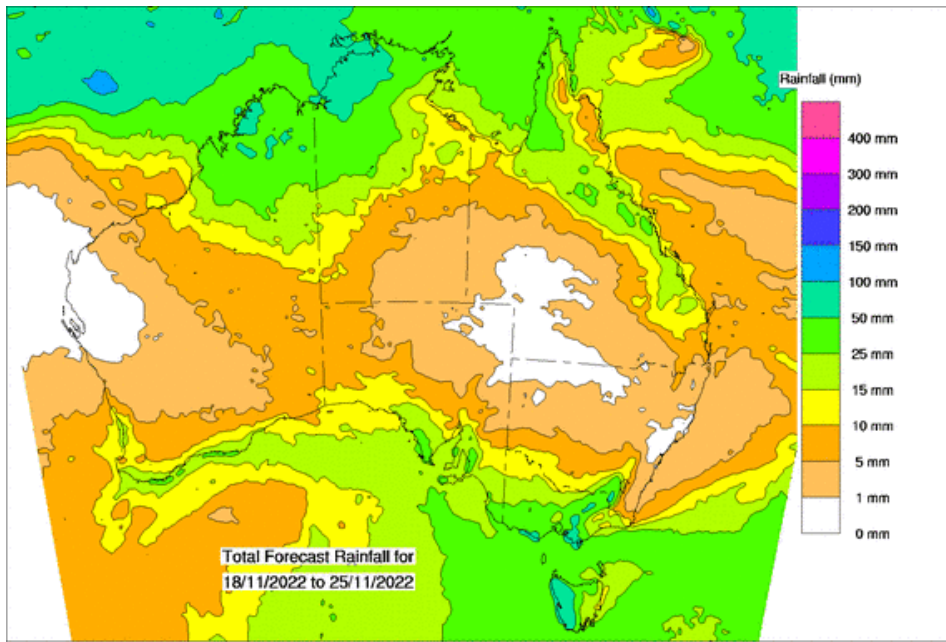


Figure 155: Bureau of Meteorology 8-day total rain forecast (18 to 25 November)

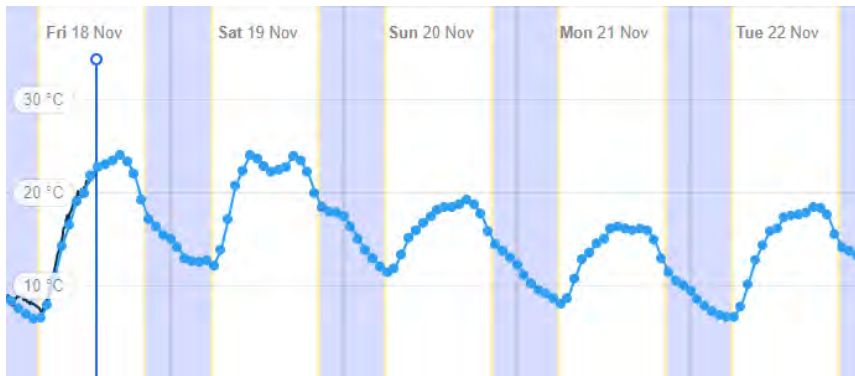


Figure 156: Forecast air temperatures for Echuca 18 to 22 November

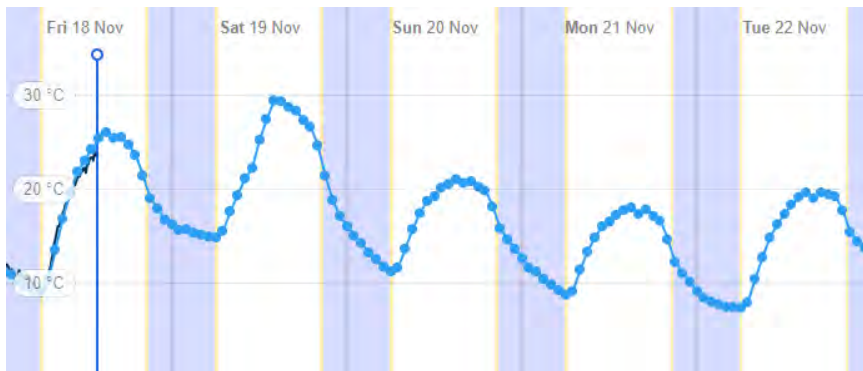


Figure 157: Forecast air temperatures for Mildura 18 to 22 November

Water quality update, Meeting No. 8 – 28 November 2022

Northern Basin

Barwon River

Discharge is slowly decreasing in the Barwon River. Flow at Brewarrina is around 100,000 ML/day (Figure 158). Figure 159 is a satellite-derived Sentinel colour infrared image showing the inundation of large areas in the Barwon and Darling River catchments.

Dissolved oxygen in the Barwon River at Walgett and Geera have been slowly improving above the 2 mg/L threshold. Levels at Brewarrina are fluctuating around 4 mg/L (Figure 160). There have been no reports of fish deaths or fish gasping at the water surface.

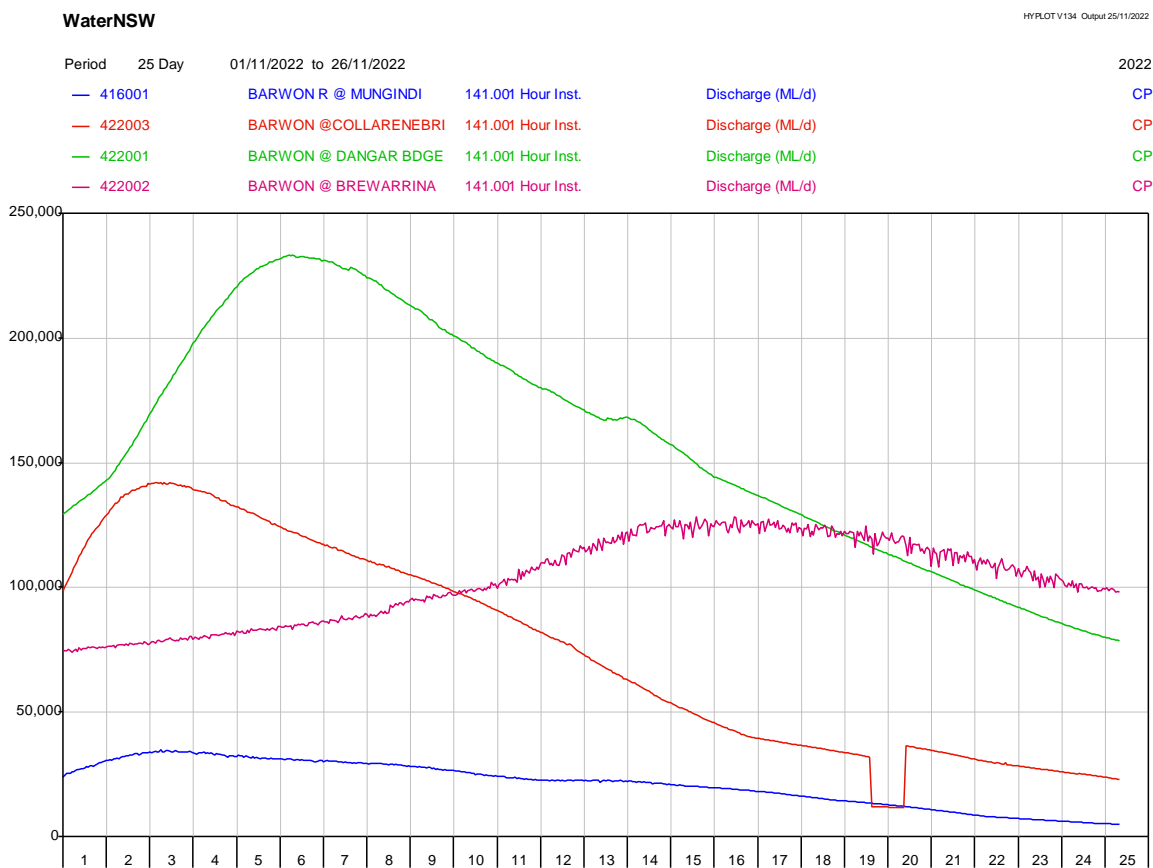


Figure 158: Discharge (ML/day) in the Barwon River

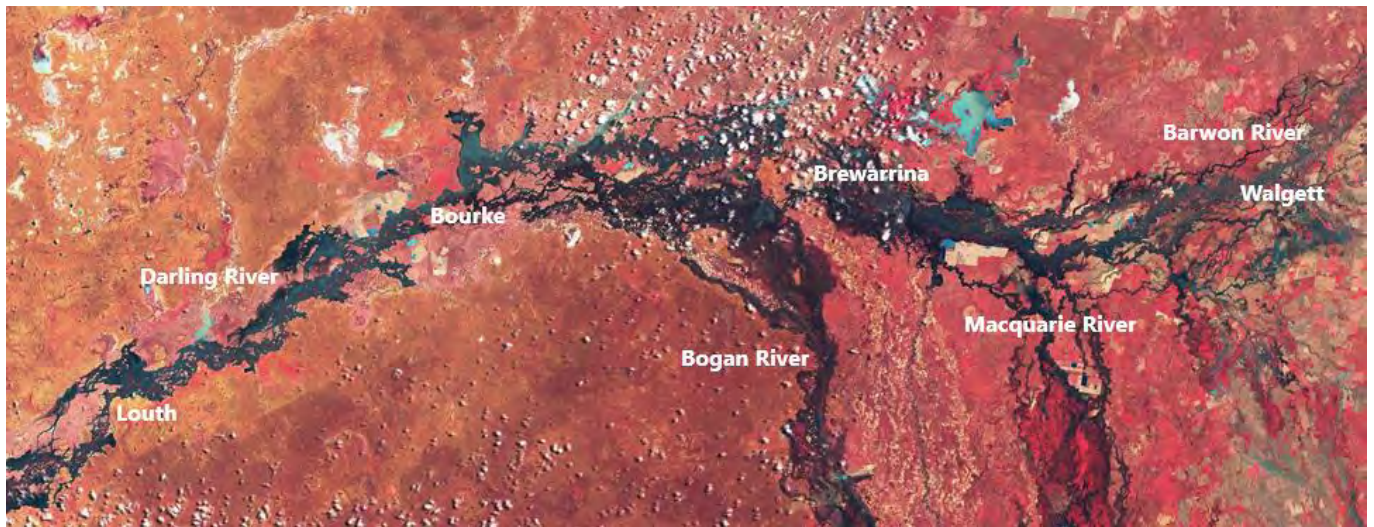


Figure 159: Satellite-derived Sentinel colour infrared image of the Barwon and Darling Rivers

WaterNSW

HYPLOT V134 Output 25/11/2022

Period 25 Day 01/11/2022 to 26/11/2022

2022

— 422003	BARWON @ COLLARENEBRI	2351.00l Hour Inst.	DO (mg/l)	CP
— 422001	BARWON @ DANGAR BDGE	2351.00l Hour Inst.	DO (mg/l)	CP
— 422027	BARWON @ GEERA	2351.00l Hour Inst.	DO (mg/l)	CP
— 422002	BARWON @ BREWARRINA	2351.00l Hour Inst.	DO (mg/l)	CP

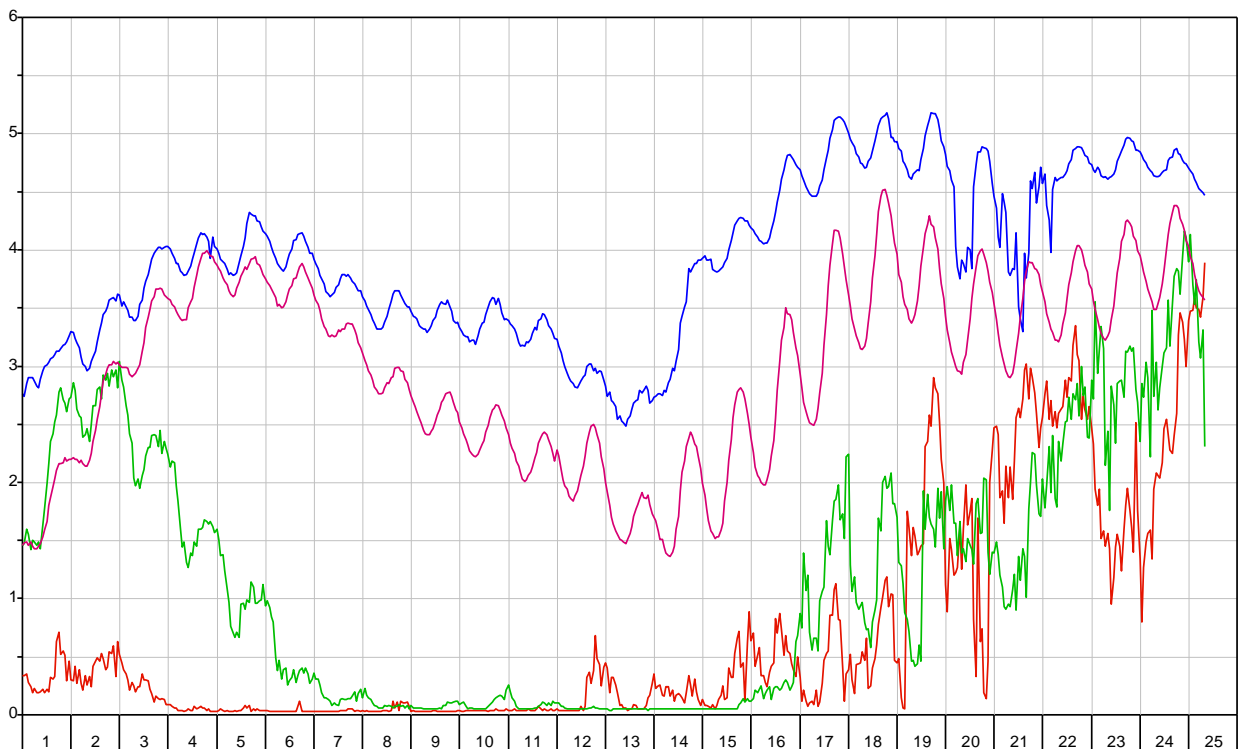


Figure 160: Continuous dissolved oxygen (mg/L) in the Barwon River

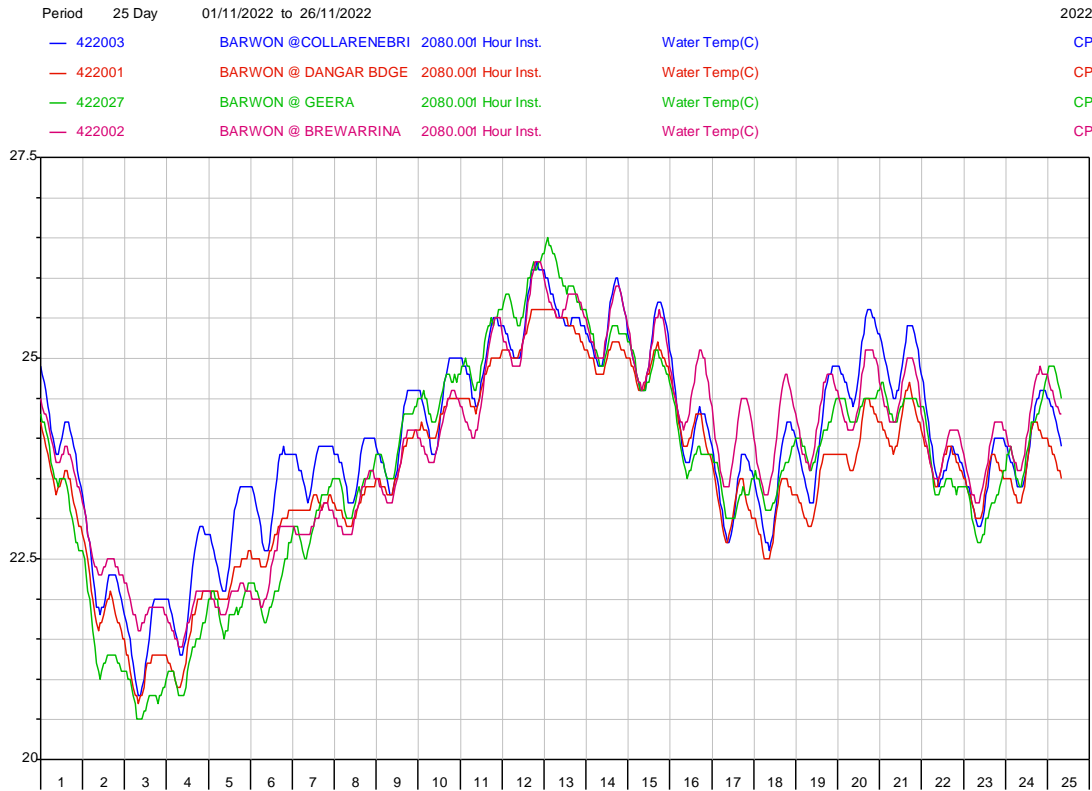


Figure 161: Continuous water temperature (°C) in the Barwon River

Darling River

Discharge is continuing to increase at Bourke (200,000 ML/day) and Louth (142,000 ML/day) and is over 32,000 ML/day at Wilcannia (Figure 162). Discharge at Weir 32 is around 32,000 ML/day and just over 17,500 ML/day at Burtundy.

Dissolved oxygen in the Darling River at Bourke and Burtundy improved during the week. Levels in the Darling River at Wilcannia have just started dropping below 4 mg/L overnight (Figure 163).

WaterNSW

HYPLOT V134 Output 25/11/2022

Period	25 Day	01/11/2022 to 26/11/2022	2022
425004	DARLING@LOUTH	141.001 Hour Inst.	Discharge (ML/d) CP
425008	DARLING@WILC. MAIN C	141.001 Hour Inst.	Discharge (ML/d) CP
425012	DARLING@U/S WEIR 32	141.001 Hour Inst.	Discharge (ML/d) CP
425007	DARLING@BURTUNDY	141.001 Hour Inst.	Discharge (ML/d) CP

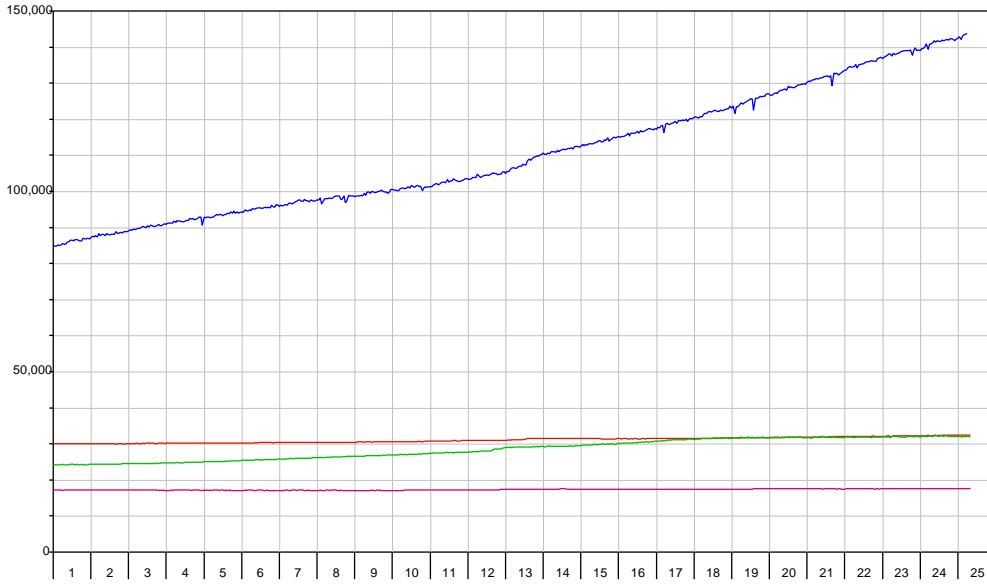


Figure 162: Discharge (ML/day) in the upper Darling River

WaterNSW

HYPLOT V134 Output 25/11/2022

Period	25 Day	01/11/2022 to 26/11/2022	2022
425003	DARLING@BOURKE TOWN	2351.001 Hour Inst.	DO (mg/l) CP
425058	Darling R @ Moorabin	2351.001 Hour Inst.	DO (mg/l) CP
425012	DARLING@U/S WEIR 32	2351.001 Hour Inst.	DO (mg/l) CP
425007	DARLING@BURTUNDY	2351.001 Hour Inst.	DO (mg/l) CP

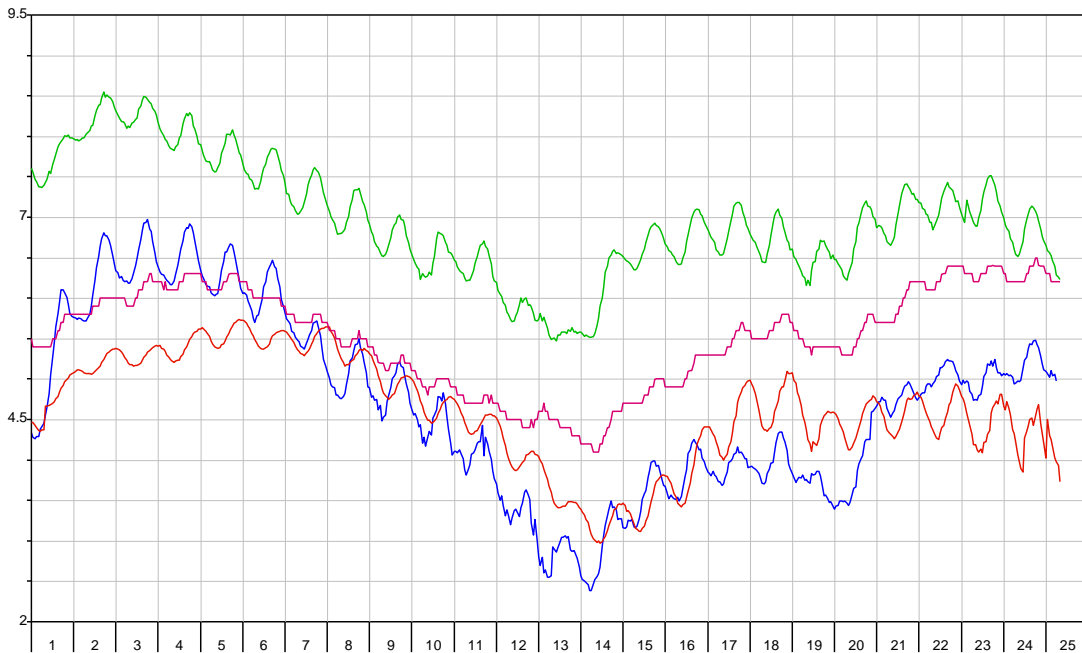


Figure 163: Continuous dissolved oxygen (mg/L) in the Darling River

Handheld result from the Darling River at Burtundy 22/11/2022 10:12 was 5.8 mg/L.

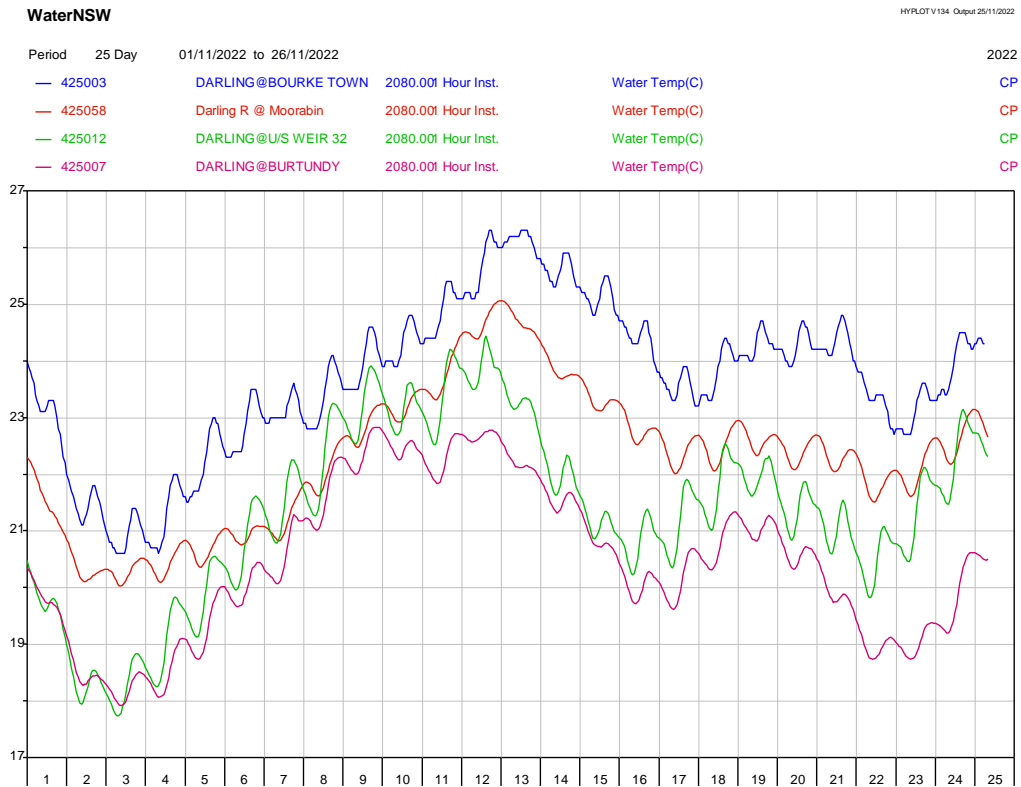


Figure 164: Continuous water temperature (°C) in the Darling River

An additional temporary dissolved oxygen monitoring site has been installed by WaterNSW at Nelia Gaari on the Darling River upstream of Lake Wetherell in preparation for the potential arrival of low floodwaters from upstream (Figure 165). On Friday morning (25/11/2022) the dissolved oxygen was 5.4 mg/L.

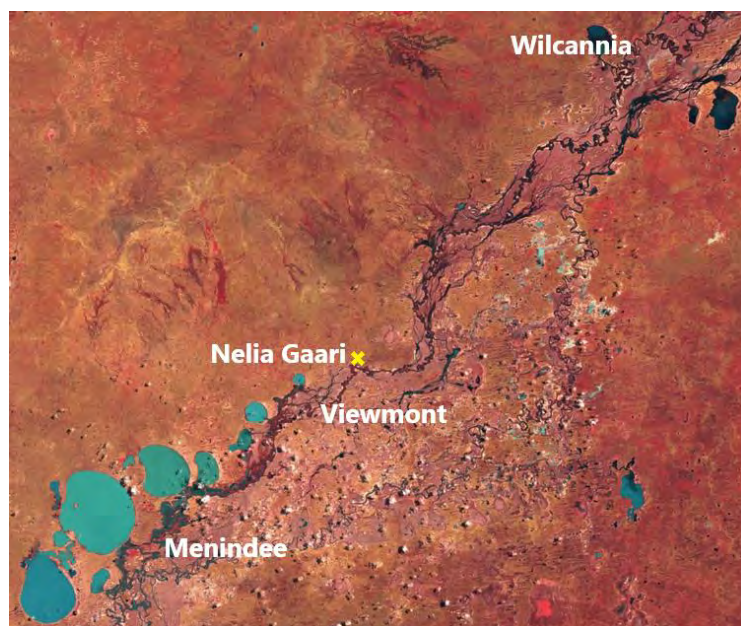


Figure 165: Location of temporary dissolved oxygen monitoring site at Nelia Gaari

Data from the Menindee Lake water quality monitoring program collected by WaterNSW shows dissolved oxygen is at safe levels for fish health across at all sites (Table 6). No profile data was collected. Site locations shown in Figure 166.

Turbidity ranged from 38 NTU at Lake Wetherell Site 1 (N1087) to 365 NTU at Lake Menindee (N1130).

Table 6: Handheld dissolved oxygen results for Menindee Lakes

Site number	Site name	Sample date	Dissolved oxygen (mg/L)	Water temperature (°C)
N1087	Lake Wetherell Site 1	21/11/2022 9:12	5.5	21.9
N1088	Lake Wetherell Site 2	21/11/2022 9:49	5.5	22.0
N1089	Lake Wetherell Site 3	21/11/2022 10:37	6.5	21.6
N1090	Lake Wetherell Site 4/Main weir	21/11/2022 13:19	7.3	21.1
N1091	Lake Tandure	21/11/2022 12:45	10.0	19.6
N1092	Lake Pamamaroo inlet	21/11/2022 13:10	7.6	21.2
N1129	Lake Pamamaroo centre	21/11/2022 13:55	8.9	19.2
N1093	Lake Pamamaroo outlet	21/11/2022 13:30	9.1	20.8
N1094	Menindee Lakes at Copi Hollow	21/11/2022 14:08	9.3	20.7
N1130	Lake Menindee	21/11/2022 14:35	9.2	19.7
N1128	Lake Cawndilla outlet	21/11/2022 15:23	10.3	20.1
N1095	Darling River at BHWB pumping station Menindee	22/11/2022 8:16	6.9	19.5
N1085	Darling River at Menindee town	22/11/2022 8:04	6.8	19.5
N1086	Darling River at Weir 32	22/11/2022 7:36	7.2	19.4
N1041	Darling River at Burtundy	22/11/2022 10:12	5.8	19.7

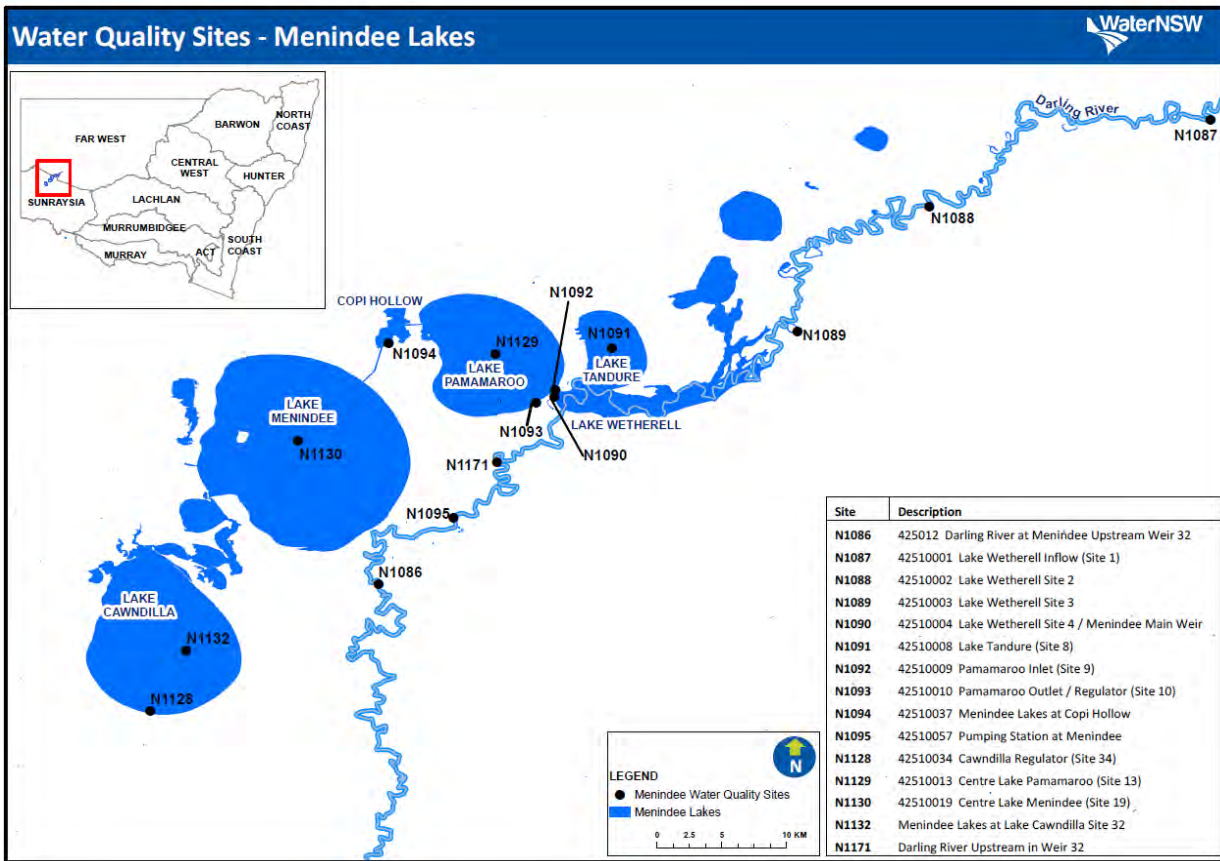


Figure 166: Location of Menindee Lakes water quality monitoring sites

Southern Basin

Lachlan River

Flooding continues in the Lachlan River (Figure 167 Figure 7) with major flooding at Condobolin and Euabalong. Despite the major flooding, dissolved oxygen readings at most sites is above 4 mg/L. Dissolved oxygen in the Lachlan River at Lake Cargelligo Weir has dropped suddenly to almost 0 mg/L (Figure 168).

WaterNSW

HYPLOT V134 Output 25/11/2022

Period	25 Day	01/11/2022 to 26/11/2022		2022
— 412004	LACHLAN FORBES CTTNS	141.001 Hour Inst.	Discharge (ML/d)	CP
— 412006	LACHLAN CONDOBOLIN B	141.001 Hour Inst.	Discharge (ML/d)	CP
— 412011	LACHLAN LAKE C WEIR	141.001 Hour Inst.	Discharge (ML/d)	CP
— 412039	LACHLAN HILLSTON WR	141.001 Hour Inst.	Discharge (ML/d)	CP
— 412005	LACHLAN @ BOOLIGAL	141.001 Hour Inst.	Discharge (ML/d)	CP

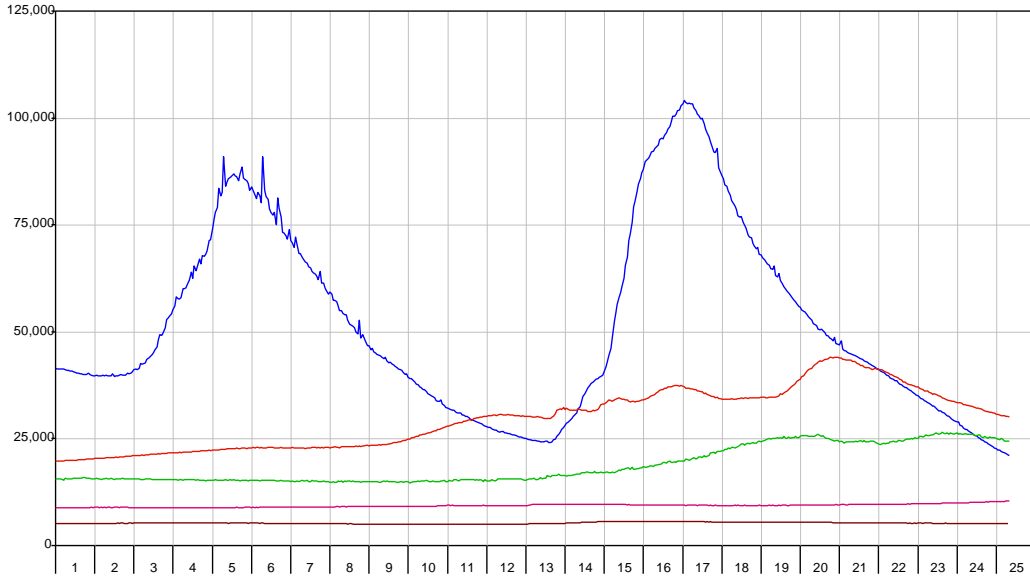


Figure 167: Discharge (ML/day) in the Lachlan River

WaterNSW

HYPLOT V134 Output 25/11/2022

Period	25 Day	01/11/2022 to 26/11/2022		2022
— 412004	LACHLAN FORBES CTTNS	2351.001 Hour Inst.	DO (mg/l)	CP
— 412006	LACHLAN CONDOBOLIN B	2351.001 Hour Inst.	DO (mg/l)	CP
— 412011	LACHLAN LAKE C WEIR	2351.001 Hour Inst.	DO (mg/l)	CP
— 412039	LACHLAN HILLSTON WR	2351.001 Hour Inst.	DO (mg/l)	CP
— 412005	LACHLAN @ BOOLIGAL	2351.001 Hour Inst.	DO (mg/l)	CP

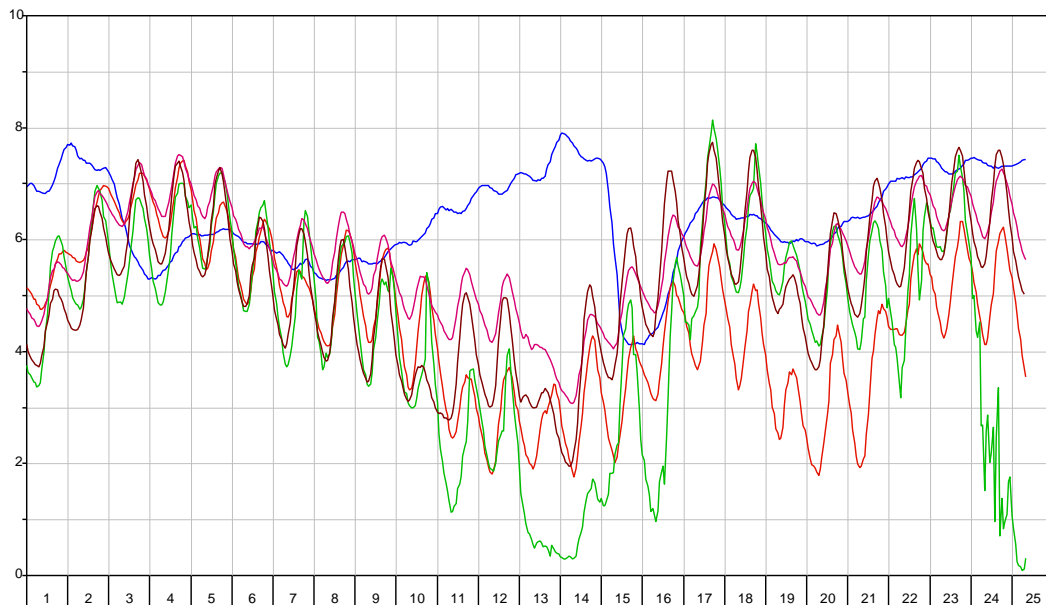


Figure 168: Continuous dissolved oxygen (mg/L) in the Lachlan River

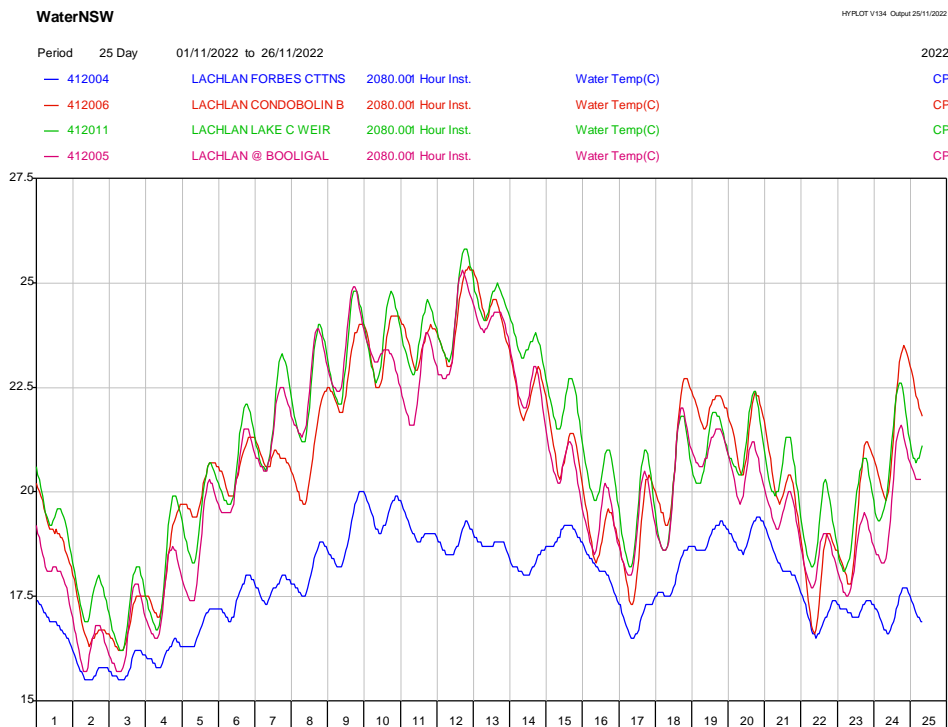


Figure 169: Continuous water temperature (°C) in the Lachlan River

Murrumbidgee River

River levels in the Murrumbidgee River at Wagga Wagga, Gogeldrie Weir and Hay are continuing to fall. Discharge is still increasing in the lower Murrumbidgee with over 48,000 ML/day at Balranald (Figure 171Figure 9).

Dissolved oxygen improved slightly at all three monitoring sites in response to the cooler temperatures during the week. The Murrumbidgee River at Redbank and Balranald are both fluctuating around the 4 mg/L threshold (Figure 172).

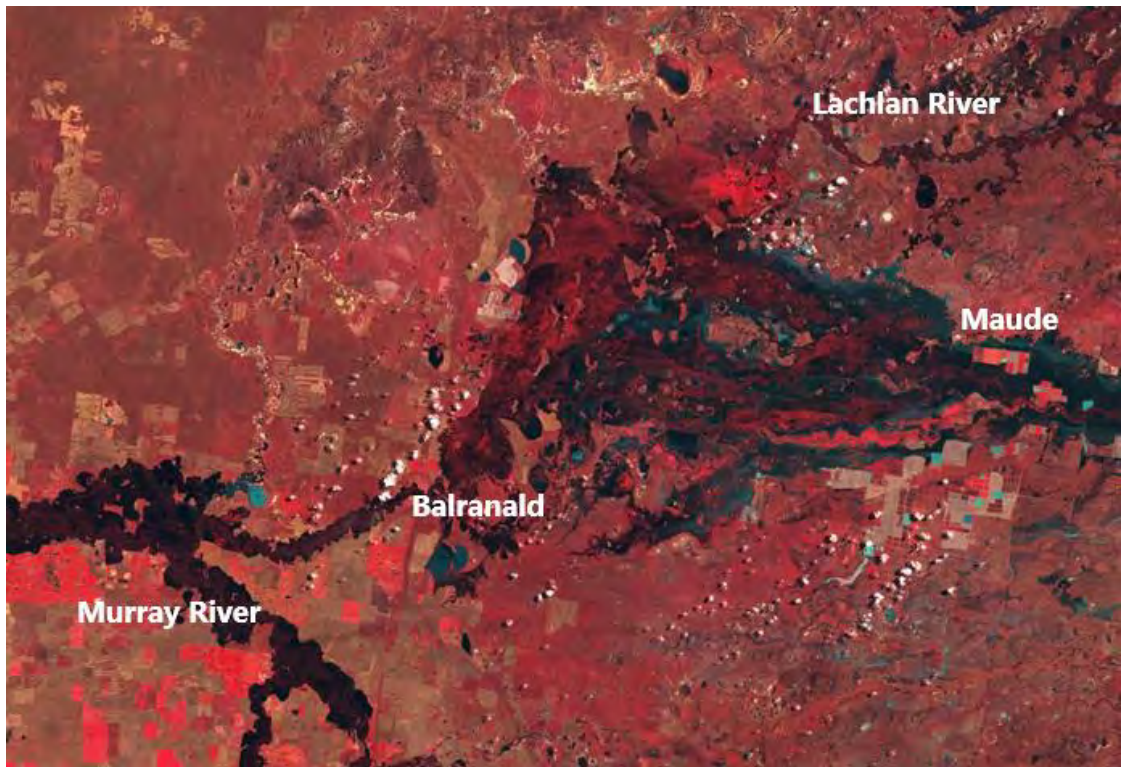


Figure 170: False colour Landsat satellite image of the lower Murrumbidgee floodplain

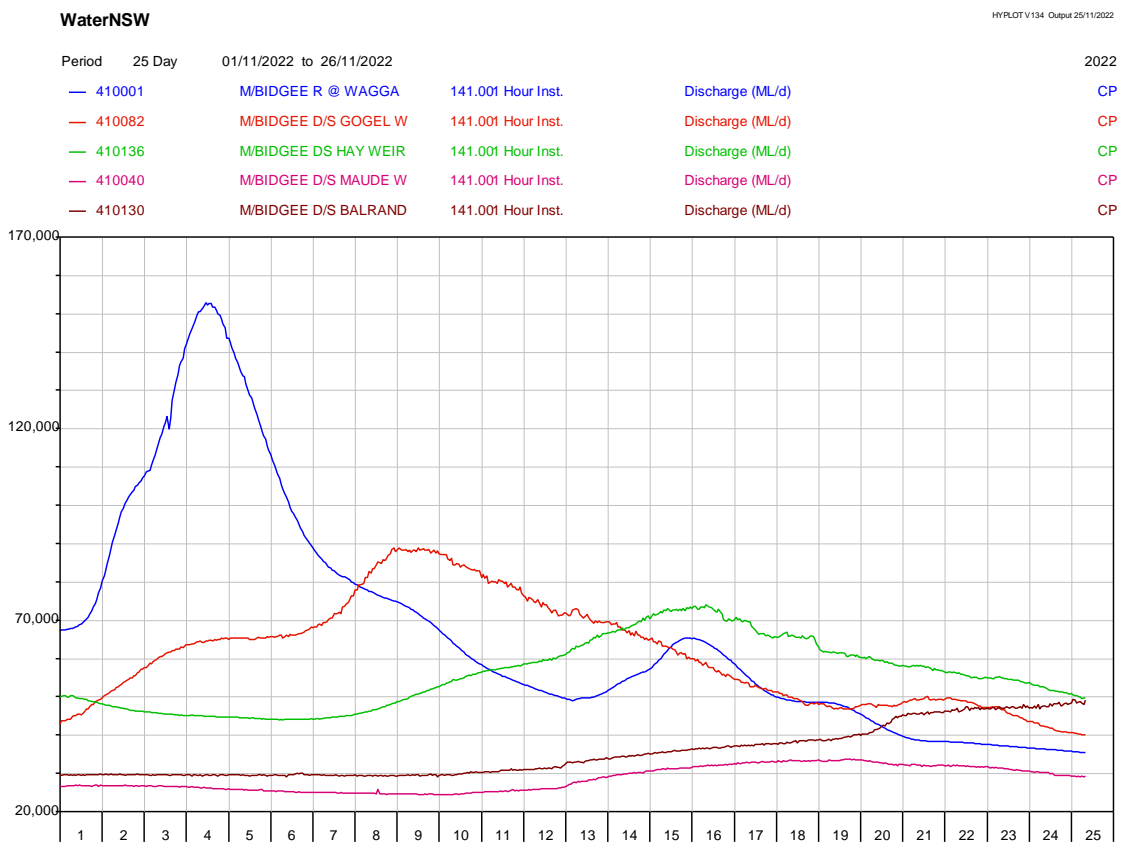


Figure 171: Discharge (ML/day) in the Murrumbidgee River

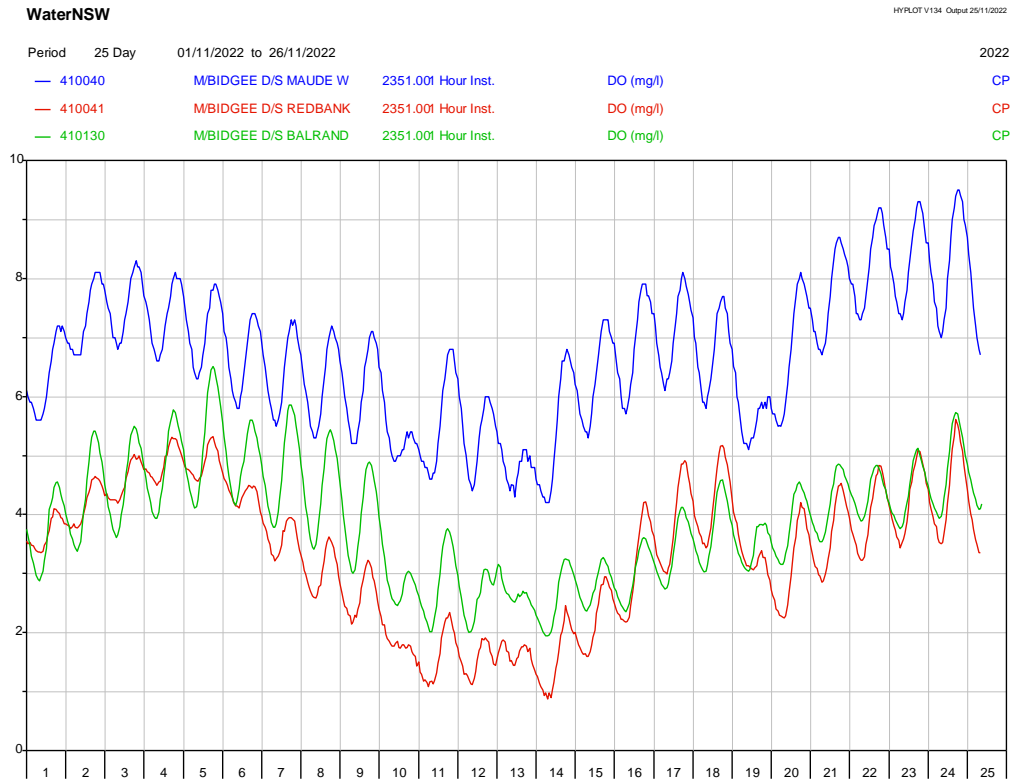


Figure 172: Continuous dissolved oxygen (mg/L) in the Murrumbidgee River

Handheld result from the Murrumbidgee River at Balranald (22/11/2022 13:56) was 3.6 mg/L.

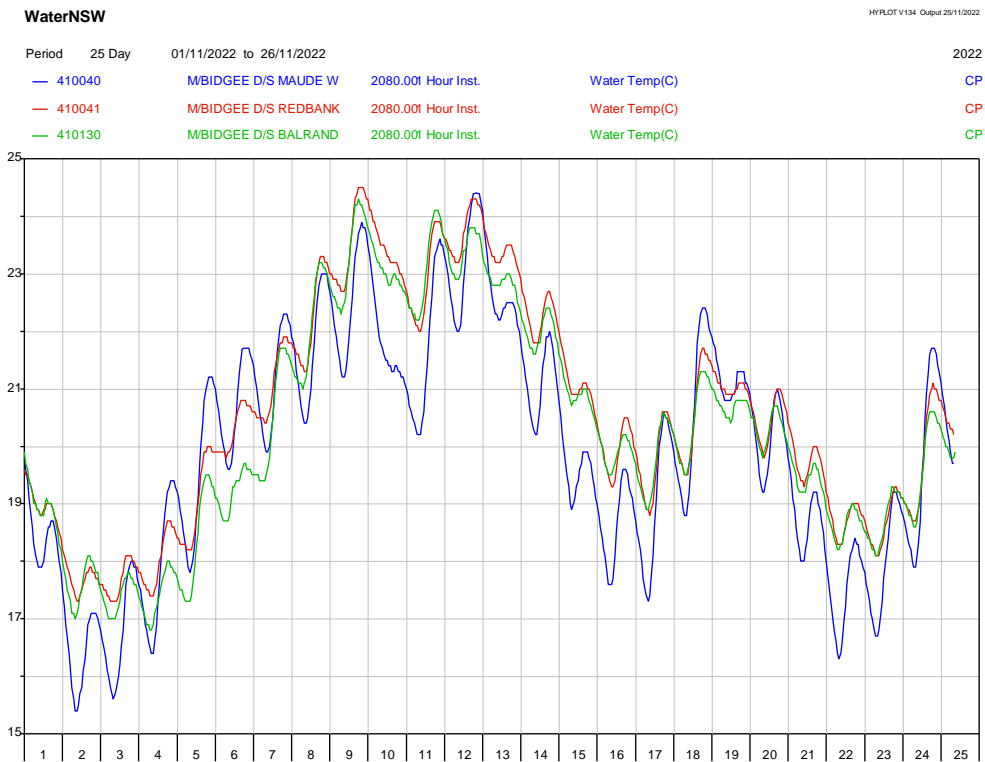


Figure 173: Continuous water temperature (°C) in the Murrumbidgee River

Kolety/Edward River

Discharge in the Kolety/Edward River at Deniliquin has peaked at over 102,000 ML/day (Figure 174). Flow at Moulamein has increased to the major flooding level with around 9,000 ML/day in Billabong Creek at Darlot. Dissolved oxygen at Deniliquin and Moulamein had been improving during the week but have dropped again with an increase in water temperature (Figure 176). CSU monitoring downstream of Stevens Weir (14/11/2022 12:20) showed better dissolved oxygen (2.87 mg/L) than the results from the two sensors.

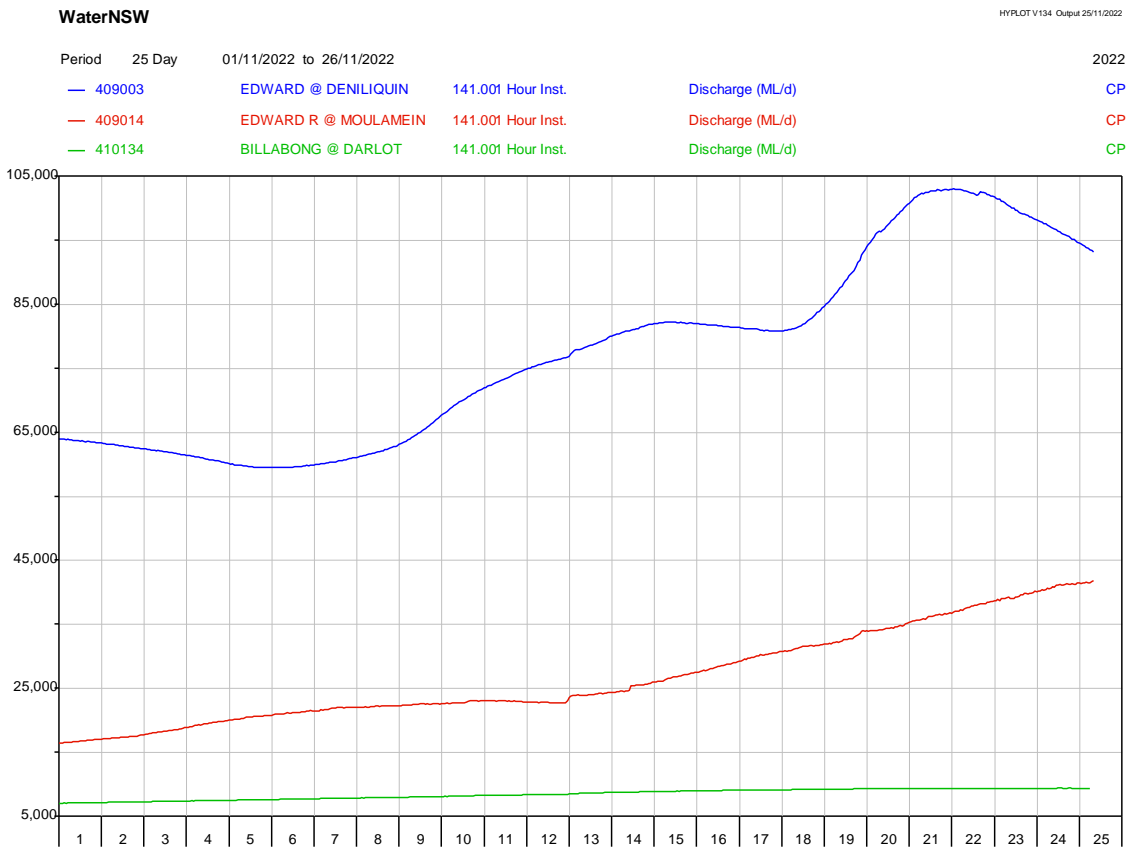


Figure 174: Discharge (ML/day) in the Kolety/Edward River

WaterNSW

HYPLOT V134 Output 25/11/2022

Period 25 Day 01/11/2022 to 26/11/2022

2022

— 409003 EDWARD @ DENILIQVIN 2351.00l Hour Inst. DO (mg/l) CP
— 409014 EDWARD R @ MOULAMEIN 2351.00l Hour Inst. DO (mg/l) CP

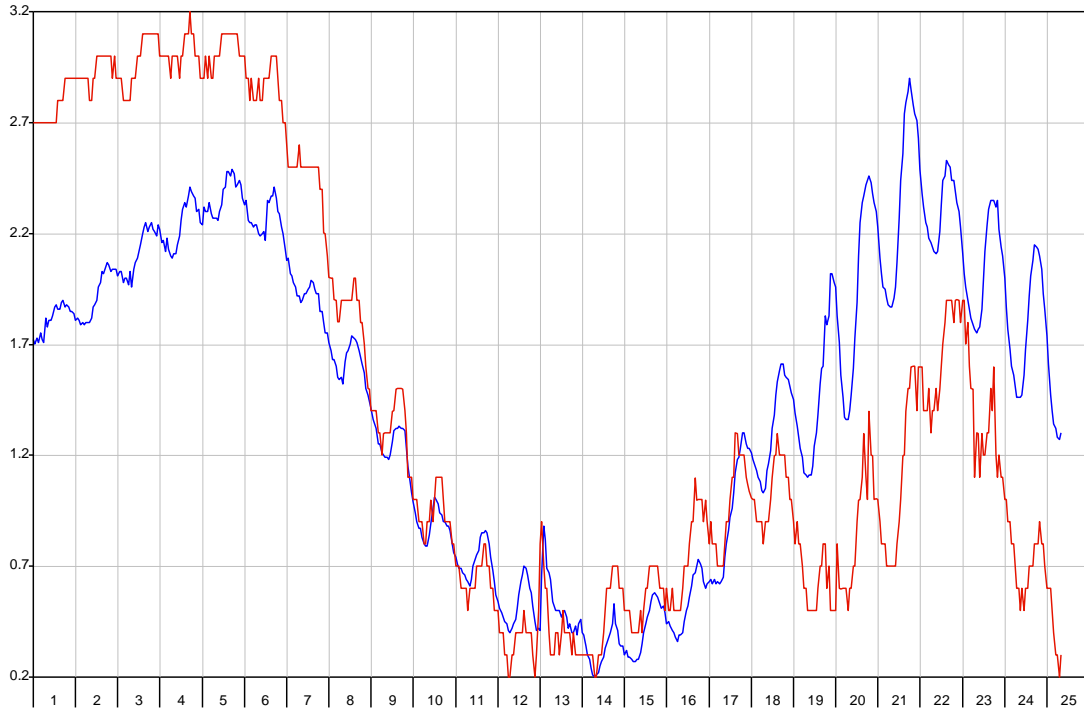


Figure 175: Continuous dissolved oxygen (mg/L) in the Kolety/Edward River

WaterNSW

HYPLOT V134 Output 25/11/2022

Period 25 Day 01/11/2022 to 26/11/2022

2022

— 409047 EDWARD R @ TOONALOOK 2080.00l Hour Inst. Water Temp(C) CP
— 409003 EDWARD @ DENILIQVIN 2080.00l Hour Inst. Water Temp(C) CP
— 409014 EDWARD R @ MOULAMEIN 2080.00l Hour Inst. Water Temp(C) CP

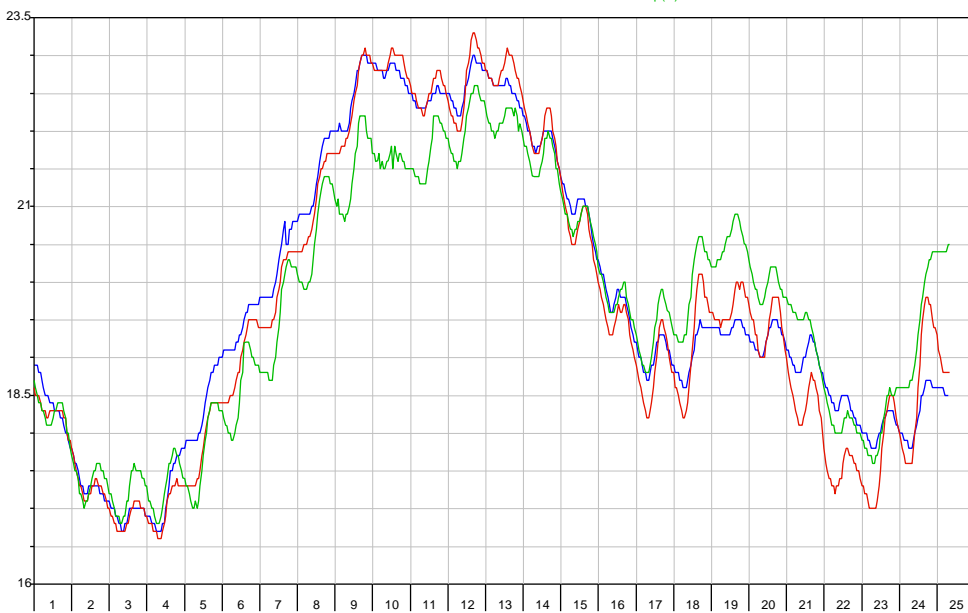


Figure 176: Continuous water temperature (°C) in the Kolety/Edward River

Wakool and Niemur rivers

Discharge in the Wakool River at Coonambit Bridge has peaked and slowly starting to decline. The Niemur River at Barham-Moulamein Road is flowing at over 31,000 ML/day (Figure 177).

Dissolved oxygen levels in the Niemur River have improved above 5 mg/L (Figure 178). Sensor results have been confirmed by results from CSU monitoring. At Niemur Moulamein-Barham Rd (15/11/2022 8:35) dissolved oxygen was 4.33 mg/L and at Niemur Mallan School (15/11/2022 9:20), 3.68 mg/L. Dissolved oxygen levels improved above 2 mg/L in the Wakool River at Gee Gee Bridge but remain below 2 mg/L at Stoney Crossing.

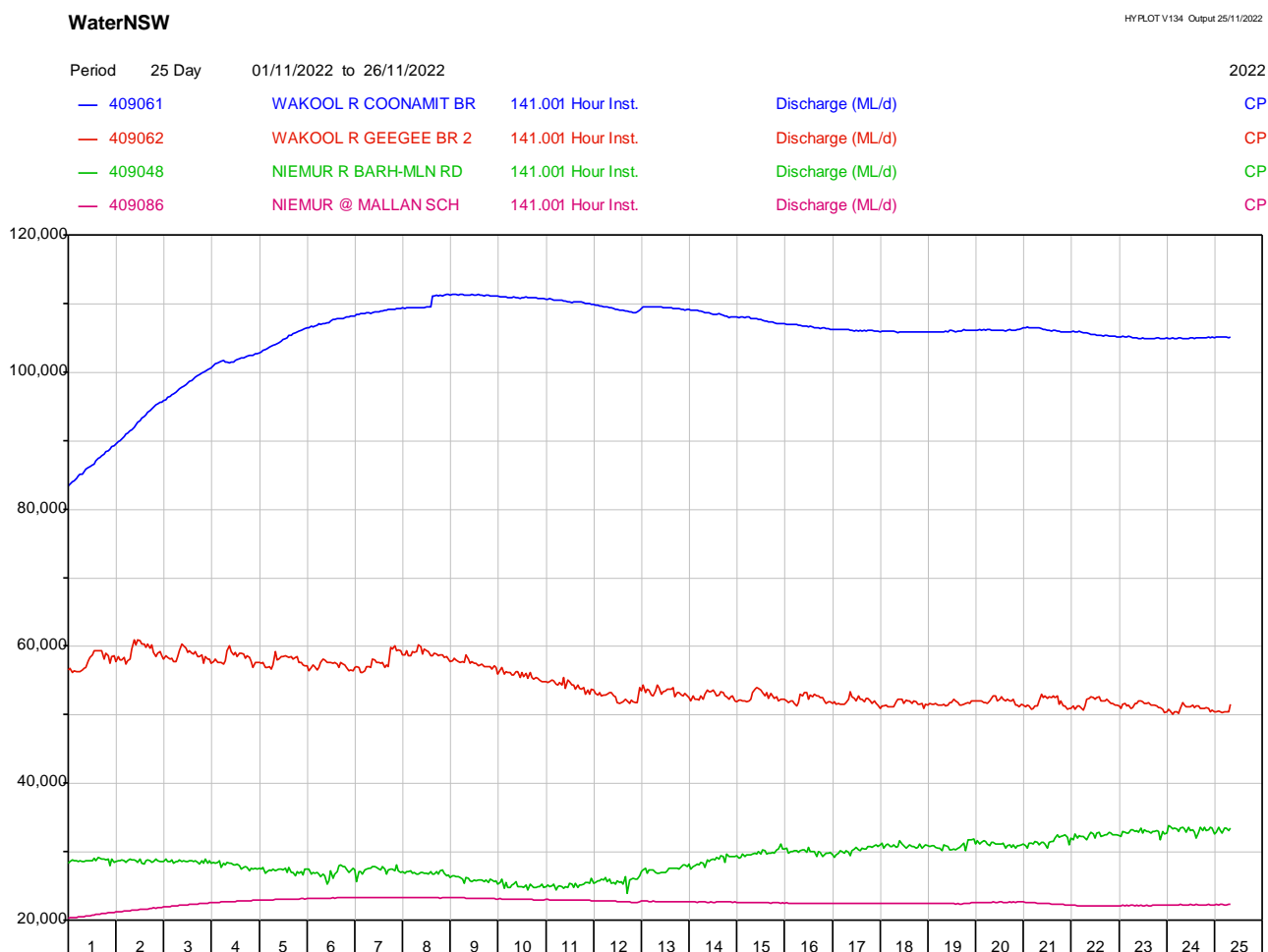


Figure 177: Discharge (ML/day) in the Wakool and Niemur rivers

WaterNSW

HYPLOT V134 Output 25/11/2022

Period 25 Day 01/11/2022 to 26/11/2022

2022

409062	WAKOOL R GEEGEE BR 2	2351.001 Hour Inst.	DO (mg/l)	CP
409013	WAKOOL @ STONEY XING	2351.001 Hour Inst.	DO (mg/l)	CP
409048	NIEMUR R BARH-MLN RD	2351.001 Hour Inst.	DO (mg/l)	CP
409086	NIEMUR @ MALLAN SCH	2351.001 Hour Inst.	DO (mg/l)	CP

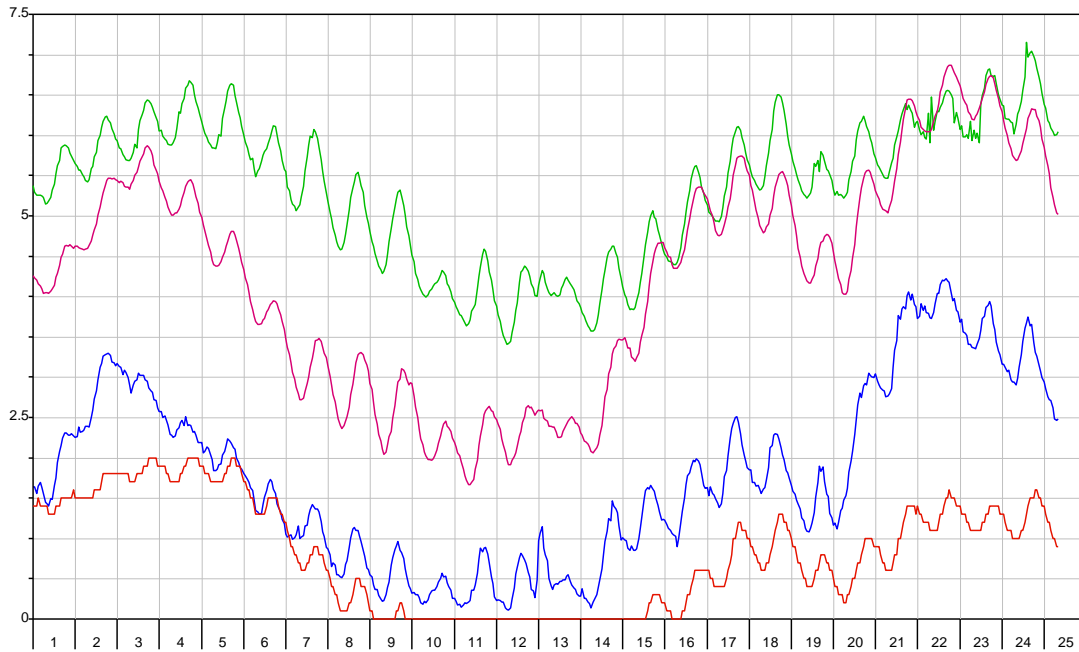


Figure 178: Continuous dissolved oxygen (mg/L) in the Wakool and Niemur rivers

WaterNSW

HYPLOT V134 Output 25/11/2022

Period 25 Day 01/11/2022 to 26/11/2022

2022

409062	WAKOOL R GEEGEE BR 2	2080.001 Hour Inst.	Water Temp(C)	CP
409013	WAKOOL @ STONEY XING	2080.001 Hour Inst.	Water Temp(C)	CP
409048	NIEMUR R BARH-MLN RD	2080.001 Hour Inst.	Water Temp(C)	CP
409086	NIEMUR @ MALLAN SCH	2080.001 Hour Inst.	Water Temp(C)	CP

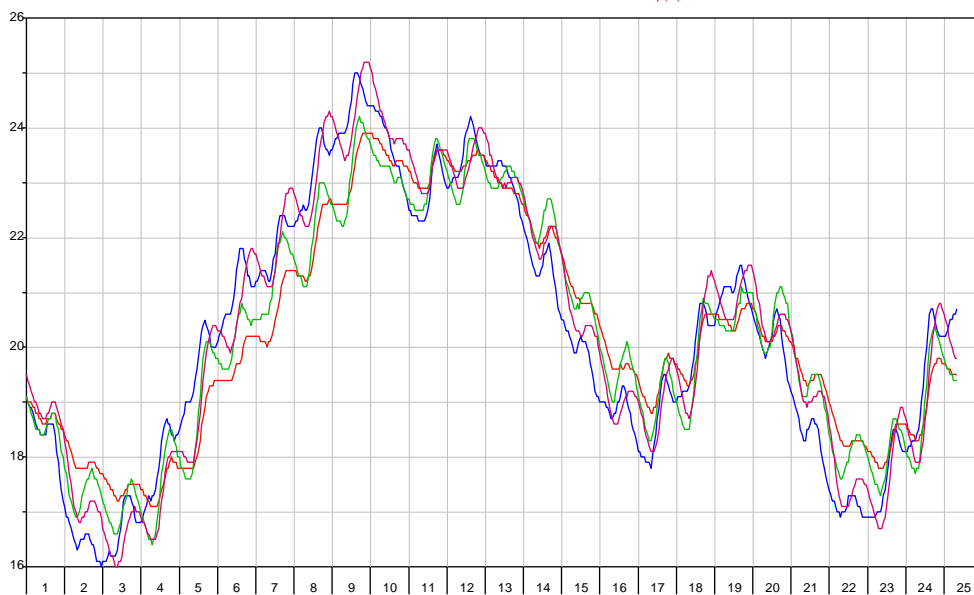


Figure 179: Continuous water temperature (°C) in the Wakool and Niemur rivers

Merran, Thule and Barber creeks

Figure 180 shows dissolved oxygen levels in Merran, Little Merran and Thule creeks improved during the week but have dropped slightly with an increase in water temperature (Figure 181).

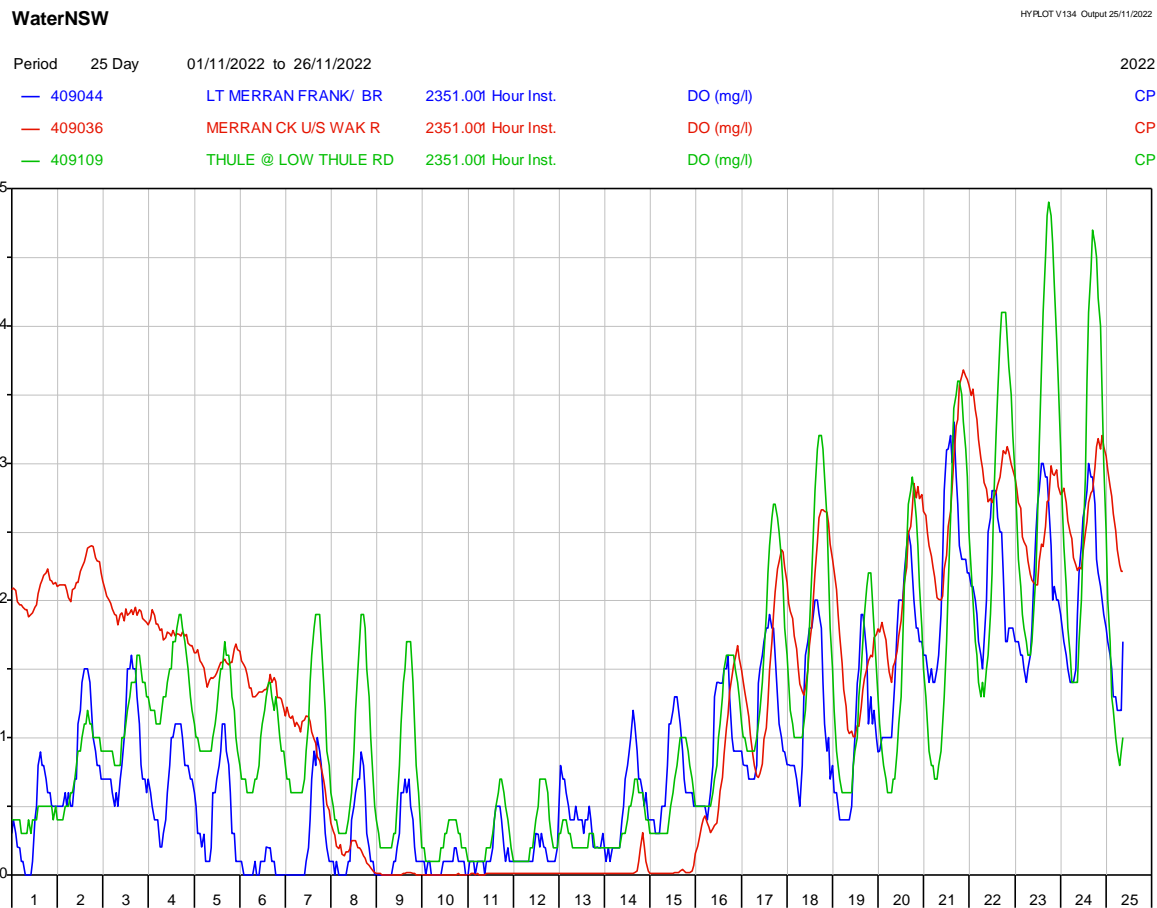


Figure 180: Continuous dissolved oxygen (mg/L) in the Merran, Little Merran, Thule and Barber creeks

WaterNSW

HYFLOT V134 Output 25/11/2022

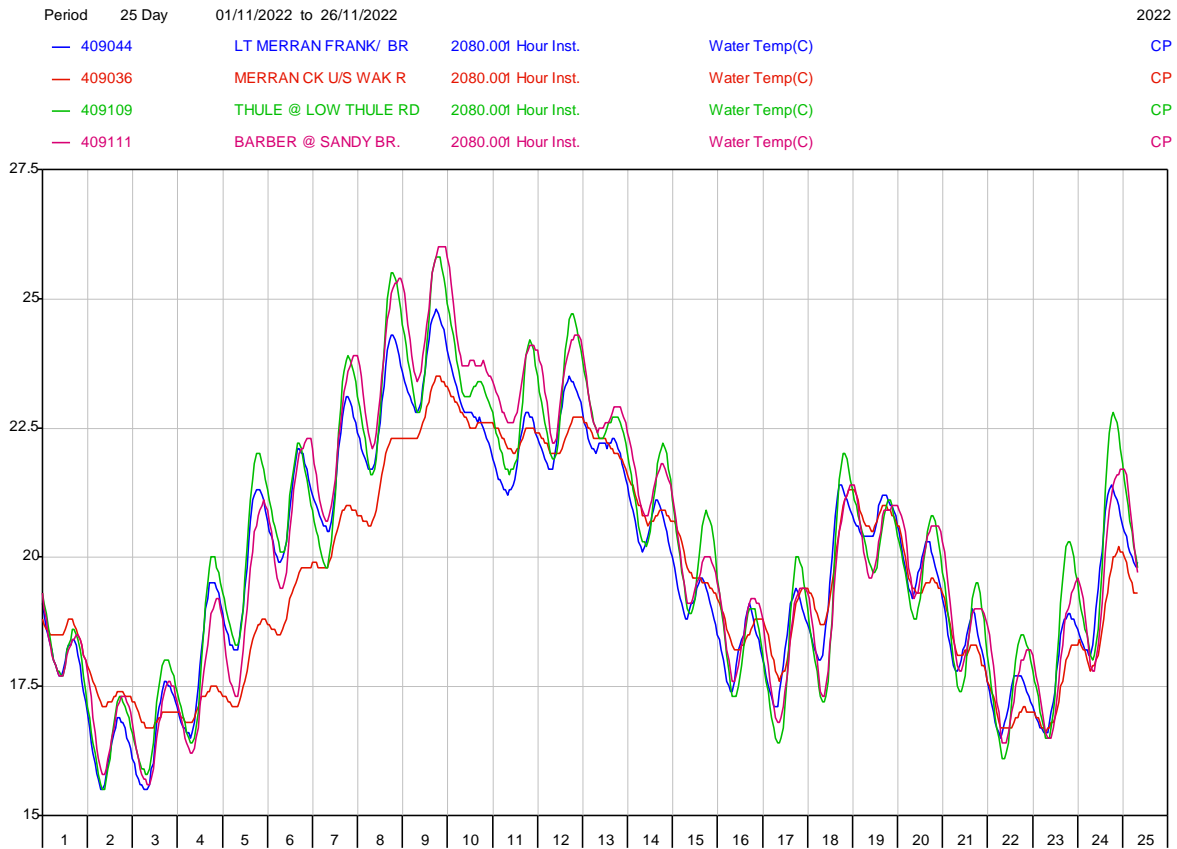


Figure 181: Continuous water temperature (°C) in the Merran, Little Merran, Thule and Barber creeks

Murray River

The Bureau of Meteorology is reporting major flooding at Torrumbarry, Barham, Wakool Junction and Boundary Bend and has predicted flooding in the Murray River at Euston to peak over the weekend with a prolonged peak. River levels will continue to rise at Wentworth into early December.

Monitoring by DELWP is showing the Murray River at Tocumwal, upstream of the Barmah/Millewa Forest, is oxygenated (Figure 182). Downstream of the forest at Barmah dissolved oxygen is 2 mg/L. Dissolved oxygen in the Goulburn River at McCoys Bridge has improved above 5 mg/L and the Campaspe River at Fehrigs Lane to over 8 mg/L.

The Murray River at Barham had dropped below 1 mg/L but has improved slightly. Monitoring further downstream at Boundary Bend is showing similar results. The Murray River at Wemen (downstream of Robinvale) has improved to 3 mg/L. The results from the temporary monitoring site installed on the Murray River downstream of Wentworth are fluctuating around 1 mg/L.

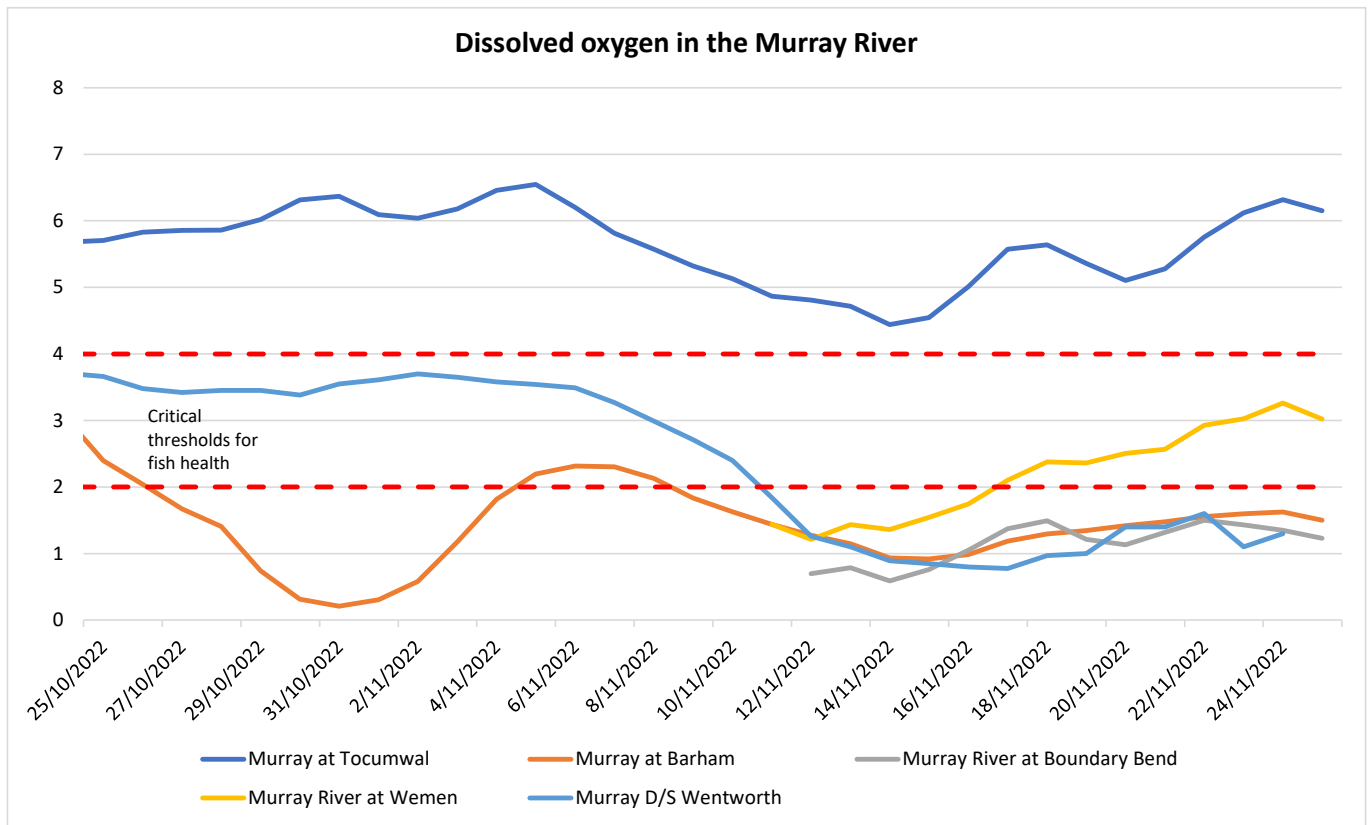


Figure 182: Continuous dissolved oxygen (mg/L) in the Murray River at Tocumwal and Barmah (data courtesy of DELWP)

Table 7: Dissolved oxygen results from Wentworth Weir -24/11/2022 (discharge 183,340 ML/day) (WaterNSW)

Site	Dissolved oxygen (mg/L)	Water temperature (°C)
Broken Hill Pipeline pump station	2.02	19.2
100m D/S Weir NSW side of Murray River	2.64	19.2
100m D/S Weir Victorian side of Murray River	1.84	19.2

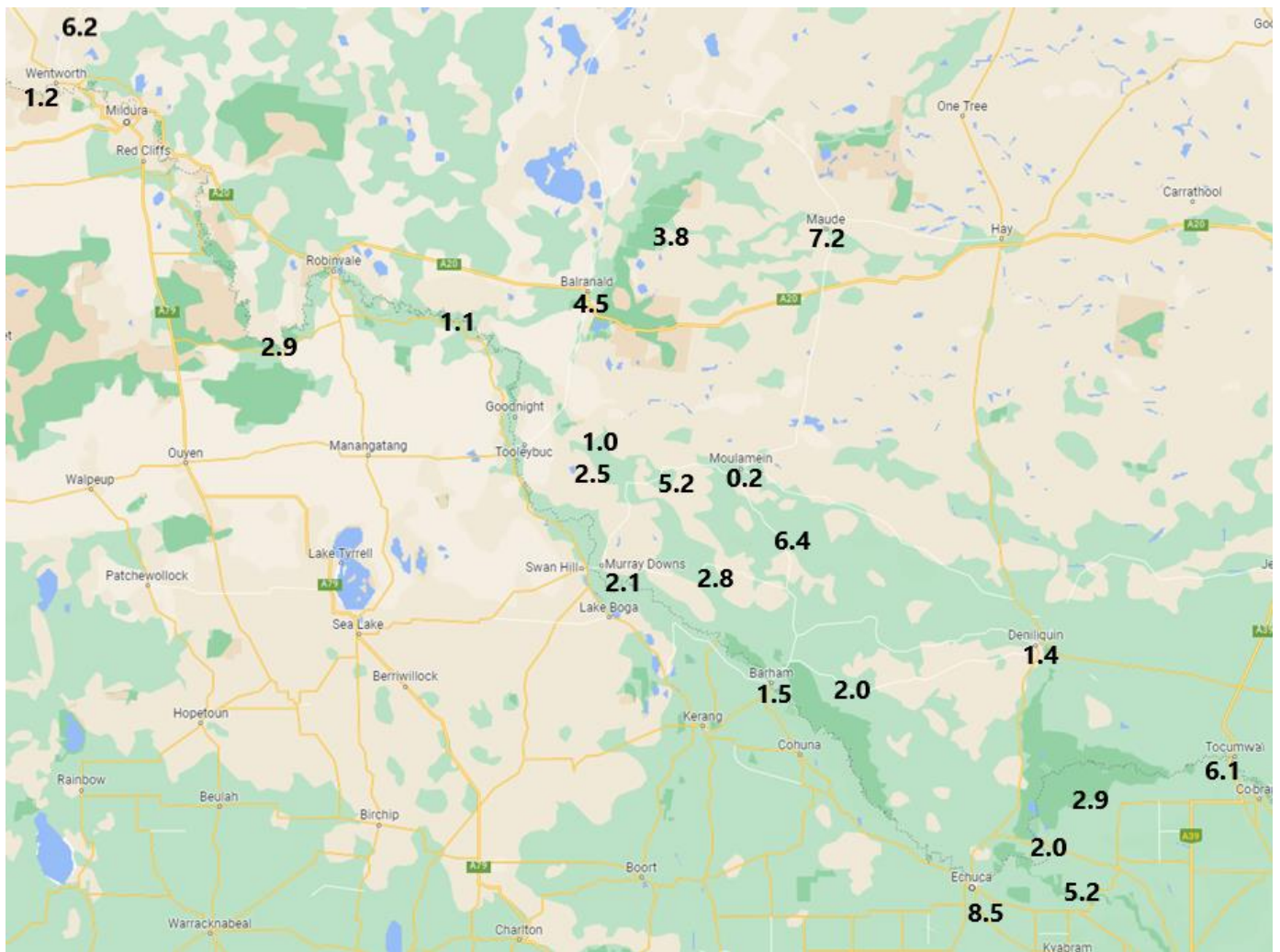


Figure 183: Summary of Southern Basin dissolved oxygen results - 25 November 2022

Weather Outlook

The Bureau of Meteorology 8-day total rain forecast (25 November to 2 December) indicates light falls across parts of inland NSW with totals increasing towards the north coast (Figure 184). Forecast is for warmer air temperatures for Echuca and Mildura over the weekend before another low pressure system brings showers and cooler air temperatures early in the week (Figure 185 and Figure 186).

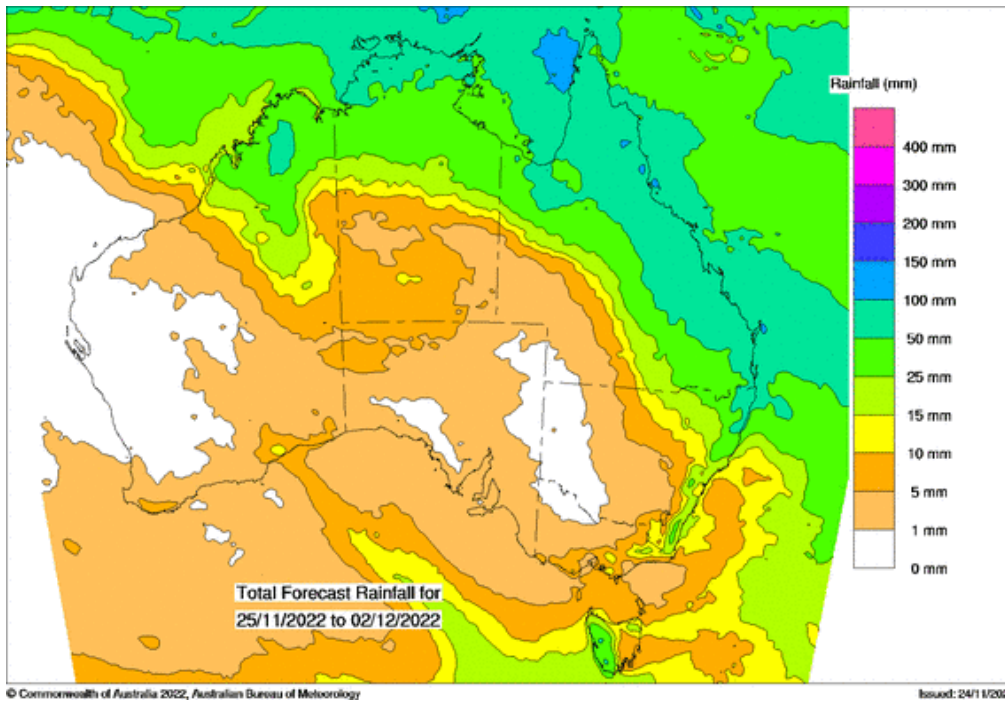


Figure 184: Bureau of Meteorology 8-day total rain forecast (25 November to 2 December)



Figure 185: Forecast air temperatures for Echuca 25 to 29 November



Figure 186: Forecast air temperatures for Mildura 25 to 29 November

Water quality update, Meeting No. 9 – 6 December 2022

Northern Basin

Barwon River

Discharge is slowly decreasing in the Barwon River. Flow at Brewarrina is around 72,000 ML/day (Figure 187).

Dissolved oxygen results in the Barwon River at Walgett and Geera have been quite erratic but have been slowly improving and are now above the 4 mg/L threshold. Levels at Brewarrina have also improved toward 4 mg/L (Figure 188).

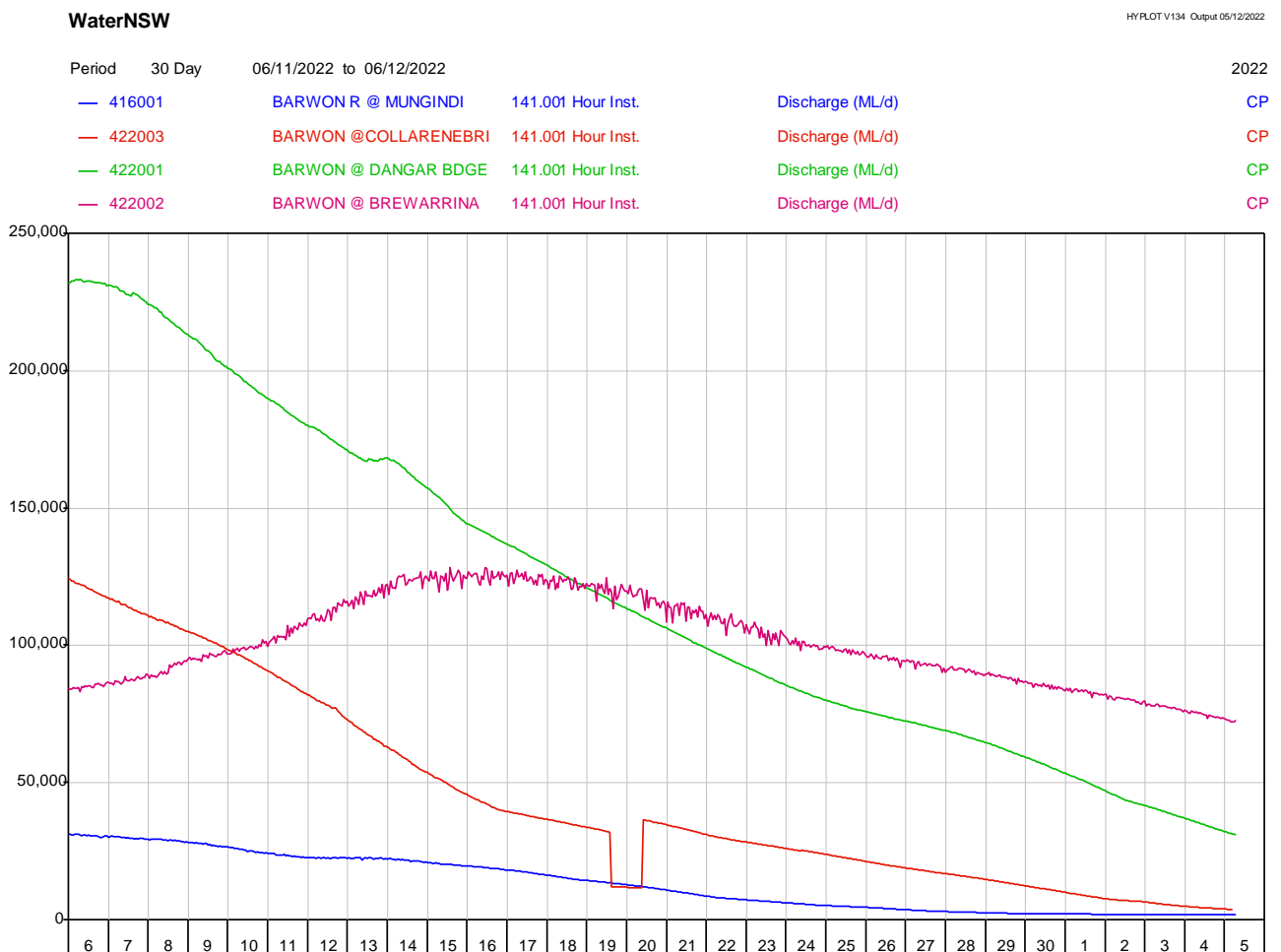


Figure 187: Discharge (ML/day) in the Barwon River

Period 30 Day 06/11/2022 to 06/12/2022 2022

422003	BARWON @ COLLARENEBRI	2351.001 Hour Inst.	DO (mg/l)	CP
422001	BARWON @ DANGAR BDGE	2351.001 Hour Inst.	DO (mg/l)	CP
422027	BARWON @ GEERA	2351.001 Hour Inst.	DO (mg/l)	CP
422002	BARWON @ BREWARRINA	2351.001 Hour Inst.	DO (mg/l)	CP

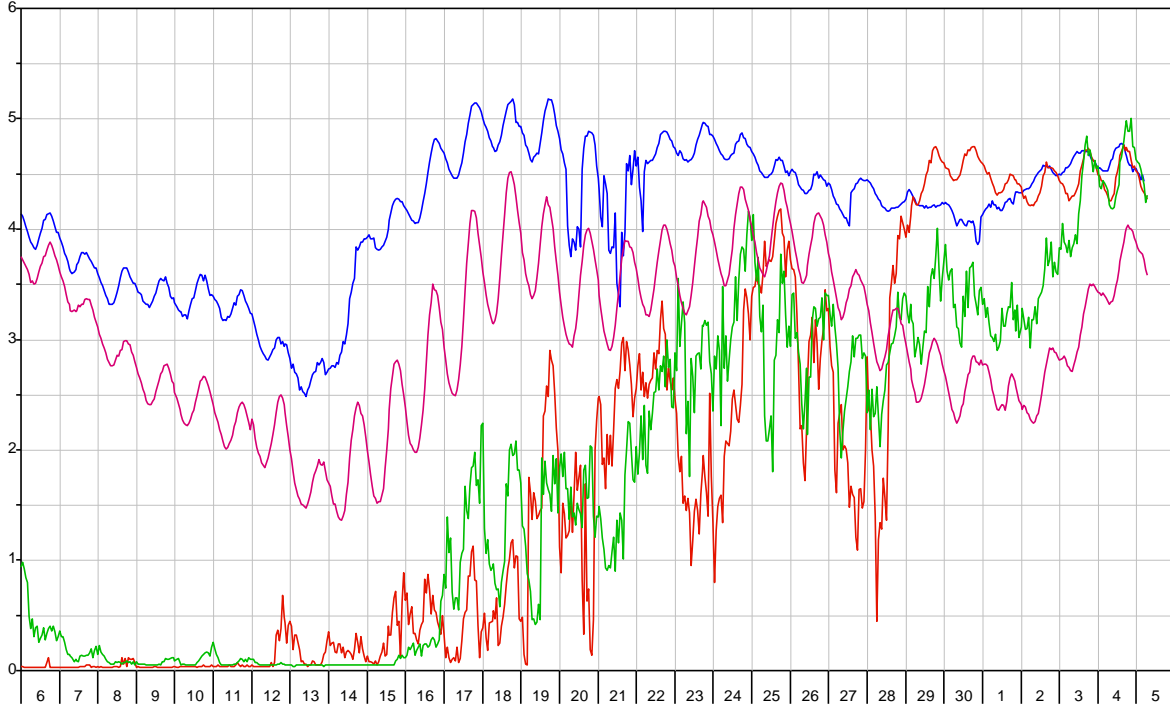


Figure 188: Continuous dissolved oxygen (mg/L) in the Barwon River

Period 30 Day 06/11/2022 to 06/12/2022 2022

416001	BARWON R @ MUNGINDI	2080.001 Hour Inst.	Water Temp(C)	CP
422003	BARWON @ COLLARENEBRI	2080.001 Hour Inst.	Water Temp(C)	CP
422001	BARWON @ DANGAR BDGE	2080.001 Hour Inst.	Water Temp(C)	CP
422002	BARWON @ BREWARRINA	2080.001 Hour Inst.	Water Temp(C)	CP

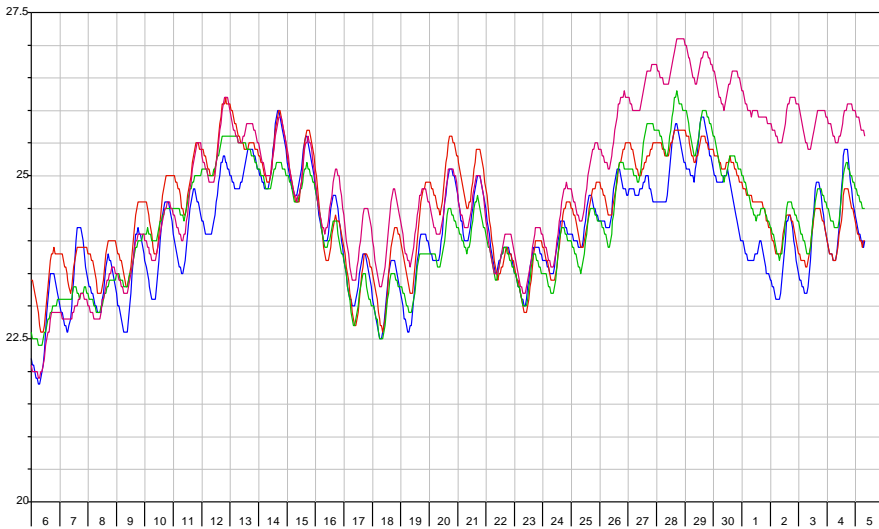


Figure 189: Continuous water temperature (°C) in the Barwon River

Darling River

Discharge peaked at Bourke on 23 November at around 205,000 ML/day. Discharge peaked at Louth on 1 December at around 150,000 ML/day. Discharge at Wilcannia is slowly increasing toward 35,000 ML/day (Figure 190). Major flooding at Wilcannia is predicted to peak in mid to late December. Figure 191 is a satellite-derived Sentinel colour infrared image showing the inundation of large areas of the Darling River floodplain upstream of Wilcannia.

Discharge at Weir 32 is around 30,000 ML/day and just over 17,500 ML/day at Burtundy.

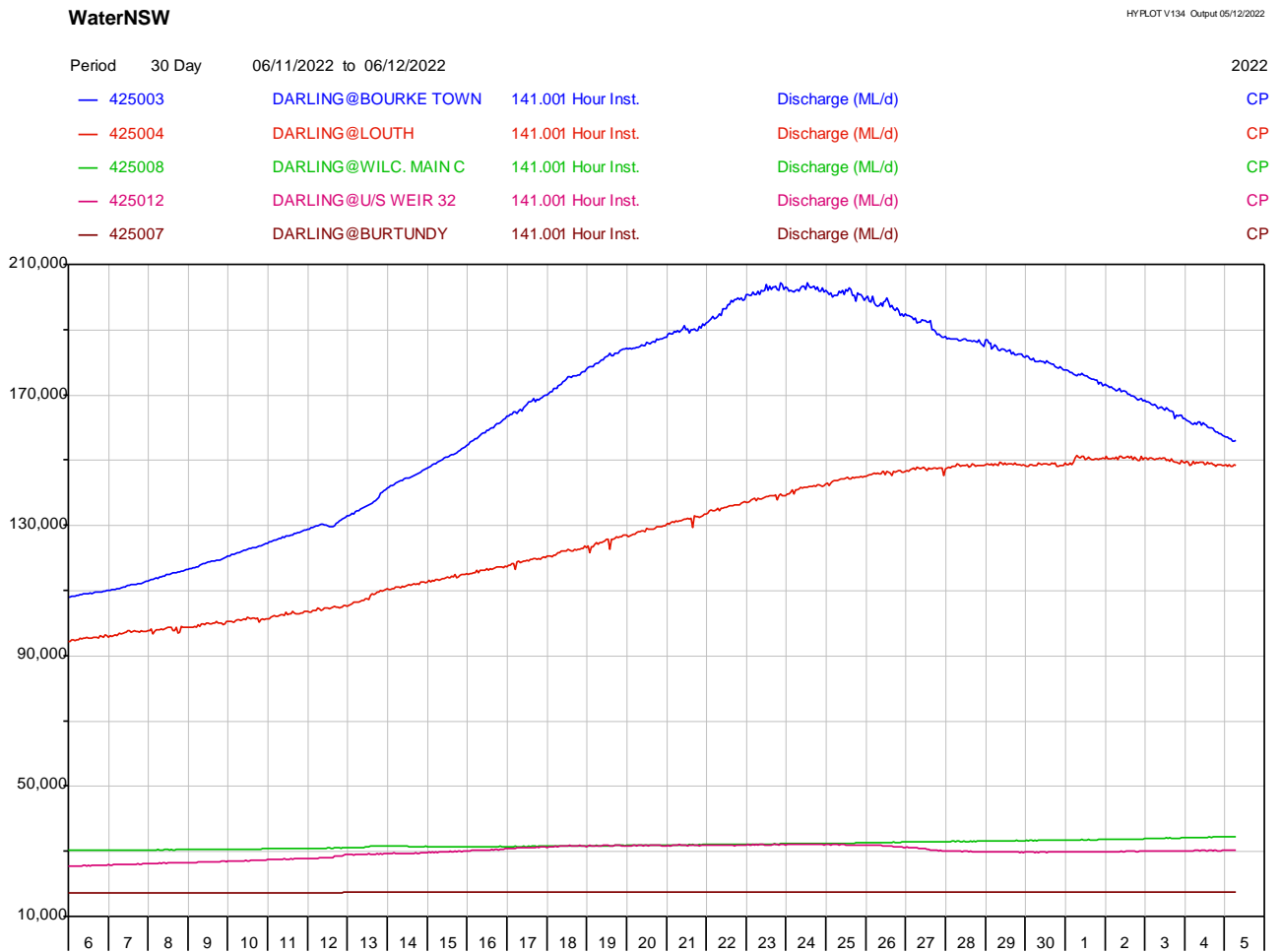


Figure 190: Discharge (ML/day) in the upper Darling River

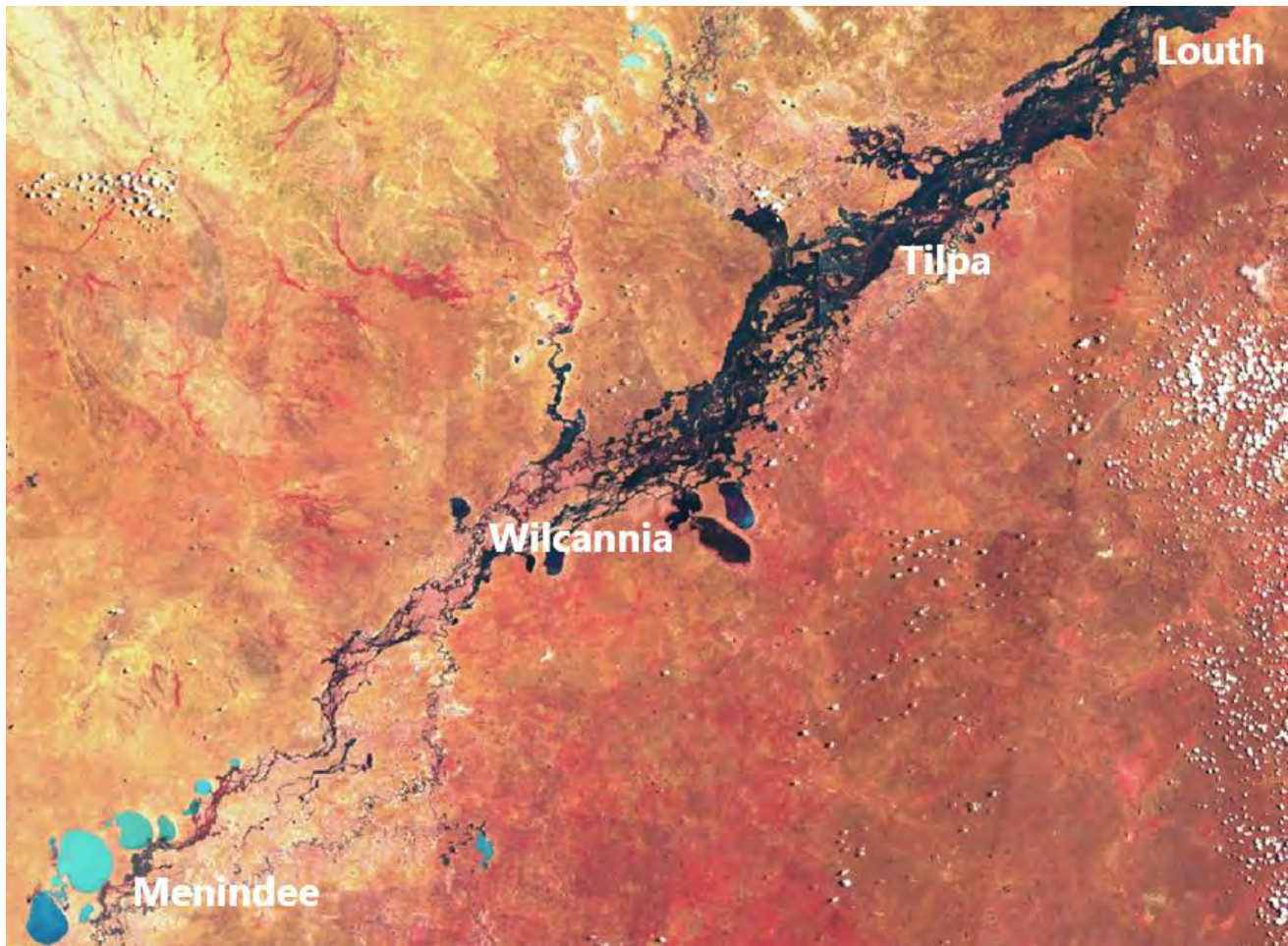


Figure 191: Satellite-derived Sentinel colour infrared image of the Darling River – 4 December 2022

Dissolved oxygen in the Darling River at Bourke and Wilcannia have declined below 4 mg/L. Levels in the Darling River downstream of Menindee Lakes is remaining above 4 mg/L (Figure 192).

The temporary dissolved oxygen monitoring site at Nelia Gaari on the Darling River upstream of Lake Wetherell had a dissolved oxygen reading of 3.6 mg/L on Monday morning (5/12/2022).

WaterNSW

HYPLOT V134 Output 05/12/2022

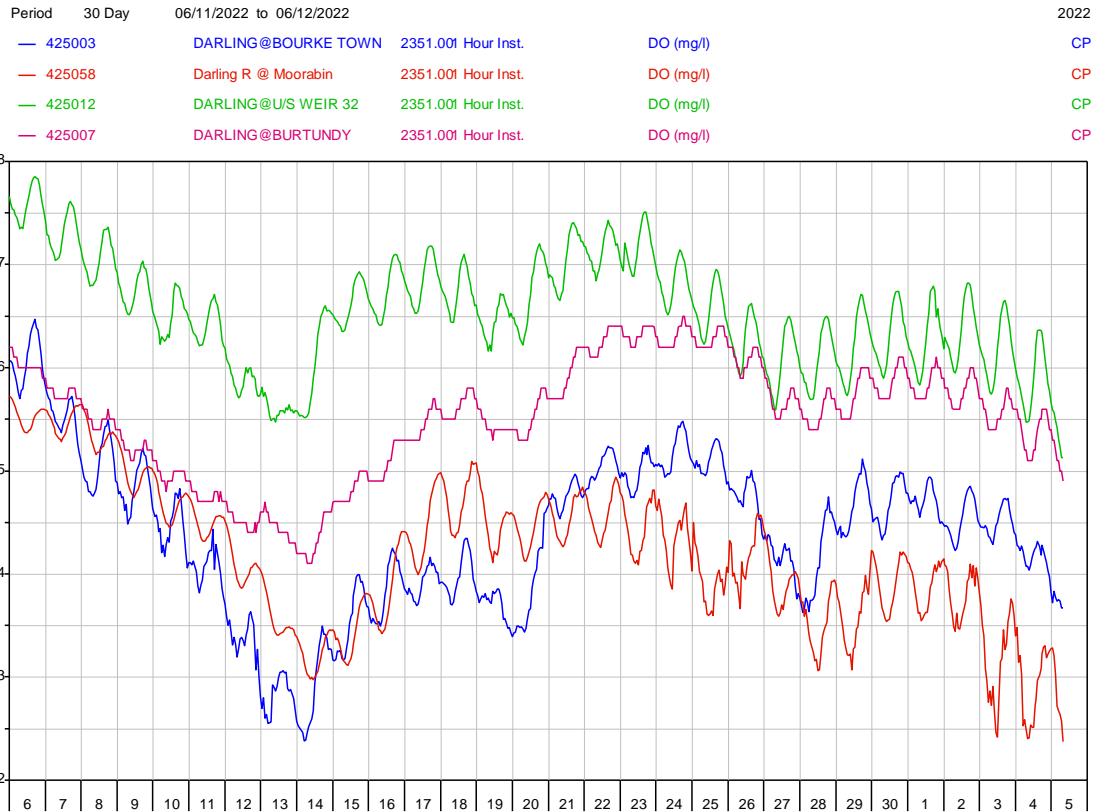


Figure 192: Continuous dissolved oxygen (mg/L) in the Darling River

Handheld result from the Darling River at Burtundy 28/11/2022 11:31 was 5.81 mg/L.

WaterNSW

HYPLOT V134 Output 05/12/2022

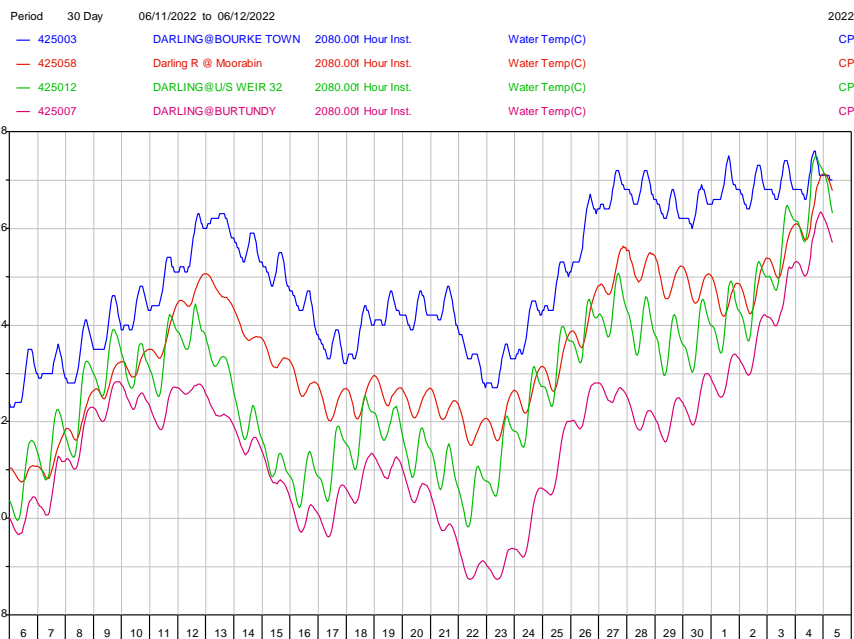


Figure 193: Continuous water temperature (°C) in the Darling River

Southern Basin

Lachlan River

Flooding continues in the Lachlan River (Figure 194) with major flooding at Euabalong and Hillston. Despite the major flooding, dissolved oxygen readings at most sites are above 4 mg/L, apart from Willandra Weir which dropped rapidly last week but has improved to above 2 mg/L over the last few days (Figure 195). Handheld readings (Table 8) suggest that there may have been a malfunction with the dissolved oxygen sensor at Lake Cargelligo Weir which was reading 0 mg/L.

WaterNSW

HYPLOT V134 Output 05/12/2022

Period	30 Day	06/11/2022 to 06/12/2022			2022
— 412004	LACHLAN FORBES CTTNS	141.001 Hour Inst.	Discharge (ML/d)	CP	
— 412006	LACHLAN CONDOBOLIN B	141.001 Hour Inst.	Discharge (ML/d)	CP	
— 412011	LACHLAN LAKE C WEIR	141.001 Hour Inst.	Discharge (ML/d)	CP	
— 412039	LACHLAN HILLSTON WR	141.001 Hour Inst.	Discharge (ML/d)	CP	
— 412005	LACHLAN @ BOOLIGAL	141.001 Hour Inst.	Discharge (ML/d)	CP	

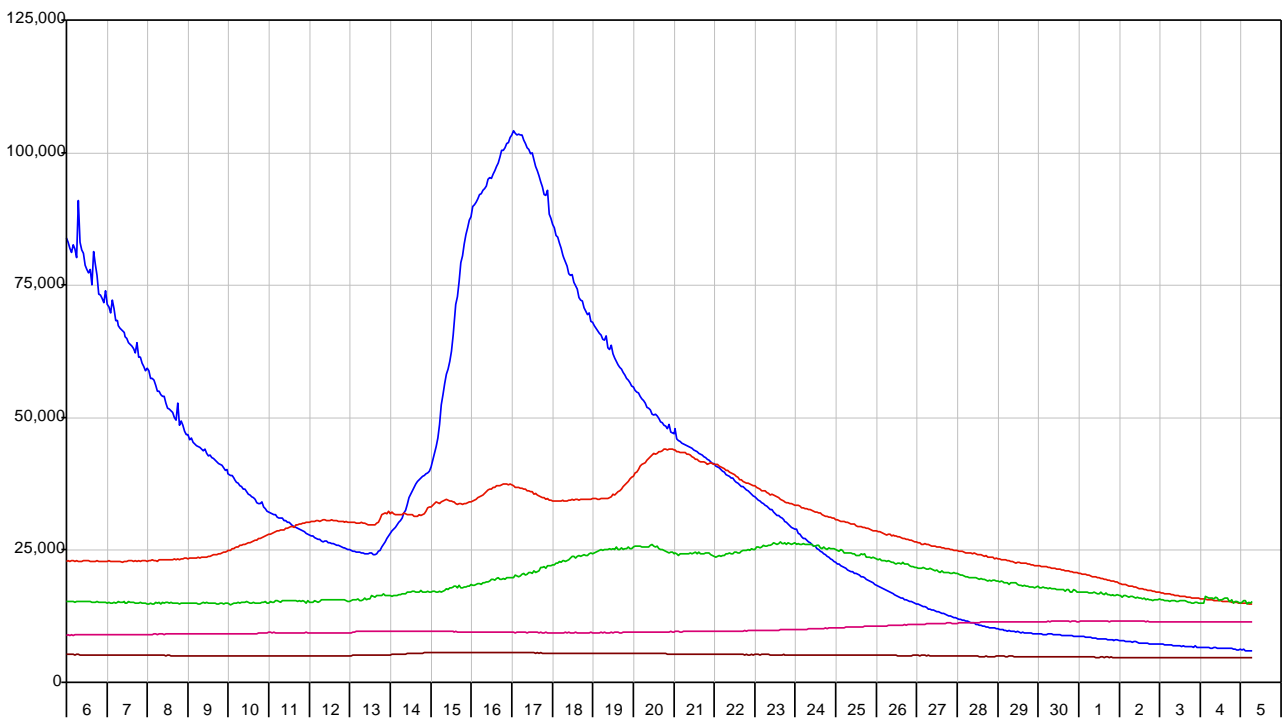


Figure 194: Discharge (ML/day) in the Lachlan River

Period 30 Day 06/11/2022 to 06/12/2022 2022

— 412004	LACHLAN FORBES CTTNS	2351.001 Hour Inst.	DO (mg/l)	CP
— 412006	LACHLAN CONDOBOLIN B	2351.001 Hour Inst.	DO (mg/l)	CP
— 412038	LACHLAN WILLANDRA WR	2351.001 Hour Inst.	DO (mg/l)	CP
— 412039	LACHLAN HILLSTON WR	2351.001 Hour Inst.	DO (mg/l)	CP
— 412005	LACHLAN @ BOOLIGAL	2351.001 Hour Inst.	DO (mg/l)	CP

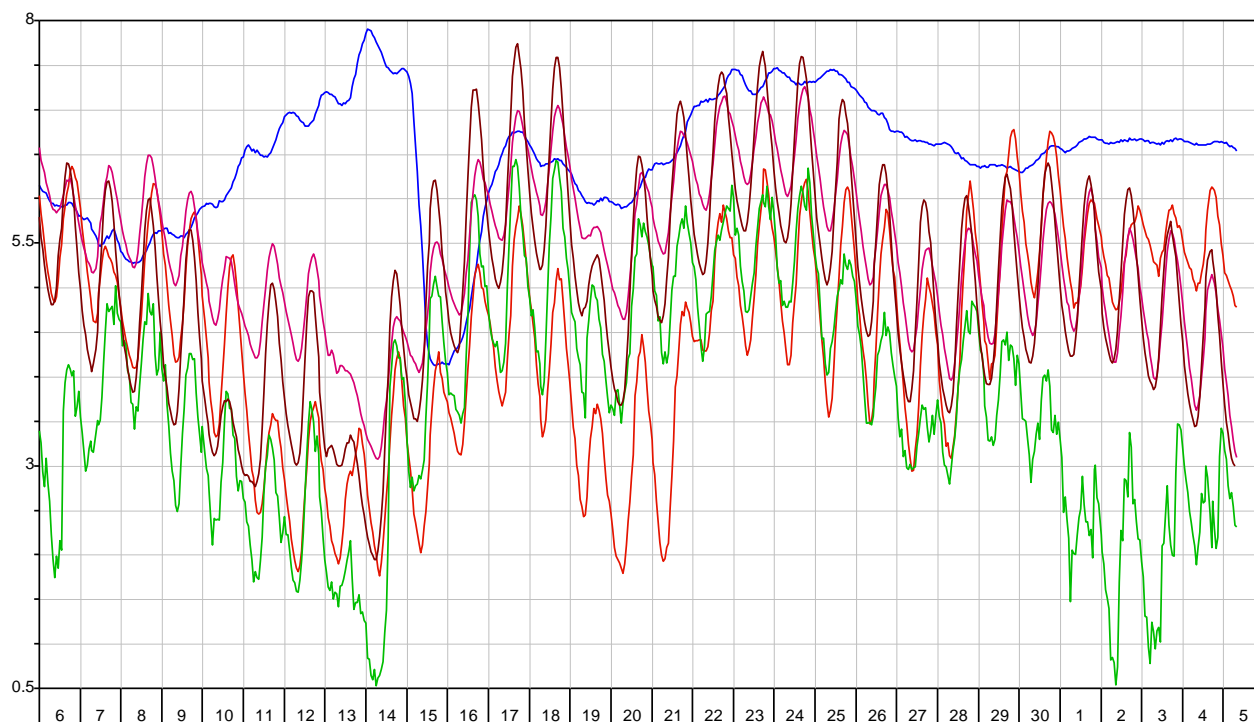


Figure 195: Continuous dissolved oxygen (mg/L) in the Lachlan River

Table 8: Dissolved oxygen results from Lachlan River catchment

Site	Sample Date	Dissolved oxygen (mg/L)
Belubula River at Canowindra	01/12/2022 13:00	9.93
Lachlan River at Forbes	29/11/2022 9:31	6.31
Lachlan River at Lake Cargelligo Weir	01/12/2022 8:25	4.21
Lachlan River at Hillston	30/11/2022 14:45	5.01

WaterNSW

HYPLOT V134 Output 05/12/2022

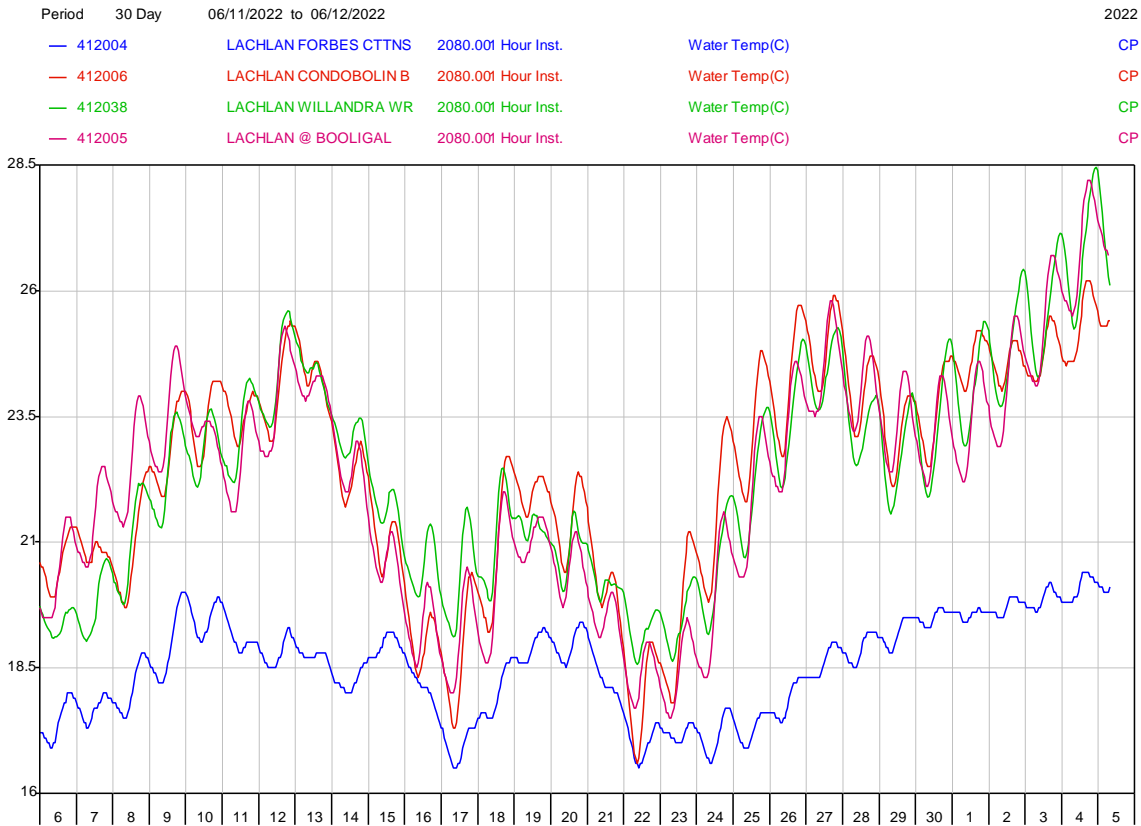


Figure 196: Continuous water temperature (°C) in the Lachlan River

Murrumbidgee River

River levels in the Murrumbidgee River at Gogeldrie Weir, Hay and Maude are continuing to fall. Discharge has reached just over 53,000 ML/day at Balranald (Figure 197).

Dissolved oxygen has declined slightly at all three monitoring sites in response to the warmer air temperatures. The Murrumbidgee River at Redbank and Balranald are both fluctuating below the 4 mg/L threshold (Figure 198).

WaterNSW

HYPLOT V134 Output 05/12/2022

Period	30 Day	06/11/2022 to 06/12/2022	2022
— 410082	MBIDGEE D/S GOGEL W	141.001 Hour Inst.	Discharge (ML/d) CP
— 410136	MBIDGEE DS HAY WEIR	141.001 Hour Inst.	Discharge (ML/d) CP
— 410040	MBIDGEE D/S MAUDE W	141.001 Hour Inst.	Discharge (ML/d) CP
— 410130	MBIDGEE D/S BALRAND	141.001 Hour Inst.	Discharge (ML/d) CP

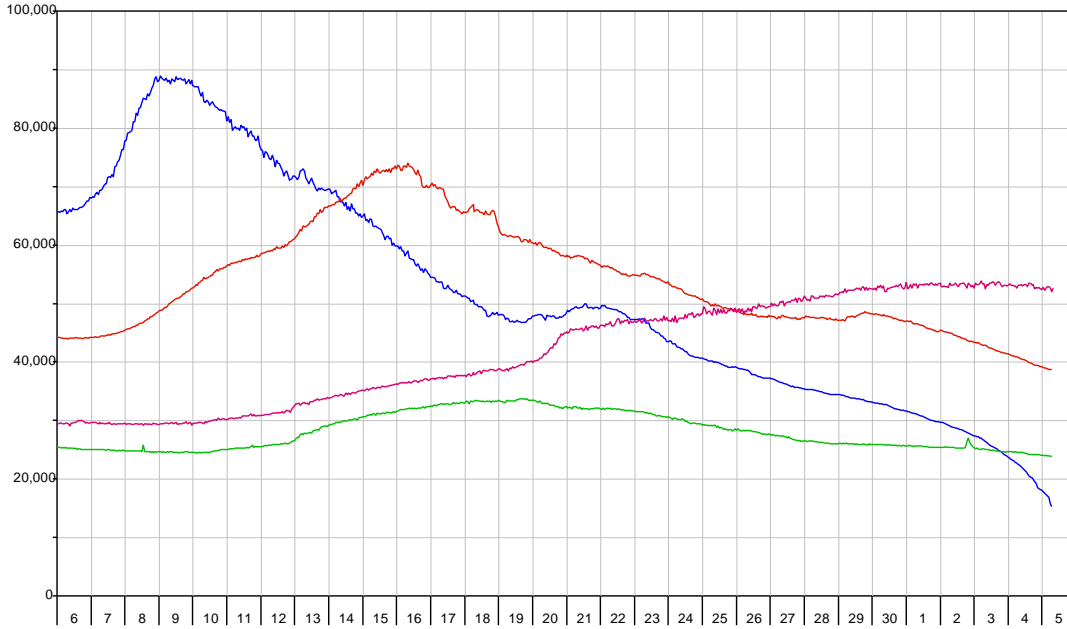


Figure 197: Discharge (ML/day) in the Murrumbidgee River

WaterNSW

HYPLOT V134 Output 05/12/2022

Period	30 Day	06/11/2022 to 06/12/2022	2022
— 410040	MBIDGEE D/S MAUDE W	2351.001 Hour Inst.	DO (mg/l) CP
— 410041	MBIDGEE D/S REDBANK	2351.001 Hour Inst.	DO (mg/l) CP
— 410130	MBIDGEE D/S BALRAND	2351.001 Hour Inst.	DO (mg/l) CP

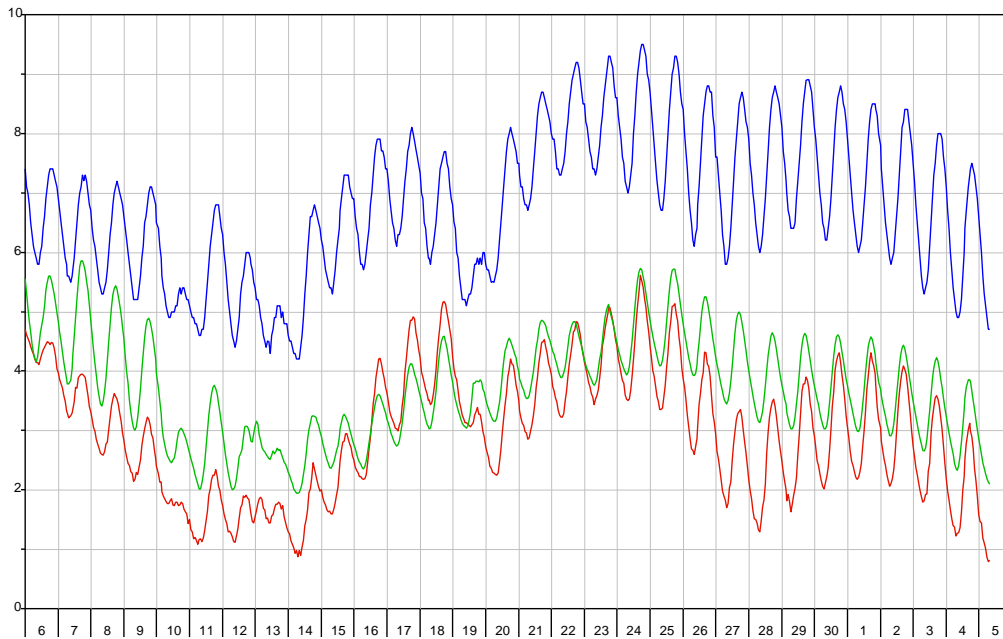


Figure 198: Continuous dissolved oxygen (mg/L) in the Murrumbidgee River

Handheld result from the Murrumbidgee River at Balranald (29/11/2022 10:28) was 2.48 mg/L.

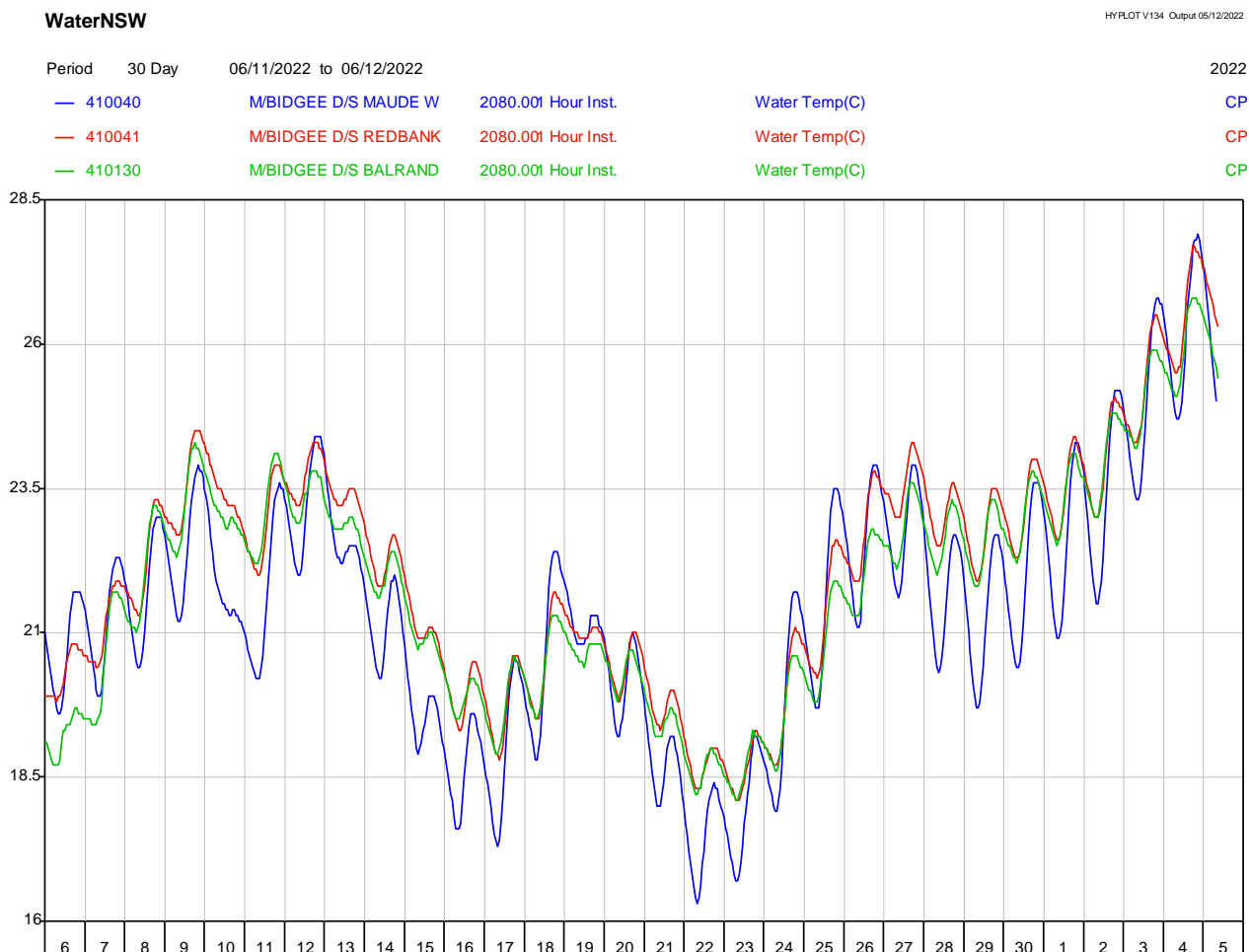


Figure 199: Continuous water temperature (°C) in the Murrumbidgee River

Kolety/Edward River

Discharge in the Kolety/Edward River at Deniliquin has been declining over the past two weeks (Figure 200). Flow from the Kolety/Edward River combined with Billabong Creek resulted in record major flooding at Moulamein. River levels at Moulamein reached a peak on 1 December and have started to fall.

Dissolved oxygen at Deniliquin has been declining in response to the increase in water temperature (Figure 201). The sensor at Moulamein is reading 0 mg/L and may have failed. Similarly, the Toonlook gauge is registering very low readings but this could be the result of sensor error.

WaterNSW

HYFLOT V134 Output 05/12/2022

Period 30 Day 06/11/2022 to 06/12/2022 2022

409003	EDWARD @ DENILQUIN	141.001 Hour Inst.	Discharge (ML/d)	CP
409035	EDWARD R @ LIEWAH	141.001 Hour Inst.	Discharge (ML/d)	CP
410134	BILLABONG @ DARLOT	141.001 Hour Inst.	Discharge (ML/d)	CP

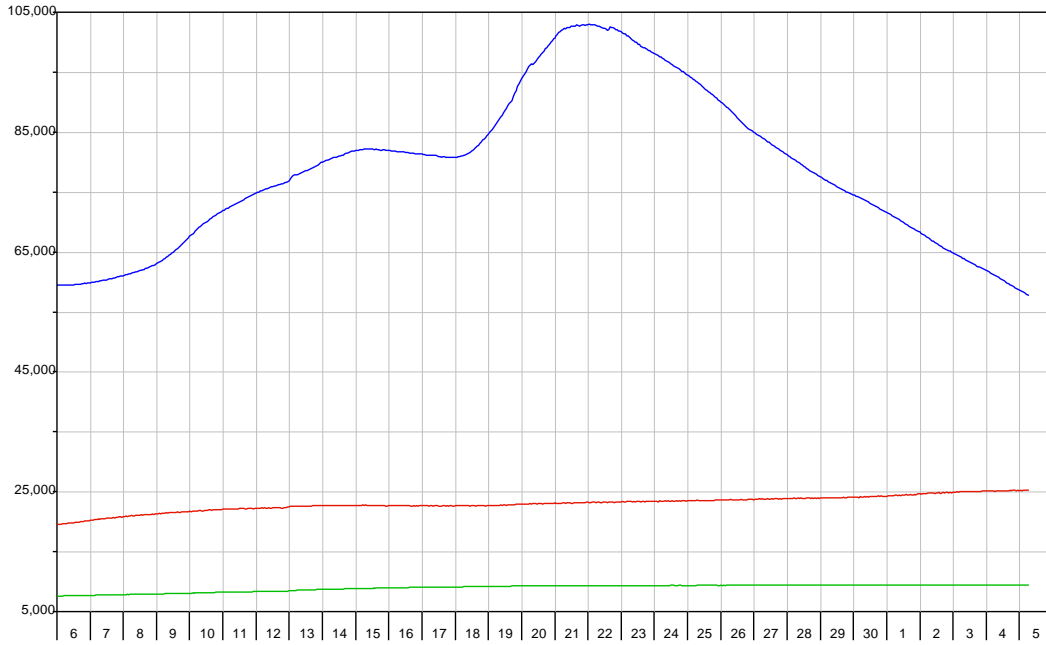


Figure 200: Discharge (ML/day) in the Kolety/Edward River

WaterNSW

HYFLOT V134 Output 05/12/2022

Period 30 Day 06/11/2022 to 06/12/2022 2022

409047	EDWARD R @ TOONALOOK	2351.001 Hour Inst.	DO (mg/l)	CP
409003	EDWARD @ DENILQUIN	2351.001 Hour Inst.	DO (mg/l)	CP
409014	EDWARD R @ MOULAMEIN	2351.001 Hour Inst.	DO (mg/l)	CP

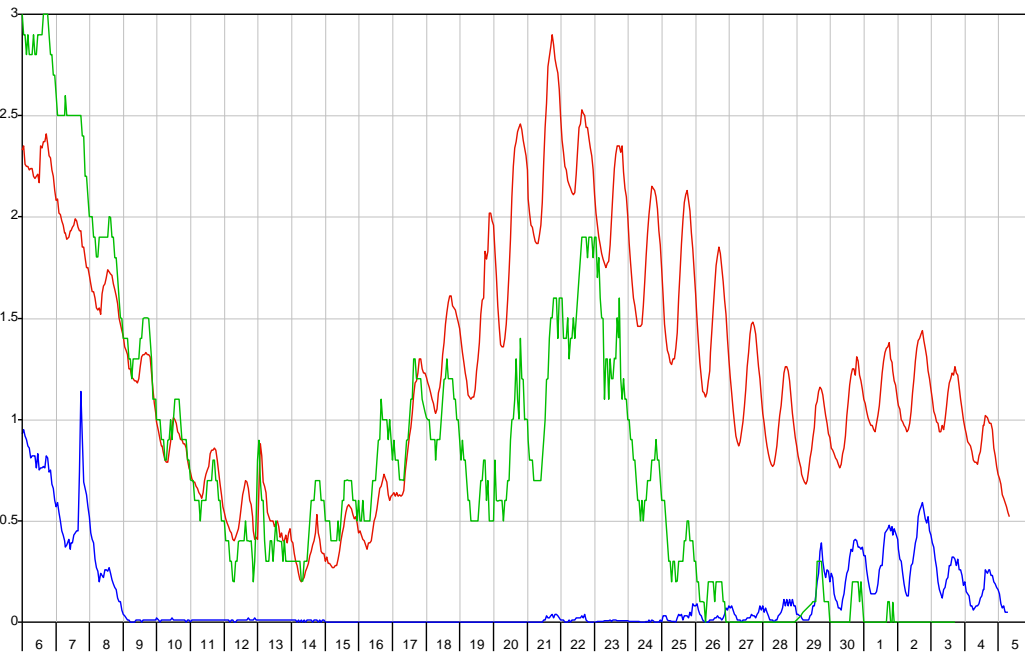


Figure 201: Continuous dissolved oxygen (mg/L) in the Kolety/Edward River

Period 30 Day 06/11/2022 to 06/12/2022 2022

— 409047	EDWARD R @ TOONALOOK	2080.001 Hour Inst.	Water Temp(C)	CP
— 409003	EDWARD @ DENLIQUIN	2080.001 Hour Inst.	Water Temp(C)	CP
— 409014	EDWARD R @ MOULAMEIN	2080.001 Hour Inst.	Water Temp(C)	CP

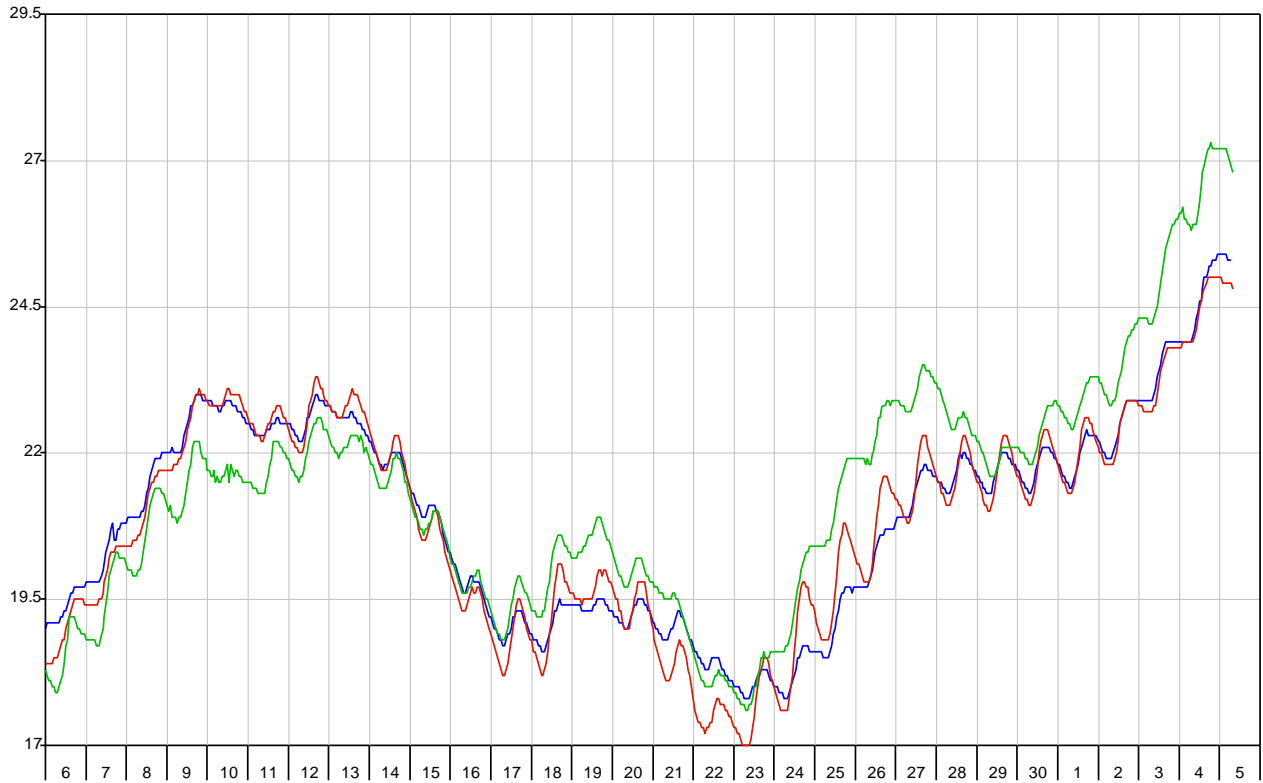


Figure 202: Continuous water temperature (°C) in the Kolety/Edward River

Wakool and Niemur rivers

Discharge in the Wakool River at Coonambit Bridge is remaining above 100,000 ML/day and at Gee Gee Bridge has just dropped below 50,000 ML/day. The Niemur River at Barham-Moulamein Road is flowing at just under 30,000 ML/day (Figure 203).

Dissolved oxygen levels at both sites in the Niemur River have declined below 4 mg/L (Figure 204). Dissolved oxygen levels at both monitoring sites on the Wakool River are below 2 mg/L.

WaterNSW

HYPLOT V134 Output 05/12/2022

Period	30 Day	06/11/2022 to 06/12/2022			2022
—	409061	WAKOOL R COONAMIT BR	141.001 Hour Inst.	Discharge (ML/d)	CP
—	409062	WAKOOL R GEEGEE BR 2	141.001 Hour Inst.	Discharge (ML/d)	CP
—	409048	NIEMUR R BARH-MLN RD	141.001 Hour Inst.	Discharge (ML/d)	CP
—	409086	NIEMUR @ MALLAN SCH	141.001 Hour Inst.	Discharge (ML/d)	CP

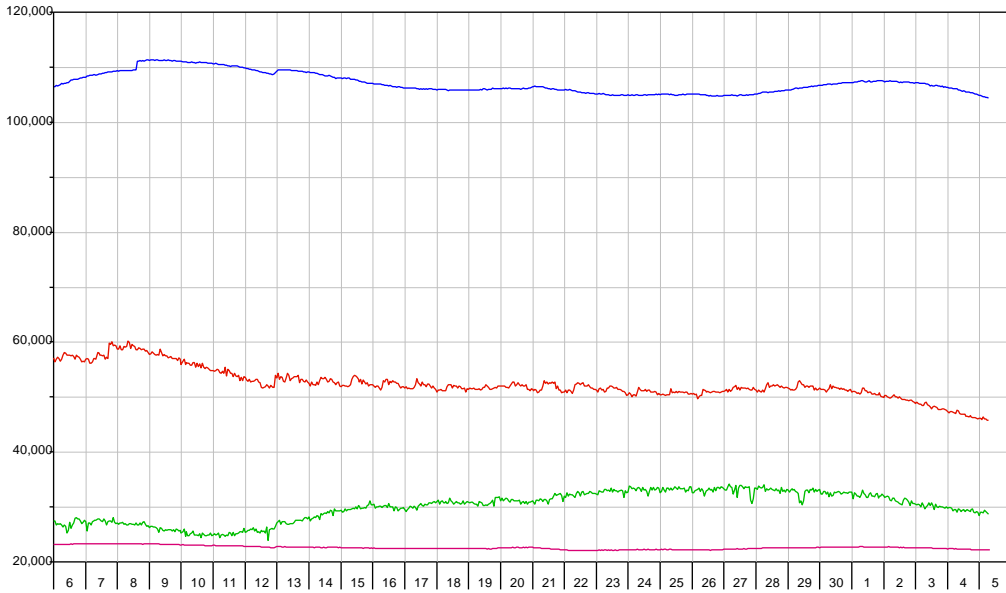


Figure 203: Discharge (ML/day) in the Wakool and Niemur rivers

WaterNSW

HYPLOT V134 Output 05/12/2022

Period	30 Day	06/11/2022 to 06/12/2022			2022
—	409062	WAKOOL R GEEGEE BR 2	2351.001 Hour Inst.	DO (mg/l)	CP
—	409013	WAKOOL @ STONEY XING	2351.001 Hour Inst.	DO (mg/l)	CP
—	409048	NIEMUR R BARH-MLN RD	2351.001 Hour Inst.	DO (mg/l)	CP
—	409086	NIEMUR @ MALLAN SCH	2351.001 Hour Inst.	DO (mg/l)	CP

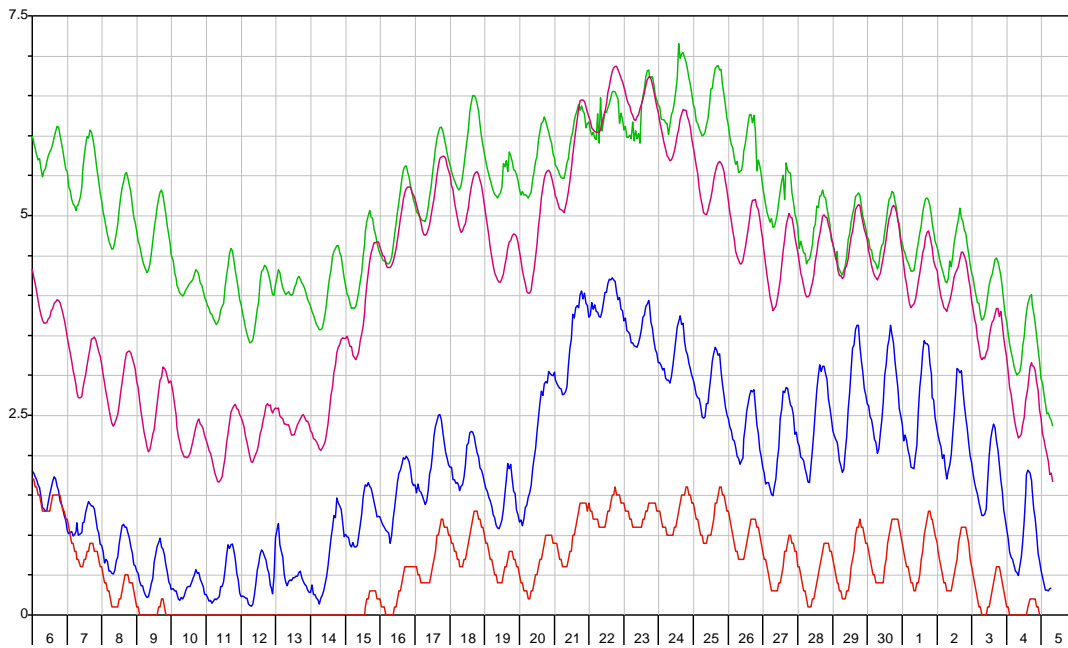


Figure 204: Continuous dissolved oxygen (mg/L) in the Wakool and Niemur rivers

Period	30 Day	06/11/2022 to 06/12/2022		2022
— 409062	WAKOOL R GEEGEE BR 2	2080.001 Hour Inst.	Water Temp(C)	CP
— 409013	WAKOOL @ STONEY XING	2080.001 Hour Inst.	Water Temp(C)	CP
— 409048	NIEMUR R BARH-MLN RD	2080.001 Hour Inst.	Water Temp(C)	CP
— 409086	NIEMUR @ MALLAN SCH	2080.001 Hour Inst.	Water Temp(C)	CP

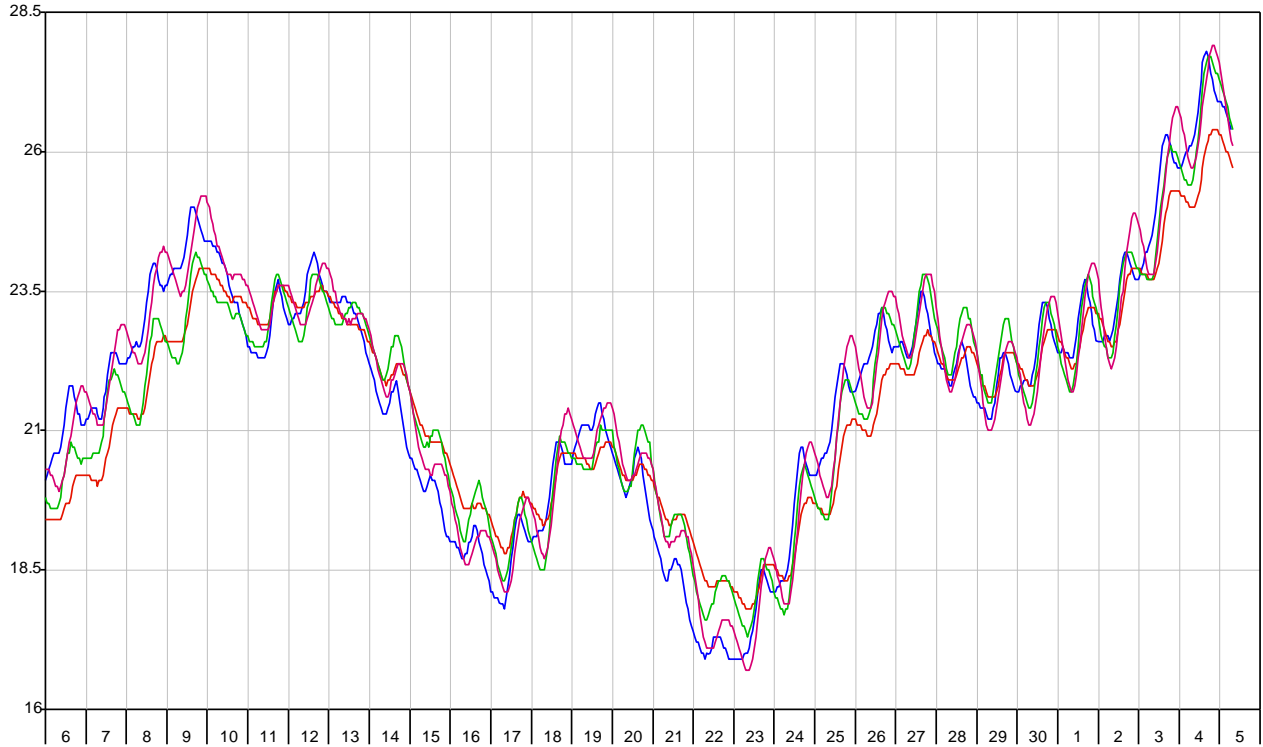


Figure 205: Continuous water temperature (°C) in the Wakool and Niemur rivers

Merran, Little Merran, Thule and Barber creeks

Figure 206 shows dissolved oxygen levels in Merran, Little Merran and Thule creeks improved during the week but have dropped slightly with an increase in water temperature (Figure 207). The dissolved oxygen sensors at both sites in Barber Creek have malfunctioned.

WaterNSW

HYPLOT V134 Output 05/12/2022

Period 30 Day 06/11/2022 to 06/12/2022 2022

— 409044	LT MERRAN FRANK/ BR	2351.001 Hour Inst.	DO (mg/l)	CP
— 409036	MERRAN CK U/S WAK R	2351.001 Hour Inst.	DO (mg/l)	CP
— 409109	THULE @ LOW THULE RD	2351.001 Hour Inst.	DO (mg/l)	CP

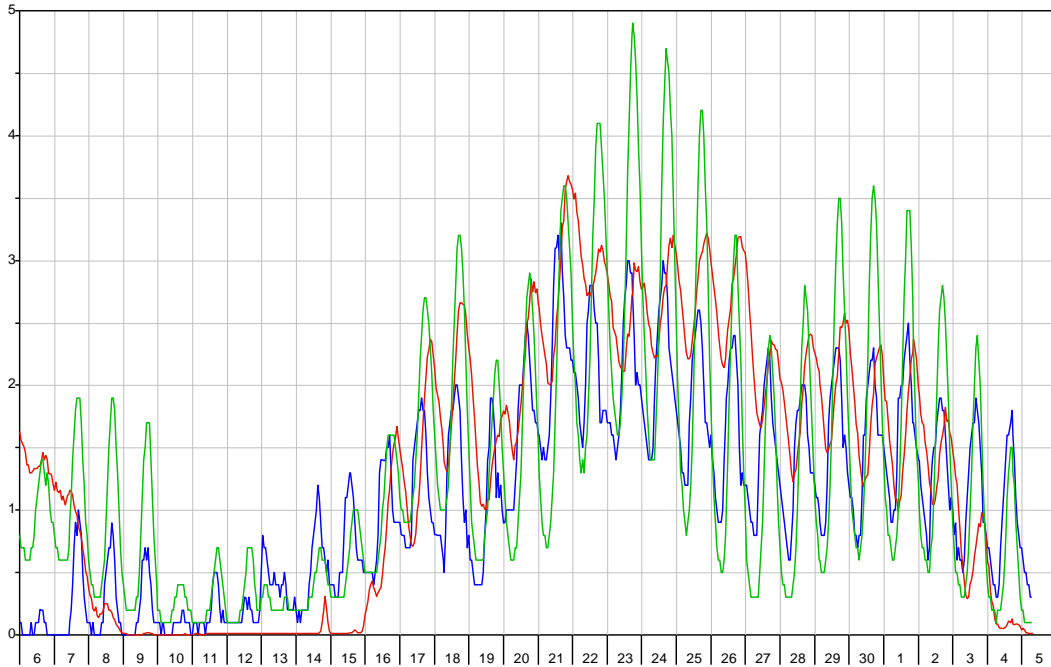


Figure 206: Continuous dissolved oxygen (mg/L) in the Merran, Little Merran and Thule creeks

WaterNSW

HYPLOT V134 Output 05/12/2022

Period 30 Day 06/11/2022 to 06/12/2022 2022

— 409044	LT MERRAN FRANK/ BR	2080.001 Hour Inst.	Water Temp(C)	CP
— 409036	MERRAN CK U/S WAK R	2080.001 Hour Inst.	Water Temp(C)	CP
— 409109	THULE @ LOW THULE RD	2080.001 Hour Inst.	Water Temp(C)	CP
— 409111	BARBER @ SANDY BR.	2080.001 Hour Inst.	Water Temp(C)	CP

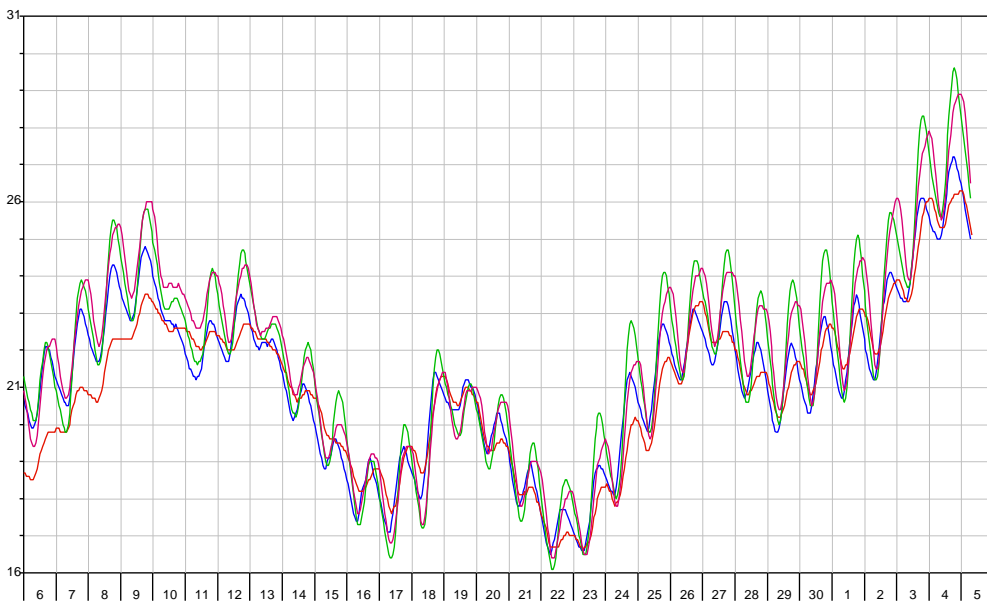


Figure 207: Continuous water temperature (°C) in the Merran, Little Merran, Thule and Barber creeks

Murray River

The Bureau of Meteorology is reporting river levels at Torrumbarry and Barham are expected to remain around the major flood level until mid-December. Major flooding is occurring at the Murray - Wakool River Junction, Boundary Bend and at Wentworth. Major flooding at Wentworth could persist through until early January 2023.

Monitoring by DELWP is showing the Murray River at Tocumwal, upstream of the Barmah/Millewa Forest, is oxygenated (Figure 208). Downstream of the forest at Barmah dissolved oxygen is 1.75 mg/L. Dissolved oxygen in the Goulburn River at McCoys Bridge is remaining above 5 mg/L and the Campaspe River at Fehrings Lane is above 4 mg/L.

The Murray River at Barham has dropped below 1 mg/L. Monitoring further downstream at Boundary Bend is showing lower dissolved oxygen results. The Murray River at Wemen (downstream of Robinvale) had been remaining around 3 mg/L but has declined to almost 2 mg/L in the last few days. The results from the temporary monitoring site installed on the Murray River downstream of Wentworth are around 1 mg/L.

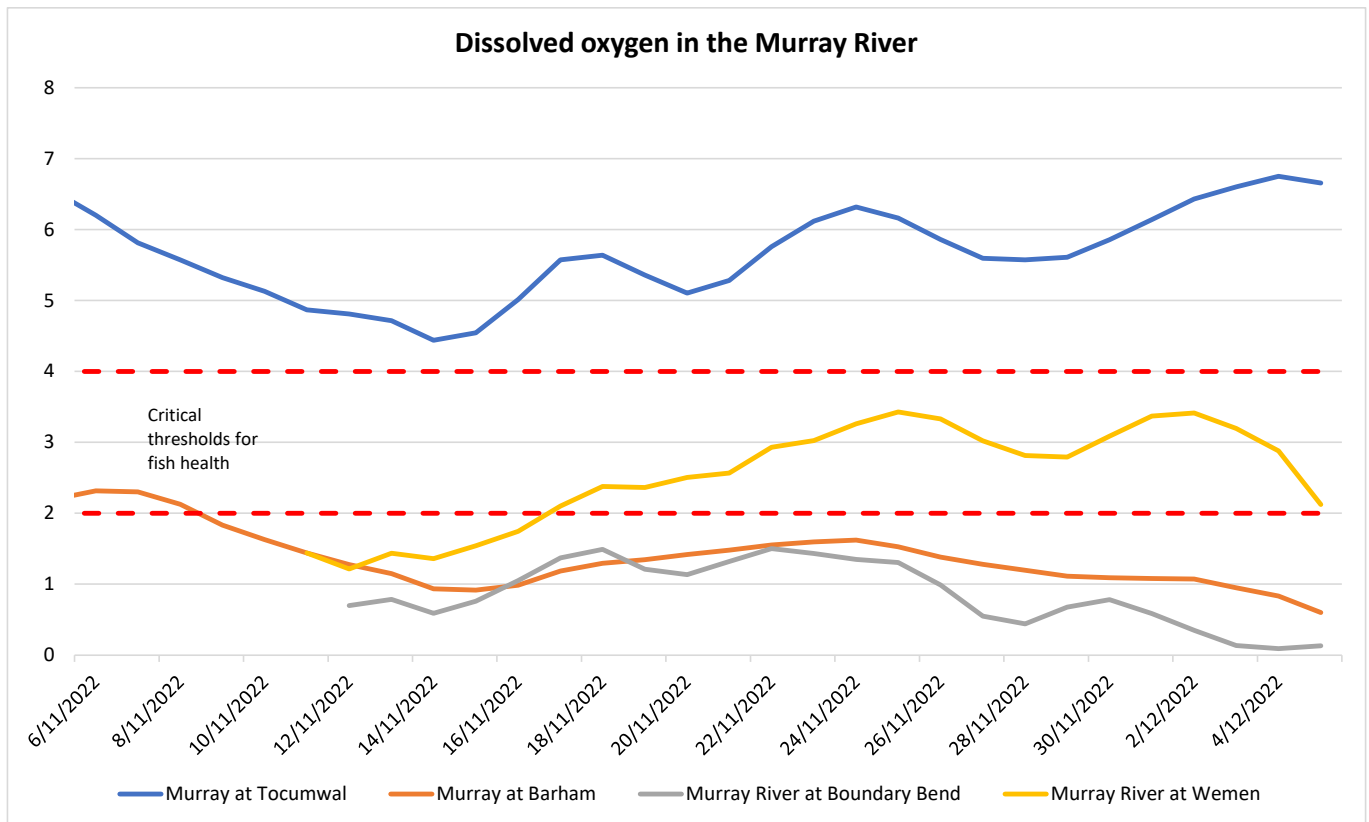


Figure 208: Continuous dissolved oxygen (mg/L) in the Murray River at Tocumwal and Barmah (data courtesy of DELWP)

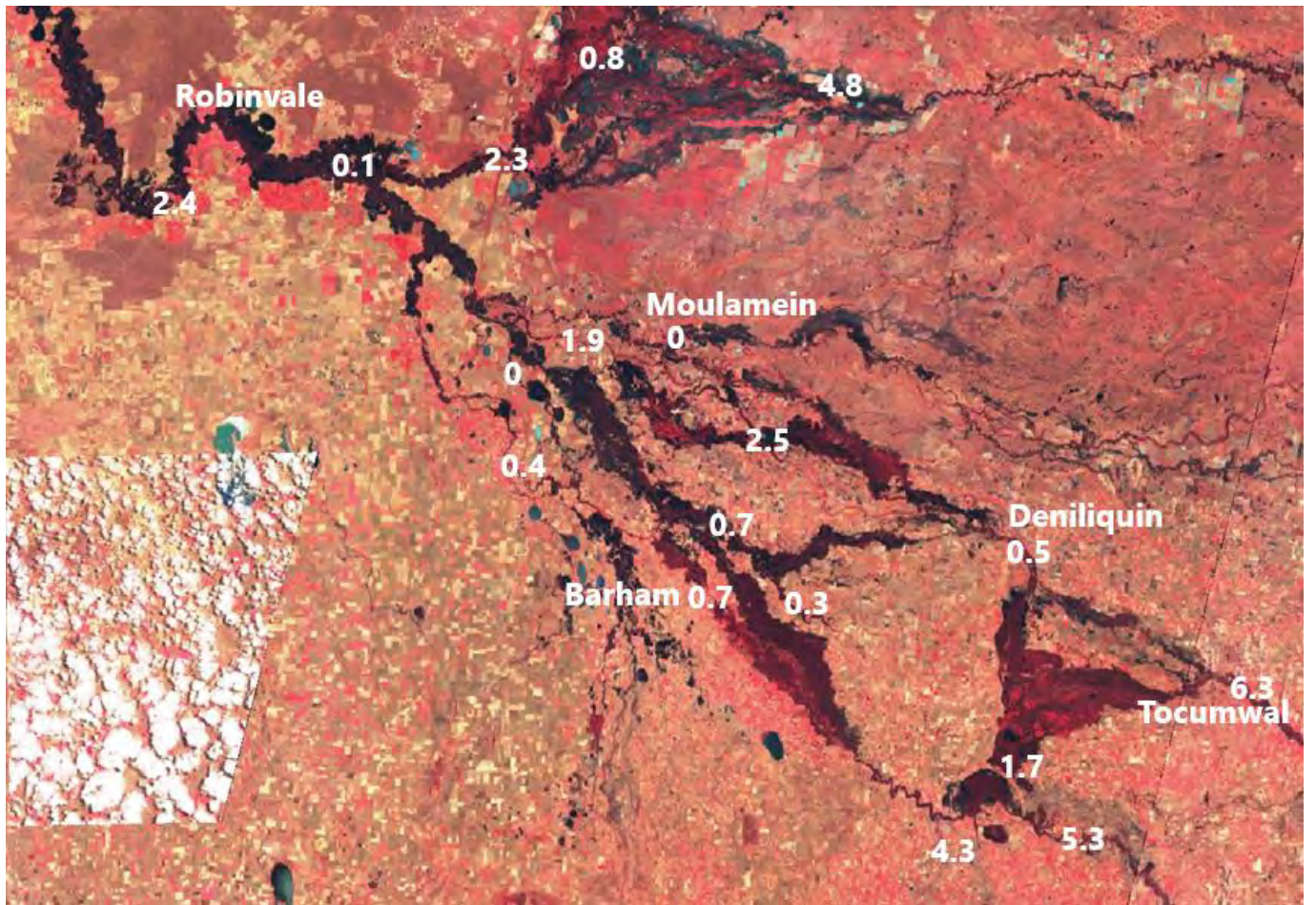


Figure 209: Satellite-derived Sentinel colour infrared image of the lower Murrumbidgee and mid Murray Rivers – 4 December 2022

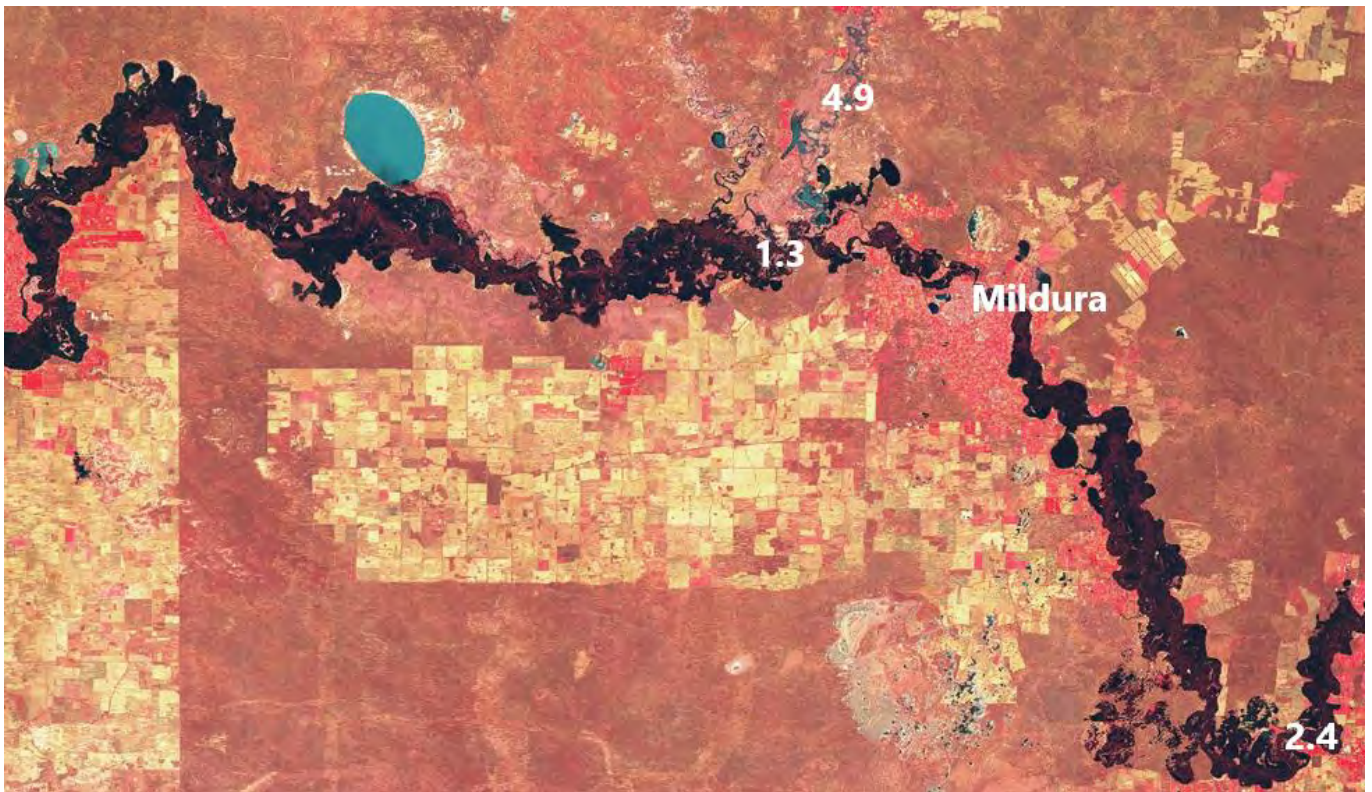


Figure 210: Satellite-derived Sentinel colour infrared image of the lower Murray River – 4 December 2022

Weather Outlook

The Bureau of Meteorology 8-day total rain forecast (5 to 12 December) indicates light falls across parts of inland NSW with totals increasing towards the far south coast (Figure 211). Forecast is for warmer air temperatures at Echuca and Mildura, reaching around 30°C on Wednesday. Low pressure and troughs will bring cooler temperatures on Thursday and Friday before warming back up to around 30°C over the weekend (Figure 212 and Figure 213).

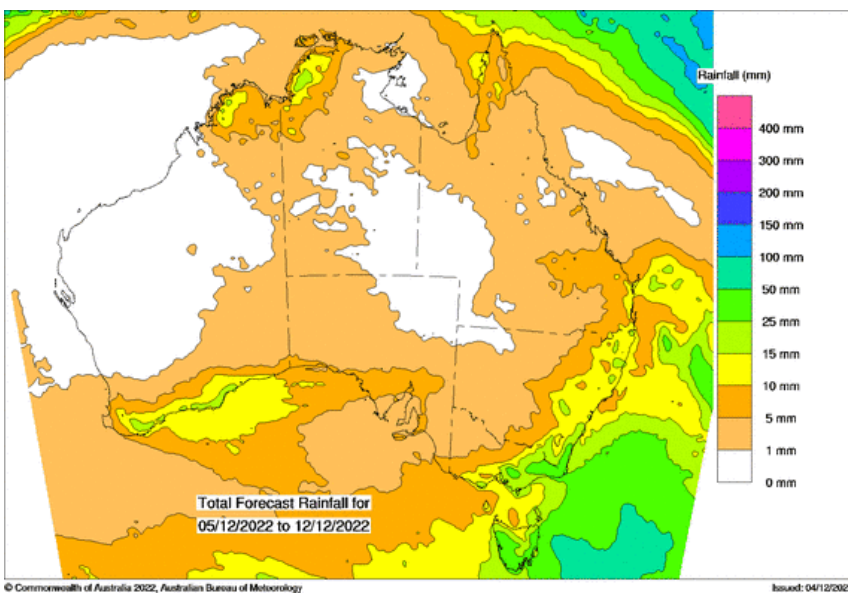


Figure 211: Bureau of Meteorology 8-day total rain forecast (5 to 12 December)

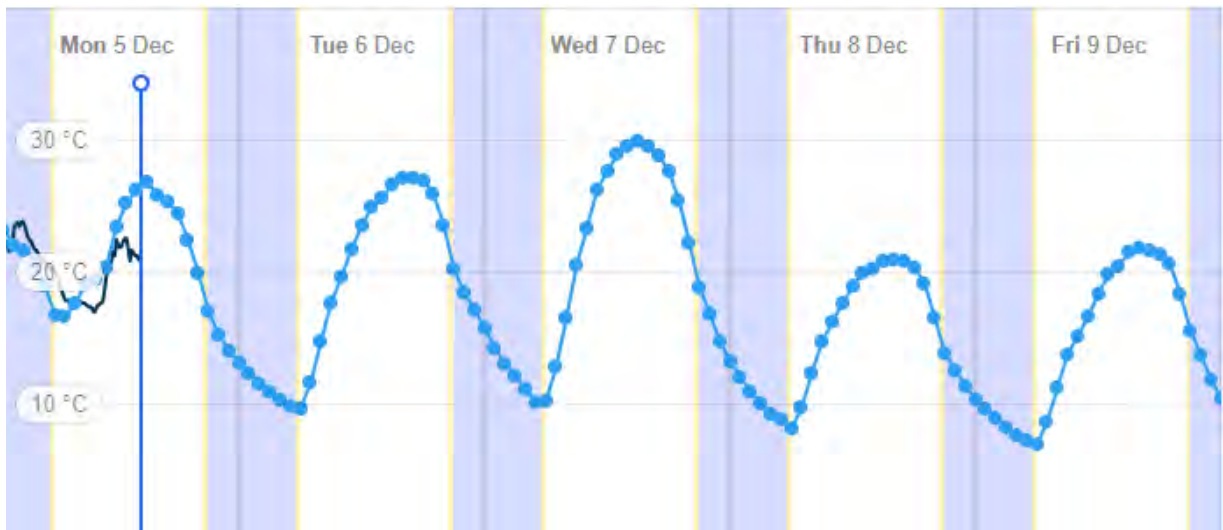


Figure 212: Forecast air temperatures for Echuca 5 to 9 December

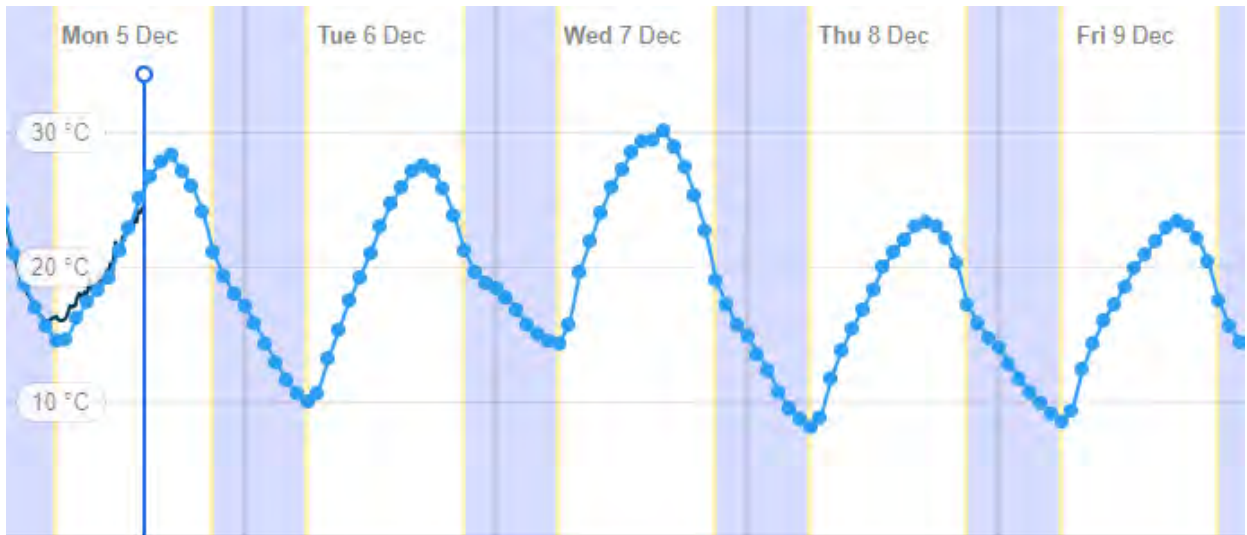


Figure 213: Forecast air temperatures for Mildura 5 to 9 December

Water quality update, Meeting No.10 – 12 December 2022

Northern Basin

Barwon River

Discharge is slowly decreasing in the Barwon River. Flow at Brewarrina is around 57,000 ML/day (Figure 1).

Dissolved oxygen results in the Barwon River at Walgett, Geera and Brewarrina have improved over the past week, and are now fluctuating around the 4 mg/L threshold (Figure 215).

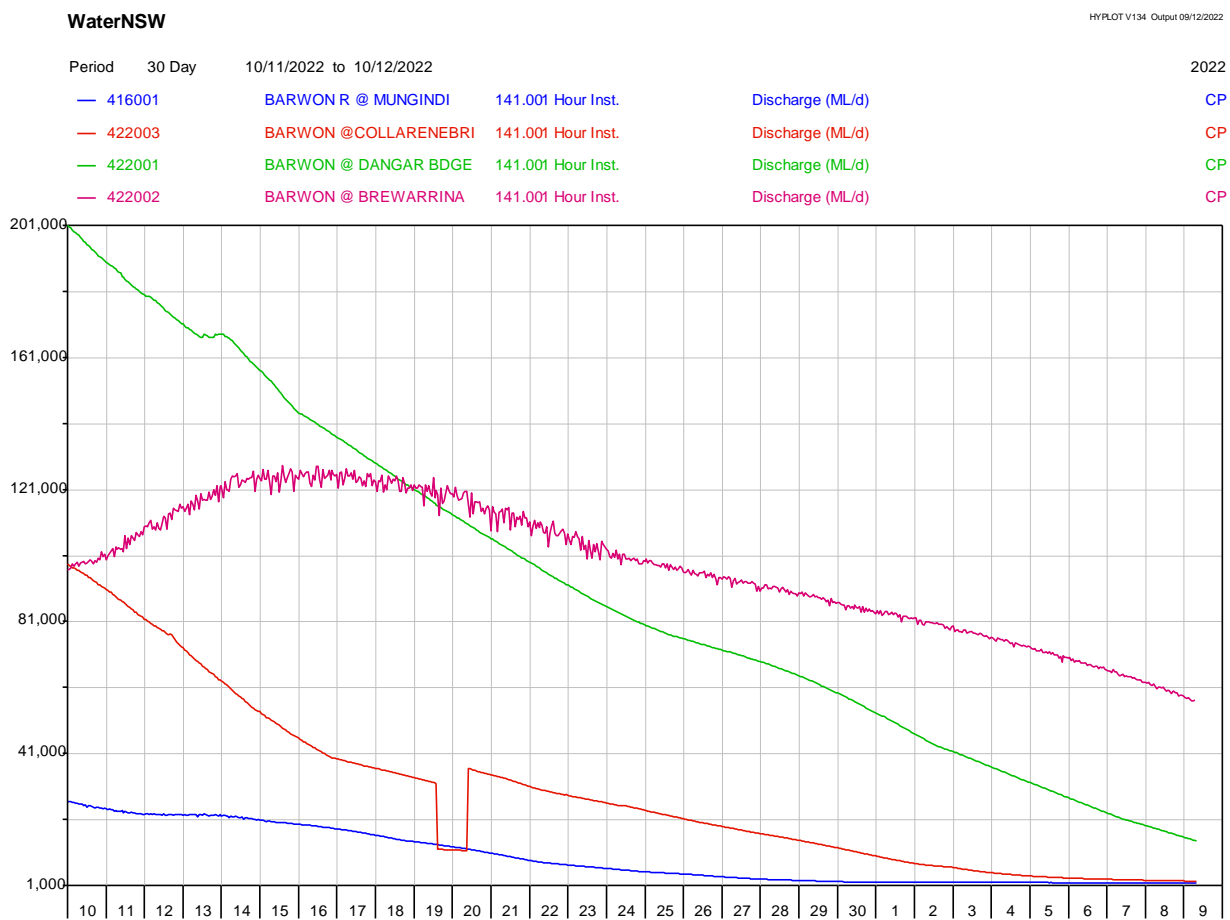


Figure 214: Discharge (ML/day) in the Barwon River

Period 30 Day 10/11/2022 to 10/12/2022 2022

— 422003	BARWON @ COLLARENEBRI	2351.00l Hour Inst.	DO (mg/l)	CP
— 422001	BARWON @ DANGAR BDGE	2351.00l Hour Inst.	DO (mg/l)	CP
— 422027	BARWON @ GEERA	2351.00l Hour Inst.	DO (mg/l)	CP
— 422002	BARWON @ BREWARRINA	2351.00l Hour Inst.	DO (mg/l)	CP

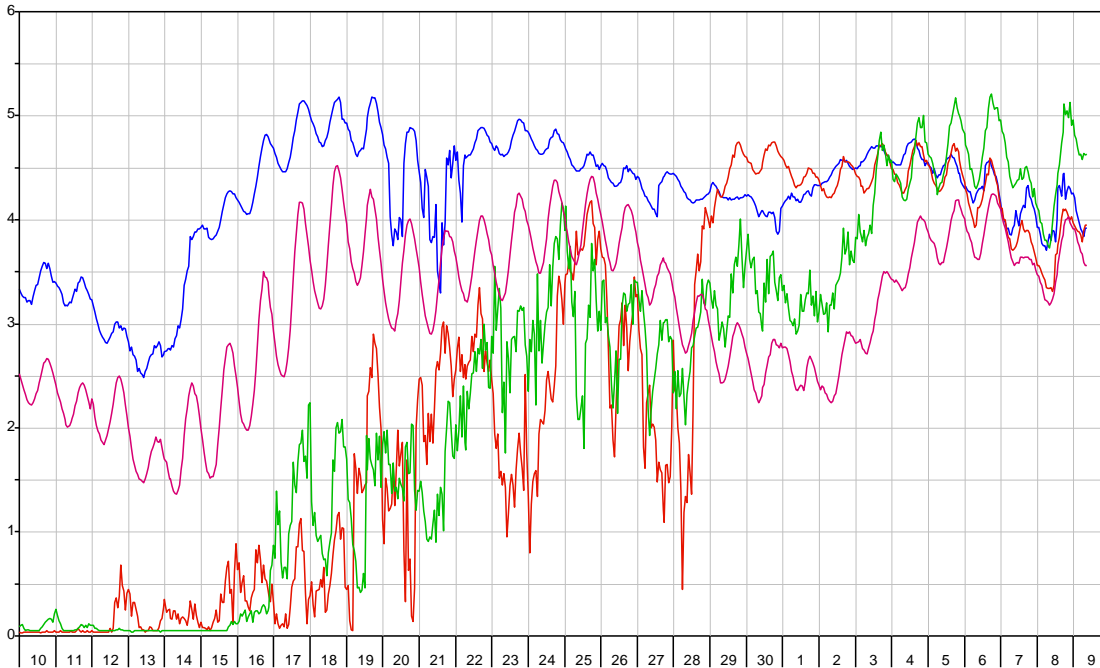


Figure 215: Continuous dissolved oxygen (mg/L) in the Barwon River

Period 30 Day 10/11/2022 to 10/12/2022 2022

— 416001	BARWON R @ MUNGINDI	2080.00l Hour Inst.	Water Temp(C)	CP
— 422003	BARWON @ COLLARENEBRI	2080.00l Hour Inst.	Water Temp(C)	CP
— 422001	BARWON @ DANGAR BDGE	2080.00l Hour Inst.	Water Temp(C)	CP
— 422002	BARWON @ BREWARRINA	2080.00l Hour Inst.	Water Temp(C)	CP

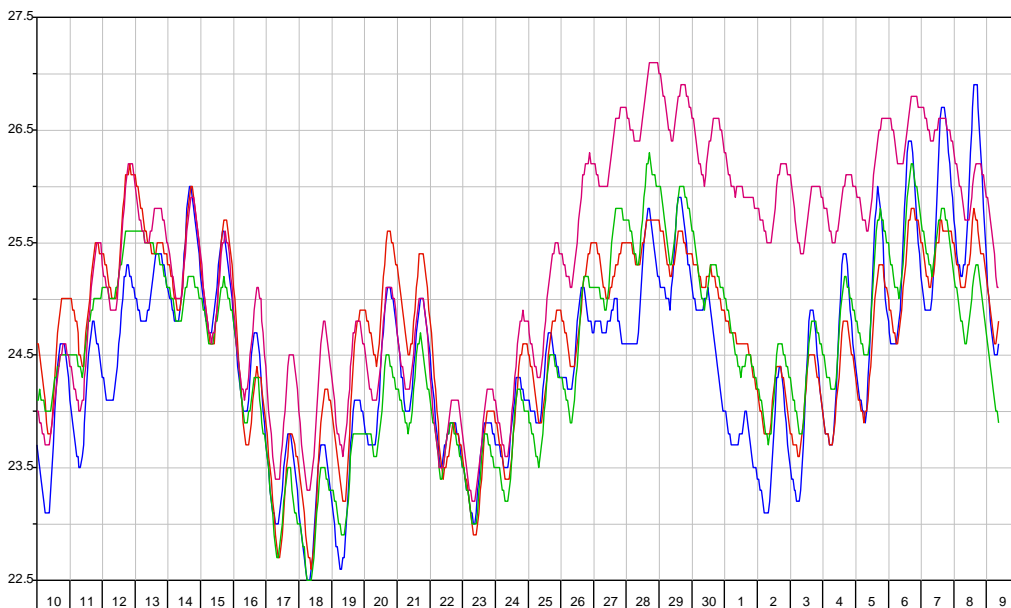


Figure 216: Continuous water temperature (°C) in the Barwon River

Darling River

Flooding peaked at Louth on 1 December at around 150,000 ML/day. Discharge at the Wilcannia gauge is slowly increasing toward 36,000 ML/day while the flow in Talyawalka Creek has increased to 49,000 ML/day (combined total 85,000 ML/day) (Figure 217). Major flooding at Wilcannia is predicted to peak in mid to late December. Figure 218 is a satellite-derived Sentinel colour infrared image showing the progression of turbid water (blue colour) from the Barwon River down the Darling River.

Discharge at Weir 32 is around 30,500 ML/day and just over 17,500 ML/day at Burtundy.

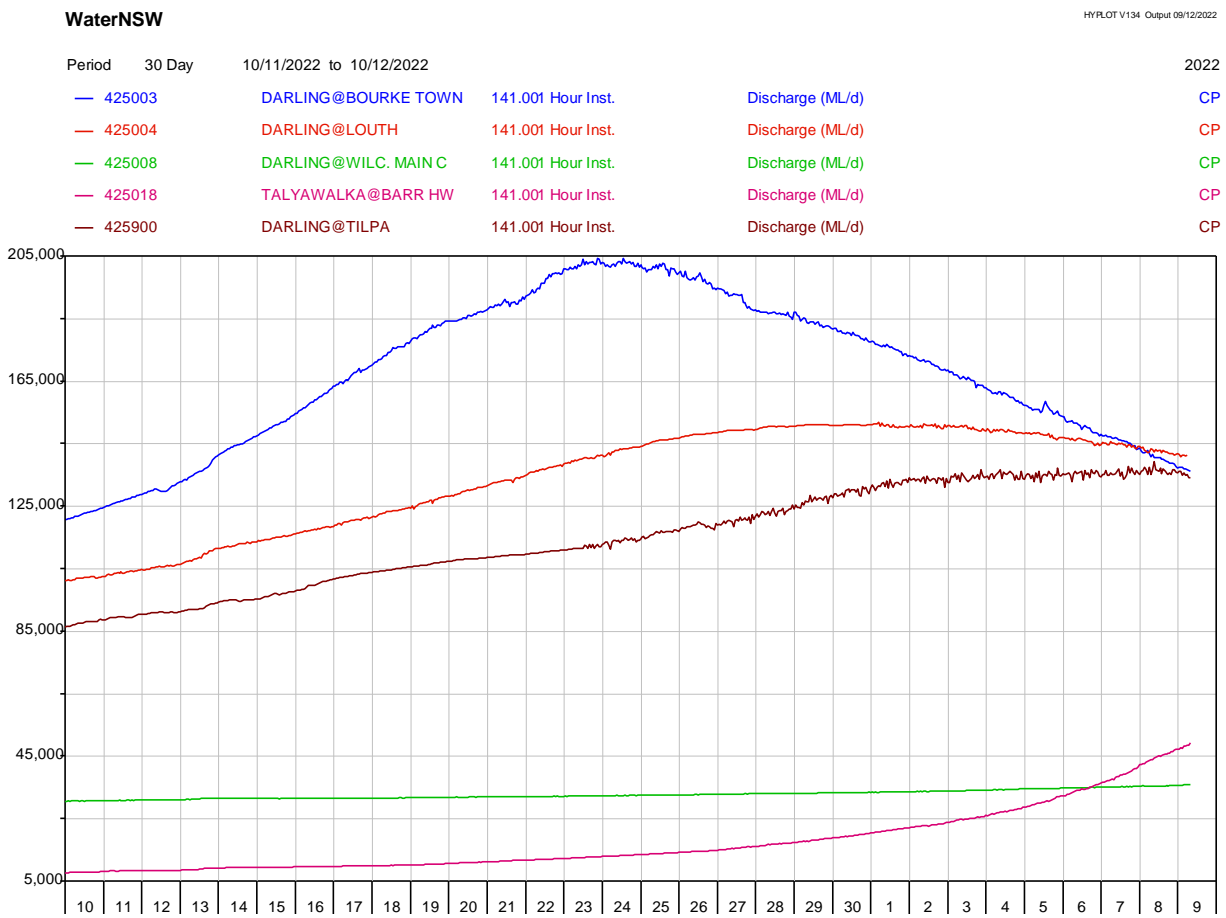


Figure 217: Discharge (ML/day) in the upper Darling River

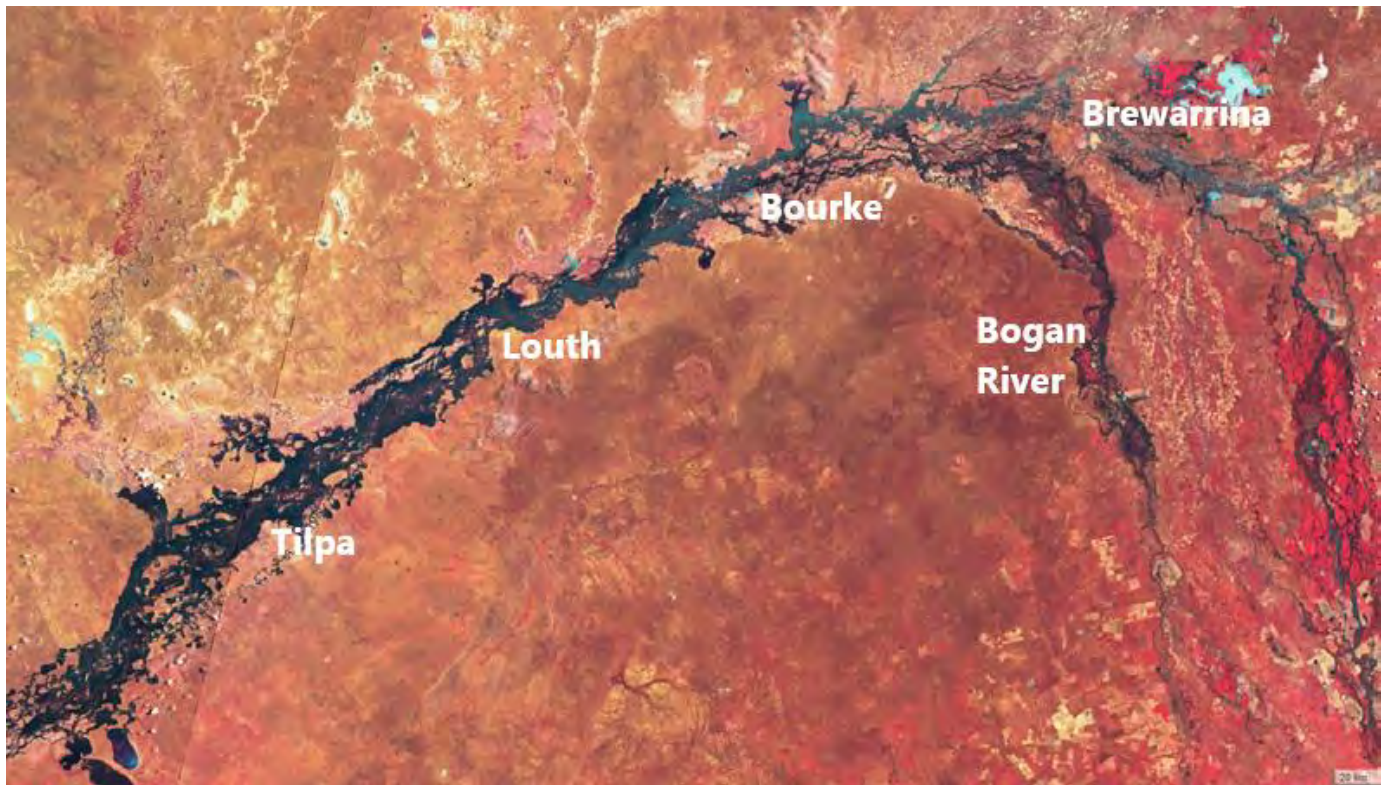


Figure 218: Satellite-derived Sentinel colour infrared image of the Darling River – 8 December 2022

Dissolved oxygen in the Darling River at Bourke and Wilcannia have both improved in response to the cooler water temperatures over the past few days. Oxygen levels in the Darling River downstream of Menindee Lakes are remaining above 4.5 mg/L (Figure 219).

The temporary dissolved oxygen monitoring site at Nelia Gaari on the Darling River upstream of Lake Wetherell had a dissolved oxygen reading of 4.2 mg/L on Friday morning (9/12/2022).

WaterNSW

HYPLOT V134 Output 09/12/2022

Period	30 Day	10/11/2022 to 10/12/2022		2022	
—	425003	DARLING@BOURKE TOWN	2351.00l Hour Inst.	DO (mg/l)	CP
—	425058	Darling R @ Moorabin	2351.00l Hour Inst.	DO (mg/l)	CP
—	425012	DARLING@U/S WEIR 32	2351.00l Hour Inst.	DO (mg/l)	CP
—	425007	DARLING@BURTUNDY	2351.00l Hour Inst.	DO (mg/l)	CP

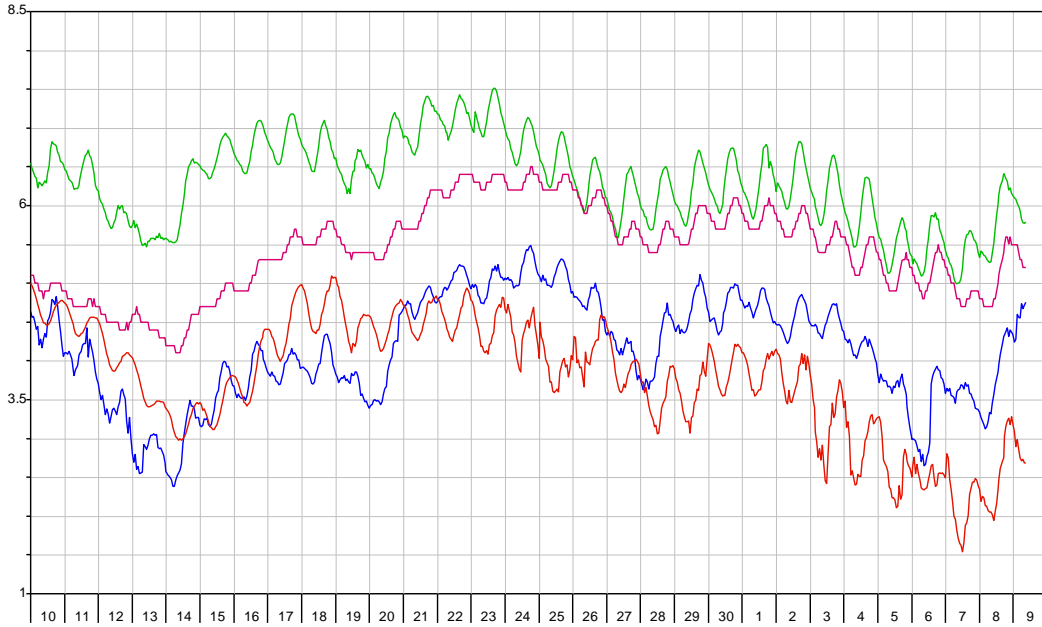


Figure 219: Continuous dissolved oxygen (mg/L) in the Darling River

Handheld result from the Darling River at Burtundy (5/12/2022 11:54) was 5.81 mg/L.

WaterNSW

HYPLOT V134 Output 09/12/2022

Period	30 Day	10/11/2022 to 10/12/2022		2022	
—	425003	DARLING@BOURKE TOWN	2080.00l Hour Inst.	Water Temp(C)	CP
—	425058	Darling R @ Moorabin	2080.00l Hour Inst.	Water Temp(C)	CP
—	425012	DARLING@U/S WEIR 32	2080.00l Hour Inst.	Water Temp(C)	CP
—	425007	DARLING@BURTUNDY	2080.00l Hour Inst.	Water Temp(C)	CP

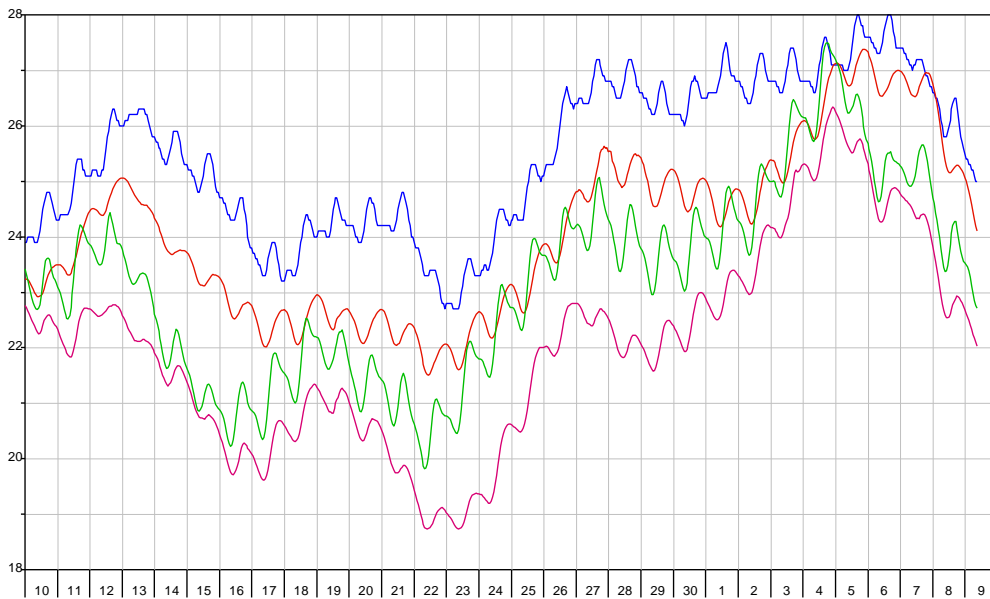


Figure 220: Continuous water temperature (°C) in the Darling River

Southern Basin

Lachlan River

Flooding continues in the Lachlan River (Figure 221) with major flooding warnings continuing for Euabalong and Hillston. Figure 222 shows floodwaters flowing down Willandra Creek to the west.

Despite the major flooding, dissolved oxygen readings at all sites are above 4 mg/L (Figure 223).

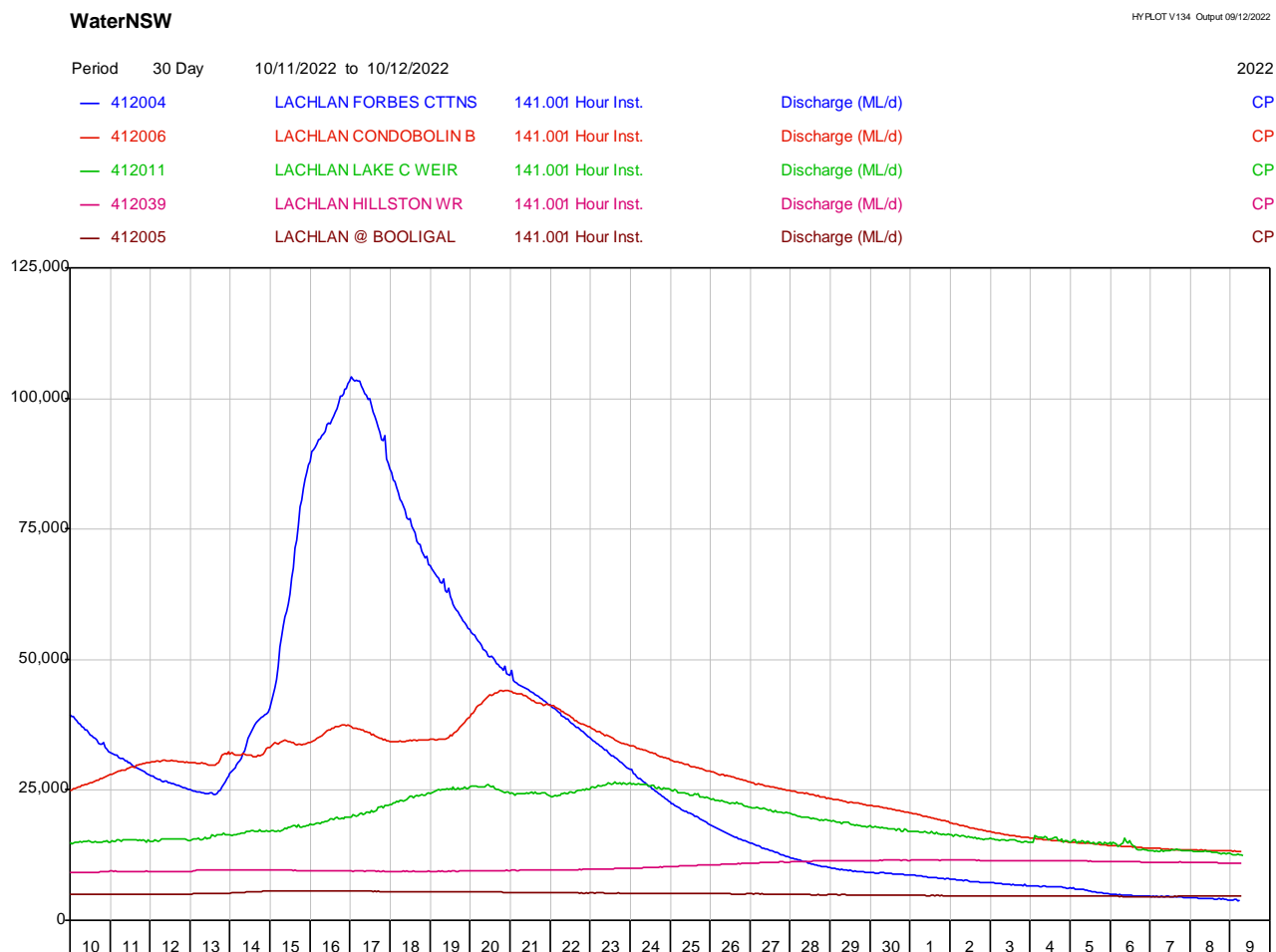


Figure 221: Discharge (ML/day) in the Lachlan River

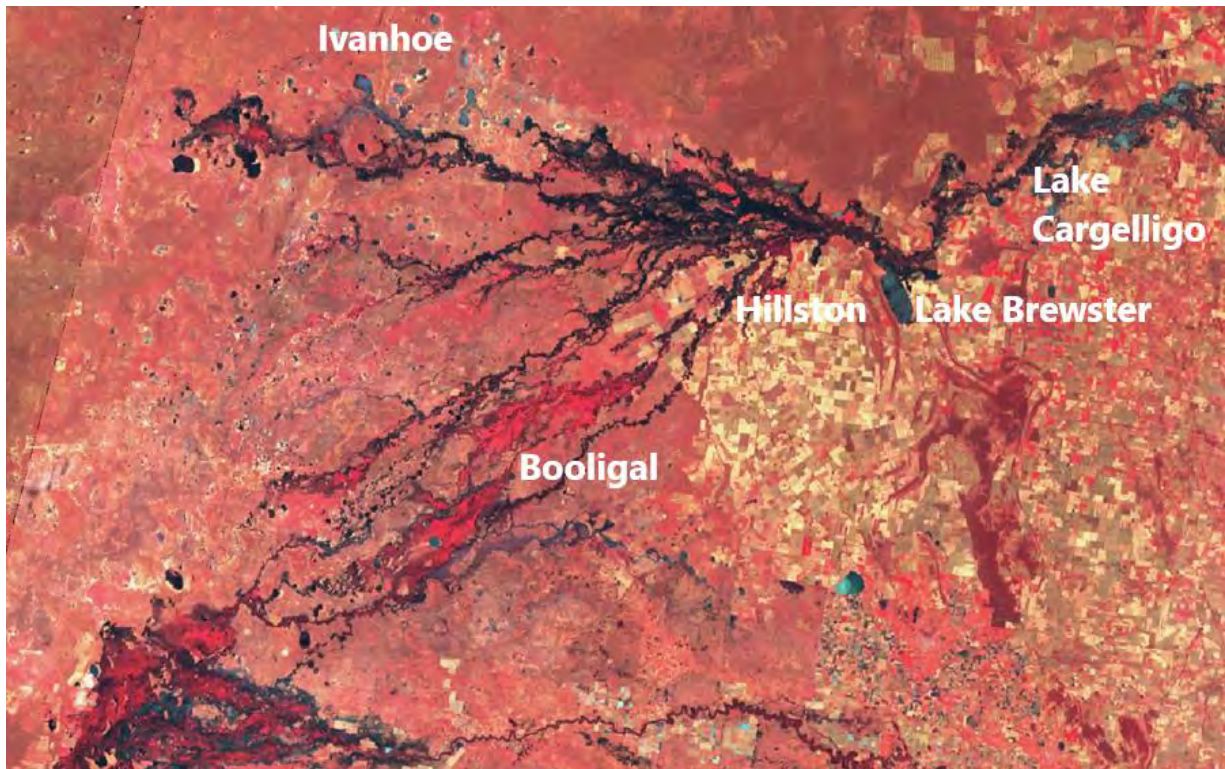


Figure 222: Satellite-derived Sentinel colour infrared image of the Lachlan River floodplain – 8 December 2022

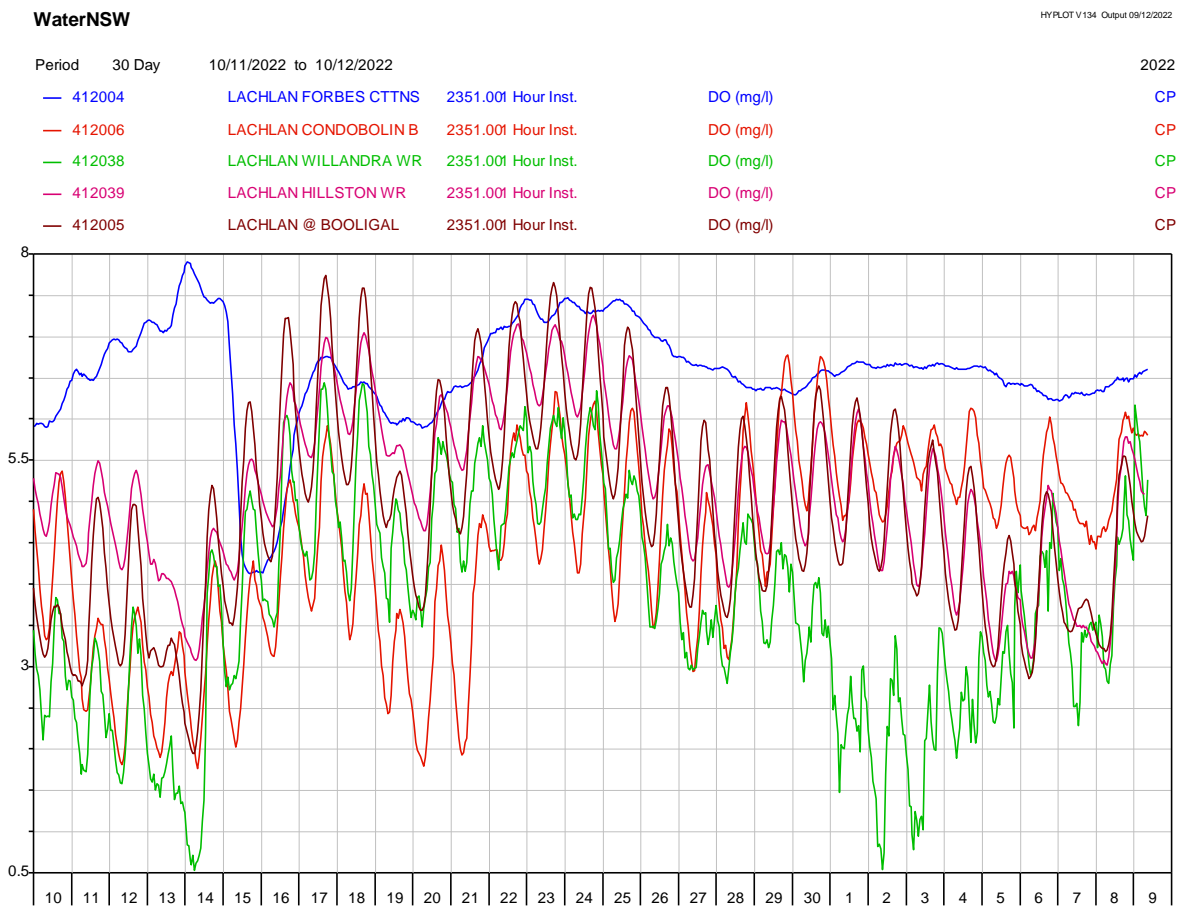


Figure 223: Continuous dissolved oxygen (mg/L) in the Lachlan River

WaterNSW

HYRLOT V134 Output 09/12/2022

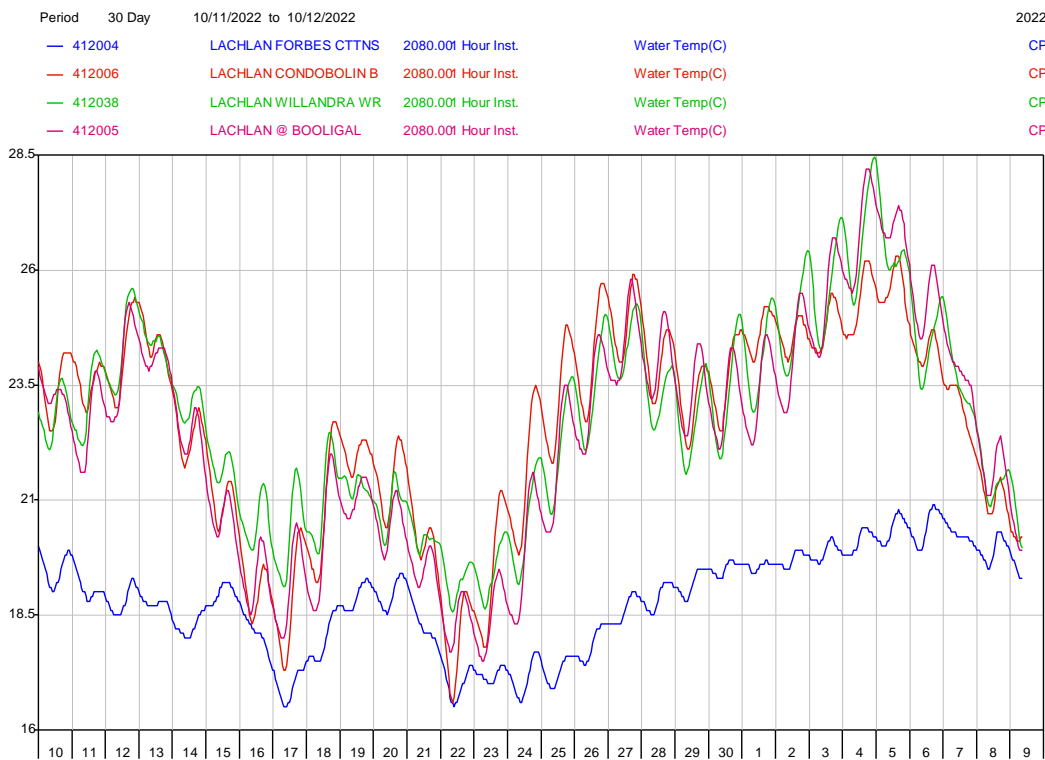


Figure 224: Continuous water temperature (°C) in the Lachlan River

Murrumbidgee River

River levels in the Murrumbidgee River at Gogeldrie Weir is steady at just over 10,000 ML/day. Discharge is continuing to fall at Hay and Maude. Discharge at Balranald is slowly decreasing toward 50,000 ML/day (Figure 225).

Dissolved oxygen levels in the Murrumbidgee River at Maude Weir are fluctuating around 6 to 7 mg/L. Oxygen levels at Redbank and Balranald remain low (<4 mg/L) but are showing stable diurnal fluctuations (Figure 226).

WaterNSW

HYPLOT V134 Output 09/12/2022

Period 30 Day 10/11/2022 to 10/12/2022 2022

— 410082	MBIDGEE D/S GOGEL W	141.001 Hour Inst.	Discharge (ML/d)	CP
— 410136	MBIDGEE DS HAY WEIR	141.001 Hour Inst.	Discharge (ML/d)	CP
— 410040	MBIDGEE D/S MAUDE W	141.001 Hour Inst.	Discharge (ML/d)	CP
— 410130	MBIDGEE D/S BALRAND	141.001 Hour Inst.	Discharge (ML/d)	CP

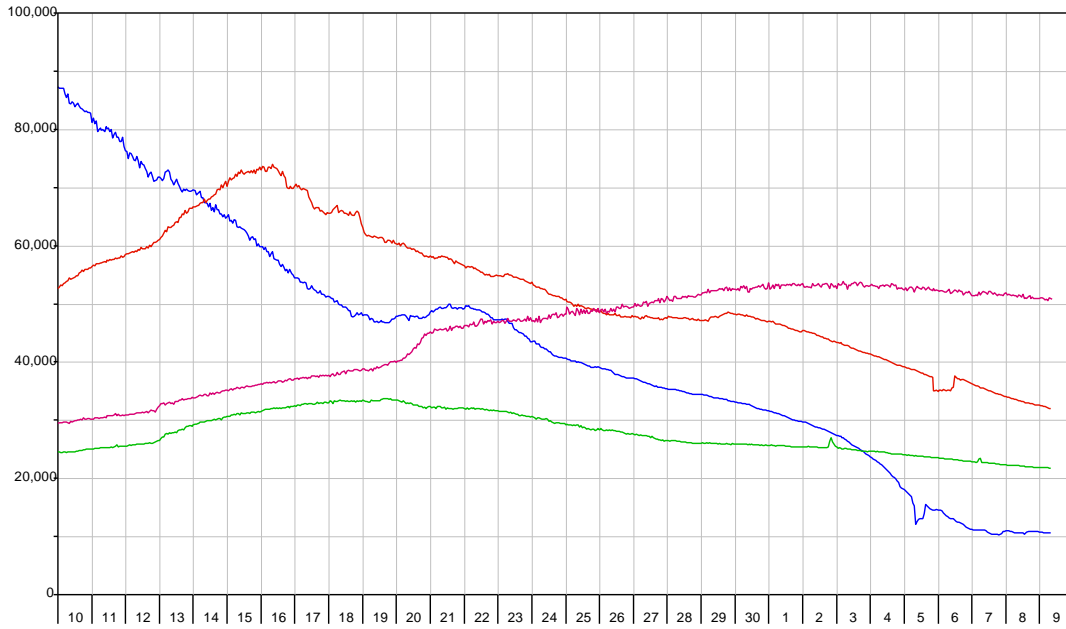


Figure 225: Discharge (ML/day) in the Murrumbidgee River

WaterNSW

HYPLOT V134 Output 09/12/2022

Period 30 Day 10/11/2022 to 10/12/2022 2022

— 410040	MBIDGEE D/S MAUDE W	2351.001 Hour Inst.	DO (mg/l)	CP
— 410041	MBIDGEE D/S REDBANK	2351.001 Hour Inst.	DO (mg/l)	CP
— 410130	MBIDGEE D/S BALRAND	2351.001 Hour Inst.	DO (mg/l)	CP

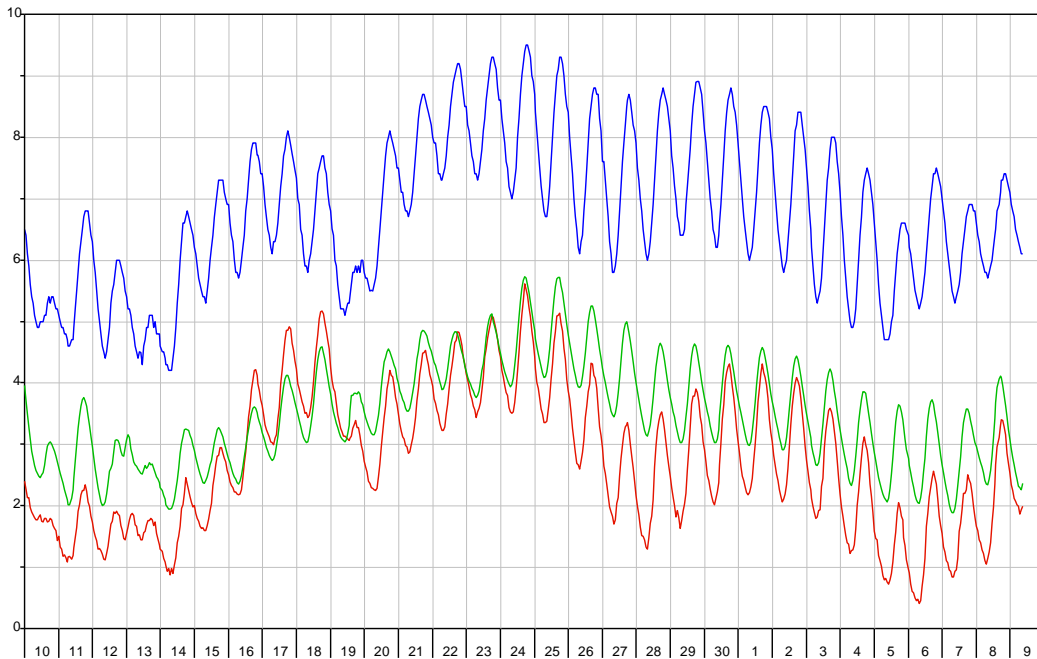


Figure 226: Continuous dissolved oxygen (mg/L) in the Murrumbidgee River

Handheld result from the Murrumbidgee River at Balranald (5/12/2022 11:43) was 1.65 mg/L.

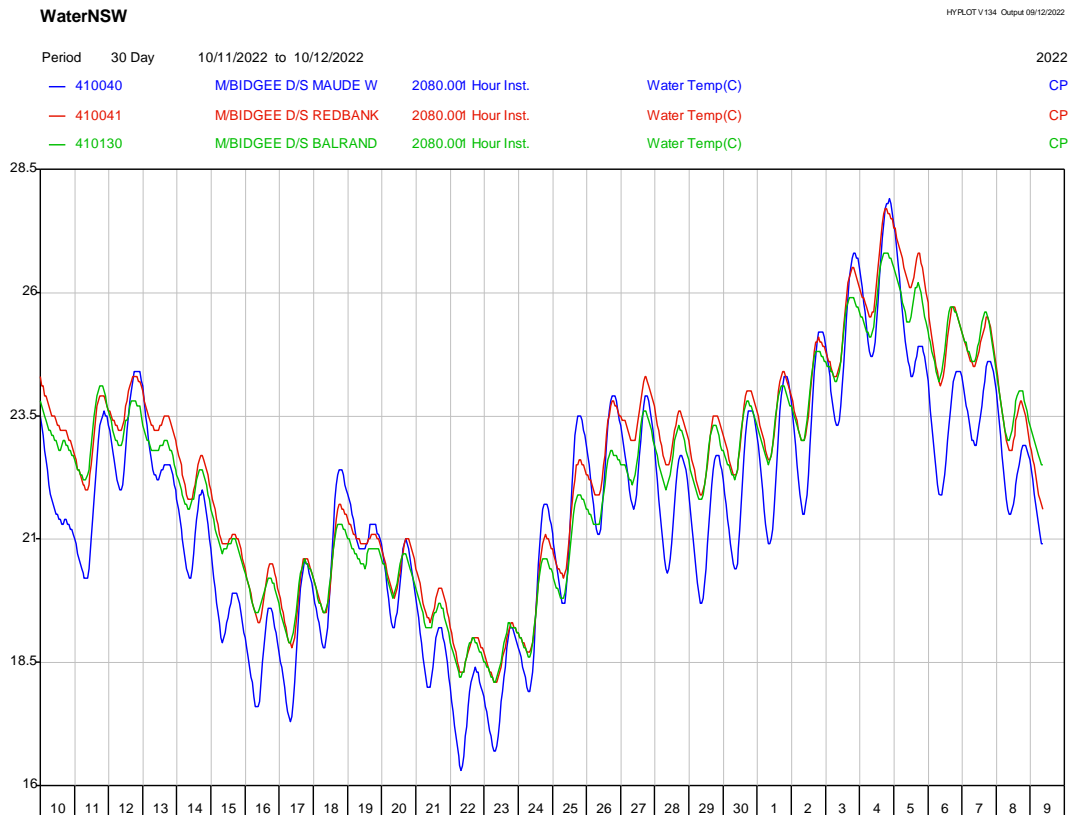


Figure 227: Continuous water temperature (°C) in the Murrumbidgee River

Kolety/Edward River

Discharge in the Kolety/Edward River at Deniliquin has been declining over the past two weeks (Figure 228). Flow from the Kolety/Edward River combined with Billabong Creek resulted in record major flooding at Moulamein. River levels at Moulamein reached a peak on 1 December and have now fallen below 38,000ML/day, yet remain above the major flood warning alert level.

There has been a slight recovery in dissolved oxygen in the Kolety/Edward River in response to the lower water temperatures this week (Figure 229).

WaterNSW

HYFLOT V134 Output 09/12/2022

Period 30 Day 10/11/2022 to 10/12/2022 2022

— 409003	EDWARD @ DENILQUIN	141.00l Hour Inst.	Discharge (ML/d)	CP
— 409035	EDWARD R @ LIEWAH	141.00l Hour Inst.	Discharge (ML/d)	CP
— 410134	BILLABONG @ DARLOT	141.00l Hour Inst.	Discharge (ML/d)	CP

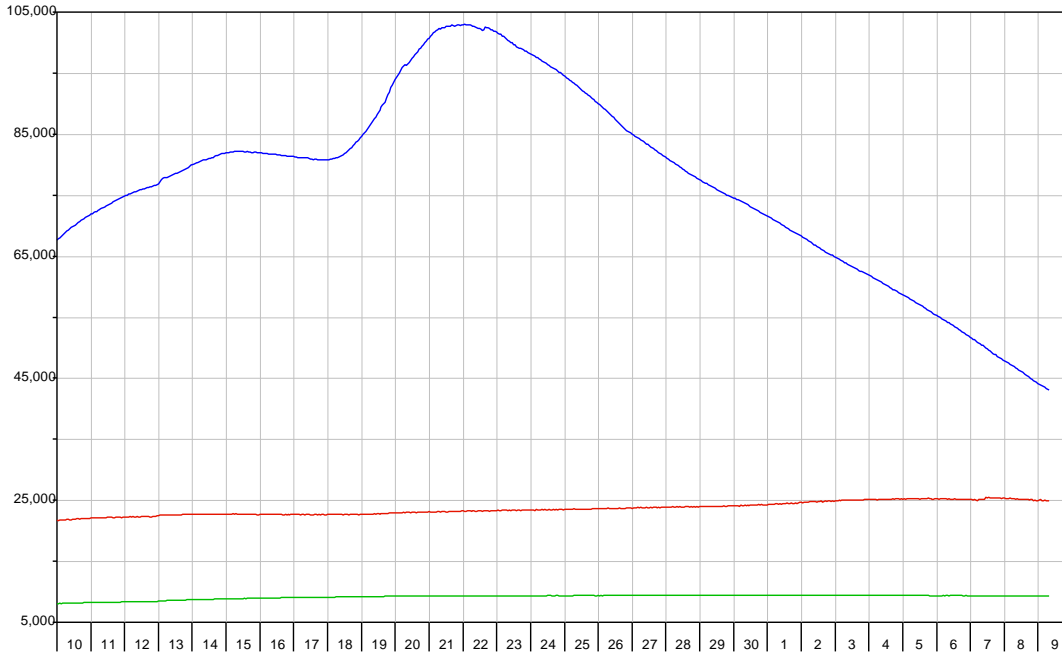


Figure 228: Discharge (ML/day) in the Kolety/Edward River

WaterNSW

HYFLOT V134 Output 09/12/2022

Period 30 Day 10/11/2022 to 10/12/2022 2022

— 409047	EDWARD R @ TOONALOOK	2351.00l Hour Inst.	DO (mg/l)	CP
— 409003	EDWARD @ DENILQUIN	2351.00l Hour Inst.	DO (mg/l)	CP
— 409014	EDWARD R @ MOULAMEIN	2351.00l Hour Inst.	DO (mg/l)	CP

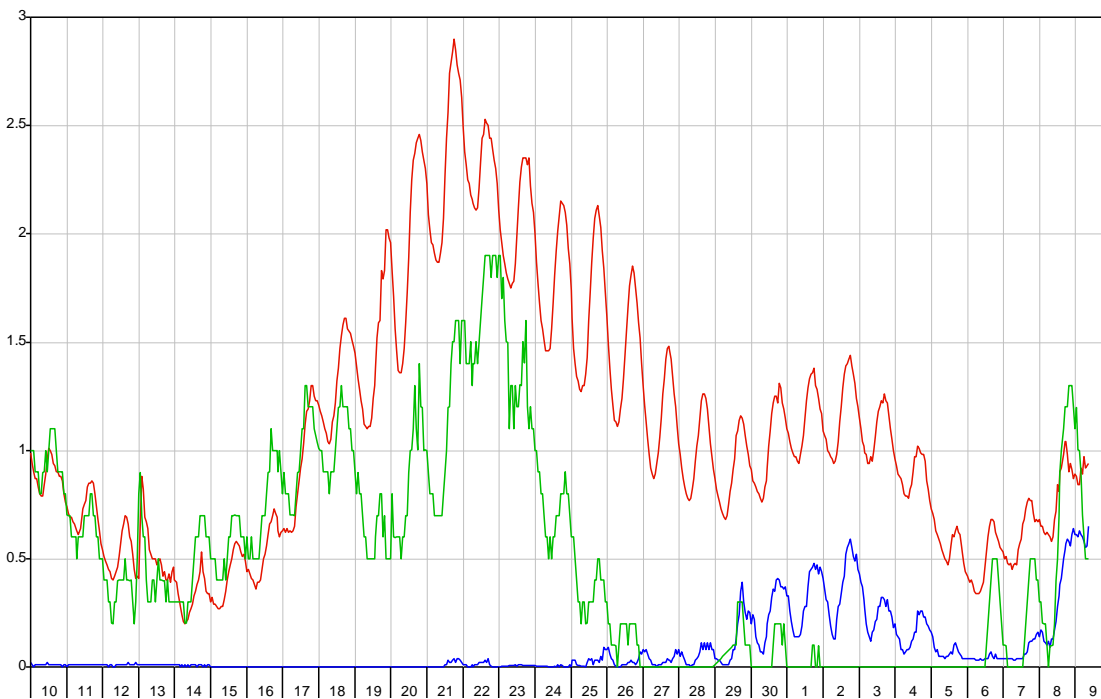


Figure 229: Continuous dissolved oxygen (mg/L) in the Kolety/Edward River

WaterNSW

HYFLOT V134 Output 08/12/2022

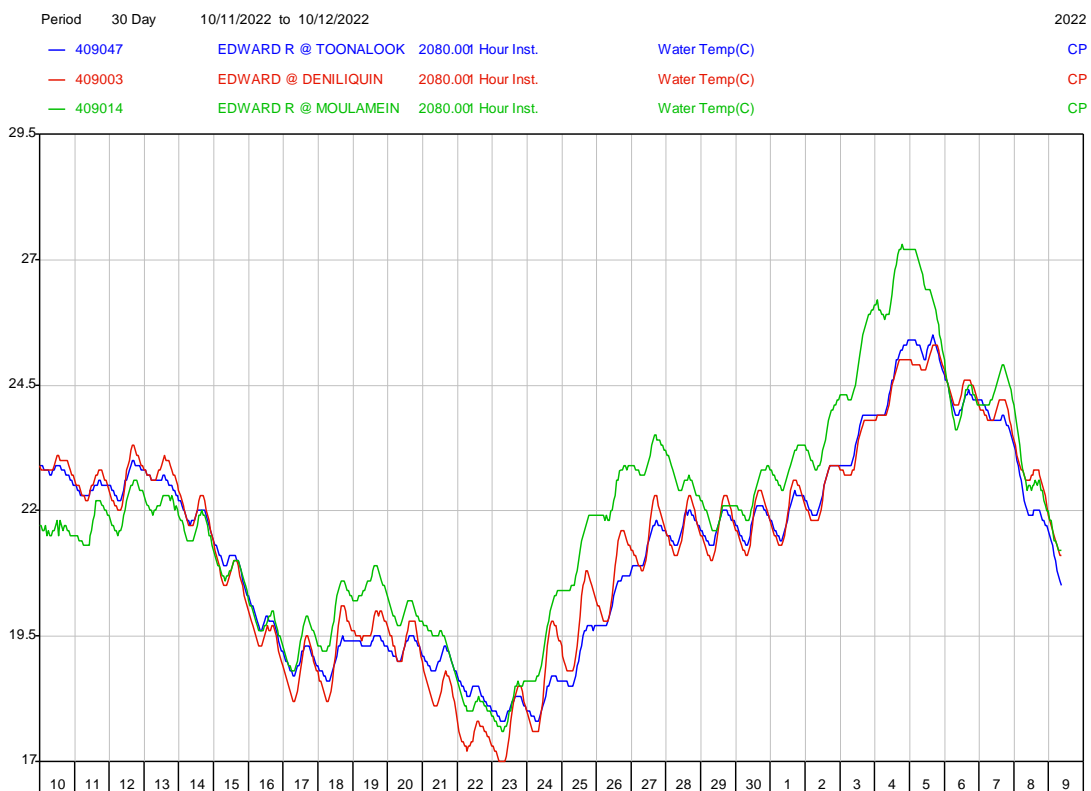


Figure 230: Continuous water temperature (°C) in the Kolety/Edward River

Wakool and Niemur rivers

Discharge in the Wakool River at Coonambit Bridge is just above 96,000 ML/day and at Gee Gee Bridge has just dropped to 40,000 ML/day. The Niemur River at Barham-Moulamein Road is flowing at just under 25,000 ML/day (Figure 231).

Dissolved oxygen levels at both sites in the Niemur River have improved back up towards the 4 mg/L threshold (Figure 232). Dissolved oxygen levels in the Wakool River at Gee Gee Bridge have improved while levels at Stoney Crossing remain very low.

WaterNSW

HYFLOT V134 Output 09/12/2022

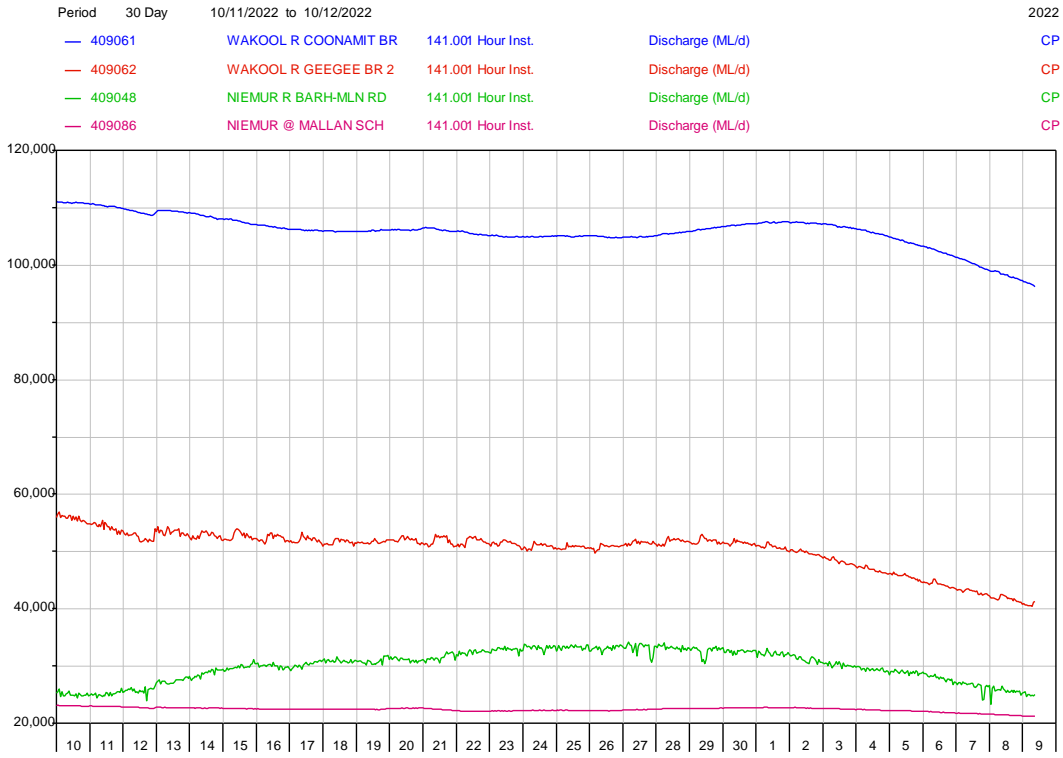


Figure 231: Discharge (ML/day) in the Wakool and Niemur rivers

WaterNSW

HYFLOT V134 Output 09/12/2022

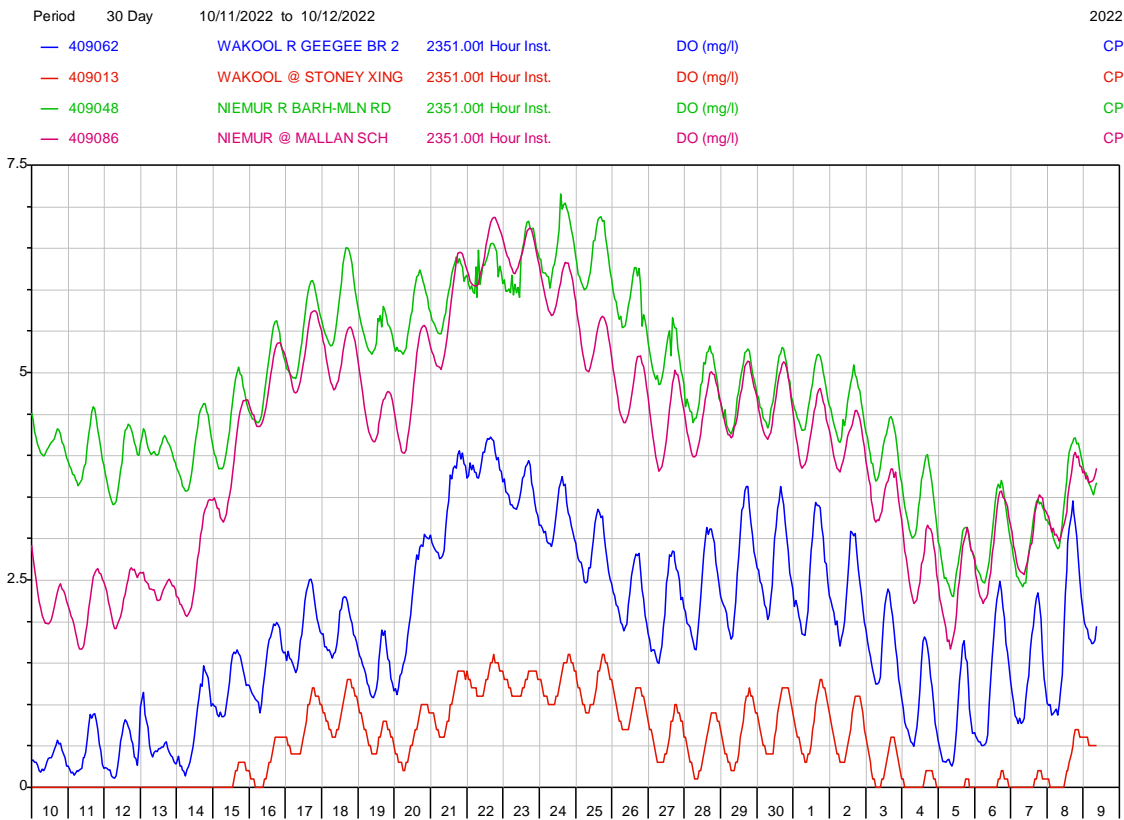


Figure 232: Continuous dissolved oxygen (mg/L) in the Wakool and Niemur rivers

WaterNSW

HY PLOT V134 Output 09/12/2022

Period	30 Day	10/11/2022 to 10/12/2022			2022
—	409062	WAKOOL R GEEGEE BR 2	2080.001 Hour Inst.	Water Temp(C)	CP
—	409013	WAKOOL @ STONEY XING	2080.001 Hour Inst.	Water Temp(C)	CP
—	409048	NIEMUR R BARH-MLN RD	2080.001 Hour Inst.	Water Temp(C)	CP
—	409086	NIEMUR @ MALLAN SCH	2080.001 Hour Inst.	Water Temp(C)	CP

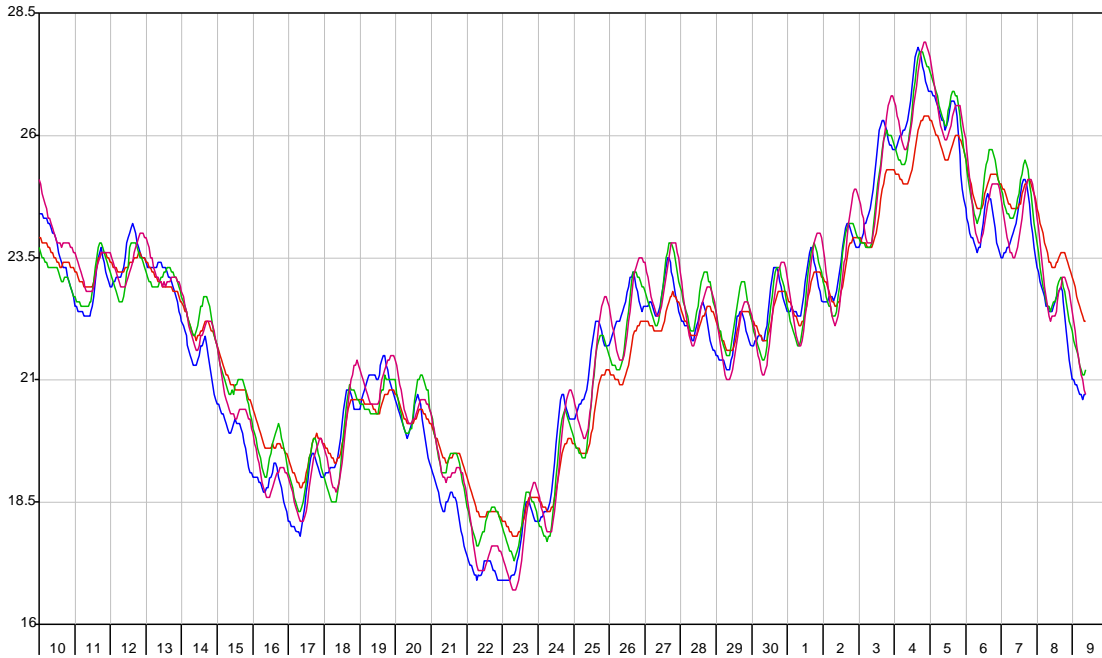


Figure 233: Continuous water temperature (°C) in the Wakool and Niemur rivers

Merran, Little Merran, Thule and Barber creeks

Figure 234 shows dissolved oxygen levels in Merran, Little Merran and Thule creeks improved during the week with lower water temperature (Figure 235). The dissolved oxygen sensors at both sites on Barber Creek have malfunctioned.

WaterNSW

HYFLOT V134 Output 09/12/2022

Period 30 Day 10/11/2022 to 10/12/2022 2022

— 409044	LT MERRAN FRANK/ BR	2351.001 Hour Inst.	DO (mg/l)	CP
— 409036	MERRAN CK U/S WAK R	2351.001 Hour Inst.	DO (mg/l)	CP
— 409109	THULE @ LOW THULE RD	2351.001 Hour Inst.	DO (mg/l)	CP

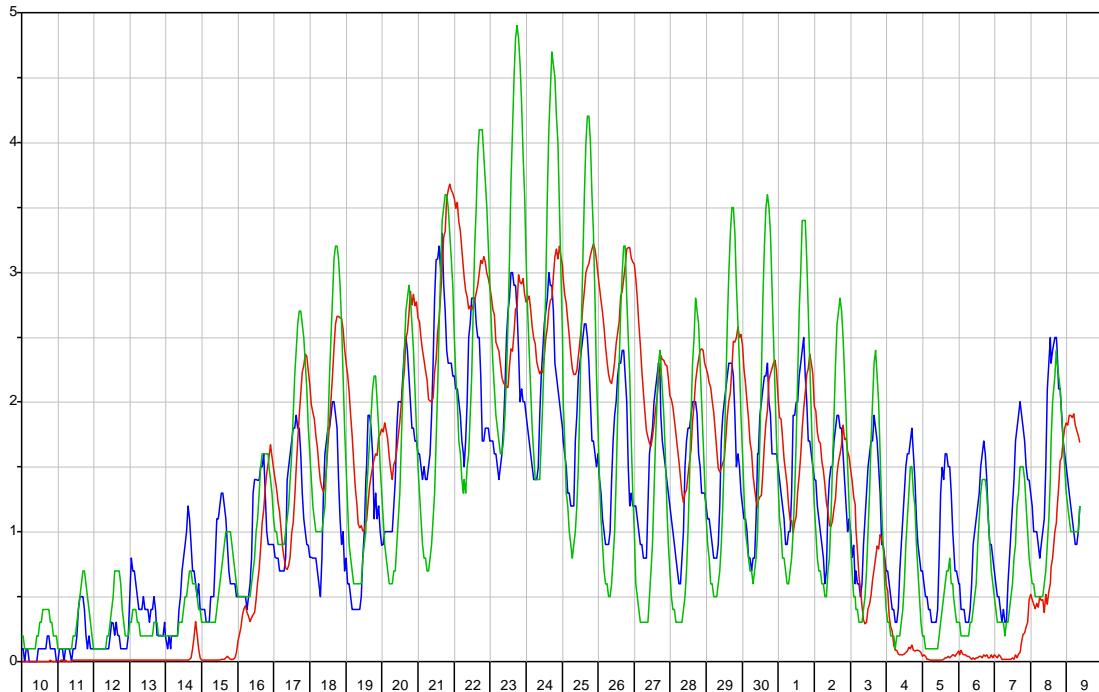


Figure 234: Continuous dissolved oxygen (mg/L) in the Merran, Little Merran and Thule creeks

WaterNSW

HYFLOT V134 Output 09/12/2022

Period 30 Day 10/11/2022 to 10/12/2022 2022

— 409044	LT MERRAN FRANK/ BR	2080.001 Hour Inst.	Water Temp(C)	CP
— 409036	MERRAN CK U/S WAK R	2080.001 Hour Inst.	Water Temp(C)	CP
— 409109	THULE @ LOW THULE RD	2080.001 Hour Inst.	Water Temp(C)	CP

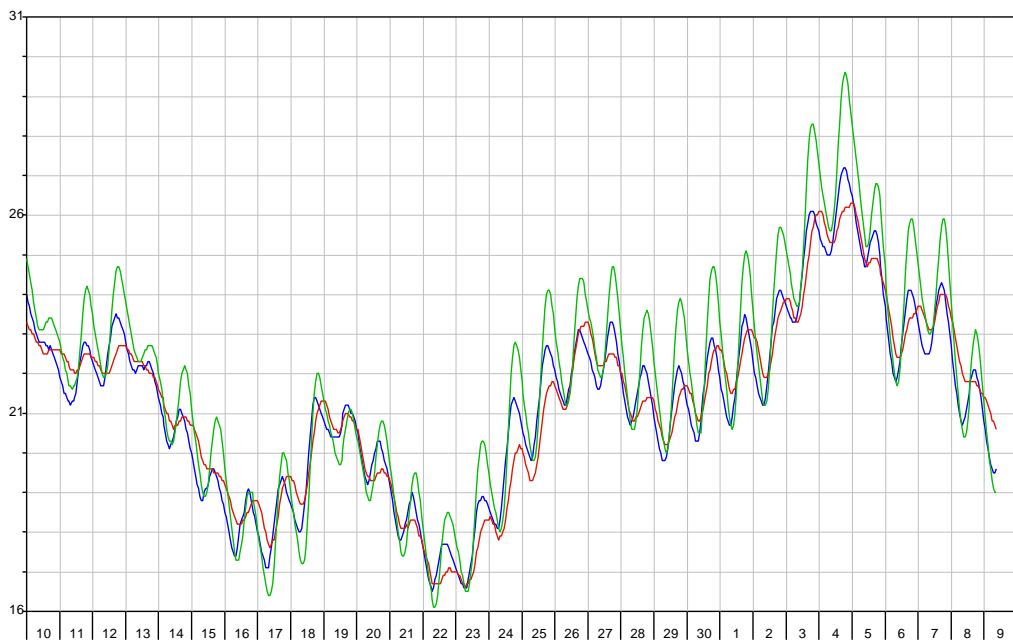


Figure 235: Continuous water temperature (°C) in the Merran, Little Merran and Thule creeks

Murray River

The Bureau of Meteorology is reporting river levels at Barham are expected to remain around the major flood level until next week. Major flooding is occurring at the Murray -Wakool River Junction, Boundary Bend and at Wentworth. Major flooding at Wentworth could persist through until early January 2023.

Monitoring by DELWP is showing the Murray River at Tocumwal, upstream of the Barmah/Millewa Forest, is oxygenated (Figure 236). Downstream of the forest at Barmah dissolved oxygen was 1.98 mg/L on 6 December (8:15). Dissolved oxygen in the Goulburn River at McCoys Bridge is remaining above 5 mg/L and the Campaspe River at Fehrings Lane is just below 4 mg/L.

The Murray River at Barham is remaining below 1 mg/L. Monitoring further downstream at Boundary Bend is also showing low dissolved oxygen results. The Murray River at Wemen (downstream of Robinvale) has been fluctuating around 3 mg/L for the past few weeks. The results from the temporary monitoring site installed on the Murray River downstream of Wentworth are around 2 mg/L.

Handheld reading from Murry River at Euston Weir on 6/12/2022 (10:01) was 1.2 mg/L.

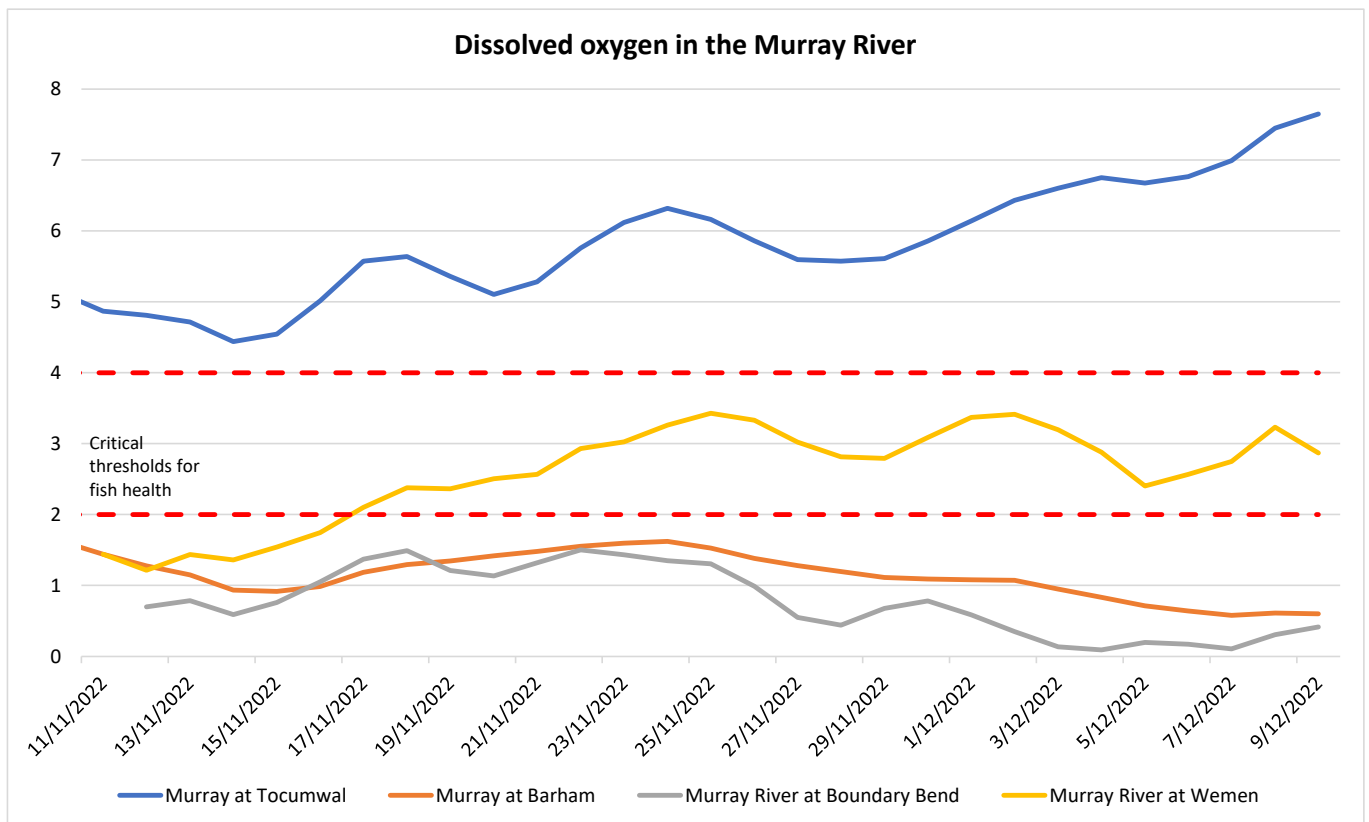


Figure 236: Continuous dissolved oxygen (mg/L) in the Murray River at Tocumwal and Barmah (data courtesy of DELWP)

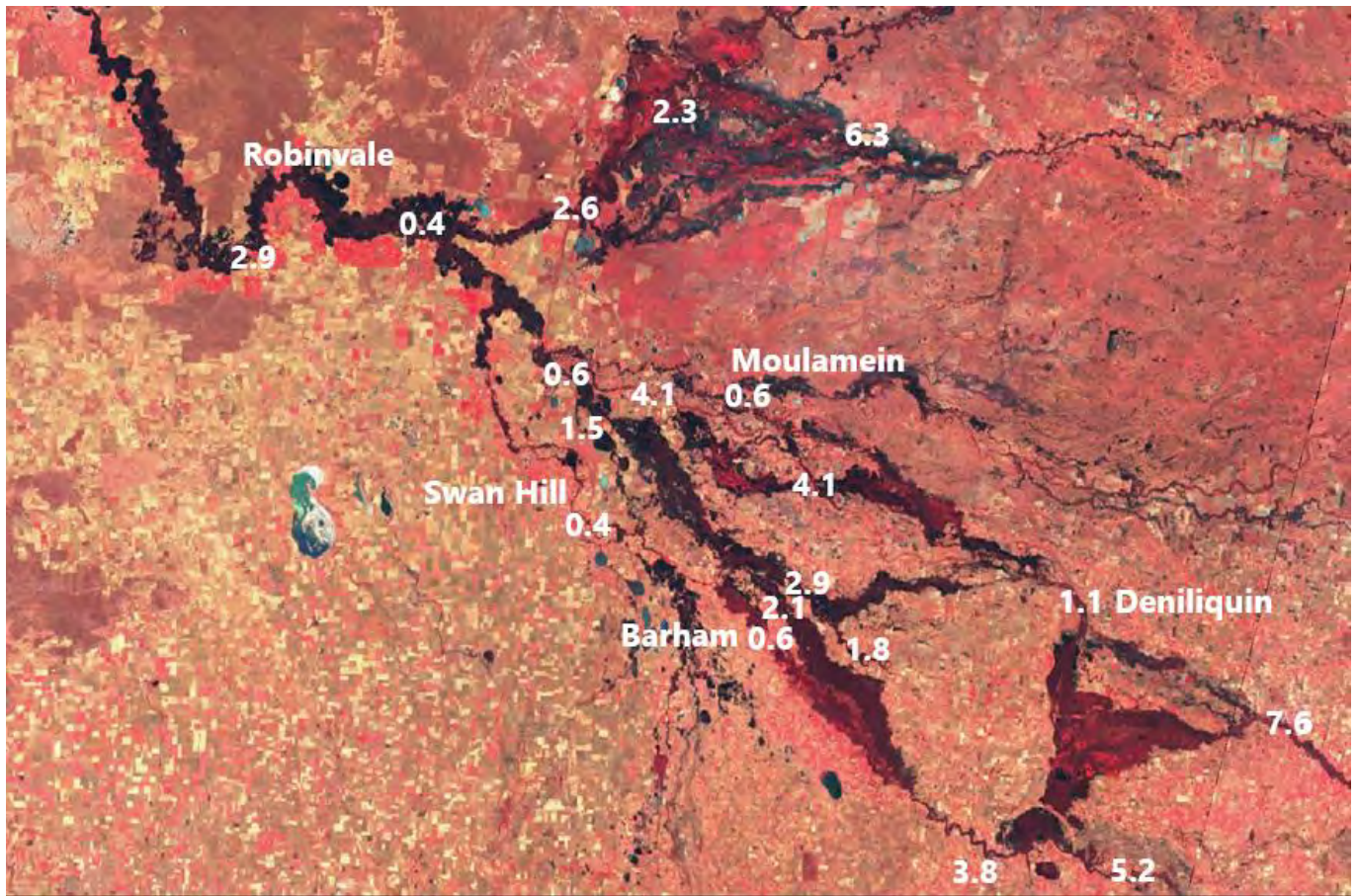


Figure 237: Satellite-derived Sentinel colour infrared image of the lower Murrumbidgee and mid Murray River catchments – 9 December 2022

Weather Outlook

The Bureau of Meteorology 8-day total rain forecast (9 to 16 December) indicates light falls across parts of inland NSW with totals increasing towards the far south coast (Figure 238). Forecast is for warmer air temperatures at Echuca and Mildura over the weekend. Low pressure and troughs will bring showers and cooler temperatures next week (Figure 239 and Figure 240).

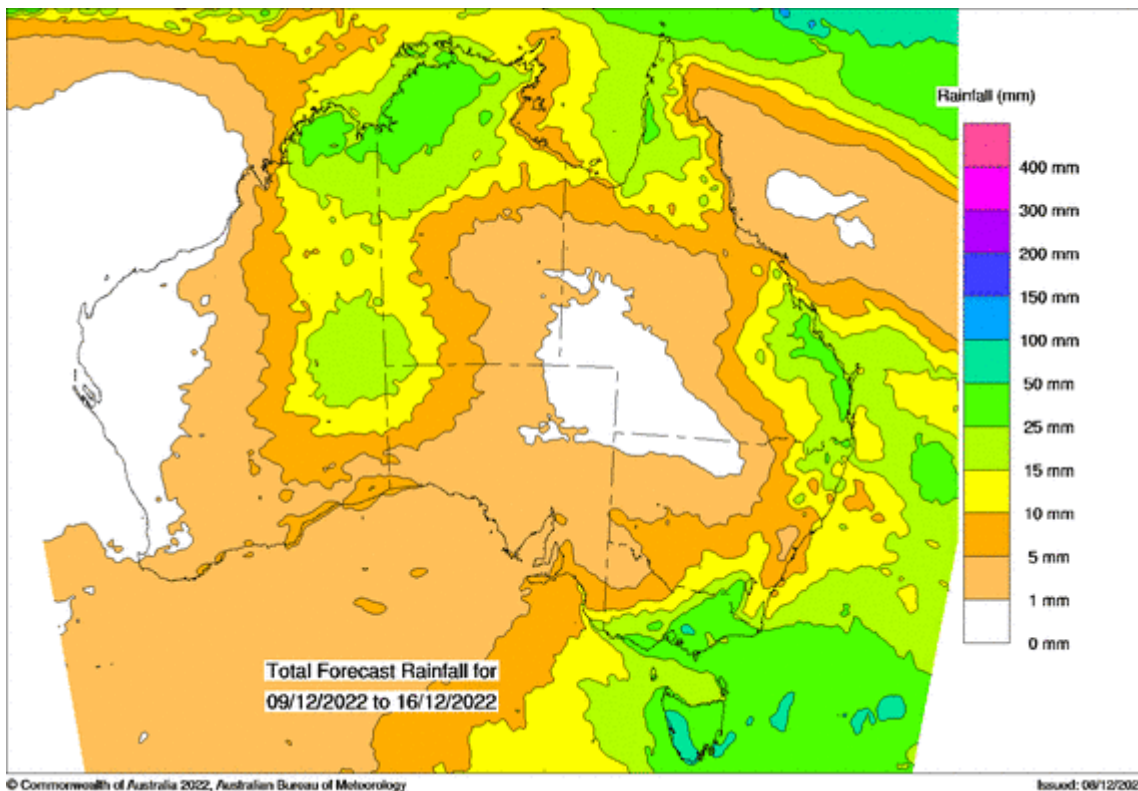


Figure 238: Bureau of Meteorology 8-day total rain forecast (9 to 16 December)

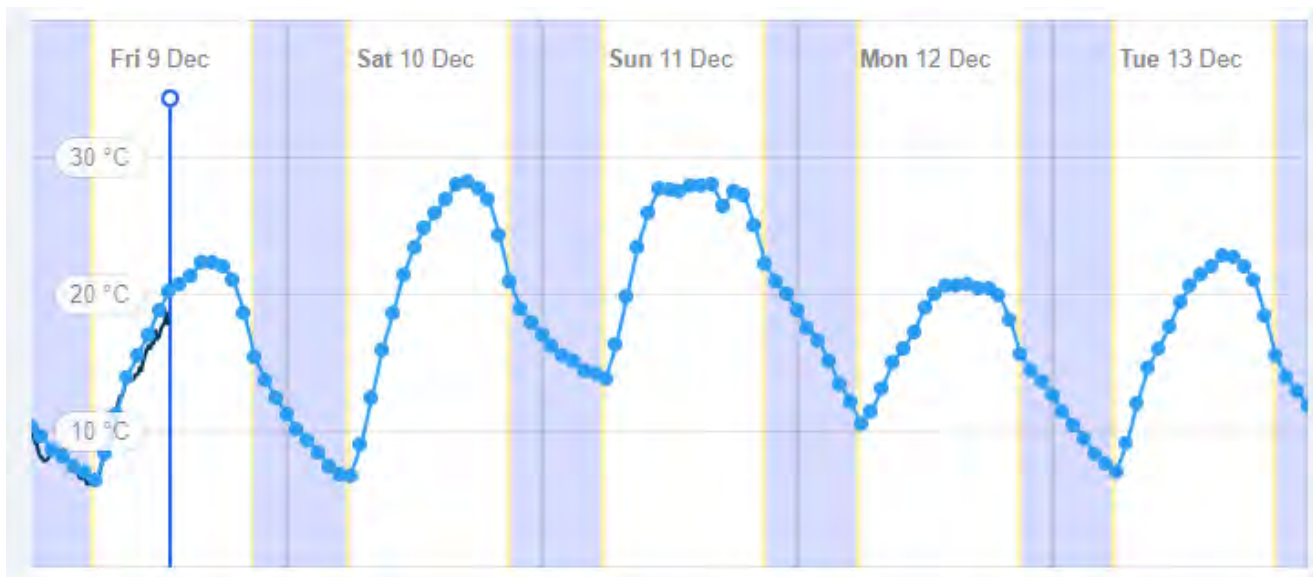


Figure 239: Forecast air temperatures for Echuca 5 to 9 December



Figure 240: Forecast air temperatures for Mildura 9 to 13 December

Water quality update, Meeting No.11 – 19 December 2022

Northern Basin

Barwon River

Discharge is slowly decreasing in the Barwon River. Flow at Brewarrina is around 31,000 ML/day (Figure 241).

Dissolved oxygen results in the Barwon River at Walgett, Geera and Brewarrina have been mostly above 4 mg/L over the past week, though Collarenebri and Brewarrina have dipped slightly in the past two days (Figure 242).

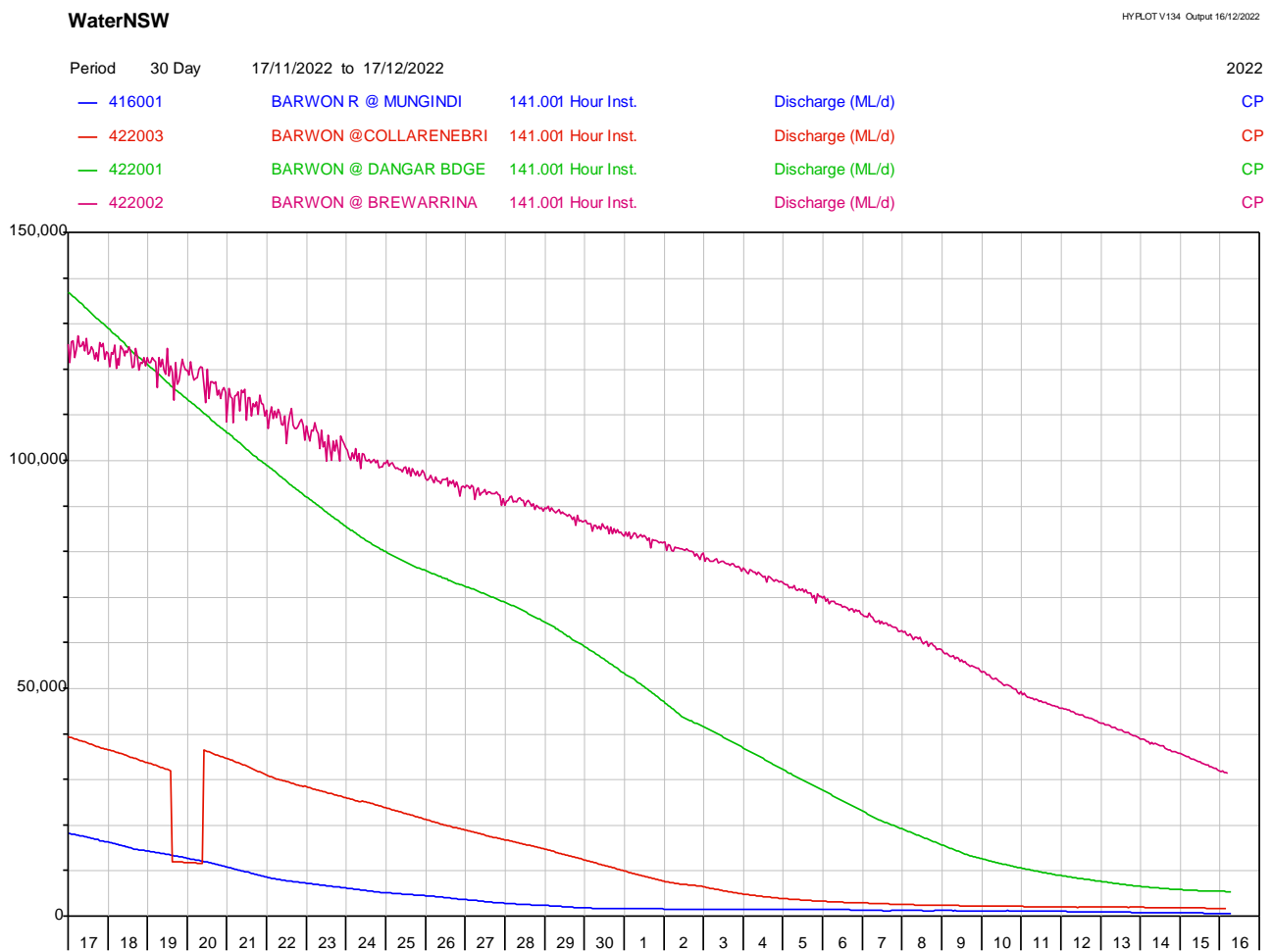


Figure 241: Discharge (ML/day) in the Barwon River

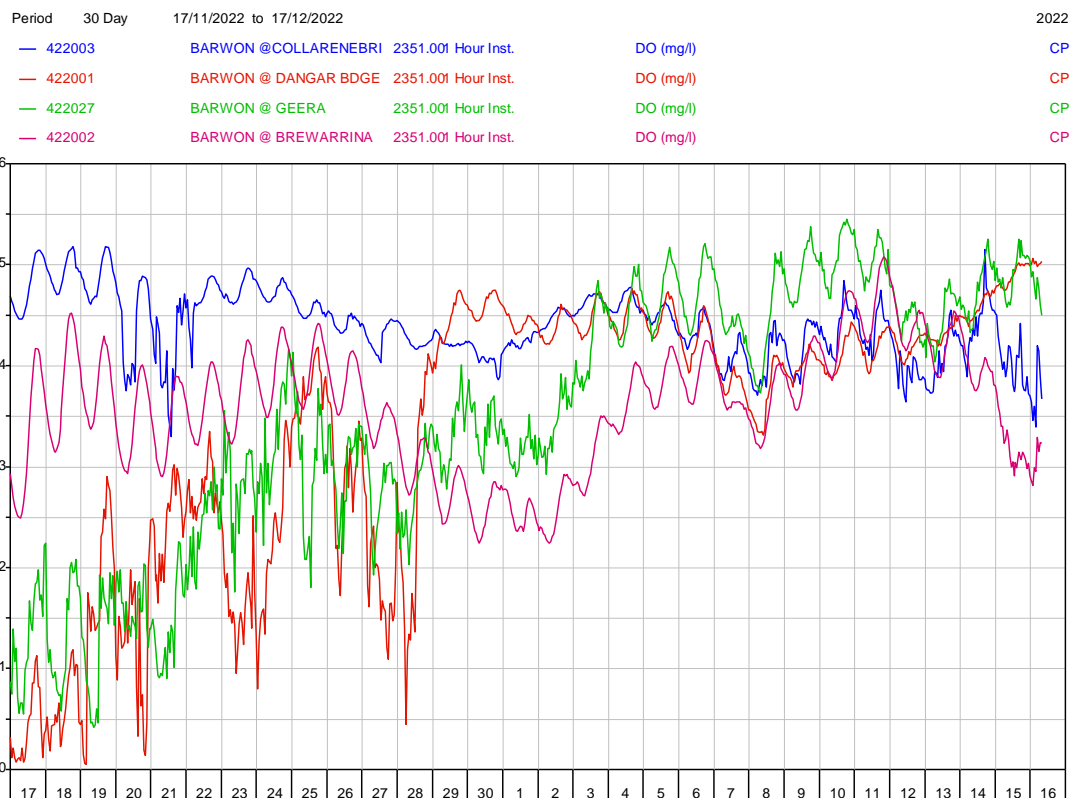


Figure 242: Continuous dissolved oxygen (mg/L) in the Barwon River

Table 9: Dissolved oxygen results (mg/L) from Barwon River and main tributaries

Site	Sample date	Dissolved oxygen (mg/L)
Namoi River at Goangra	13/12/2022 10:11	5.99
Barwon River at Dangar Bridge (Walgett)	14/12/2022 15:00	4.92
Marthaguy Creek at Carinda	14/12/2022 6:59	6.37
Barwon River at Brewarrina	13/12/2022 9:53	4.86
Bogan River at Gongolgon	13/12/2022 8:12	3.88

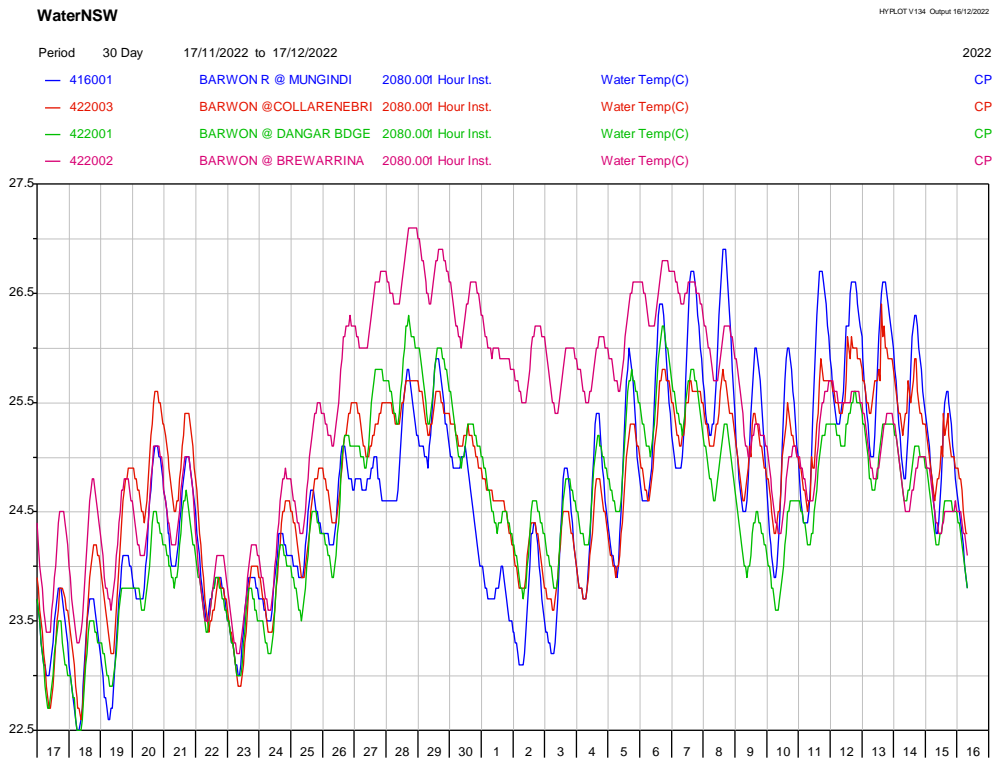


Figure 243: Continuous water temperature (°C) in the Barwon River

Darling River

Flooding peaked at Tilpa in early December at around 137,000 ML/day. Discharge at the Wilcannia gauge has slowly increased over 40,000 ML/day while the flow in Talyawalka Creek has increased to over 54,000 ML/day (combined total 94,000 ML/day) (Figure 244). Major flooding at Wilcannia is predicted to peak in mid to late December.

Discharge at Weir 32 is around 30,000 ML/day and just over 17,500 ML/day at Burtundy.

Period	30 Day	17/11/2022 to 17/12/2022	2022
— 425003	DARLING@BOURKE TOWN	141.001 Hour Inst.	Discharge (ML/d) CP
— 425004	DARLING@LOUTH	141.001 Hour Inst.	Discharge (ML/d) CP
— 425900	DARLING@TILPA	141.001 Hour Inst.	Discharge (ML/d) CP
— 425008	DARLING@WILC. MAIN C	141.001 Hour Inst.	Discharge (ML/d) CP
— 425018	TALYAWALKA@BARR HW	141.001 Hour Inst.	Discharge (ML/d) CP

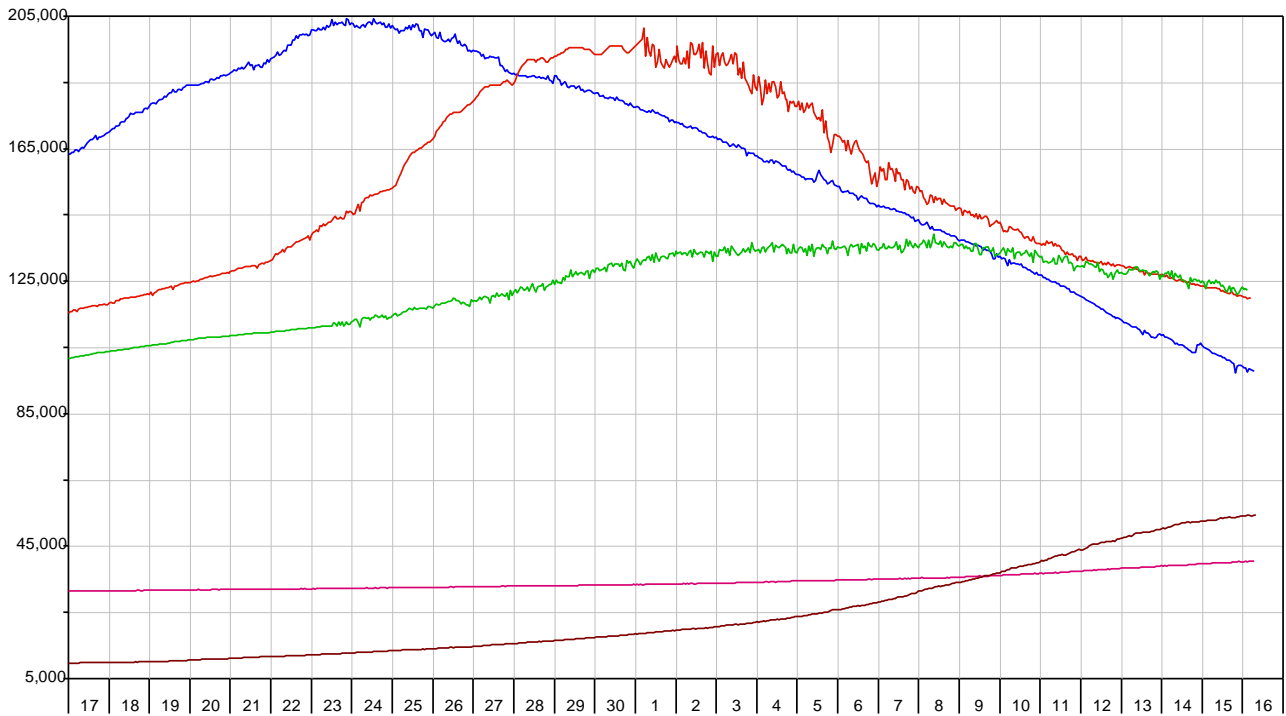


Figure 244: Discharge (ML/day) in the upper Darling River

Figure 245 is a satellite-derived Sentinel colour infrared image showing the progression of turbid water (blue colour) from the Barwon River down the Darling River. Figure 246 highlights the floodwater is starting to push into Menindee Lakes.

Dissolved oxygen in the Darling River at Bourke has improved in response to the cooler water temperatures. Oxygen levels at Wilcannia are remaining low. In the Darling River downstream of Menindee Lakes, dissolved oxygen has improved to above 6 mg/L (Figure 247).

The temporary dissolved oxygen monitoring site at Nelia Gaari on the Darling River upstream of Lake Wetherell had a dissolved oxygen reading of 5.0 mg/L on Friday morning (16/12/2022).

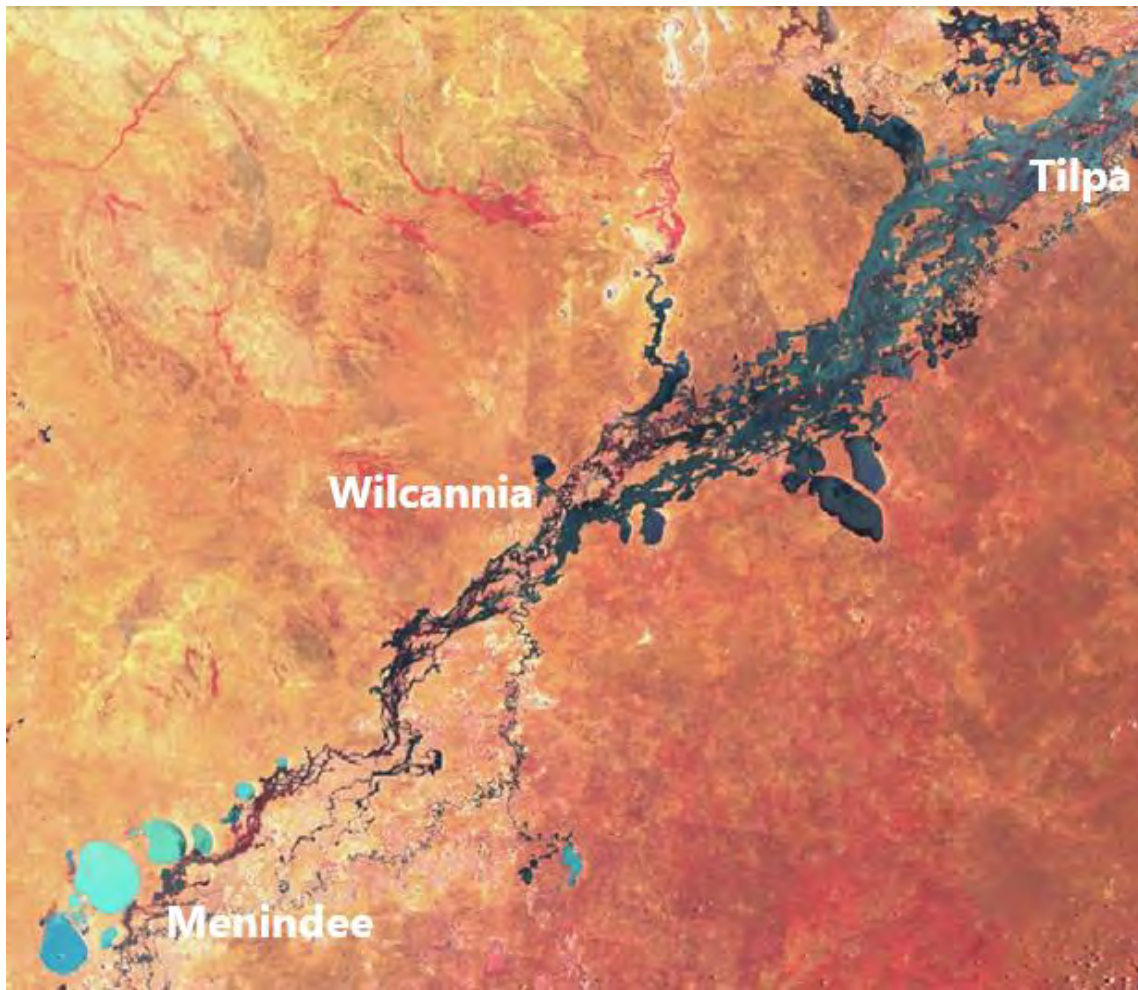


Figure 245: Satellite-derived Sentinel colour infrared image of the Darling River – 14 December 2022

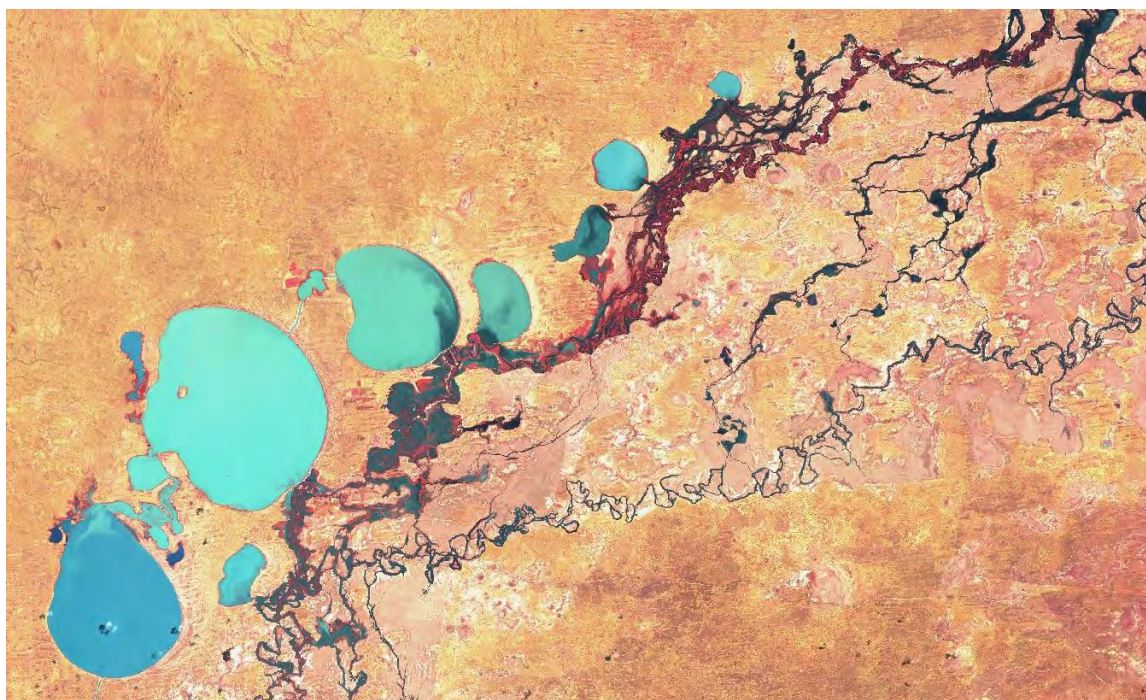


Figure 246: Satellite-derived Sentinel colour infrared image of Menindee Lakes – 14 December 2022

Period 30 Day 17/11/2022 to 17/12/2022 2022

— 425003	DARLING@BOURKE TOWN	2351.001 Hour Inst.	DO (mg/l)	CP
— 425058	Darling R @ Moorabin	2351.001 Hour Inst.	DO (mg/l)	CP
— 425012	DARLING@U/S WEIR 32	2351.001 Hour Inst.	DO (mg/l)	CP
— 425007	DARLING@BURTUNDY	2351.001 Hour Inst.	DO (mg/l)	CP

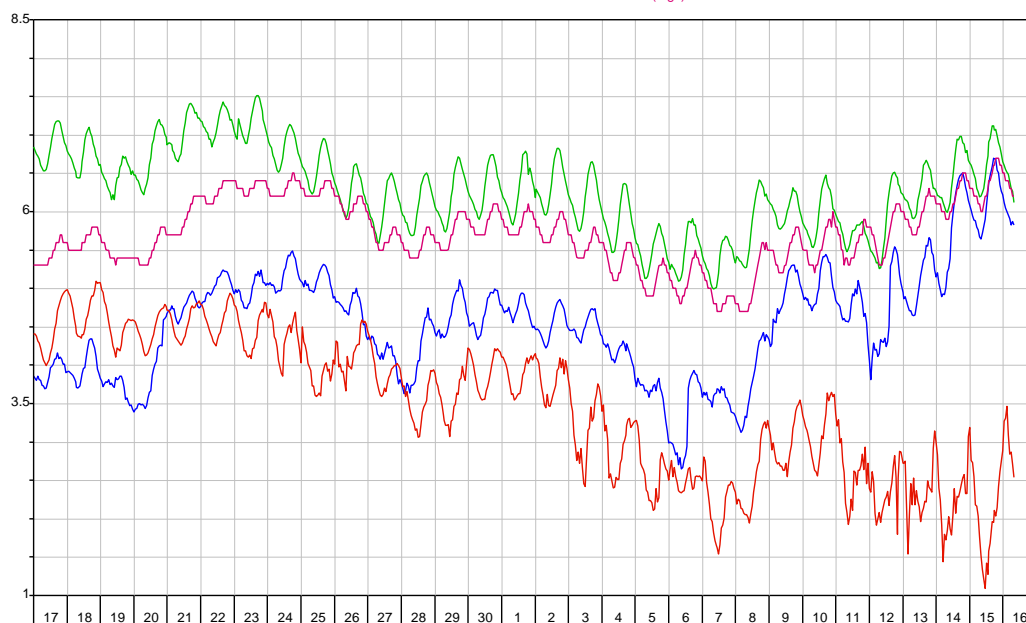


Figure 247: Continuous dissolved oxygen (mg/L) in the Darling River

Table 10: Dissolved oxygen results (mg/L) from Darling River and Intersecting Streams

Site	Sample date	Dissolved oxygen (mg/L)
Narran River at New Angledool	13/12/2022 14:58	3.73
Bokhara River at Goodooga	13/12/2022 12:16	6.79
Birrie River at Near Goodooga	13/12/2022 12:55	7.21
Culgoa River at Brenda	13/12/2022 13:47	6.00
Warrego River at Fords Bridge bywash	13/12/2022 10:28	7.00
Paroo River at Willara Crossing	13/12/2022 12:06	4.06
Darling River at Bourke	13/12/2022 15:03	6.28
Darling River at Louth	14/12/2022 15:13	13.29

Site	Sample date	Dissolved oxygen (mg/L)
Darling River at Wilcannia	09/12/2022 6:47	3.80
Darling River at Burtundy	12/12/2022 11:53	5.67

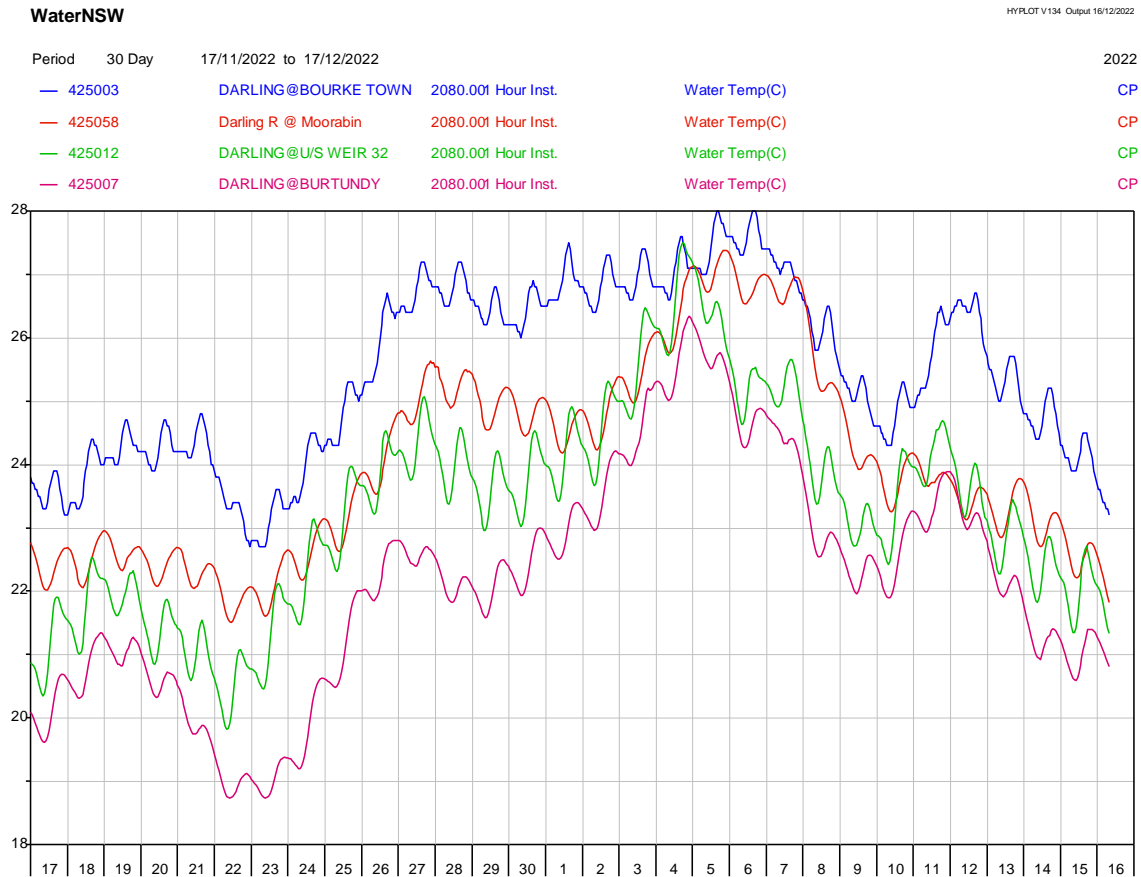


Figure 248: Continuous water temperature (°C) in the Darling River

Southern Basin

Lachlan River

Flooding continues in the Lachlan River (Figure 249Figure 7) with major flooding warnings for Euabalong, Hillston and Booligal. A lot of water is heading to the west, down Willandra Creek.

Despite the major flooding, dissolved oxygen readings at all gauged sites are above 4 mg/L (Figure 250). Low dissolved oxygen levels have been detected in the lower Lachlan River at Corrong (Table 11).

WaterNSW

HYFLOT V134 Output 16/12/2022

Period	30 Day	17/11/2022 to 17/12/2022	2022
— 412004	LACHLAN FORBES CTTNS	141.001 Hour Inst.	Discharge (ML/d) CP
— 412006	LACHLAN CONDOBOLIN B	141.001 Hour Inst.	Discharge (ML/d) CP
— 412011	LACHLAN LAKE C WEIR	141.001 Hour Inst.	Discharge (ML/d) CP
— 412039	LACHLAN HILLSTON WR	141.001 Hour Inst.	Discharge (ML/d) CP
— 412005	LACHLAN @ BOOLIGAL	141.001 Hour Inst.	Discharge (ML/d) CP

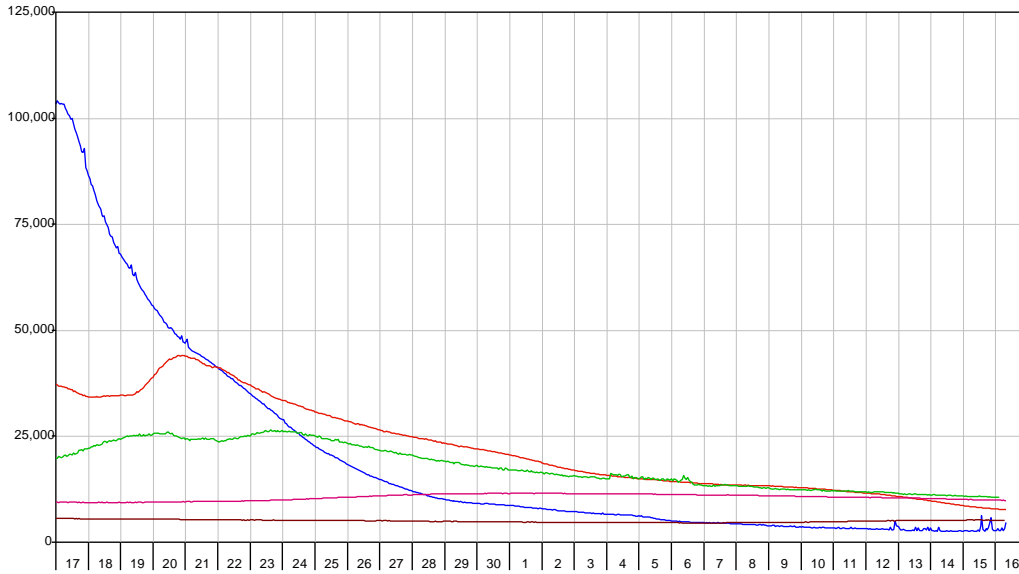


Figure 249: Discharge (ML/day) in the Lachlan River

WaterNSW

HYFLOT V134 Output 16/12/2022

Period	30 Day	17/11/2022 to 17/12/2022	2022
— 412004	LACHLAN FORBES CTTNS	2351.001 Hour Inst.	DO (mg/l) CP
— 412006	LACHLAN CONDOBOLIN B	2351.001 Hour Inst.	DO (mg/l) CP
— 412038	LACHLAN WILLANDRA WR	2351.001 Hour Inst.	DO (mg/l) CP
— 412039	LACHLAN HILLSTON WR	2351.001 Hour Inst.	DO (mg/l) CP
— 412005	LACHLAN @ BOOLIGAL	2351.001 Hour Inst.	DO (mg/l) CP

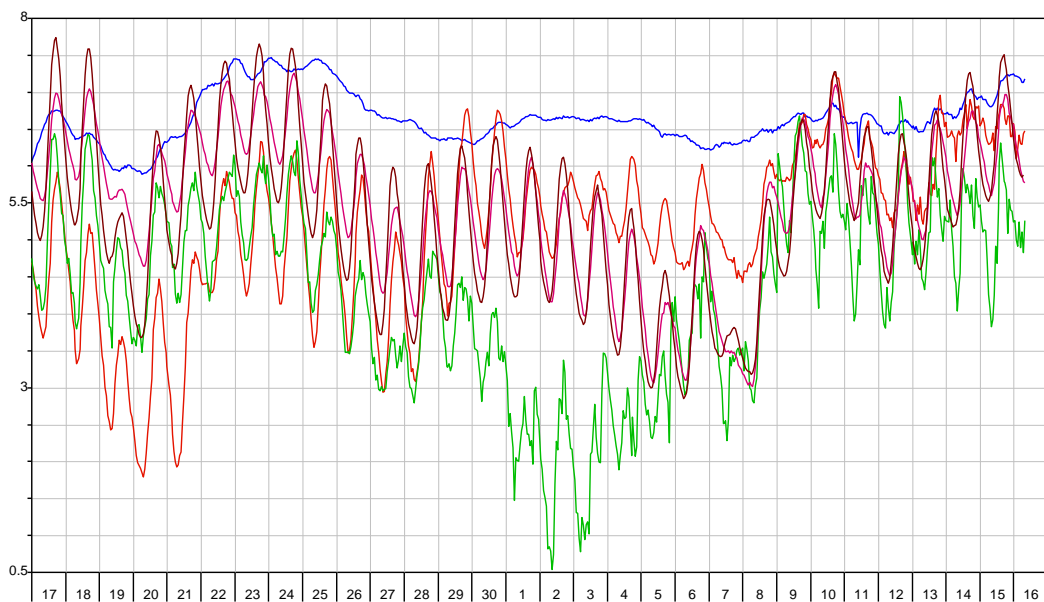


Figure 250: Continuous dissolved oxygen (mg/L) in the Lachlan River

Table 11: Dissolved oxygen results (mg/L) from Lachlan River

Site	Sample date	Dissolved oxygen (mg/L)
Lachlan River at Booligal	14/12/2022 8:30	5.85
Lachlan River at Corrong	14/12/2022 7:34	0.83

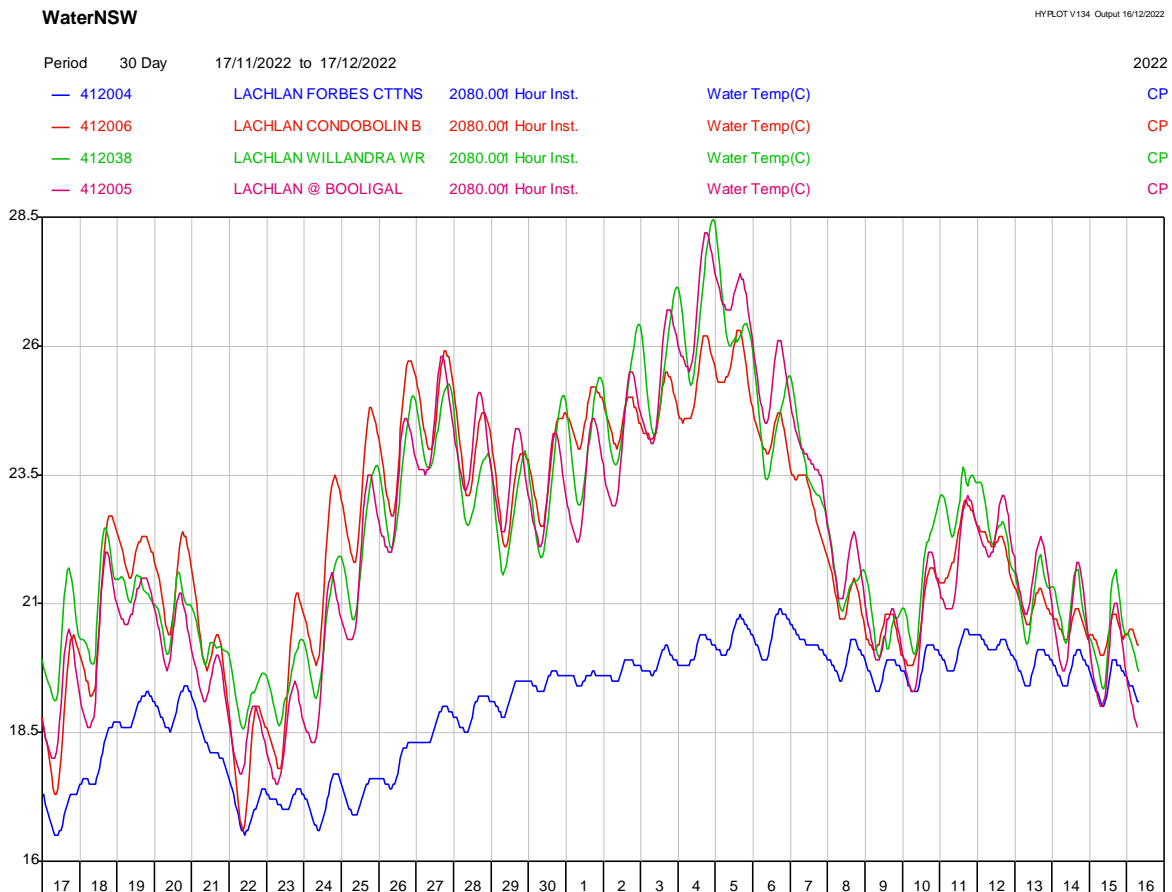


Figure 251: Continuous water temperature (°C) in the Lachlan River

Murrumbidgee River

River level in the Murrumbidgee River at Gogeldrie Weir is steady at just over 10,000 ML/day. Discharge is continuing to fall at Hay and Maude. Discharge at Balranald is slowly decreasing below 50,000 ML/day (Figure 252).

Dissolved oxygen levels in the Murrumbidgee River at Maude Weir are fluctuating around 7 mg/L. Oxygen levels at Redbank and Balranald are showing stable diurnal fluctuations and have been slowly improving toward 4 mg/L (Figure 253).

WaterNSW

HYPLOT V134 Output 16/12/2022

Period	30 Day	17/11/2022 to 17/12/2022	2022
410082	M/BIDGEE D/S GOGEL W	141.001 Hour Inst.	Discharge (ML/d) CP
410136	M/BIDGEE DS HAY WEIR	141.001 Hour Inst.	Discharge (ML/d) CP
410040	M/BIDGEE D/S MAUDE W	141.001 Hour Inst.	Discharge (ML/d) CP
410130	M/BIDGEE D/S BALRAND	141.001 Hour Inst.	Discharge (ML/d) CP

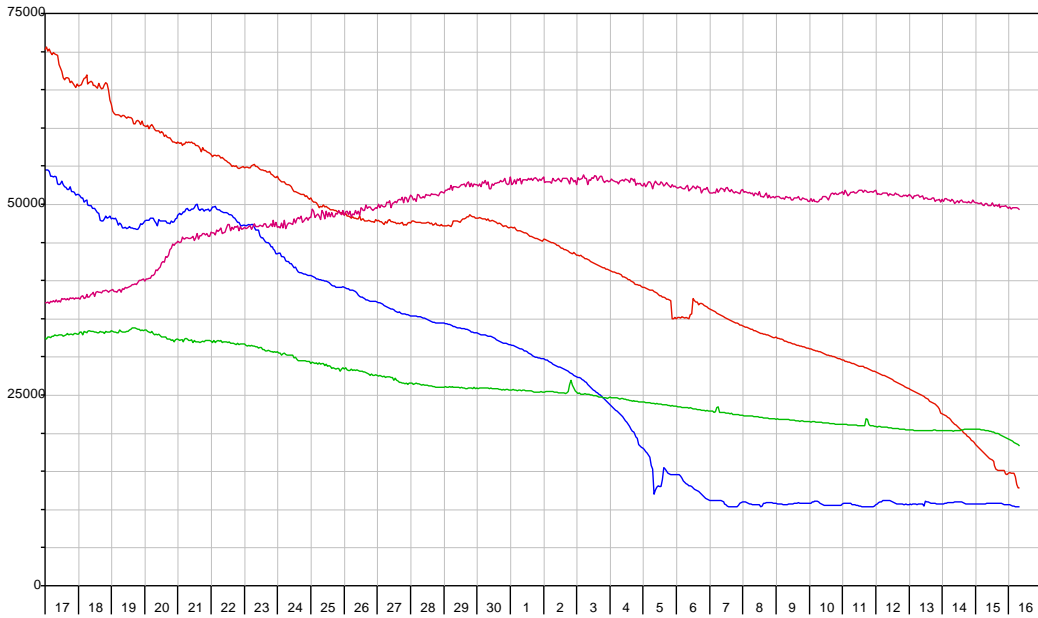


Figure 252: Discharge (ML/day) in the Murrumbidgee River

WaterNSW

HYPLOT V134 Output 16/12/2022

Period	30 Day	17/11/2022 to 17/12/2022	2022
410040	M/BIDGEE D/S MAUDE W	2351.001 Hour Inst.	DO (mg/l) CP
410041	M/BIDGEE D/S REDBANK	2351.001 Hour Inst.	DO (mg/l) CP
410130	M/BIDGEE D/S BALRAND	2351.001 Hour Inst.	DO (mg/l) CP

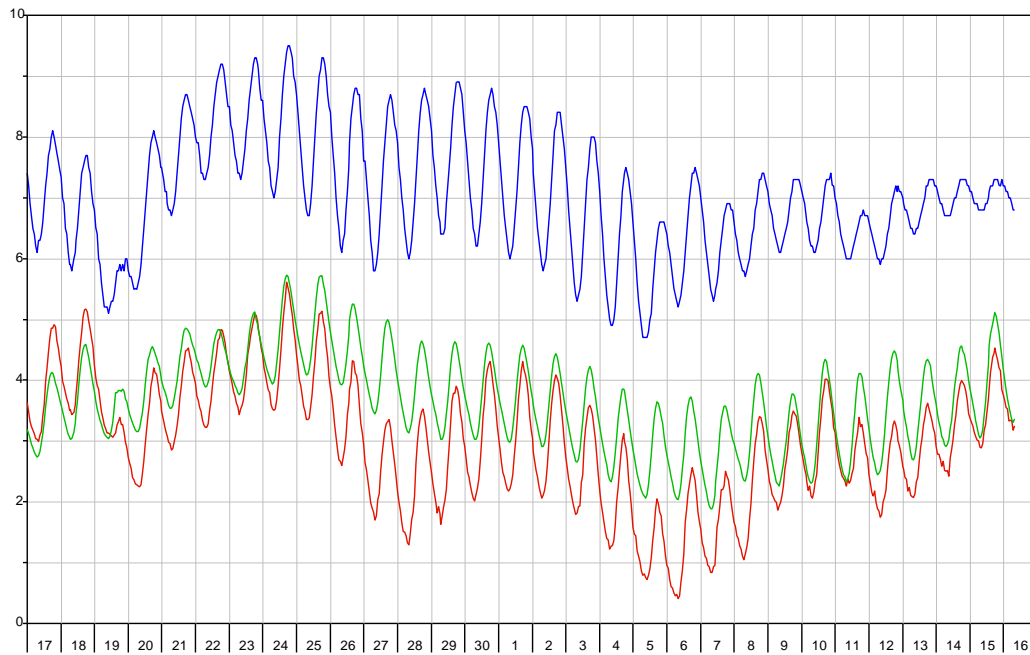


Figure 253: Continuous dissolved oxygen (mg/L) in the Murrumbidgee River

Table 12: Dissolved oxygen results (mg/L) from Murrumbidgee catchment

Site	Sample date	Dissolved oxygen (mg/L)
Yanco Creek at Yanco Bridge	05/12/2022 10:09	1.74
Billabong Creek at Walbundrie	08/12/2022 14:21	7.67
Billabong Creek at Jerilderie	05/12/2022 10:43	1.50
Billabong Creek at Darlot	06/12/2022 9:34	1.04
Murrumbidgee River at downstream Hay Weir	13/12/2022 9:15	6.66
Murrumbidgee River at downstream Maude Weir	13/12/2022 10:00	6.16
Murrumbidgee River at Balranald	13/12/2022 13:10	2.57

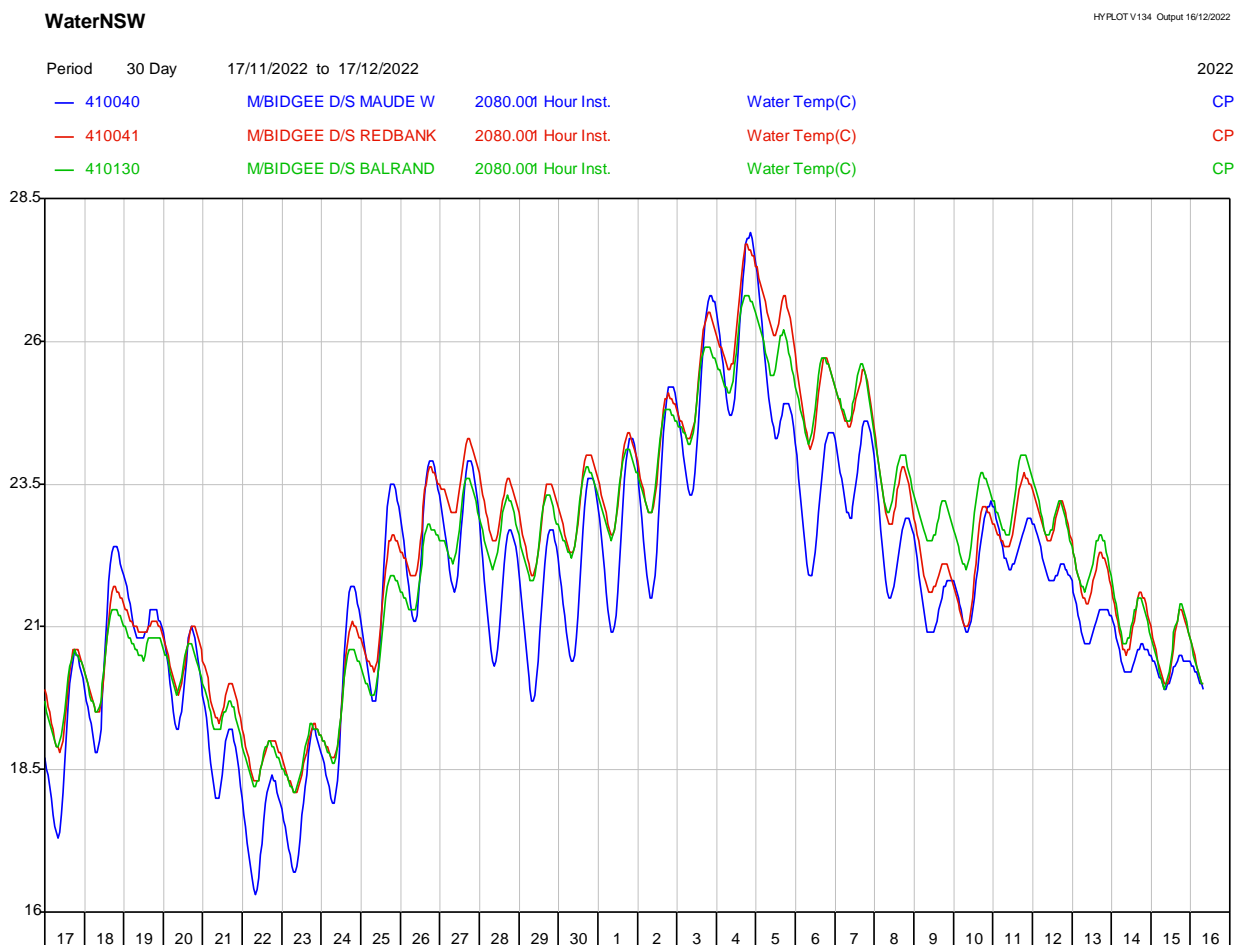


Figure 254: Continuous water temperature (°C) in the Murrumbidgee River

Kolety/Edward River

Discharge in the Kolety/Edward River at Deniliquin is continuing to decline (Figure 255). River level at Moulamein has now fallen to 27,000 ML/day yet remains above the moderate flood warning level. The flood peak has reached the gauging station at Liewah.

Dissolved oxygen in the Kolety/Edward River has recovered above 2 mg/L in response to the lower water temperatures (Figure 256).

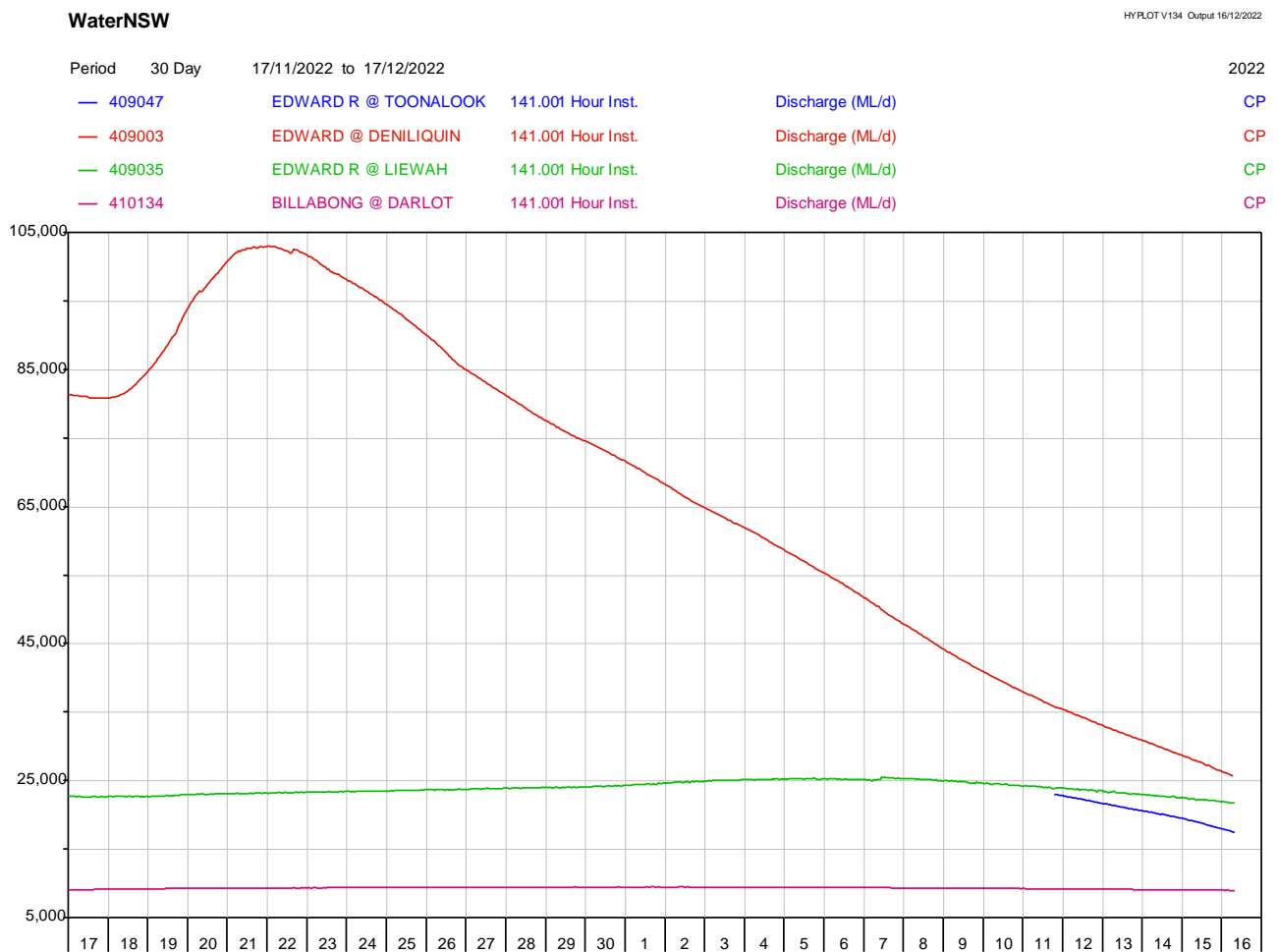


Figure 255: Discharge (ML/day) in the Kolety/Edward River

Period 30 Day 17/11/2022 to 17/12/2022 2022

— 409047 EDWARD R @ TOONALOOK 2351.00l Hour Inst. DO (mg/l) CP

— 409003 EDWARD @ DENILIQVIN 2351.00l Hour Inst. DO (mg/l) CP

— 409014 EDWARD R @ MOULAMEIN 2351.00l Hour Inst. DO (mg/l) CP

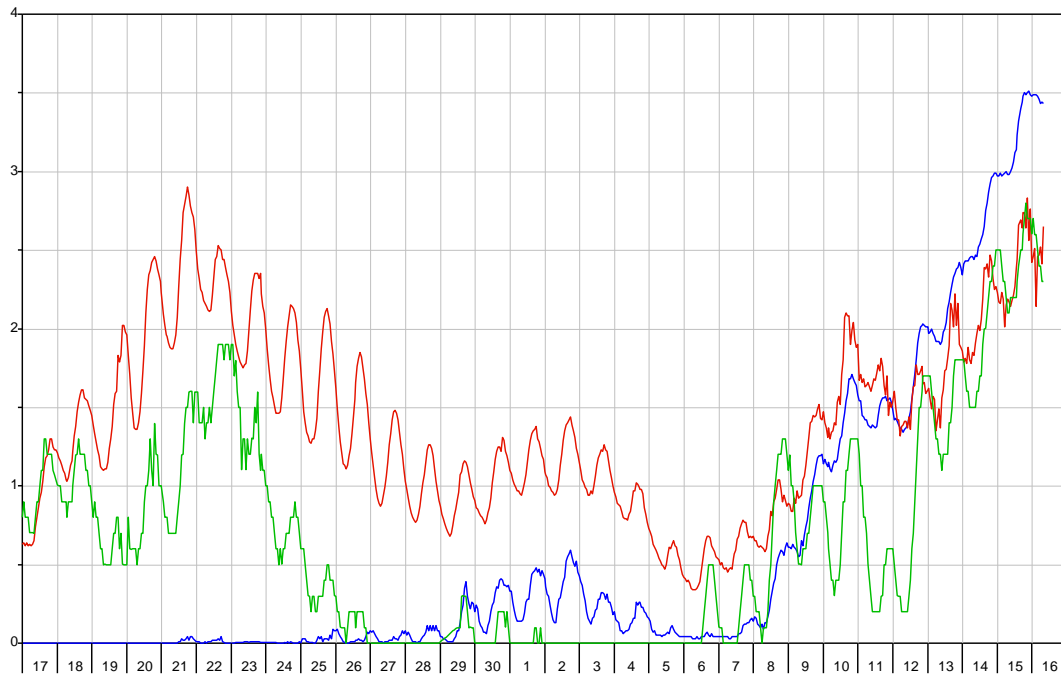


Figure 256: Continuous dissolved oxygen (mg/L) in the Kolety/Edward River

Table 13: Dissolved oxygen results (mg/L) from Kolety/Edward and Niemur Rivers (CSU Robyn Watts)

Site	Sample date	Dissolved oxygen (mg/L)
Four Post camp, Edward River (this site is upstream of Tuppal Creek return flows to the Edward River)	12/12/2022 18:20	2.27
Upstream of Edward Escape (off Lawson Siphon Rd)	12/12/2022 17:50	2.84
Mulwala Canal	12/12/2022 11:30	8.51
Downstream of Edward Escape 1 (near River Rd, Deniliquin)	12/12/2022 12:00	2.99
Downstream of Edward Escape 2 (at Box St, Deniliquin)	12/12/2022 12:20	2.75

Site	Sample date	Dissolved oxygen (mg/L)
Downstream of Edward Escape 3 (Deniliquin town centre)	12/12/2022 12:40	2.69
Downstream Stevens Weir (Eastman Bridge)	12/12/2022 14:35	5.33
Werai Station Bridge (downstream of Tumudgery Creek return flows from Werai Forest to Colligen Creek)	13/12/2022 10:50	4.08
Northern Branch Canal	13/12/2022 11:10	8.22

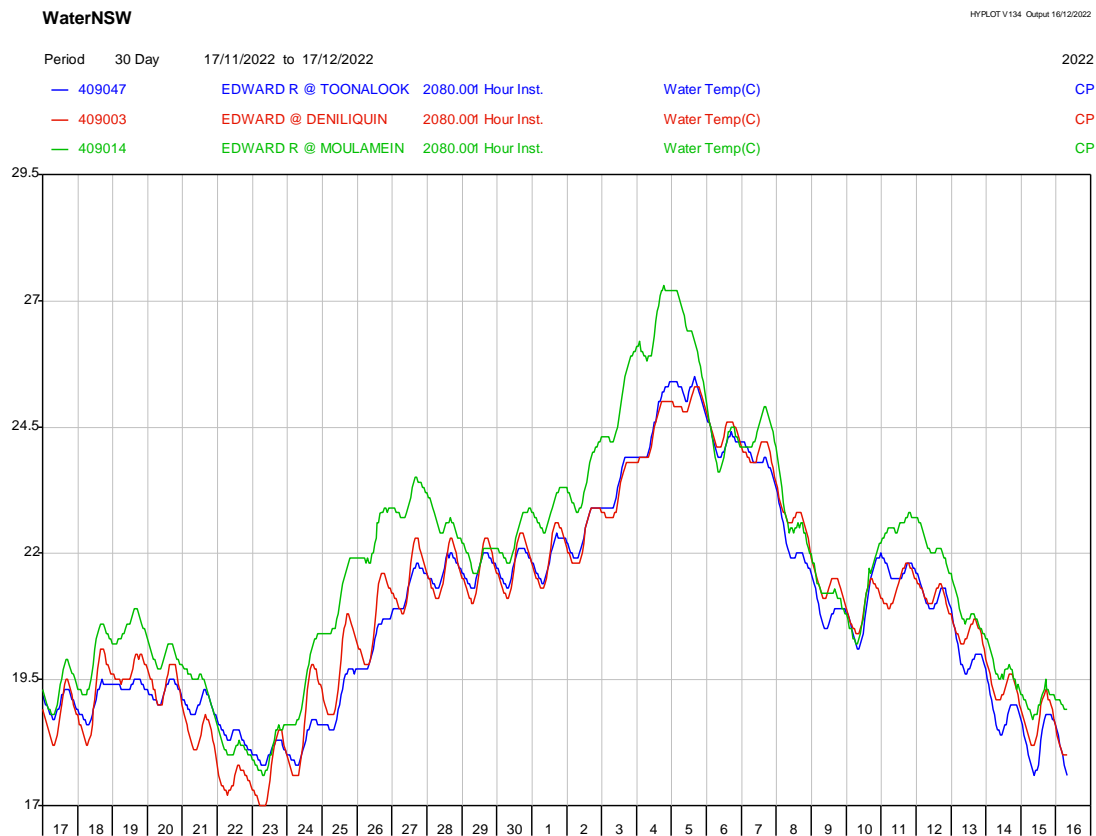


Figure 257: Continuous water temperature (°C) in the Kolety/Edward River

Wakool and Niemur rivers

Discharge in the Wakool River at Coonambit Bridge is just above 77,000 ML/day and at Gee Gee Bridge has just dropped to 30,000 ML/day. The Niemur River is flowing at just under 20,000 ML/day at both gauging stations (Figure 258).

Dissolved oxygen levels at both sites in the Niemur River have improved back up towards the 4 mg/L threshold (Figure 259). Dissolved oxygen levels in the Wakool River at Gee Gee Bridge have improved while levels at Stoney Crossing remain very low.

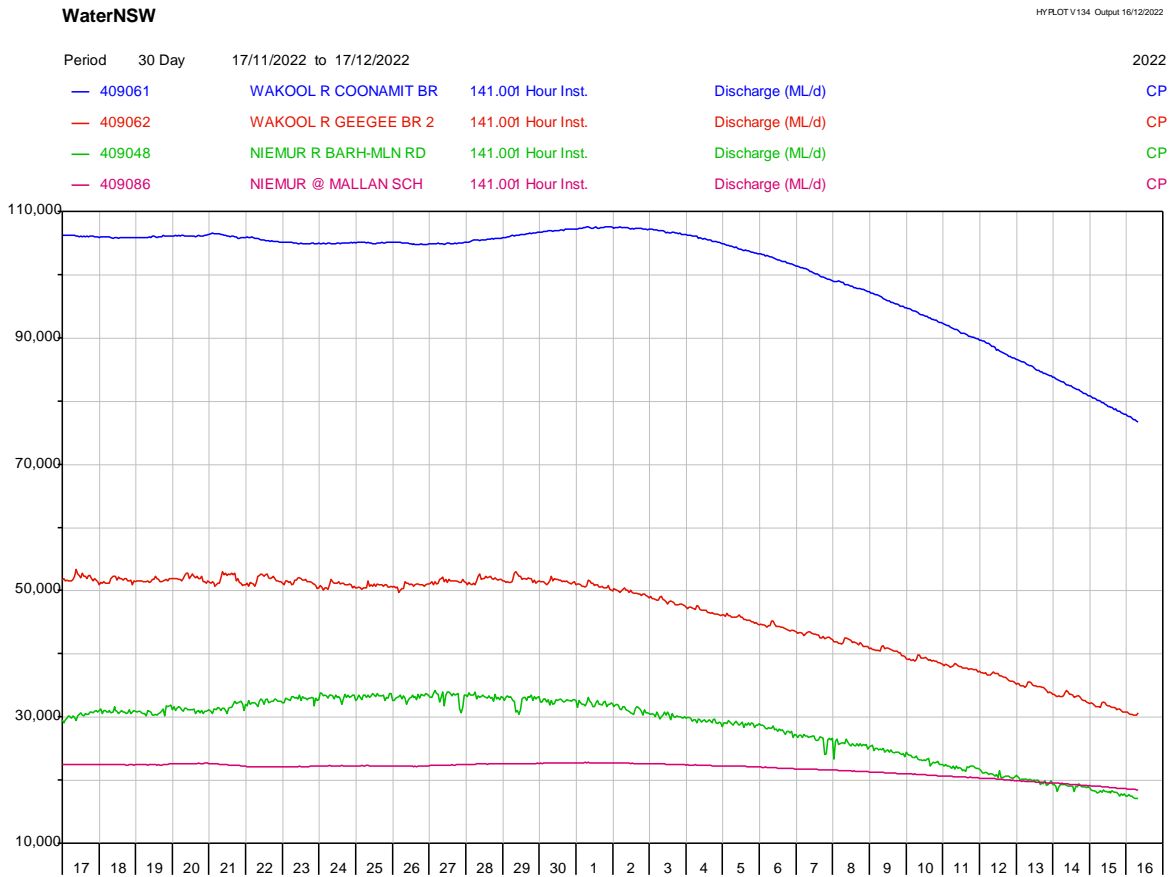


Figure 258: Discharge (ML/day) in the Wakool and Niemur rivers

Period 30 Day 17/11/2022 to 17/12/2022 2022

- 409062 WAKOOL R GEEGEE BR 2 2351.00l Hour Inst. DO (mg/l) CP
- 409013 WAKOOL @ STONEY XING 2351.00l Hour Inst. DO (mg/l) CP
- 409048 NIEMUR R BARH-MLN RD 2351.00l Hour Inst. DO (mg/l) CP
- 409086 NIEMUR @ MALLAN SCH 2351.00l Hour Inst. DO (mg/l) CP

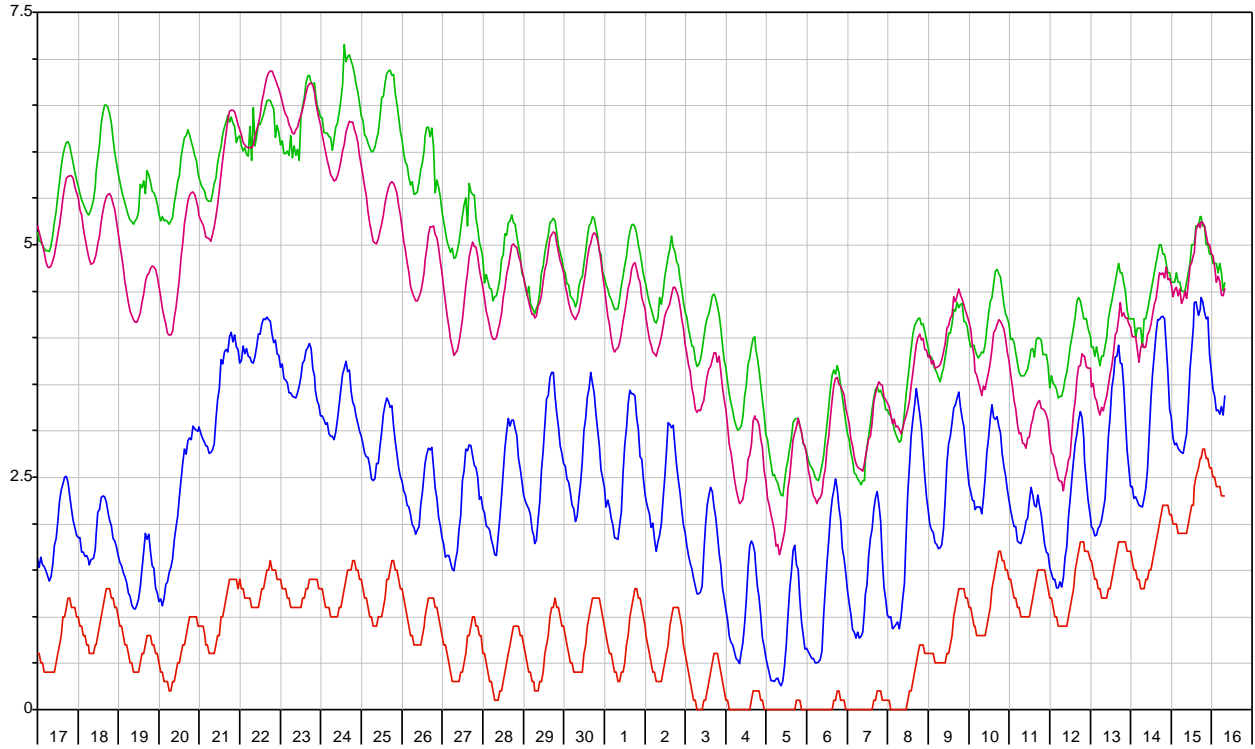


Figure 259: Continuous dissolved oxygen (mg/L) in the Wakool and Niemur rivers

Table 14: : Dissolved oxygen results (mg/L) from Wakool River

Site	Sample date	Dissolved oxygen (mg/L)
Wakool River at Stoney Crossing	06/12/2022 13:13	1.47
Wakool River at Kyalite	06/12/2022 11:32	2.43
Railway bridge (downstream of Niemur Escape)	13/12/2022 12:30	5.04
Moulamein Barham Road (downstream of Niemur Escape)	13/12/2022 13:00	6.24
Niemur Mallan School (downstream of Niemur Escape)	13/12/2022 14:10	6.12

Period	30 Day	17/11/2022 to 17/12/2022		2022
—	409062	WAKOOL R GEEGEE BR 2	2080.001 Hour Inst.	Water Temp(C) CP
—	409013	WAKOOL @ STONEY XING	2080.001 Hour Inst.	Water Temp(C) CP
—	409048	NIEMUR R BARH-MLN RD	2080.001 Hour Inst.	Water Temp(C) CP
—	409086	NIEMUR @ MALLAN SCH	2080.001 Hour Inst.	Water Temp(C) CP

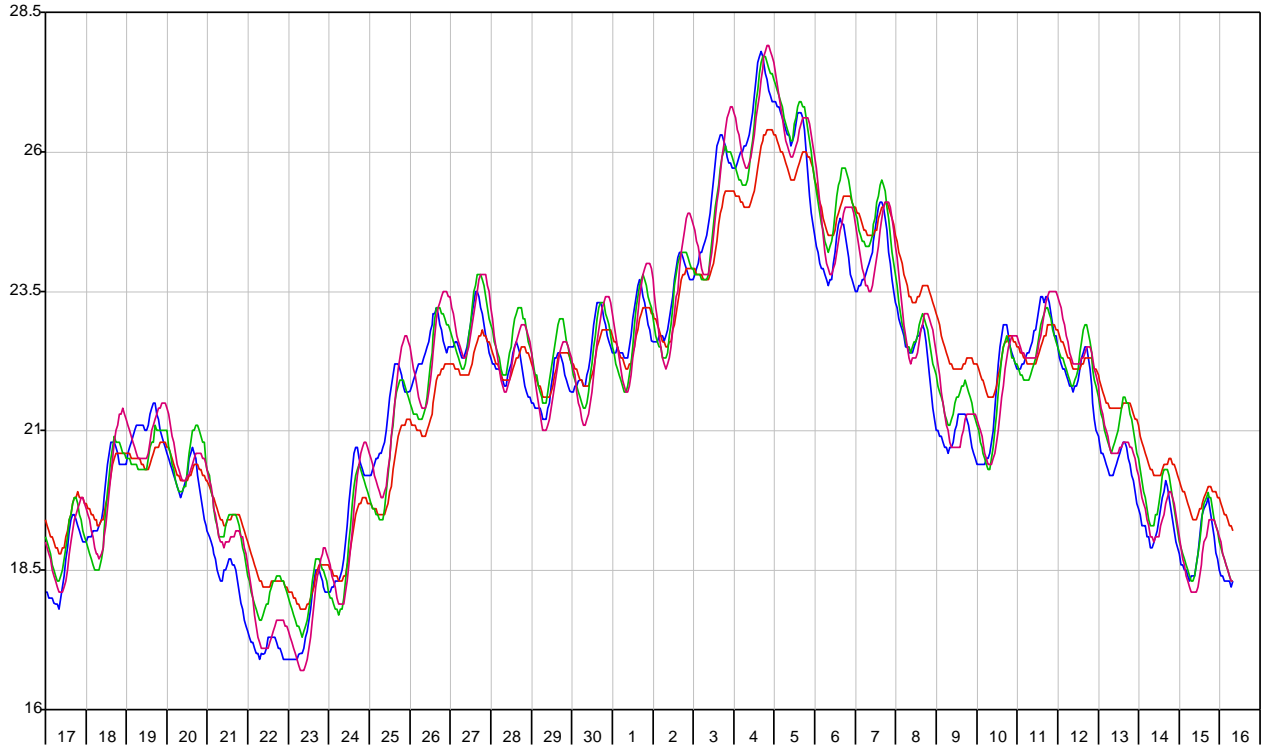


Figure 260: Continuous water temperature (°C) in the Wakool and Niemur rivers

Merran, Little Merran, Thule and Barber creeks

Figure 261 shows dissolved oxygen levels in Merran, Little Merran and Thule creeks improved during the week with lower water temperatures (Figure 262).

WaterNSW

HYPLOT V134 Output 16/12/2022

Period 30 Day 17/11/2022 to 17/12/2022 2022

— 409044	LT MERRAN FRANK/ BR	2351.00l Hour Inst.	DO (mg/l)	CP
— 409036	MERRAN CK U/S WAK R	2351.00l Hour Inst.	DO (mg/l)	CP
— 409109	THULE @ LOW THULE RD	2351.00l Hour Inst.	DO (mg/l)	CP

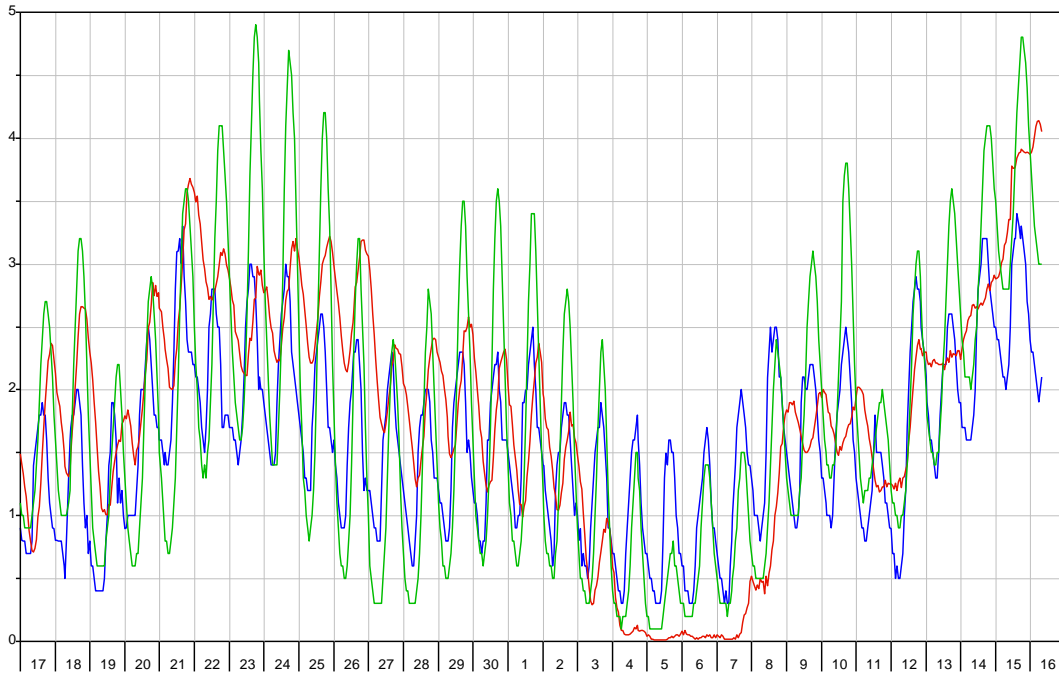


Figure 261: Continuous dissolved oxygen (mg/L) in the Merran, Little Merran and Thule creeks

WaterNSW

HYPLOT V134 Output 16/12/2022

Period 30 Day 17/11/2022 to 17/12/2022 2022

— 409044	LT MERRAN FRANK/ BR	2080.00l Hour Inst.	Water Temp(C)	CP
— 409036	MERRAN CK U/S WAK R	2080.00l Hour Inst.	Water Temp(C)	CP
— 409109	THULE @ LOW THULE RD	2080.00l Hour Inst.	Water Temp(C)	CP

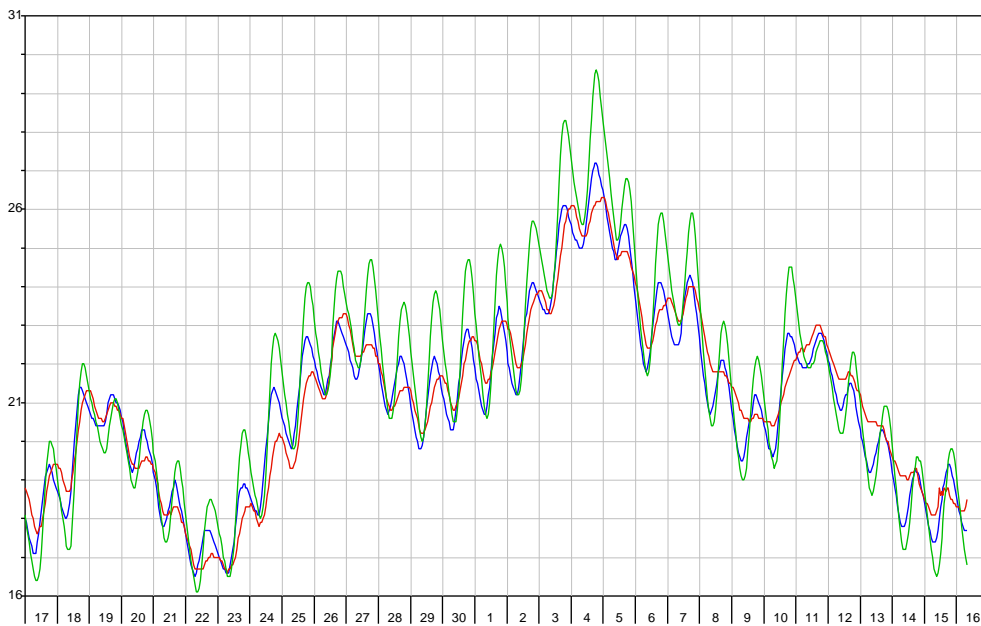


Figure 262: Continuous water temperature (°C) in the Merran, Little Merran and Thule creeks

Murray River

The Bureau of Meteorology is reporting river levels at Barham are expected to remain around the major flood level until next week. Major flooding is occurring at the Murray -Wakool River Junction, Boundary Bend and at Wentworth. Major flooding at Wentworth could persist through until early January 2023. A flood emergency warning has been issued for Renmark in South Australia.

Monitoring by DELWP is showing the Murray River at Tocumwal, upstream of the Barmah/Millewa Forest, is oxygenated (Figure 263). Downstream of the forest at Barmah dissolved oxygen was 1.12 mg/L on 16 December (6:00). Dissolved oxygen in the Goulburn River at McCoys Bridge is remaining above 6 mg/L and the Campaspe River at Fehrings Lane is above 5 mg/L.

The Murray River at Barham is remaining around 1 mg/L. Monitoring further downstream at Pental Island Pumps and Boundary Bend is showing dissolved oxygen results has improved above 2 mg/L at both sites. The Murray River at Wemen (downstream of Robinvale) has been fluctuating around 3 mg/L for the past few weeks, but has improved up to 4 mg/L. The results from the temporary monitoring site installed on the Murray River downstream of Wentworth are around 4 mg/L.

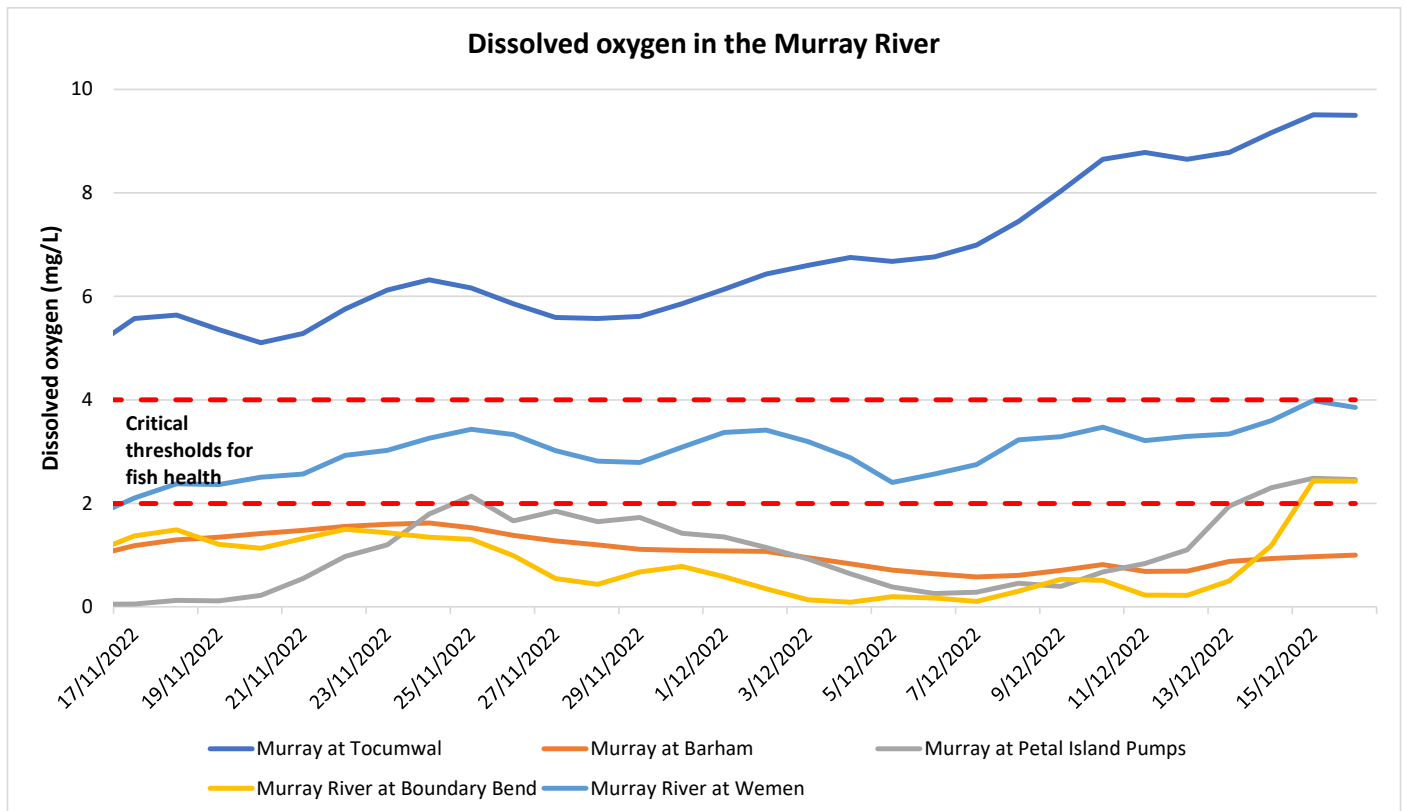


Figure 263: Continuous dissolved oxygen (mg/L) in the Murray River at Tocumwal and Barmah (data courtesy of DELWP)

Table 15: Dissolved oxygen results (mg/L) from Murray River

Site	Sample date	Dissolved oxygen (mg/L)
Murray River at Moama	05/12/2022 13:58	1.42
Murray River at Barham	06/12/2022 15:25	2.12
Murray River U/S Euston Weir	06/12/2022 10:01	1.20

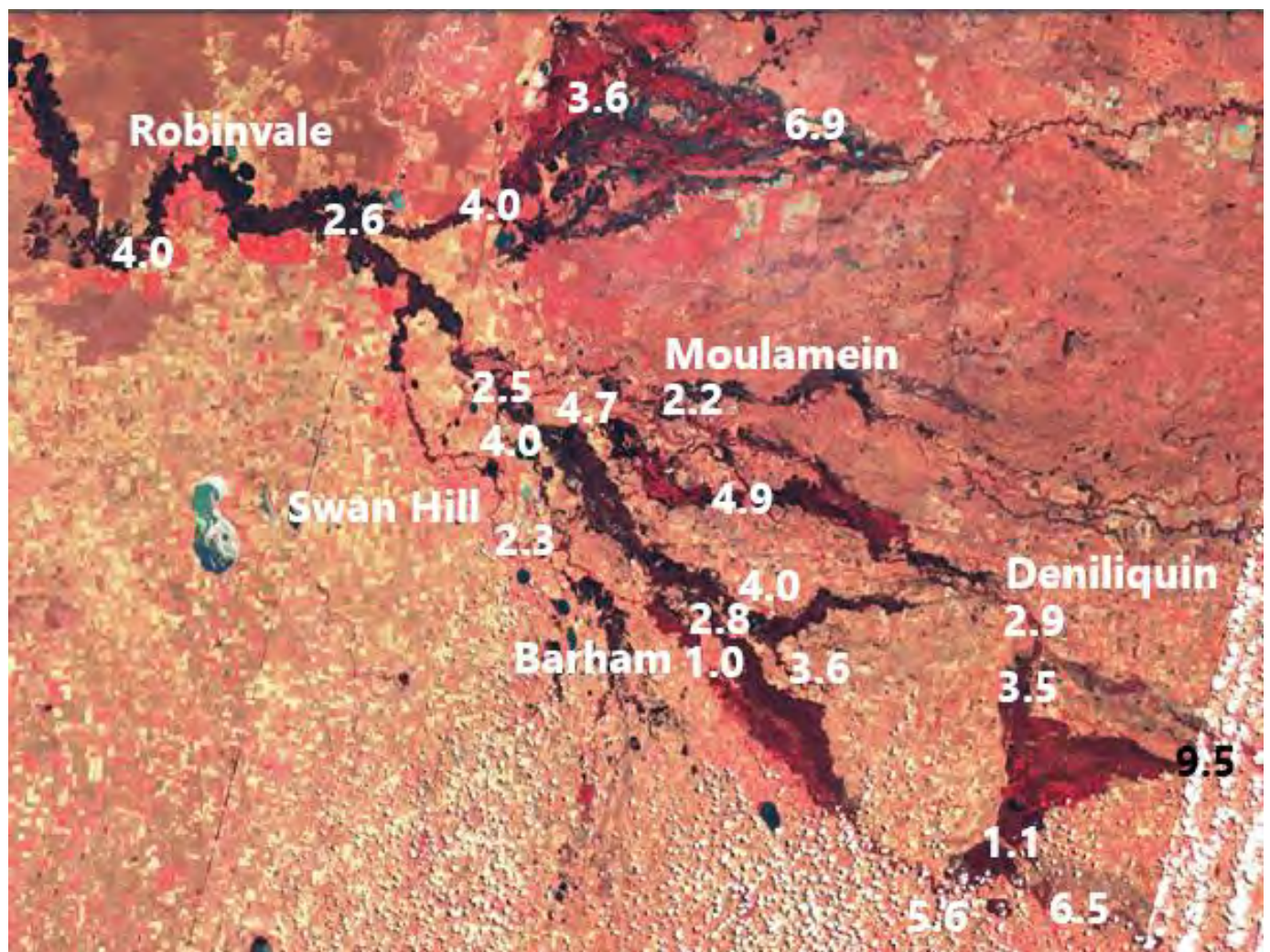


Figure 264: Satellite-derived Sentinel colour infrared image of the lower Murrumbidgee and mid Murray River catchments - 9 December 2022

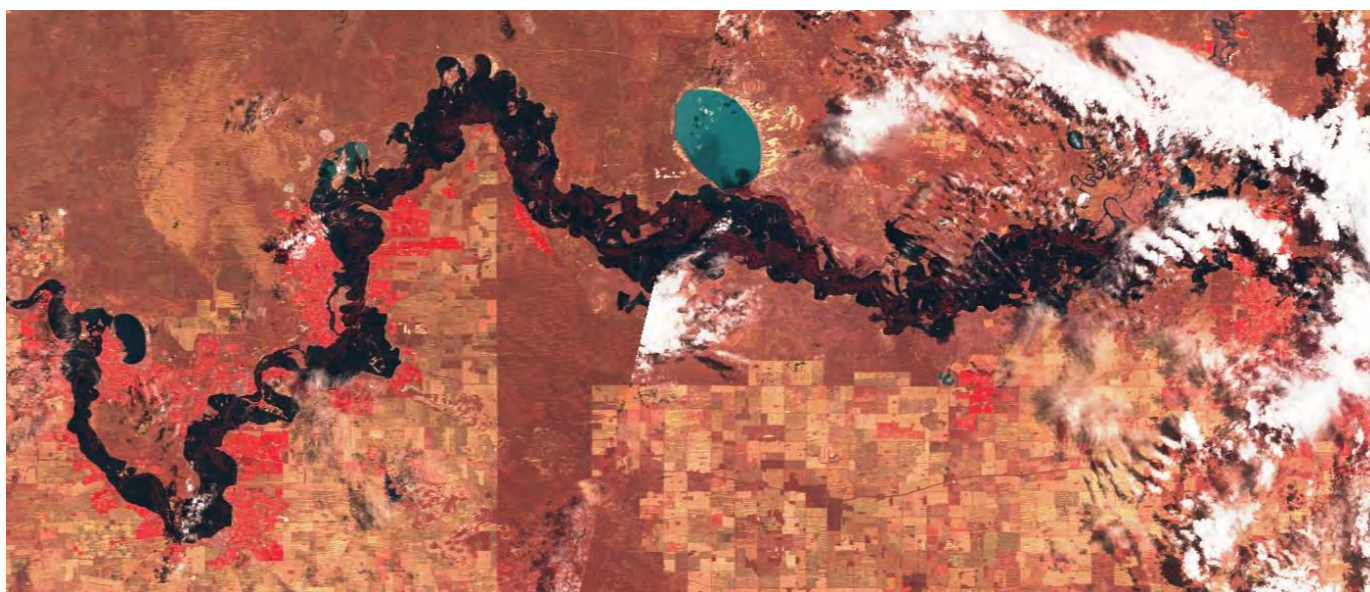


Figure 265: Landsat infrared image of the lower Murray River – 11 December 2022

Table 7: Dissolved oxygen results from Wentworth Weir -15/12/2022 (discharge 235,238 ML/day) (WaterNSW)

Site	Dissolved oxygen (mg/L)	Water temperature (°C)
Broken Hill Pipeline pump station	4.12	21.2
100m D/S Weir NSW side of Murray River	4.36	20.7
100m D/S Weir Victorian side of Murray River	4.12	21.2

Weather Outlook

The Bureau of Meteorology 8-day total rain forecast (16 to 23 December) indicates rainfall across NSW with some pockets of higher totals in the upper far west, coast and southern slopes (Figure 266). Forecast is for air temperatures at Echuca and Mildura to increase over the weekend and into next week. A cold front and trough should bring showers and cooler temperatures later next week (Figure 267 and Figure 268).

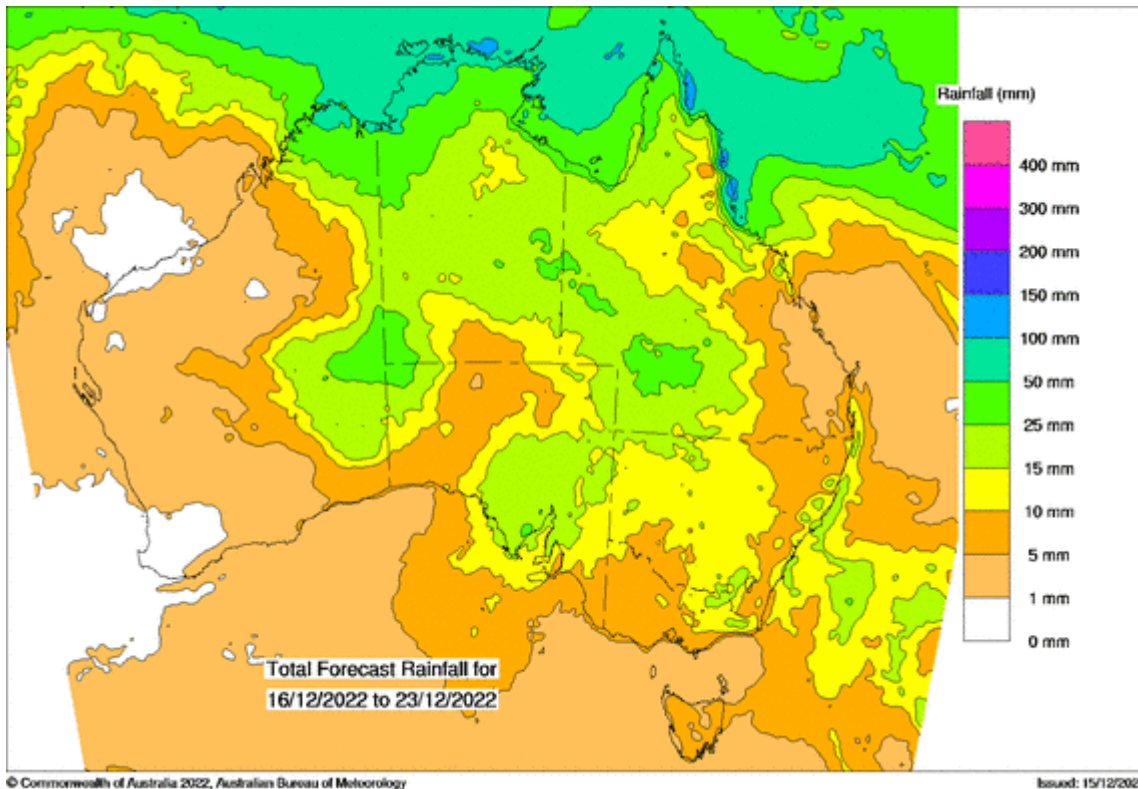


Figure 266: Bureau of Meteorology 8-day total rain forecast (16 to 23 December)

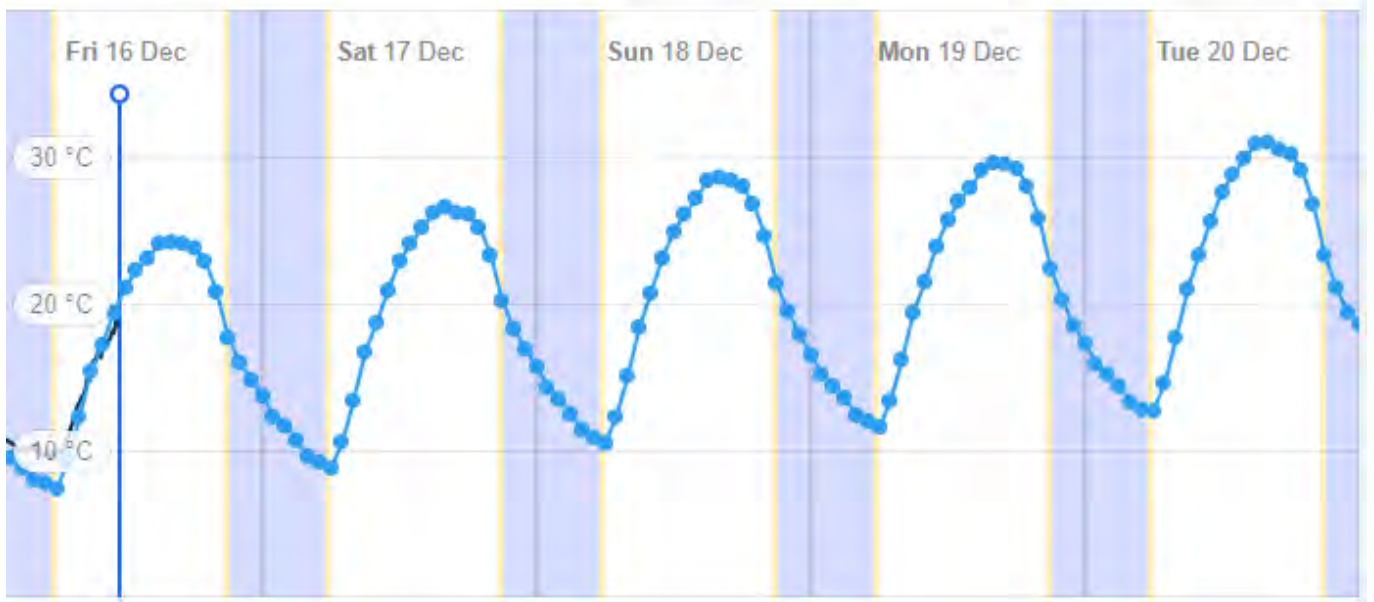


Figure 267: Forecast air temperatures for Echuca 16 to 20 December

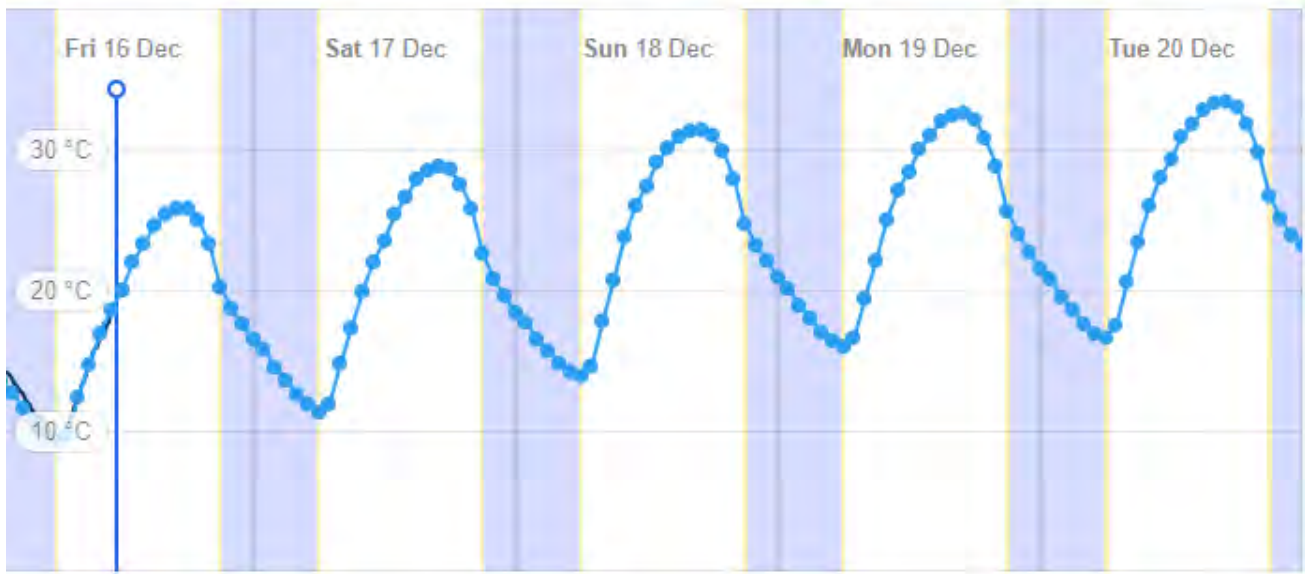


Figure 268: Forecast air temperatures for Mildura 16 to 20 December

Water quality update, Meeting No.12 – 9 January 2023

Northern Basin

Barwon River

Discharge in the Barwon River at Brewarrina has decreased to around 7,000 ML/day (Figure 269).

Dissolved oxygen results in the Barwon River at Collarenebri and Walgett have decreased below 4 mg/L. Readings at Geera are fluctuating between 2 and 4 mg/L, while results from Brewarrina are remaining below 2 mg/L (Figure 270). Water temperature is between 28 and 30°C (Figure 271).

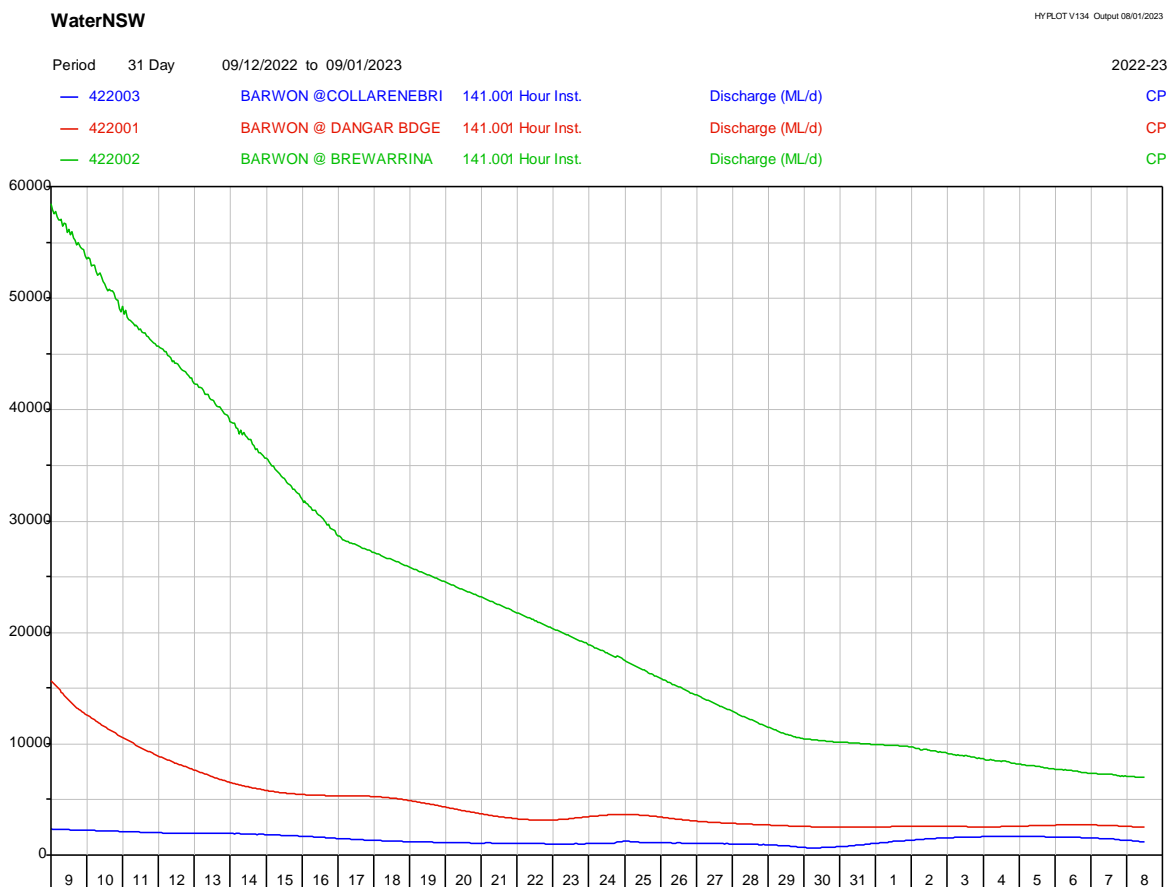


Figure 269: Discharge (ML/day) in the Barwon River

WaterNSW

HYPLOT V134 Output 08/01/2023

Period 31 Day 09/12/2022 to 09/01/2023 2022-23

Inst. ID	Location	Instrument	Parameter	Unit	CP
422003	BARWON @ COLLARENEBRI	2351.001 Hour Inst.	DO (mg/l)	mg/l	CP
422001	BARWON @ DANGAR BDGE	2351.001 Hour Inst.	DO (mg/l)	mg/l	CP
422027	BARWON @ GEERA	2351.001 Hour Inst.	DO (mg/l)	mg/l	CP
422002	BARWON @ BREWARRINA	2351.001 Hour Inst.	DO (mg/l)	mg/l	CP

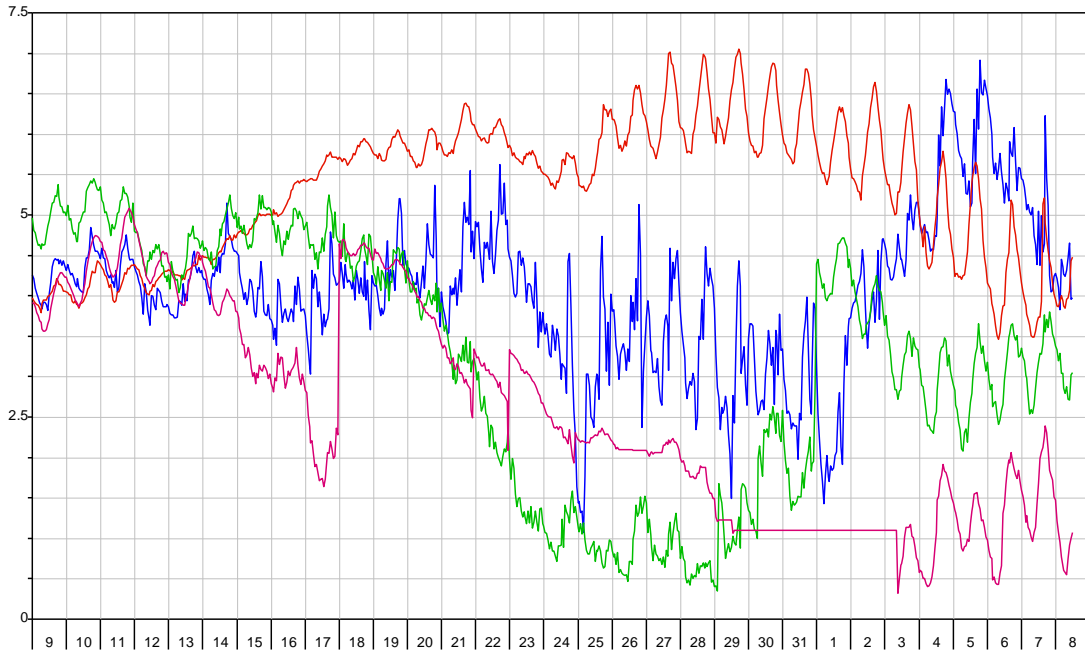


Figure 270: Continuous dissolved oxygen (mg/L) in the Barwon River

WaterNSW

HYPLOT V134 Output 08/01/2023

Period 31 Day 09/12/2022 to 09/01/2023 2022-23

Inst. ID	Location	Instrument	Parameter	Unit	CP
422003	BARWON @ COLLARENEBRI	2080.001 Hour Inst.	Water Temp(C)	°C	CP
422001	BARWON @ DANGAR BDGE	2080.001 Hour Inst.	Water Temp(C)	°C	CP
422027	BARWON @ GEERA	2080.001 Hour Inst.	Water Temp(C)	°C	CP
422002	BARWON @ BREWARRINA	2080.001 Hour Inst.	Water Temp(C)	°C	CP

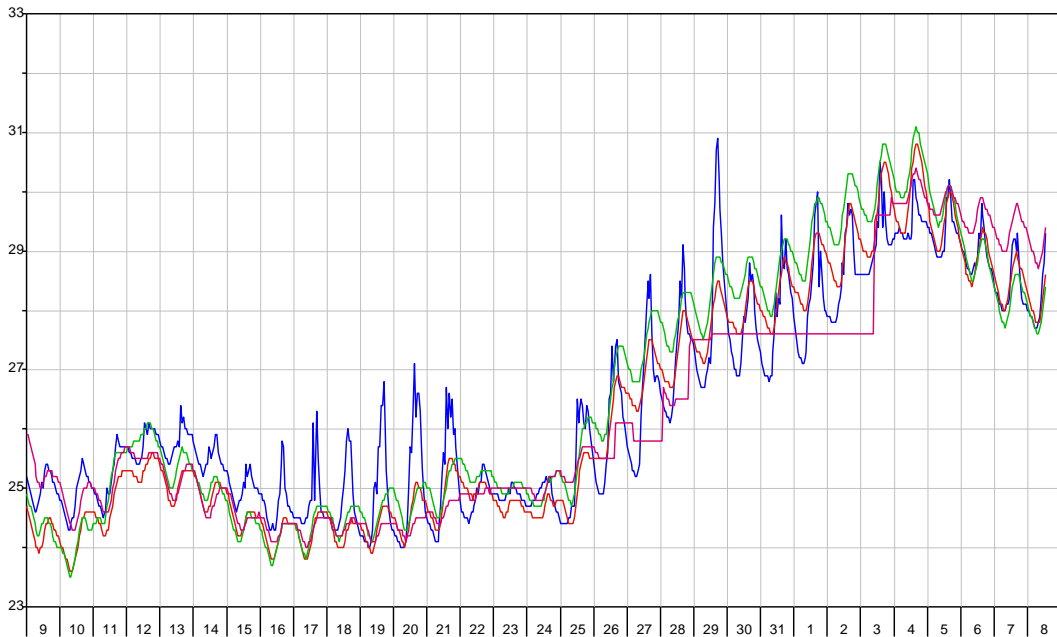


Figure 271: Continuous water temperature (°C) in the Barwon River

Darling River

Discharge at the Wilcannia gauge peaked at 50,000 ML/day while the flow in Talyawalka Creek has peaked at around 60,000 ML/day (Figure 272). Discharge is just over 17,800 ML/day at Burtundy. Major flood warnings continue for Tilpa, Wilcannia and Menindee.



Figure 272: Discharge (ML/day) in the upper Darling River

Figure 273 is a satellite derived colour infrared Sentinel image highlighting the floodwater is mixing in Lakes Tandure and Pamamaroo, and major flooding around Menindee town.

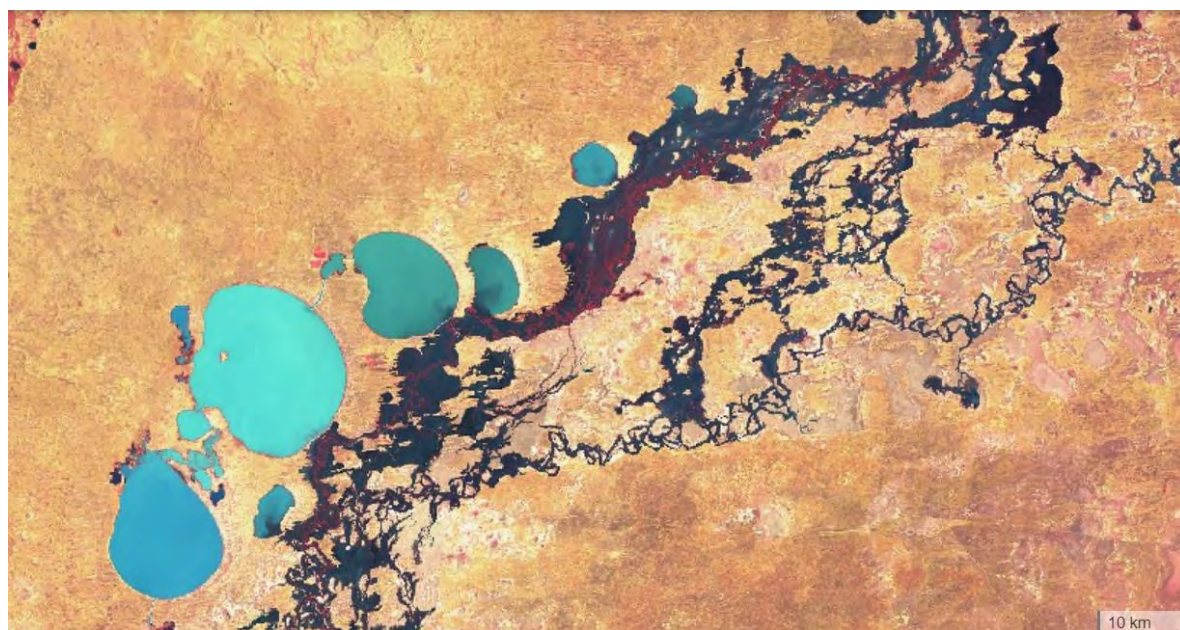


Figure 273: Satellite derived infrared image of Menindee Lakes – 3 January 2023

Dissolved oxygen in the Darling River at Bourke has dropped to 0 mg/L over the past week, while downstream at Louth dissolved oxygen has just dropped below 2 mg/L (Figure 274). Oxygen readings at Wilcannia had been less than 1 mg/L but have improved to 2 mg/L in recent days. At Weir 32 and Burtundy oxygen levels are above 4 mg/L. Water temperatures are above 28°C at Bourke and fluctuating between 26 and 28°C at Wilcannia, Weir 32 and Burtundy (Figure 275).

In contrast to the results from Wilcannia, the temporary dissolved oxygen monitoring site at Nellia Gaari on the Darling River upstream of Lake Wetherell had a dissolved oxygen reading of 6.7 mg/L on Sunday afternoon (8/01/2023).

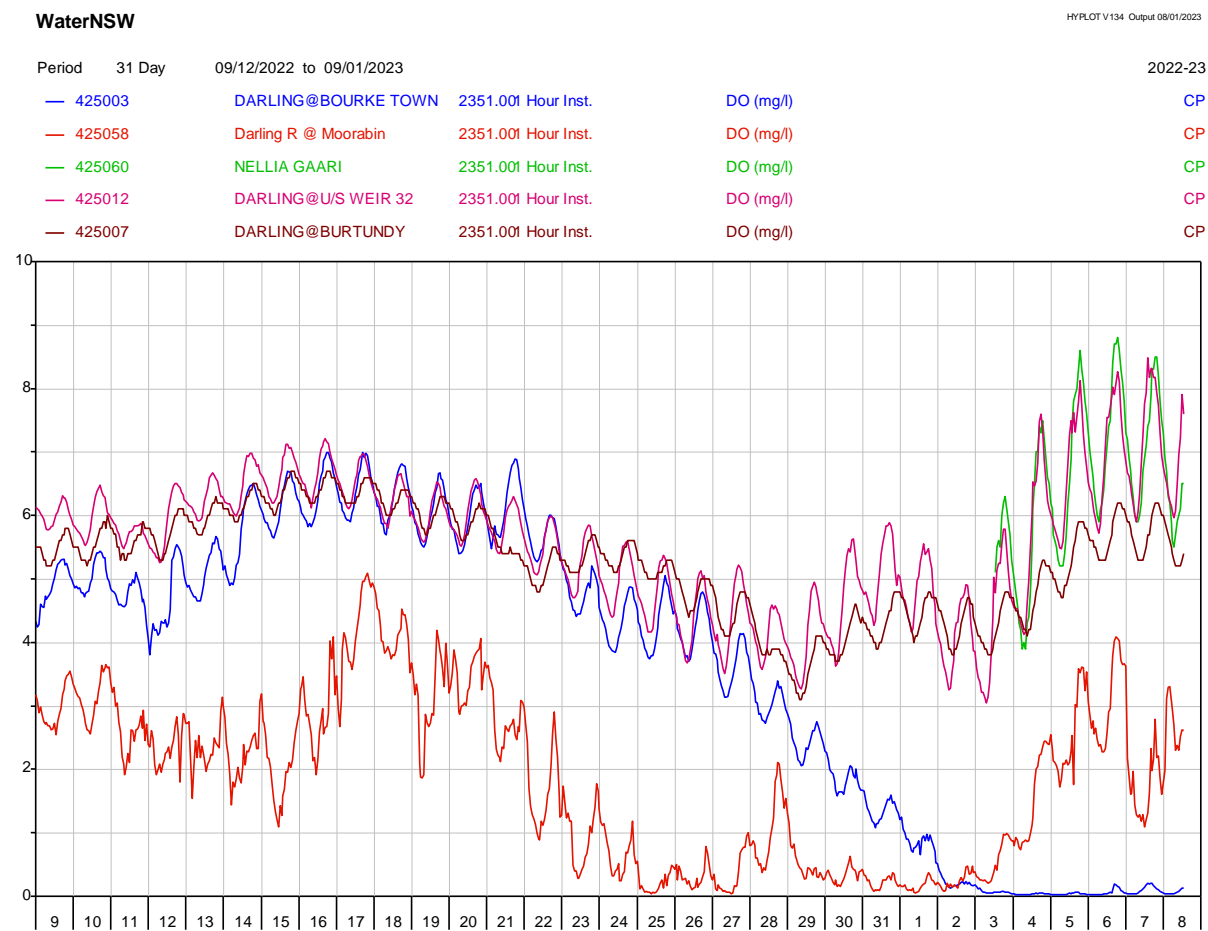


Figure 274: Continuous dissolved oxygen (mg/L) in the Darling River

Period 31 Day 09/12/2022 to 09/01/2023

2022-23

— 425003	DARLING@BOURKE TOWN	2080.001 Hour Inst.	Water Temp(C)	CP
— 425058	Darling R @ Moorabin	2080.001 Hour Inst.	Water Temp(C)	CP
— 425012	DARLING@U/S WEIR 32	2080.001 Hour Inst.	Water Temp(C)	CP
— 425007	DARLING@BURTUNDY	2080.001 Hour Inst.	Water Temp(C)	CP

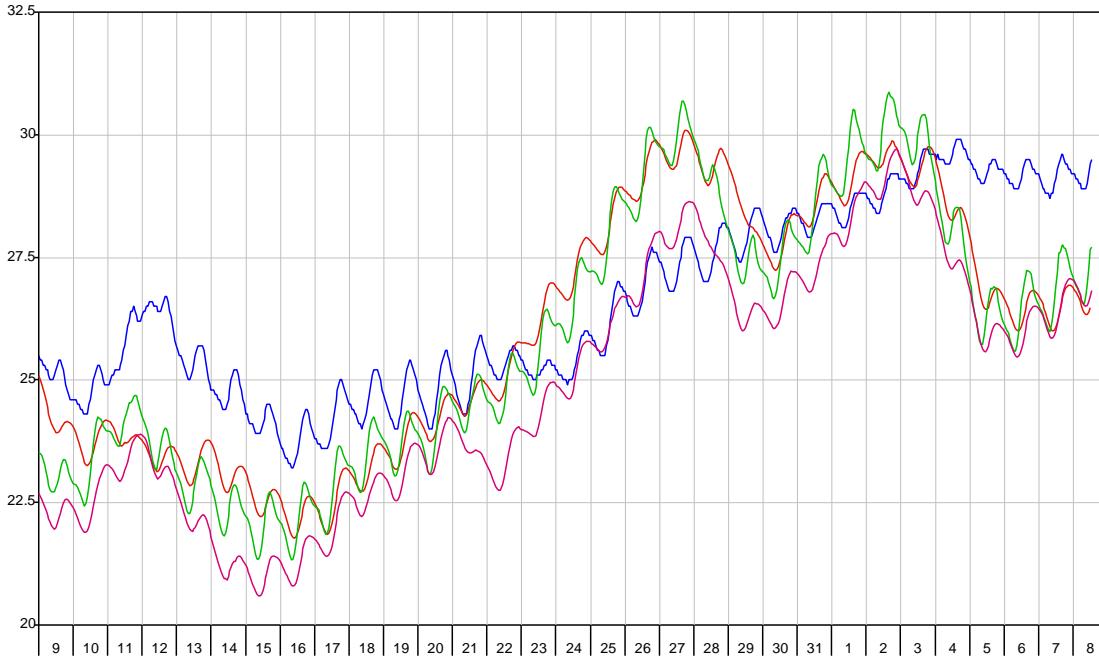


Figure 275: Continuous water temperature (°C) in the Darling River

Southern Basin

Lachlan River

Discharge in the Lachlan River at Wilandra Weir is decreasing towards 10,000 ML/day (Figure 276). The flood warning for Hillston is moderate.

Dissolved oxygen in the Lachlan River at Forbes and Condobolin is remaining above 5 mg/L while all other sites are fluctuating around 4 mg/L (Figure 277).

WaterNSW

HY/PL07 V134 Output 08/01/2023

Period	31 Day	09/12/2022 to 09/01/2023		2022-23
— 412004	LACHLAN FORBES CTTNS	141.001 Hour Inst.	Discharge (ML/d)	CP
— 412006	LACHLAN CONDOBOLIN B	141.001 Hour Inst.	Discharge (ML/d)	CP
— 412011	LACHLAN LAKE C WEIR	141.001 Hour Inst.	Discharge (ML/d)	CP
— 412038	LACHLAN WILLANDRA WR	141.001 Hour Inst.	Discharge (ML/d)	CP
— 412005	LACHLAN @ BOOLIGAL	141.001 Hour Inst.	Discharge (ML/d)	CP

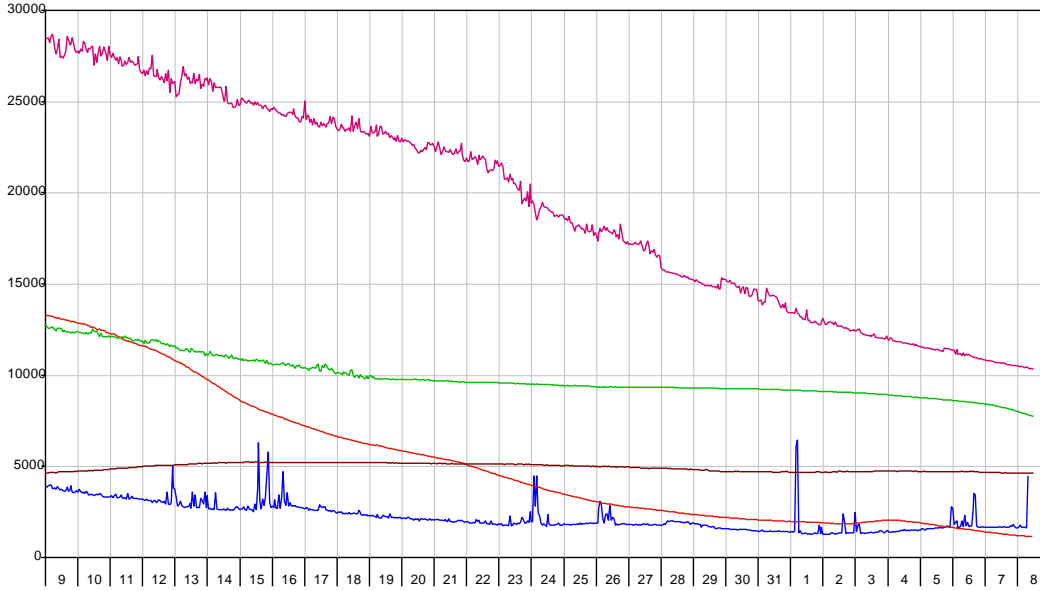


Figure 276: Discharge (ML/day) in the Lachlan River

WaterNSW

HY/PL07 V134 Output 08/01/2023

Period	31 Day	09/12/2022 to 09/01/2023		2022-23
— 412004	LACHLAN FORBES CTTNS	2351.001 Hour Inst.	DO (mg/l)	CP
— 412006	LACHLAN CONDOBOLIN B	2351.001 Hour Inst.	DO (mg/l)	CP
— 412011	LACHLAN LAKE C WEIR	2351.001 Hour Inst.	DO (mg/l)	CP
— 412039	LACHLAN HILLSTON WR	2351.001 Hour Inst.	DO (mg/l)	CP
— 412005	LACHLAN @ BOOLIGAL	2351.001 Hour Inst.	DO (mg/l)	CP

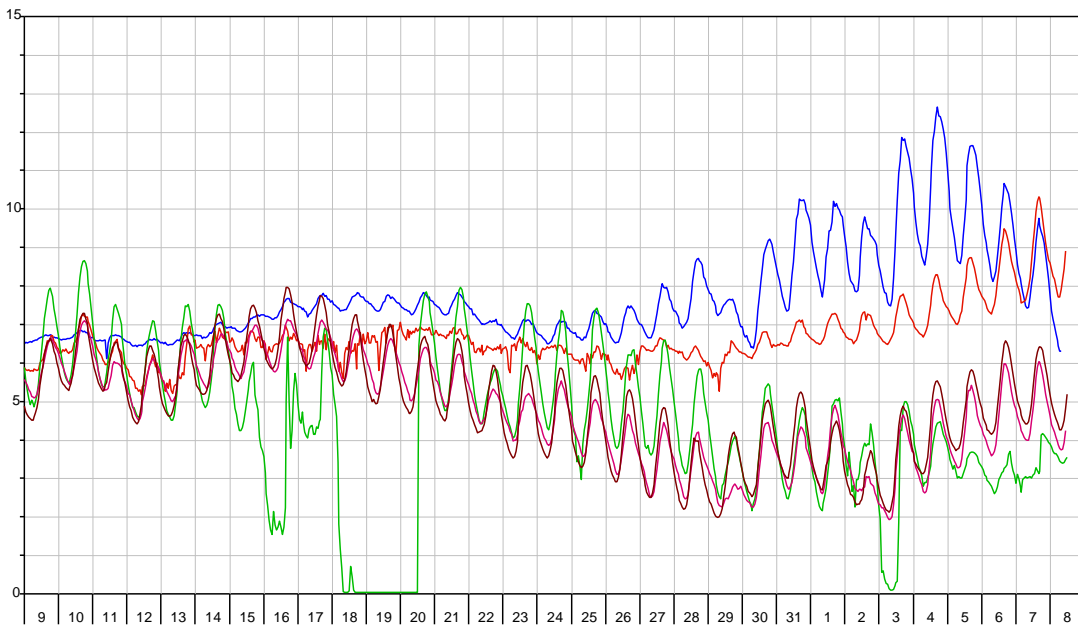


Figure 277: Continuous dissolved oxygen (mg/L) in the Lachlan River

Period 31 Day 09/12/2022 to 09/01/2023 2022-23

- 412004 LACHLAN FORBES CTTNS 2080.001 Hour Inst. Water Temp(C) CP
- 412006 LACHLAN CONDOBOLIN B 2080.001 Hour Inst. Water Temp(C) CP
- 412038 LACHLAN WILLANDRA WR 2080.001 Hour Inst. Water Temp(C) CP
- 412005 LACHLAN @ BOOLIGAL 2080.001 Hour Inst. Water Temp(C) CP

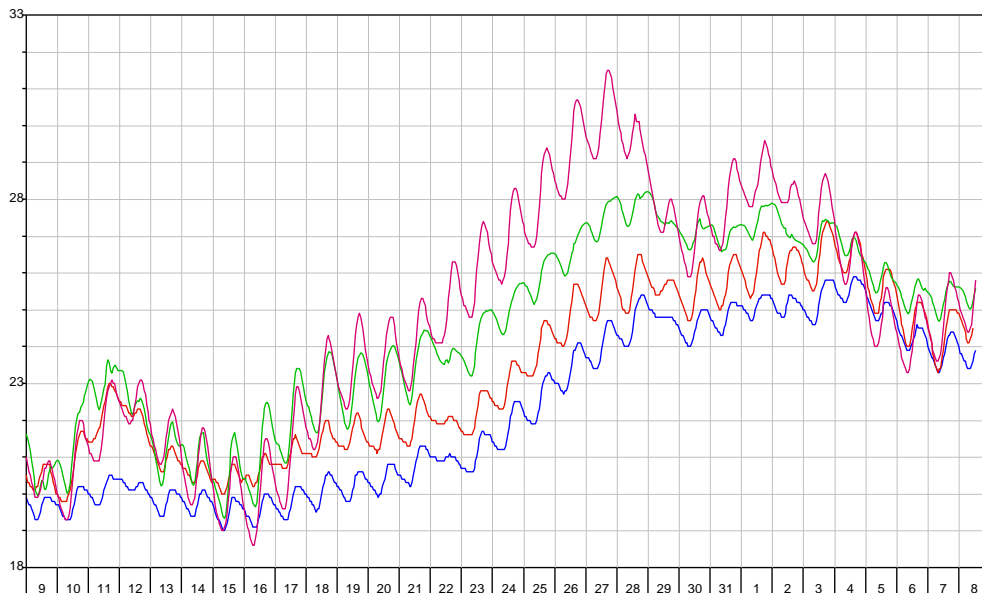


Figure 278: Continuous water temperature (°C) in the Lachlan River

WaterNSW and DPE were informed on Friday 30 December by landholders of a fish kill (mostly small carp) in Jemalong Creek and visual evidence of poor water quality (algal scum, smell). Indications are that the high water level in the Jemalong weir pool was causing low dissolved oxygen floodwater to back up in Jemalong Creek and not drain freely into the main river channel. Low dissolved oxygen in Jemalong Creek was confirmed on Saturday morning with a spot measurement of 1.83mg/L. As a mitigating measure, the water level in Jemalong weir has been drawn down to allow the poor quality water to drain into the main channel and water from the Lachlan Water Quality Allowance is being released from Wyangala Dam at 500 ML/day for 10 days (cease on Tuesday 10 January) to assist with dilution and flushing. Monitoring is showing oxygen levels in Jemalong Creek have improved (thanks Sam Davis DPI Fisheries) and there has not been any impact on the dissolved oxygen levels at the monitoring site further downstream of Jemalong Weir at Condobolin.

Table 16: Dissolved oxygen readings from Lachlan River at Jemalong Weir – 7 December 2023

Site	DO (mg/L)	Water temp
Jemalong Creek U/S Lachlan River confluence	4.33	24
Lachlan River D/S Jemalong Creek confluence	9.81	24
Lachlan River D/S Jemalong Weir	10.35	24
Lachlan River at Bedgerabong Straneys Bridge	10.98	23



Murrumbidgee River

The river level in the Murrumbidgee River at Maude Weir is around 6,400 ML/day. Discharge at Balranald is slowly decreasing toward 33,000 ML/day (Figure 279). The flood warning for Balranald has been decreased to moderate.

Dissolved oxygen levels in the Murrumbidgee River at Maude Weir are around 7 mg/L. Oxygen levels at Redbank are above 4 mg/L. At Balranald dissolved oxygen is fluctuating between 1 and 4 mg/L (Figure 280).

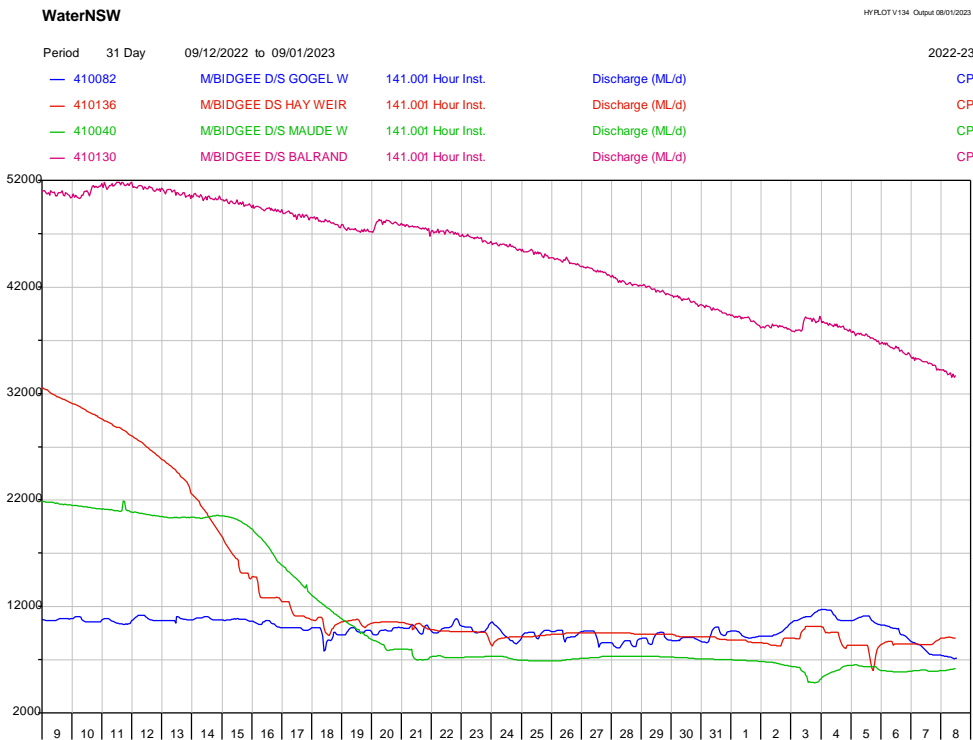


Figure 279: Discharge (ML/day) in the Murrumbidgee River

WaterNSW

HYPLOT V134 Output 08/01/2023

Period 31 Day 09/12/2022 to 09/01/2023 2022-23

— 410040	M/BIDGEE D/S MAUDE W	2351.001 Hour Inst.	DO (mg/l)	CP
— 410041	M/BIDGEE D/S REDBANK	2351.001 Hour Inst.	DO (mg/l)	CP
— 410130	M/BIDGEE D/S BALRAND	2351.001 Hour Inst.	DO (mg/l)	CP

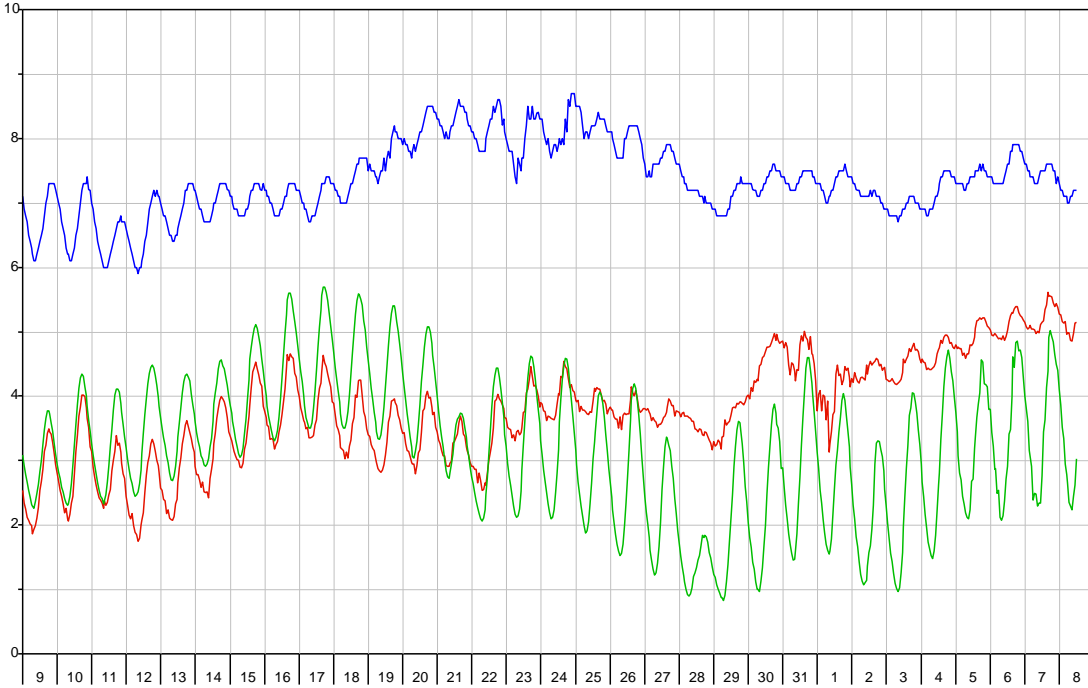


Figure 280: Continuous dissolved oxygen (mg/L) in the Murrumbidgee River

WaterNSW

HYPLOT V134 Output 08/01/2023

Period 31 Day 09/12/2022 to 09/01/2023 2022-23

— 410040	M/BIDGEE D/S MAUDE W	2080.001 Hour Inst.	Water Temp(C)	CP
— 410041	M/BIDGEE D/S REDBANK	2080.001 Hour Inst.	Water Temp(C)	CP
— 410130	M/BIDGEE D/S BALRAND	2080.001 Hour Inst.	Water Temp(C)	CP

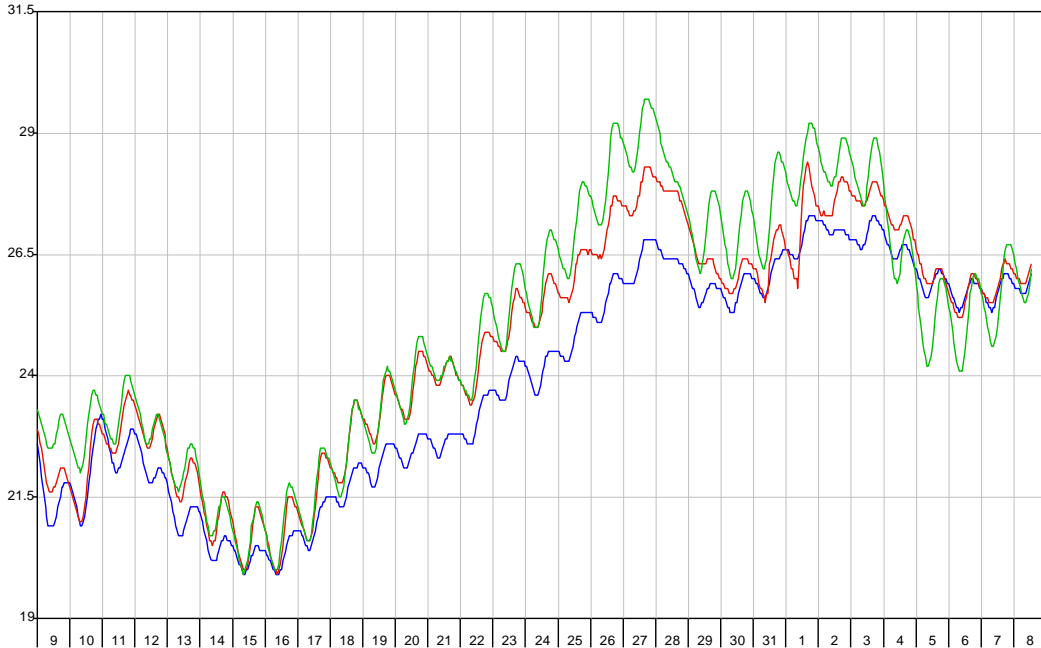


Figure 281: Continuous water temperature (°C) in the Murrumbidgee River

Kolety/Edward River

Discharge in the Kolety/Edward River is continuing to decline (Figure 282). Discharge at Moulamein has now fallen to 5,000 ML/day.

Dissolved oxygen in the Kolety/Edward River at Toonalook and Deniliquin has improved to above 4 mg/L (Figure 283). Readings from Moulamein had been less than 1 mg/L but have now also improved above 4 mg/L in response to cooler water temperatures.

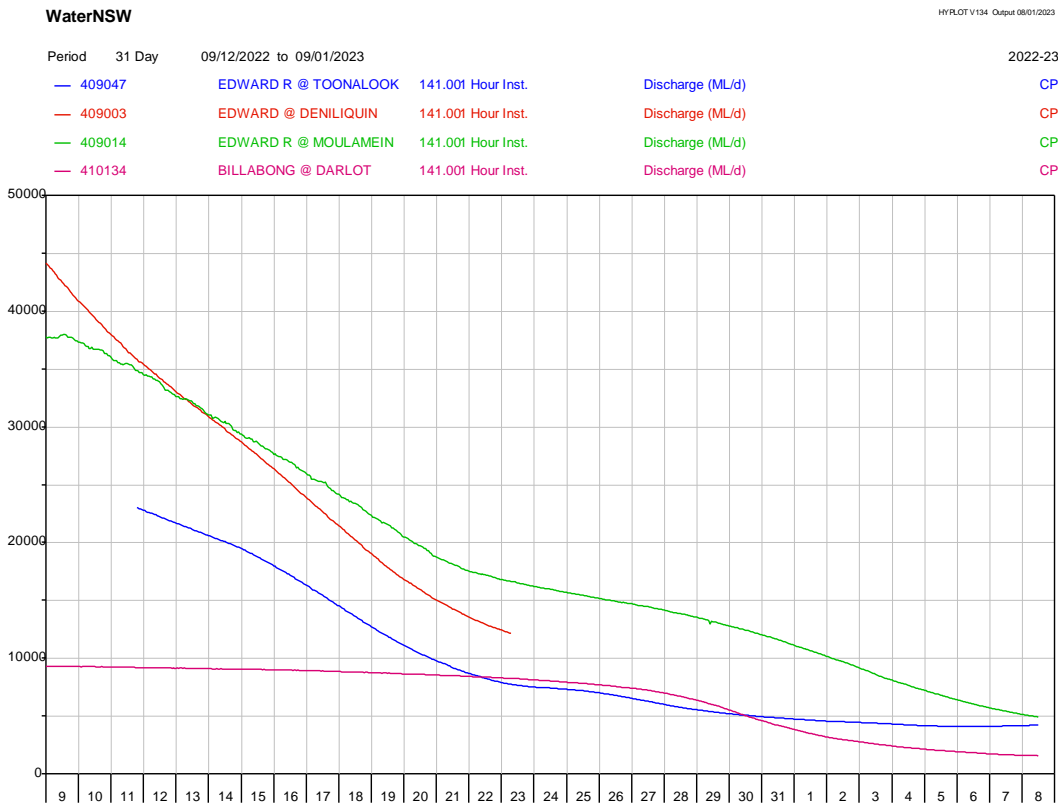


Figure 282: Discharge (ML/day) in the Kolety/Edward River

WaterNSW

HYPLOT V134 Output 08/01/2023

Period 31 Day 09/12/2022 to 09/01/2023 2022-23

— 409047	EDWARD R @ TOONALOOK	2351.00l Hour Inst.	DO (mg/l)	CP
— 409003	EDWARD @ DENILIQVIN	2351.00l Hour Inst.	DO (mg/l)	CP
— 409014	EDWARD R @ MOULAMEIN	2351.00l Hour Inst.	DO (mg/l)	CP

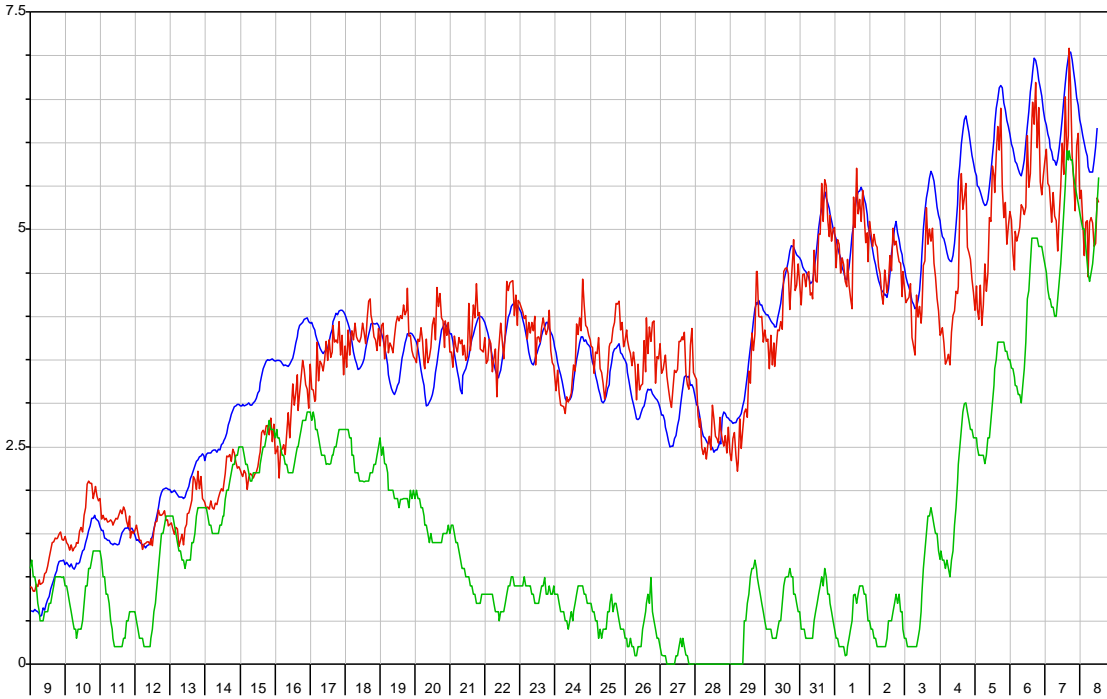


Figure 283: Continuous dissolved oxygen (mg/L) in the Kolety/Edward River

WaterNSW

HYPLOT V134 Output 08/01/2023

Period 31 Day 09/12/2022 to 09/01/2023 2022-23

— 409047	EDWARD R @ TOONALOOK	2080.00l Hour Inst.	Water Temp(C)	CP
— 409003	EDWARD @ DENILIQVIN	2080.00l Hour Inst.	Water Temp(C)	CP
— 409014	EDWARD R @ MOULAMEIN	2080.00l Hour Inst.	Water Temp(C)	CP

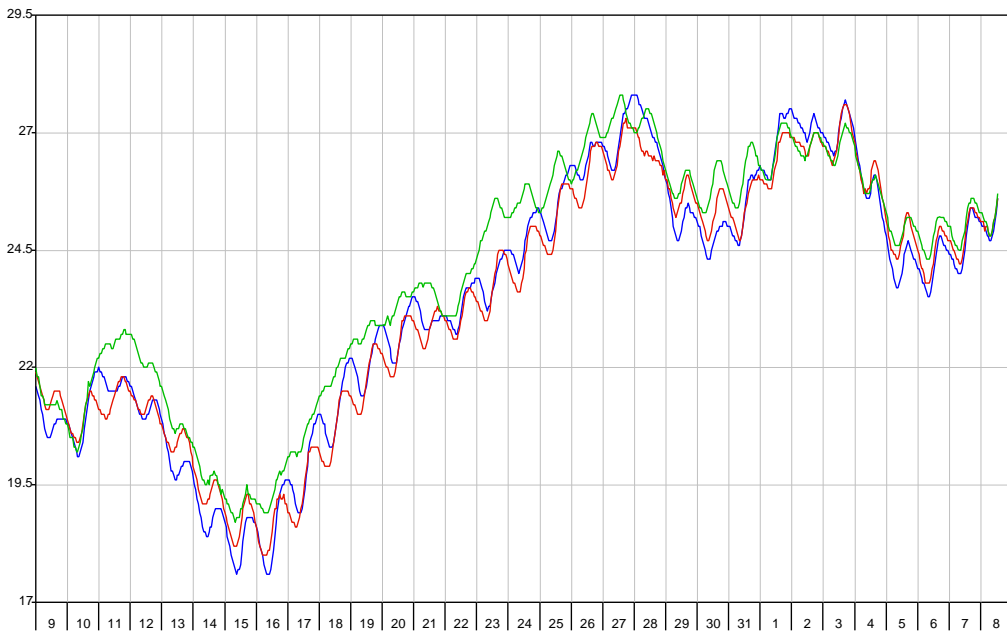


Figure 284: Continuous water temperature (°C) in the Kolety/Edward River

Wakool and Niemur rivers

Discharge in the Wakool River at Coonambit Bridge is just above 14,000 ML/day and at Gee Gee Bridge has dropped to almost 3,500 ML/day. The Niemur River at Mallan School is flowing at 4,300 ML/day (Figure 285).

Figure 286 highlights dissolved oxygen at both monitoring sites in the Wakool River and Niemur River at Mallan School are remaining below the 2 mg/L threshold. Results in the Niemur River at Barham-Moulamein Road are improving toward 4 mg/L.

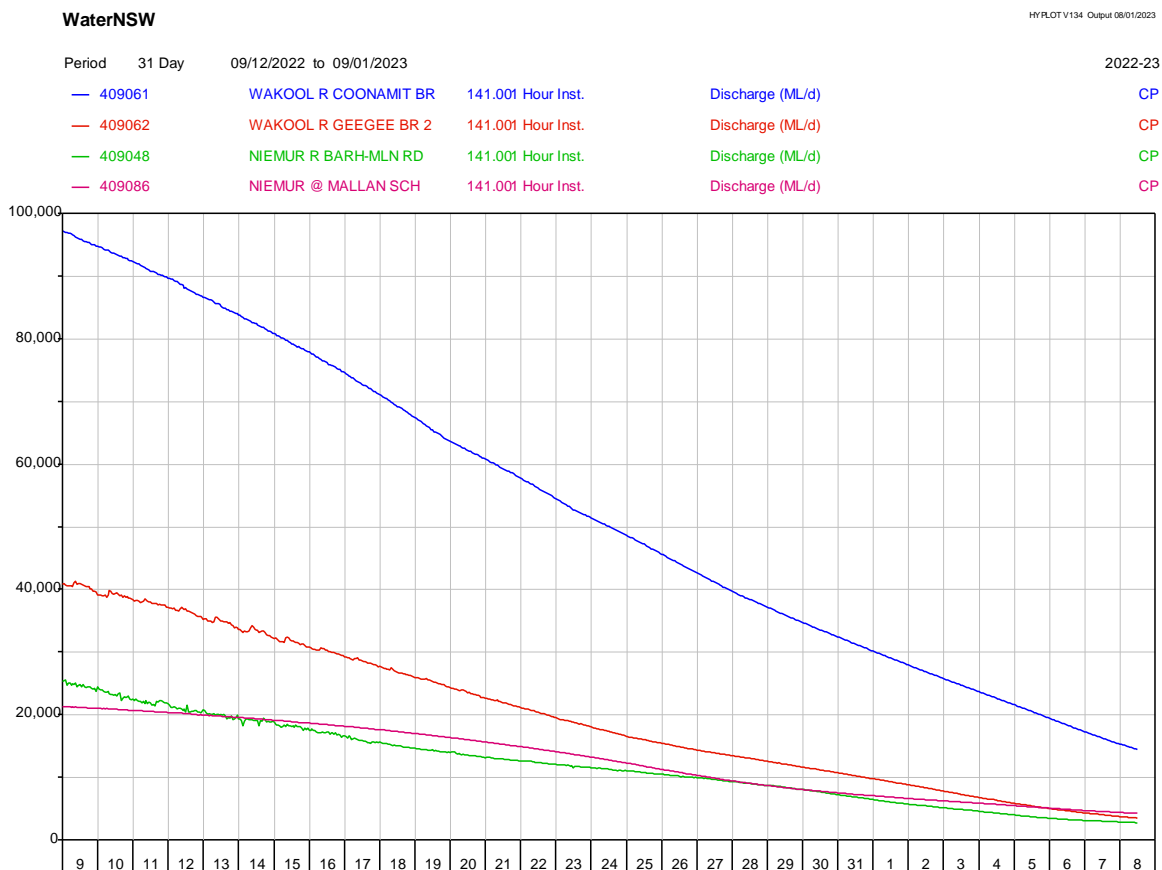


Figure 285: Discharge (ML/day) in the Wakool and Niemur rivers

Period 31 Day 09/12/2022 to 09/01/2023 2022-23

- 409062 WAKOOL R GEEGEE BR 2 2351.001 Hour Inst. DO (mg/l) CP
- 409013 WAKOOL @ STONEY XING 2351.001 Hour Inst. DO (mg/l) CP
- 409048 NIEMUR R BARH-MLN RD 2351.001 Hour Inst. DO (mg/l) CP
- 409086 NIEMUR @ MALLAN SCH 2351.001 Hour Inst. DO (mg/l) CP

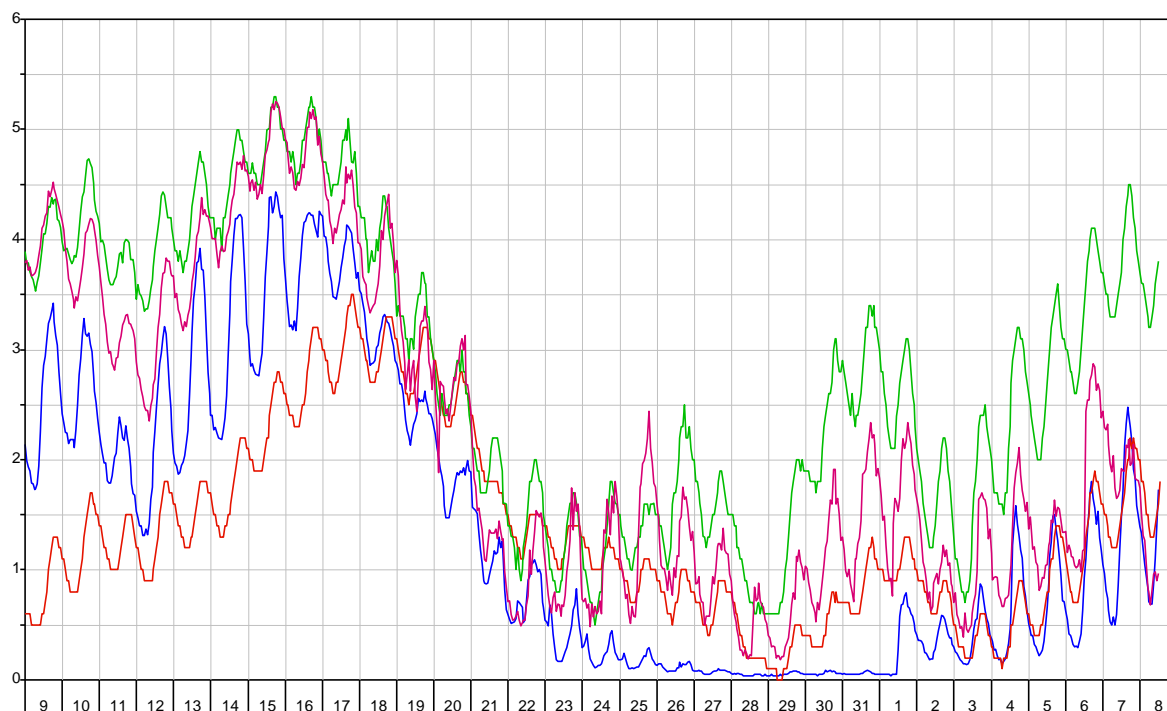


Figure 286: Continuous dissolved oxygen (mg/L) in the Wakool and Niemur rivers

Table 17 and Table 18 show some recent monitoring results from the Charles Sturt University Edward/Kolety Flow-MER team who are monitoring the delivery of Commonwealth environmental water from the Edward and Niemur escapes. Spot water quality measurements of dissolved oxygen taken at the water surface have been consistently higher than those reported at the same site from automated gauges where dissolved oxygen is measured at the bottom of the water column.

Table 17: Results from Edward escape – 30/12/2022

River	Site	Sample date	DO (mg/L)	Water Temp
Edward/Kolety River	Upstream Edward Escape (site is downstream Tuppal and Bullatale inflows)	30/12/2022 16:20	4.36	26.23
canal	Mulwala Canal	30/12/2022 17:00	8.79	26.8
Edward/Kolety River	Downstream Edward Escape 1 (near River St)	30/12/2022 17:23	3.25	27.63

River	Site	Sample date	DO (mg/L)	Water Temp
Edward/Kolety River	Downstream Edward Escape 2 (near Box St)	30/12/2022 17:46	3.73	27.18
Edward/Kolety River	Downstream Edward Escape 3 (DS Kolety Bridge, Deniliquin)	30/12/2022 18:16	5.31	26.51

Table 18: Dissolved oxygen results from Niemur escape – 30/12/2022

River	Site	Sample date	DO (mg/L)	Water Temp
Edward/Kolety River	Downstream Stevens Weir (Eastman Bridge)	30/12/2022 10:48	4.98	26.23
Colligen Creek	Werai Station Bridge (downstream Tumudgery inflows to Colligen Ck)	30/12/2022 11:40	2.62	24.93
Niemur River	Upstream Niemur Escape	30/12/2022 12:32	3.52	24.65
canal	Northern Branch Canal	30/12/2022 12:40	9.1	25.64
Niemur River	Downstream Niemur Escape 1 (Niemur near railway bridge)	30/12/2022 13:15	4.53	25.06
Niemur River	Downstream Niemur Escape 2 (Niemur at Barham-Moulamein Rd)	30/12/2022 14:10	3.65	26.44
Niemur River	Downstream Niemur Escape 3 (Niemur at Mallan School)	30/12/2022 14:38	3.62	26.34

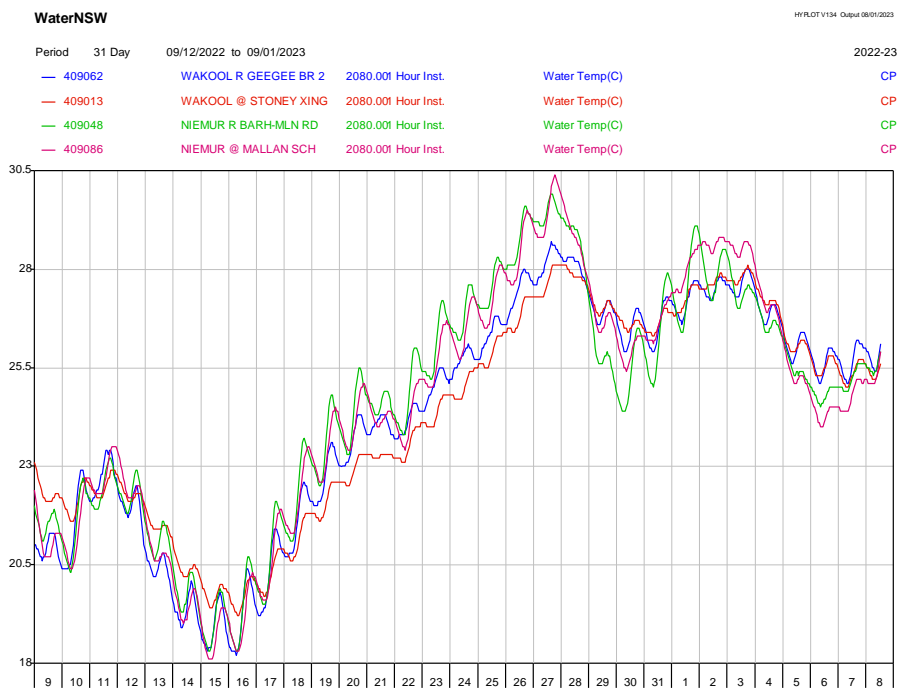


Figure 287: Continuous water temperature (°C) in the Wakool and Niemur rivers

Merran, Little Merran, Thule and Barber creeks

Figure 288 shows dissolved oxygen levels in Merran and Little Merran have improved while the sensor at Thule Creek is registering 0 mg/L. There has been some improvement in Merran and Little Merran Creeks with slightly lower water temperatures (Figure 289).

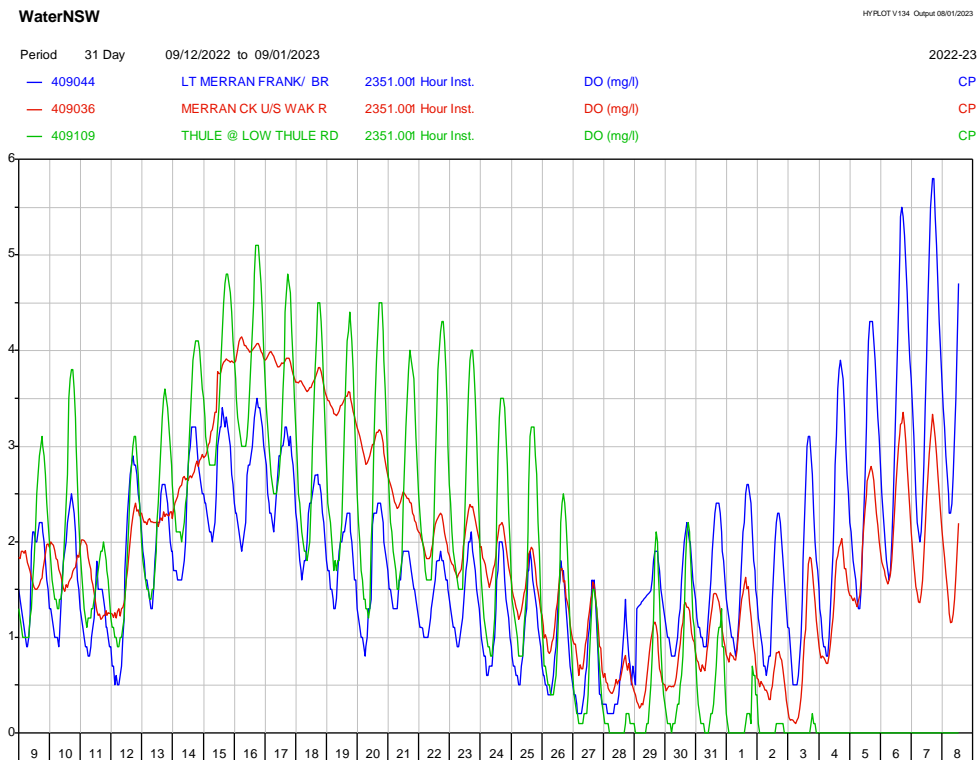


Figure 288: Continuous dissolved oxygen (mg/L) in the Merran, Little Merran and Thule creeks

Period 31 Day 09/12/2022 to 09/01/2023 2022-23

— 409044	LT MERRAN FRANK/ BR	2080.001 Hour Inst.	Water Temp(C)	CP
— 409036	MERRAN CK U/S WAK R	2080.001 Hour Inst.	Water Temp(C)	CP
— 409109	THULE @ LOW THULE RD	2080.001 Hour Inst.	Water Temp(C)	CP

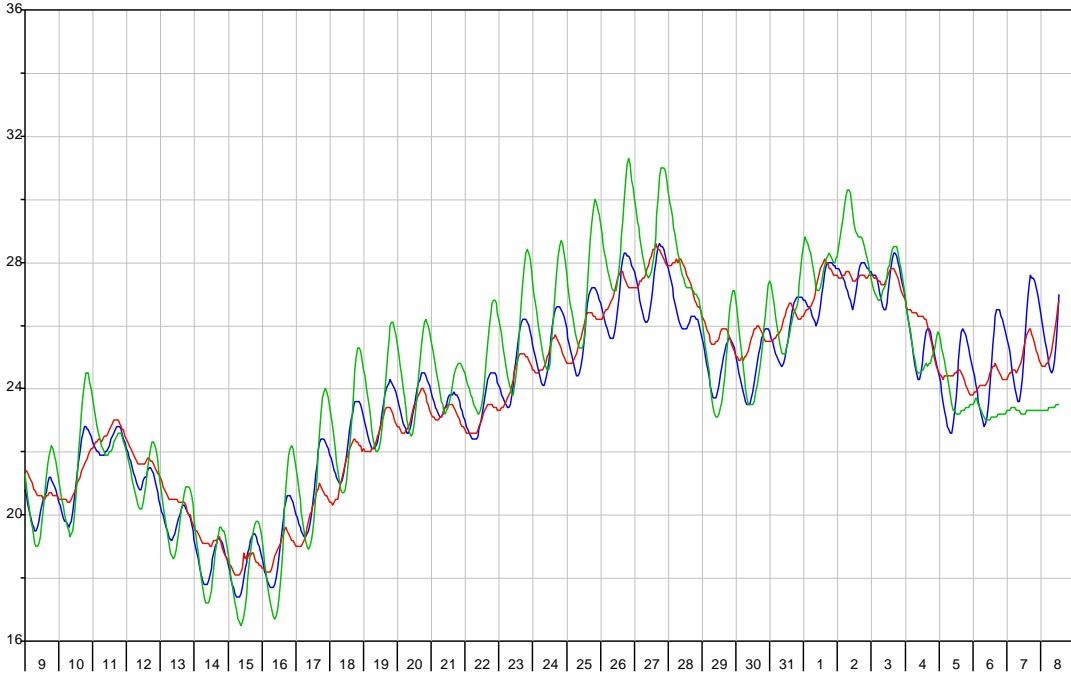


Figure 289: Continuous water temperature (°C) in the Merran, Little Merran and Thule creeks

Murray River

The Bureau of Meteorology has issued a moderate flood warning for Mildura and Wentworth.

Monitoring by DELWP is showing the Murray River at Tocumwal, upstream of the Barmah/Millewa Forest, is oxygenated (Figure 290). Downstream of the forest at Barmah, dissolved oxygen is 5.5 mg/L. Dissolved oxygen in the Goulburn River at McCoys Bridge and the Campaspe River at Fehrings Lane is above 5 mg/L.

Dissolved oxygen in the Murray River at Barham and downstream at Pental Island Pumps has improved above 5 mg/L at both sites. Monitoring at Wemen shows dissolved oxygen dropped to almost 0 mg/L last week but has improved to above 3 mg/L. The temporary monitoring site installed on the Murray River downstream of Wentworth was reading 4.7 mg/L on Sunday 8 January.

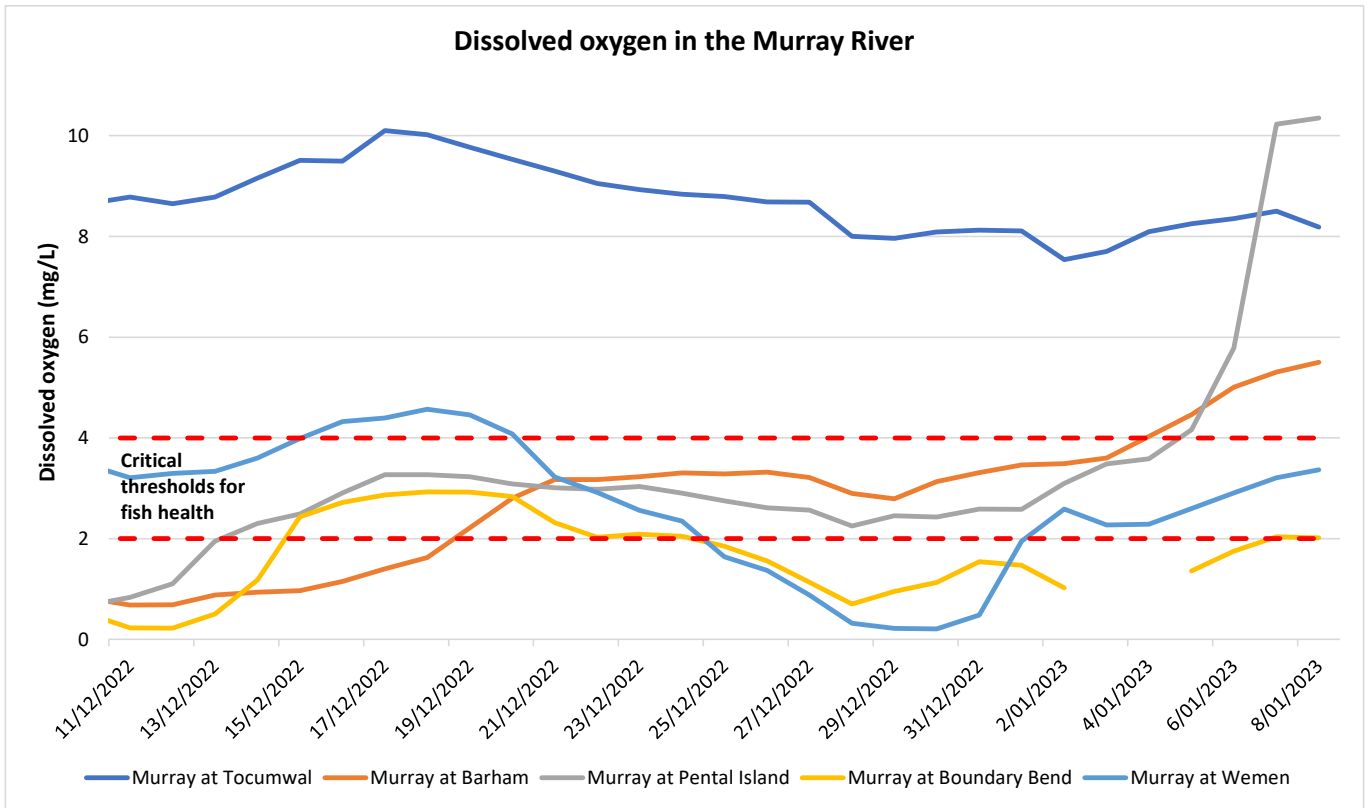


Figure 290: Continuous dissolved oxygen (mg/L) in the Murray River (data courtesy of DELWP)

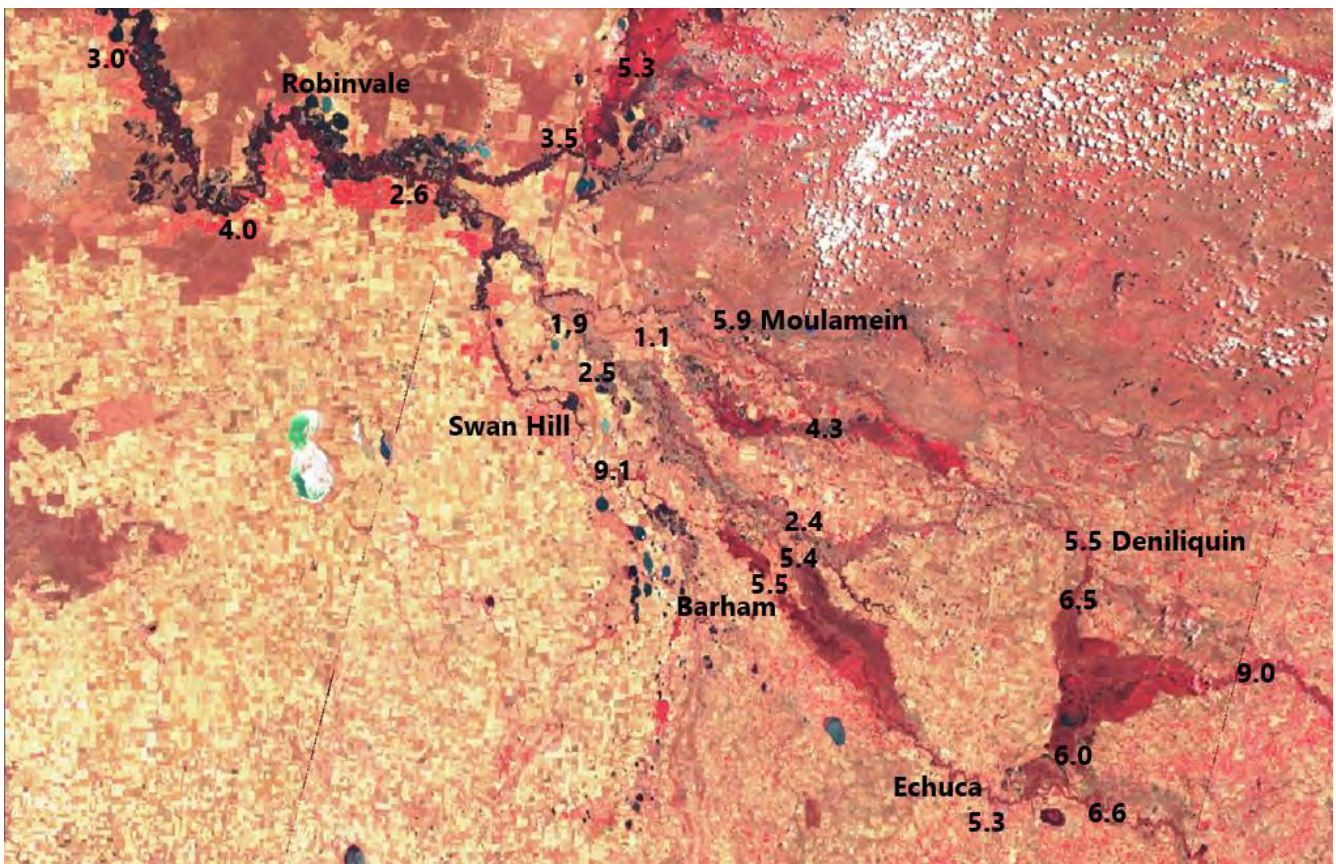


Figure 291: Satellite-derived Sentinel colour infrared image of the lower Murrumbidgee and mid Murray River catchments - 8 January 2023

Weather Outlook

The Bureau of Meteorology 8-day total rain forecast (8 to 15 January) indicates the heaviest falls will be along the NSW/Queensland border and the southern Alps (Figure 292). Forecast is for air temperatures at Echuca and Mildura to increase to the high 30's during the week and peaking in the low 40's at Mildura on the weekend (Figure 293 and Figure 294). There is low intensity to severe heatwave conditions forecast for most of NSW for Thursday to Saturday this week (Figure 295).

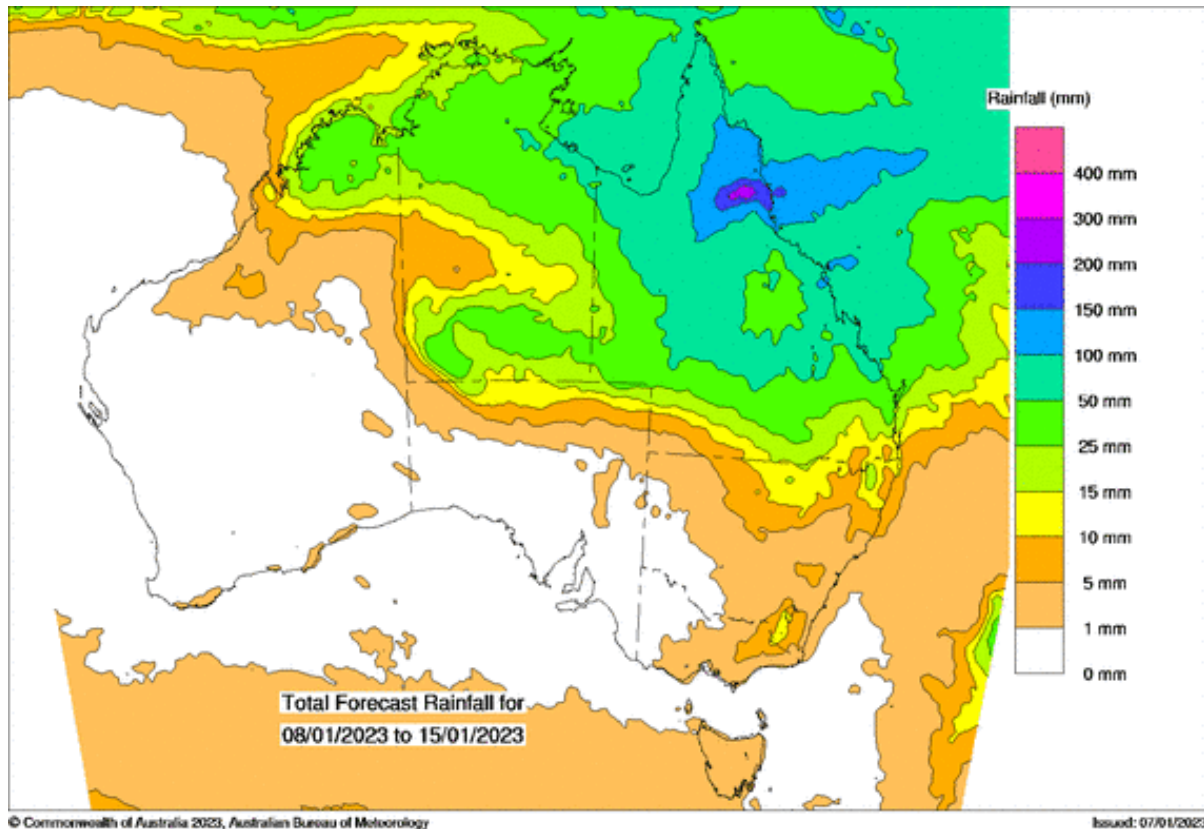


Figure 292: Bureau of Meteorology 8-day total rain forecast (8 to 15 January)

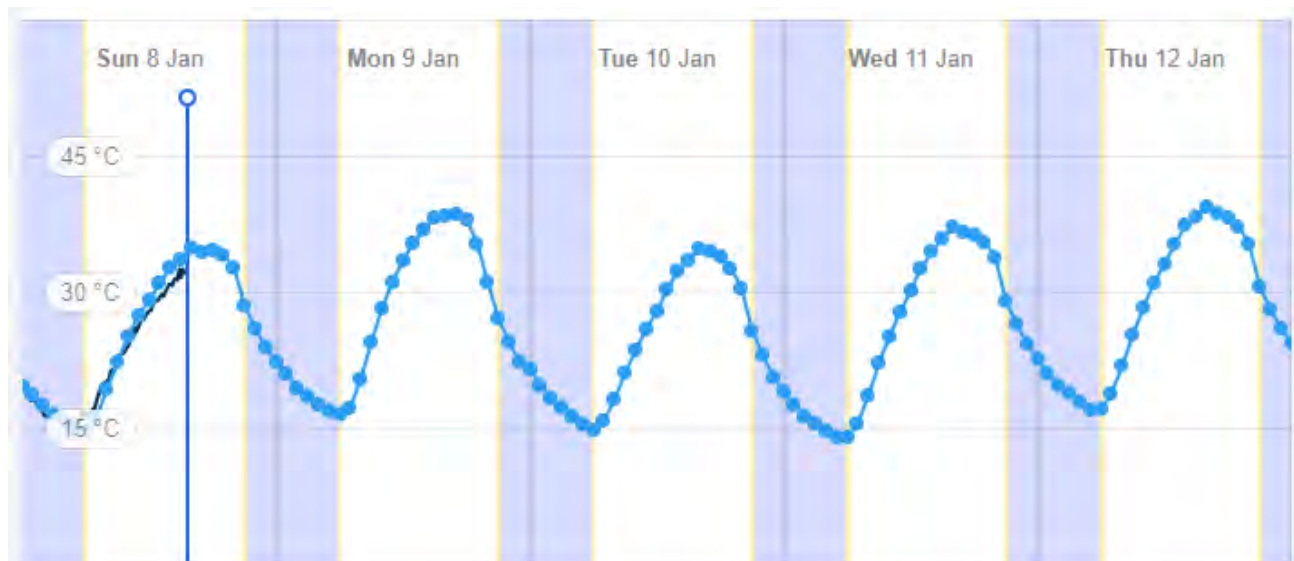


Figure 293: Forecast air temperatures for Echuca 8 to 12 January

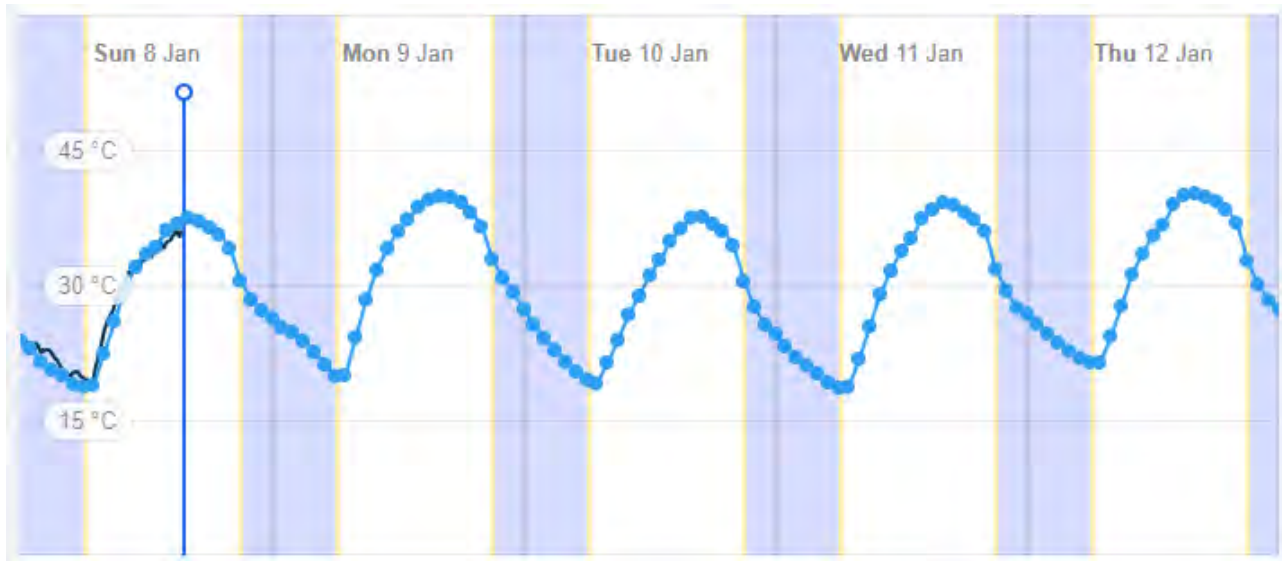


Figure 294: Forecast air temperatures for Mildura 8 to 12 January

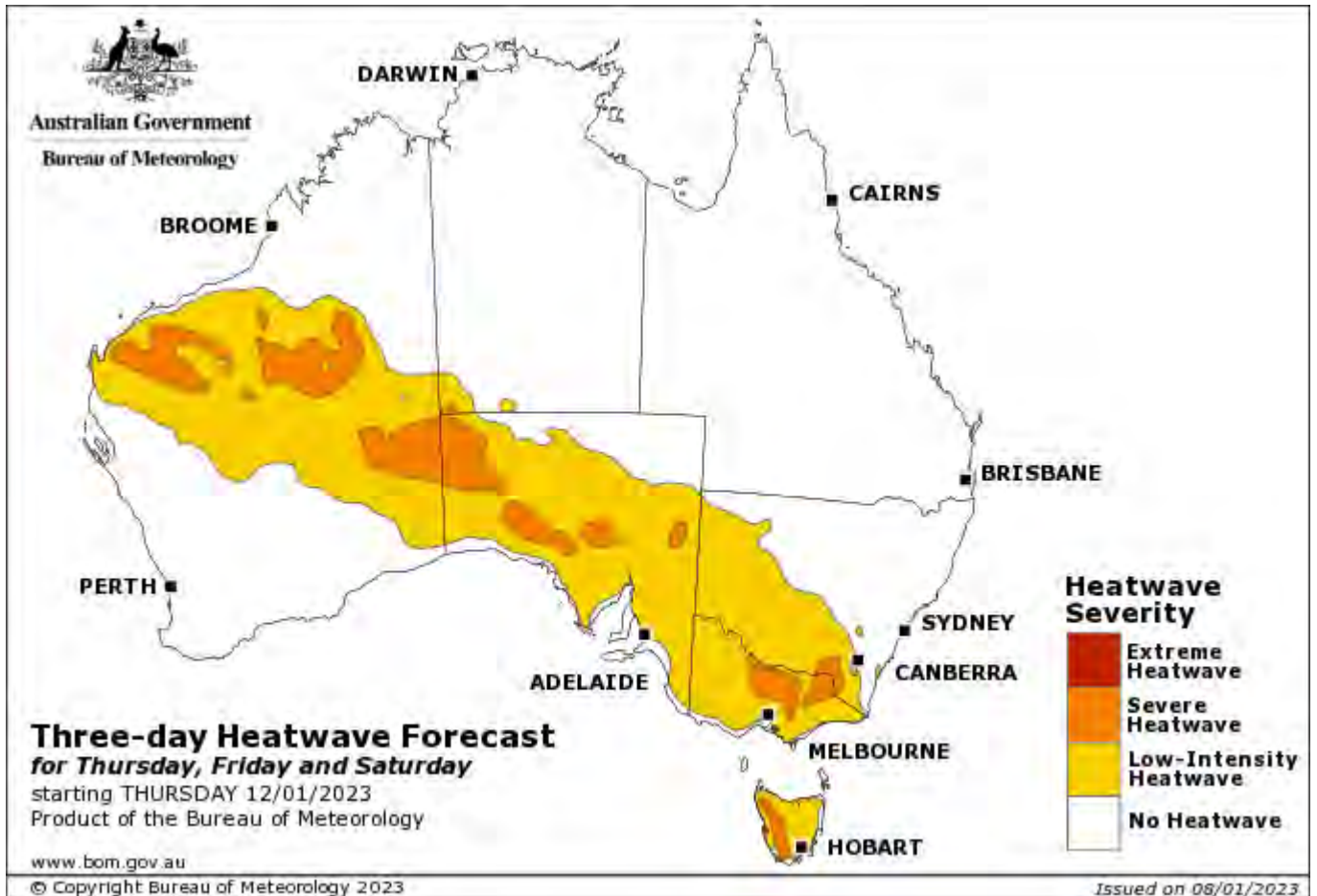


Figure 295: Forecast heat wave conditions for Thursday 12 January to Saturday 14 January 2023

Water quality update, Meeting No.13 – 16 January 2023

Northern Basin

Barwon River

Discharge in the Barwon River at Brewarrina has decreased to almost 5,000 ML/day (Figure 296 Figure 1).

Dissolved oxygen results from the automated gauge in the Barwon River at Collarenebri have been decreasing below 2 mg/L. Routine monitoring results from 11/01/2023 show much higher readings near the water surface (6.72 mg/L). Oxygen levels at Walgett have just decreased below 4 mg/L. Readings at Geera are fluctuating between 2 and 4 mg/L, while results from Brewarrina are increasing above 2 mg/L during the day and dropping again overnight (Figure 297). Water temperature is between 28 and 31°C (Figure 298).

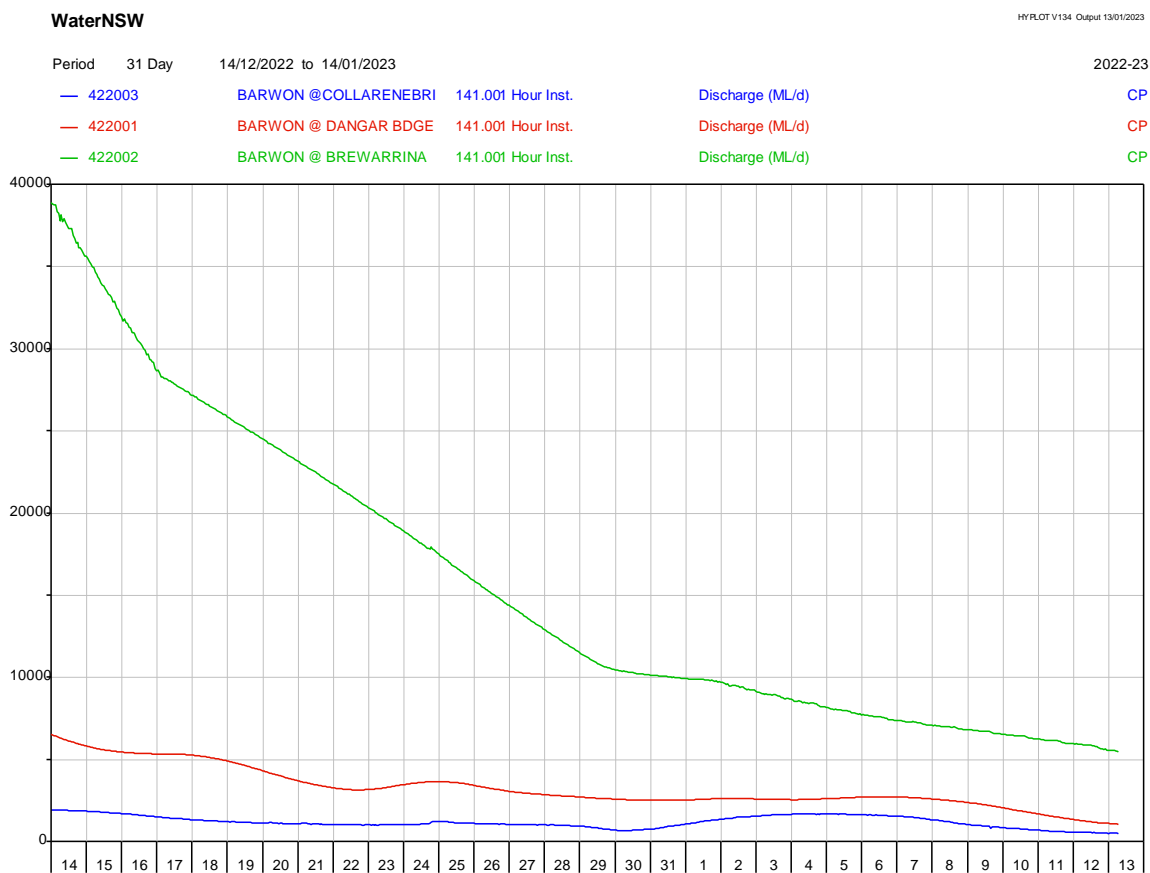


Figure 296: Discharge (ML/day) in the Barwon River

Period 31 Day 14/12/2022 to 14/01/2023

2022-23

— 422003 BARWON @ COLLARENEBRI 2351.001 Hour Inst. DO (mg/l) CP
 — 422001 BARWON @ DANGAR BDGE 2351.001 Hour Inst. DO (mg/l) CP
 — 422027 BARWON @ GEERA 2351.001 Hour Inst. DO (mg/l) CP
 — 422002 BARWON @ BREWARRINA 2351.001 Hour Inst. DO (mg/l) CP

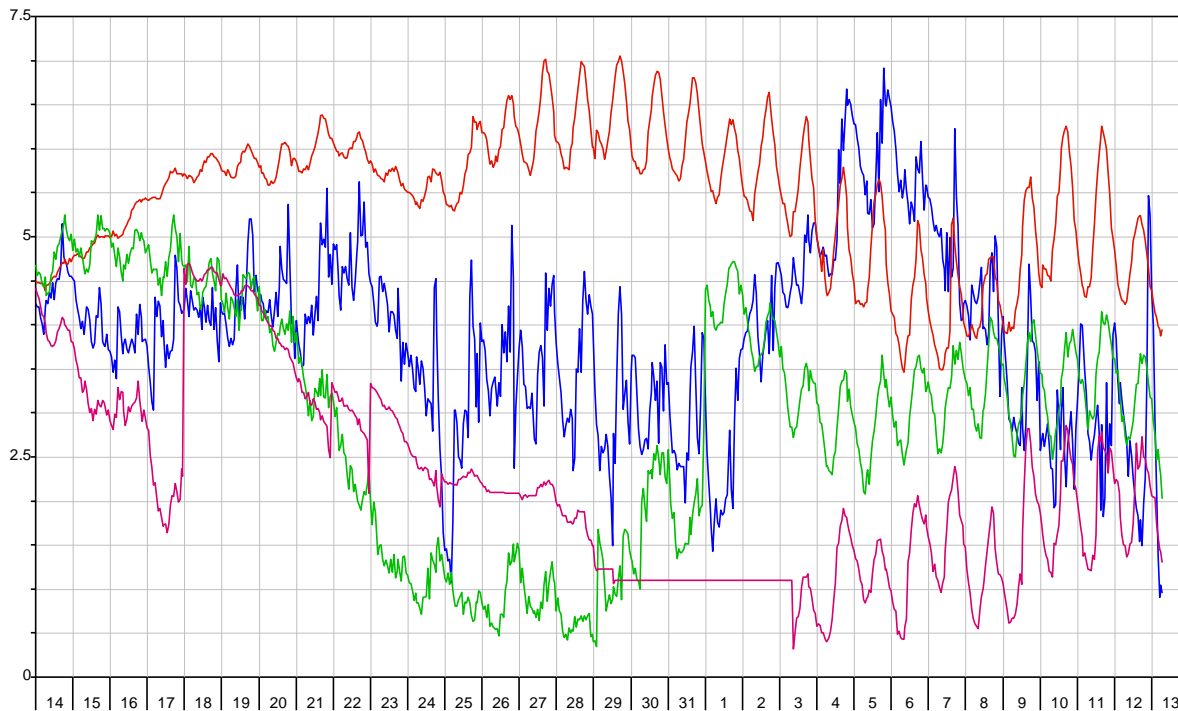


Figure 297: Continuous dissolved oxygen (mg/L) in the Barwon River

Table 19: Dissolved oxygen readings from Barwon River and tributaries - January 2023

Site	Sample Date	DO (mg/L)	Water temp
Barwon at Mungindi	11/01/2023 13:39	5.41	30.08
Barwon at Collarenebri	11/01/2023 11:34	6.72	29.53
Namoi River at Goangra	11/01/2023 09:14	5.88	27.70
Barwon River at Dangar Bridge (Walgett)	10/01/2023 15:49	6.86	29.95
Marthaguy Creek at Carinda	11/01/2023 07:05	3.47	27.64
Macquarie River at Carinda (Bells Bridge)	11/01/2023 07:33	3.94	27.39

Site	Sample Date	DO (mg/L)	Water temp
Barwon River at Brewarrina	10/01/2023 11:17	2.54	29.14
Bogan River at Gongolgon	10/01/2023 12:34	2.92	29.26

WaterNSW

HYFLOT V134 Output 13/01/2023

Period 31 Day 14/12/2022 to 14/01/2023 2022-23

- 422003 BARWON @ COLLARENEBRI 2080.001 Hour Inst. Water Temp(C) CP
- 422001 BARWON @ DANGAR BDGE 2080.001 Hour Inst. Water Temp(C) CP
- 422027 BARWON @ GEERA 2080.001 Hour Inst. Water Temp(C) CP
- 422002 BARWON @ BREWARRINA 2080.001 Hour Inst. Water Temp(C) CP

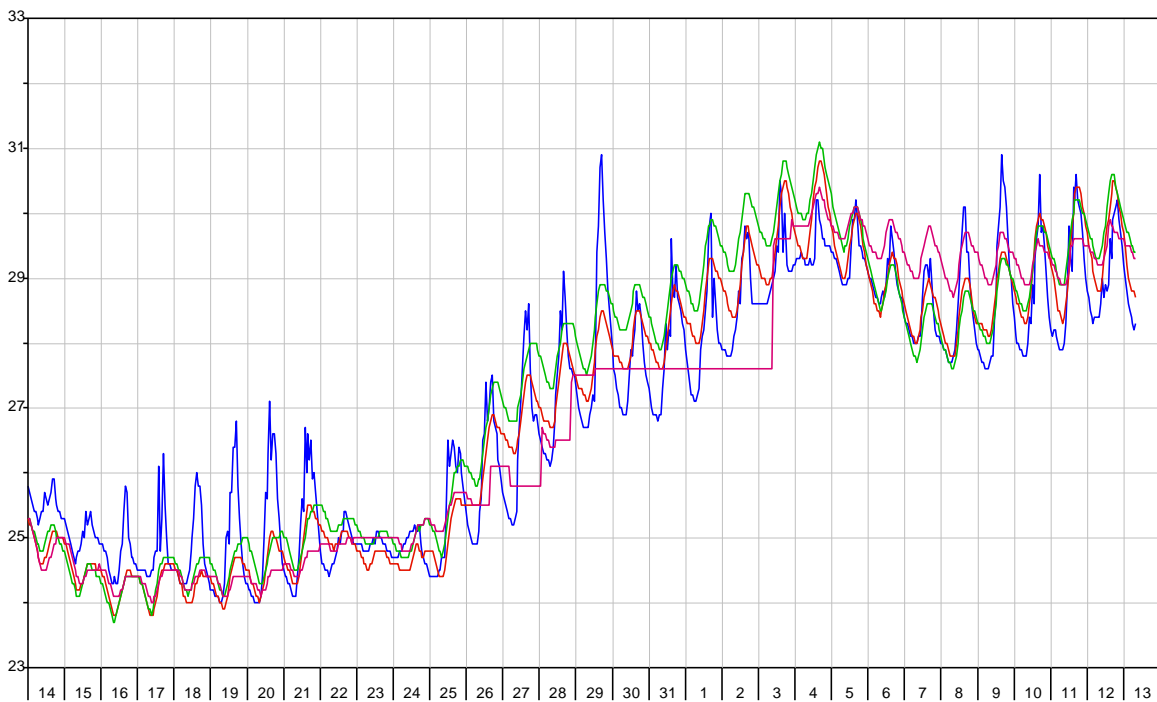


Figure 298: Continuous water temperature (°C) in the Barwon River

Darling River

Discharge at the Wilcannia gauge has decreased to less than 40,000 ML/day while the flow in Talyawalka Creek has dropped below 35,000 ML/day (Figure 299). Discharge is just over 17,800 ML/day at Burtundy. Major flood warnings continue for Wilcannia and Menindee. The Bureau of Meteorology has forecast major flooding at Burtundy in late January.

Period	31 Day	14/12/2022 to 14/01/2023		2022-23
— 425003	DARLING@BOURKE TOWN	141.001 Hour Inst.	Discharge (ML/d)	CP
— 425900	DARLING@TILPA	141.001 Hour Inst.	Discharge (ML/d)	CP
— 425008	DARLING@WILC. MAIN C	141.001 Hour Inst.	Discharge (ML/d)	CP
— 425018	TALYAWALKA@BARR HW	141.001 Hour Inst.	Discharge (ML/d)	CP

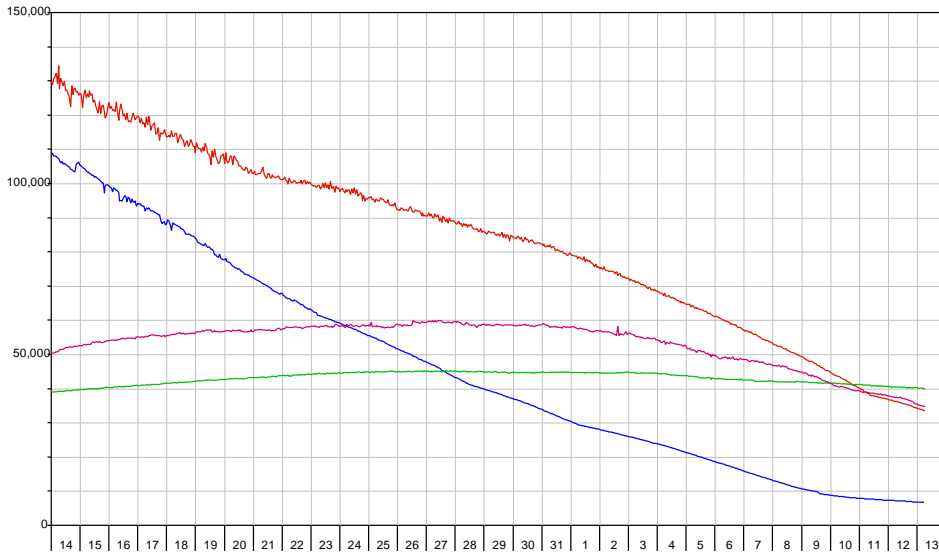


Figure 299: Discharge (ML/day) in the upper Darling River

Figure 300 is a satellite derived colour infrared Sentinel image highlighting some floodwater is mixing in Lakes Tandure and Pamamaroo and major flooding around Menindee town.

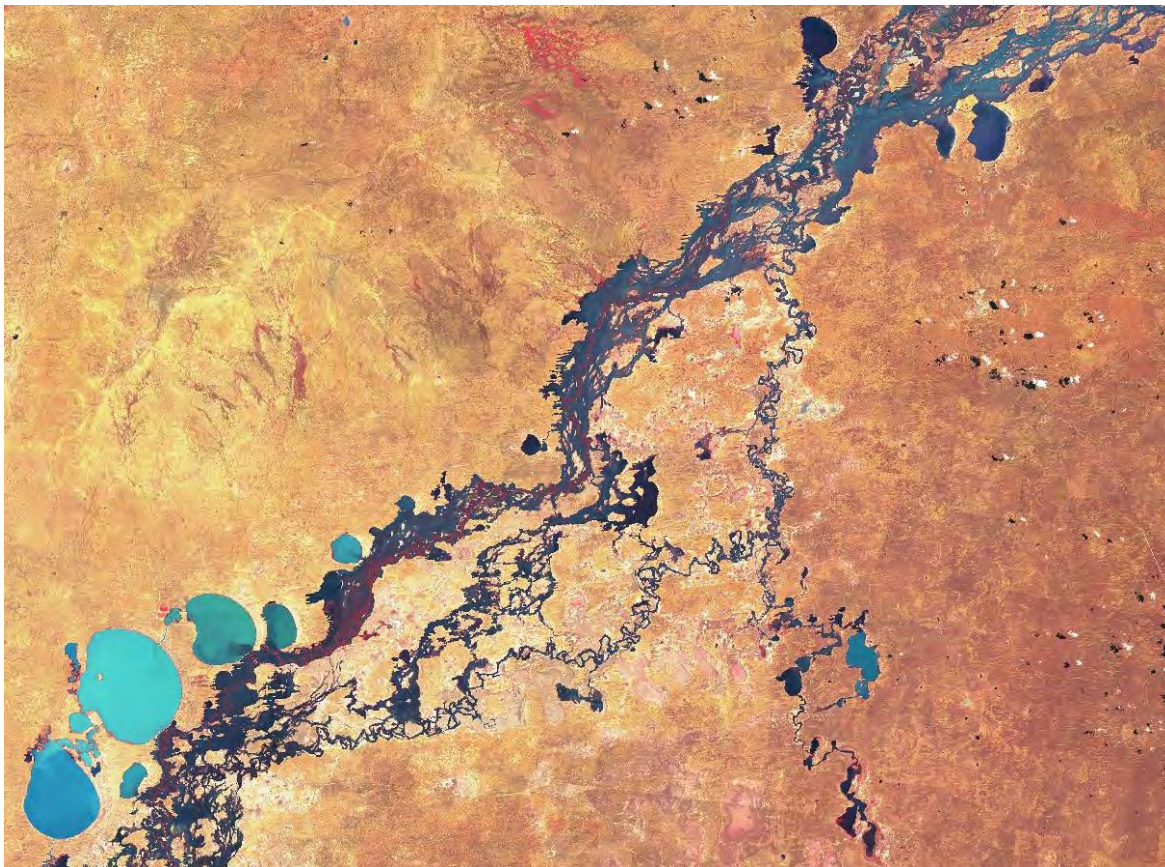


Figure 300: Satellite derived infrared image of Darling River from Wilcannia to Menindee Lakes – 11 January 2023

Dissolved oxygen in the Darling River at Bourke had dropped to 0 mg/L over the past week. It appears the sensor may have been serviced during the week and improved to above 1 mg/L (Figure 301). Oxygen readings at Wilcannia had been above 2 mg/L but have declined below 2 mg/L in recent days. In contrast to the results from Wilcannia, the temporary dissolved oxygen monitoring site at Nellia Gaari on the Darling River upstream of Lake Wetherell has dissolved oxygen readings above 3 mg/L. Routine monitoring on 12/01/2023 (9:30) shows oxygen levels in the Darling River at Wilcannia are better near the water surface (3.29 mg/L).

At Weir 32 and Burtundy oxygen levels are above 4 mg/L. Routine monitoring on 12/01/2023 (11:52) shows oxygen levels in the Darling River at Burtundy are slightly better near the water surface (5.06 mg/L). Water temperatures are above 30°C at Bourke and fluctuating between 27.5 and 30°C at Wilcannia, Weir 32 and Burtundy (Figure 302).

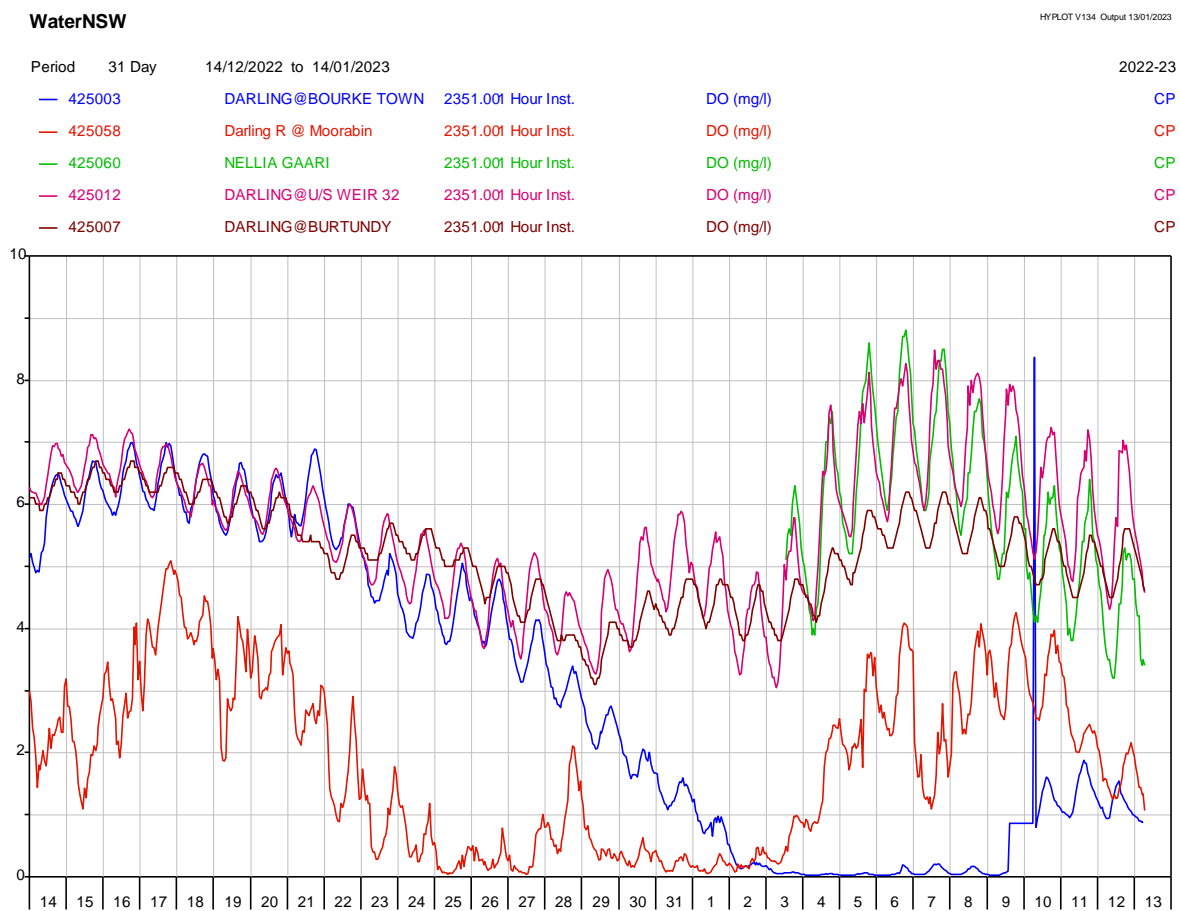


Figure 301: Continuous dissolved oxygen (mg/L) in the Darling River

Period	31 Day	14/12/2022 to 14/01/2023			2022-23
— 425003	DARLING@BOURKE TOWN	2080.001 Hour Inst.	Water Temp(C)	CP	
— 425058	Darling R @ Moorabin	2080.001 Hour Inst.	Water Temp(C)	CP	
— 425012	DARLING@U/S WEIR 32	2080.001 Hour Inst.	Water Temp(C)	CP	
— 425007	DARLING@BURTUNDY	2080.001 Hour Inst.	Water Temp(C)	CP	

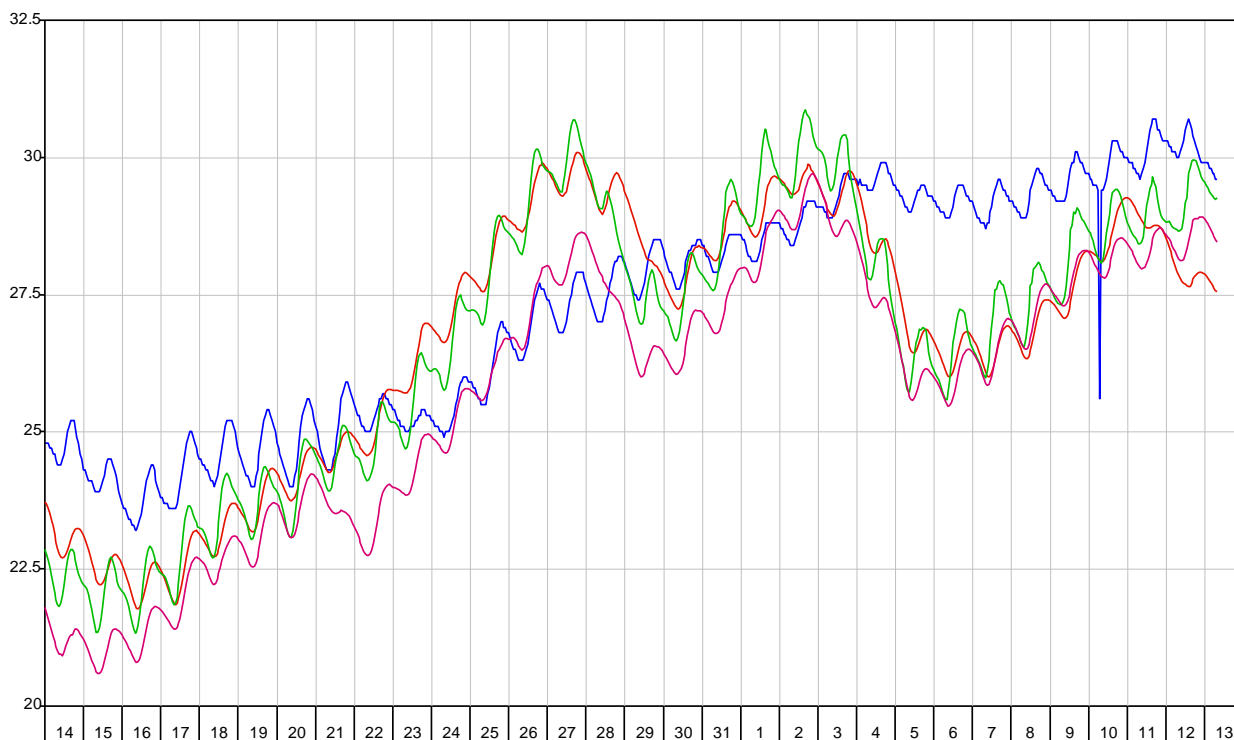


Figure 302: Continuous water temperature (°C) in the Darling River

Southern Basin

Lachlan River

Discharge in the Lachlan River at Willandra Weir is decreasing towards 7,500 ML/day (Figure 303). Minor flooding continues at Hillston and Booligal. Lachlan Water Quality Allowance releases ceased on Tuesday 10 January.

Dissolved oxygen in the Lachlan River at Forbes and Condobolin has been remaining above 5 mg/L. There have been lower readings at Forbes over the past two days. All other sites in the Lachlan River are fluctuating around 3 to 4 mg/L (Figure 304). Routine monitoring this week showed low dissolved oxygen at Corrong.

WaterNSW

HYPLOT V134 Output 13/01/2023

Period	31 Day	14/12/2022 to 14/01/2023		2022-23
— 412004	LACHLAN FORBES CTTNS	141.001 Hour Inst.	Discharge (ML/d)	CP
— 412006	LACHLAN CONDOBOLIN B	141.001 Hour Inst.	Discharge (ML/d)	CP
— 412011	LACHLAN LAKE C WEIR	141.001 Hour Inst.	Discharge (ML/d)	CP
— 412038	LACHLAN WILLANDRA WR	141.001 Hour Inst.	Discharge (ML/d)	CP
— 412005	LACHLAN @ BOOLIGAL	141.001 Hour Inst.	Discharge (ML/d)	CP

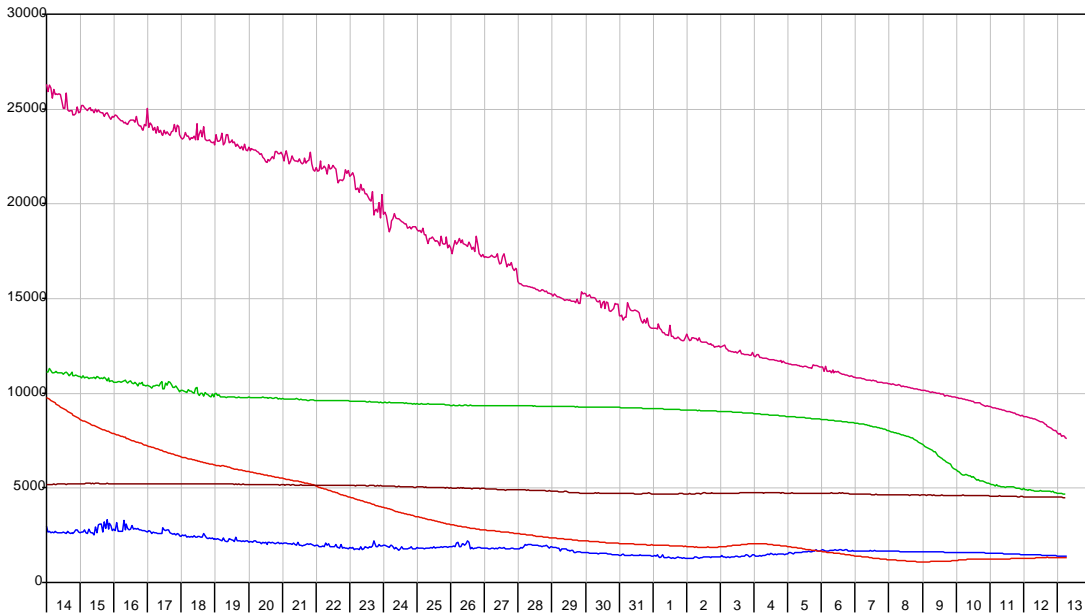


Figure 303: Discharge (ML/day) in the Lachlan River

WaterNSW

HYPLOT V134 Output 13/01/2023

Period	31 Day	14/12/2022 to 14/01/2023		2022-23
— 412004	LACHLAN FORBES CTTNS	2351.001 Hour Inst.	DO (mg/l)	CP
— 412006	LACHLAN CONDOBOLIN B	2351.001 Hour Inst.	DO (mg/l)	CP
— 412011	LACHLAN LAKE C WEIR	2351.001 Hour Inst.	DO (mg/l)	CP
— 412039	LACHLAN HILLSTON WR	2351.001 Hour Inst.	DO (mg/l)	CP
— 412005	LACHLAN @ BOOLIGAL	2351.001 Hour Inst.	DO (mg/l)	CP

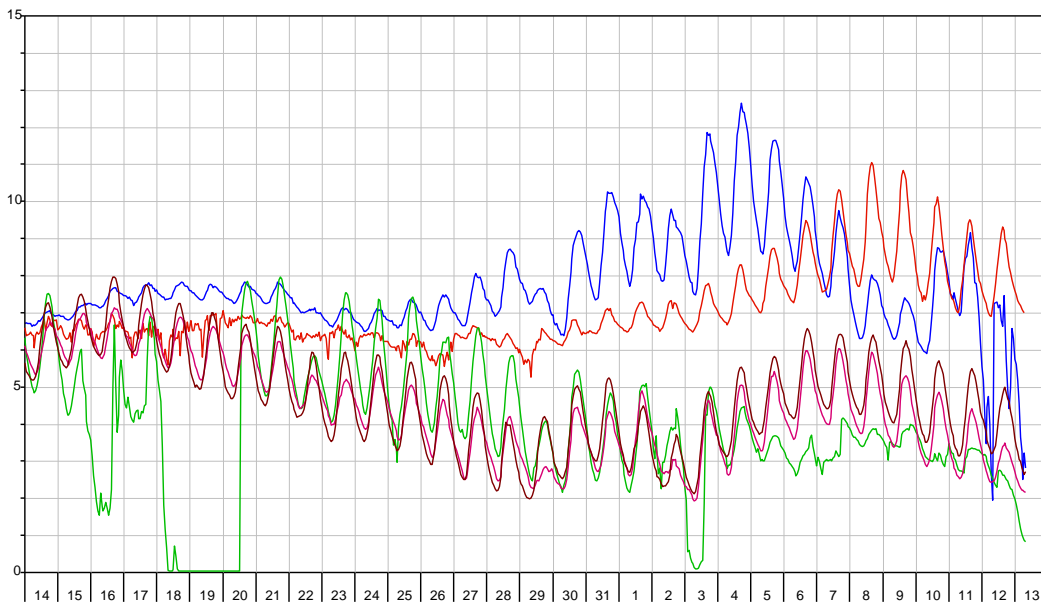


Figure 304: Continuous dissolved oxygen (mg/L) in the Lachlan River

Table 20: Dissolved oxygen readings from Lachlan River - January 2023

Site	Sample Date	DO (mg/L)	Water temp
Belubula River at Canowindra	3/01/2023 12:25	7.53	23.99
Lachlan River at Cottons Weir (Forbes)	4/01/2023 10:30	8.38	25.33
Lachlan River at Condobolin Bridge	5/01/2023 08:10	5.10	24.87
Lachlan River at Lake Cargelligo Weir	4/01/2023 16:45	5.89	27.56
Lachlan River at Hillston	4/01/2023 15:20	5.01	26.97
Lachlan River at Booligal	10/01/2023 12:59	6.01	28.48
Lachlan River at Corrong	10/01/2023 12:10	1.93	28.35

WaterNSW

HYPLOT V134 Output:13/01/2023

Period 31 Day 14/12/2022 to 14/01/2023 2022-23

- 412004 LACHLAN FORBES CTTNS 2080.001 Hour Inst. Water Temp(C) CP
- 412006 LACHLAN CONDOBOLIN B 2080.001 Hour Inst. Water Temp(C) CP
- 412038 LACHLAN WILLANDRA WR 2080.001 Hour Inst. Water Temp(C) CP
- 412005 LACHLAN @ BOOLIGAL 2080.001 Hour Inst. Water Temp(C) CP

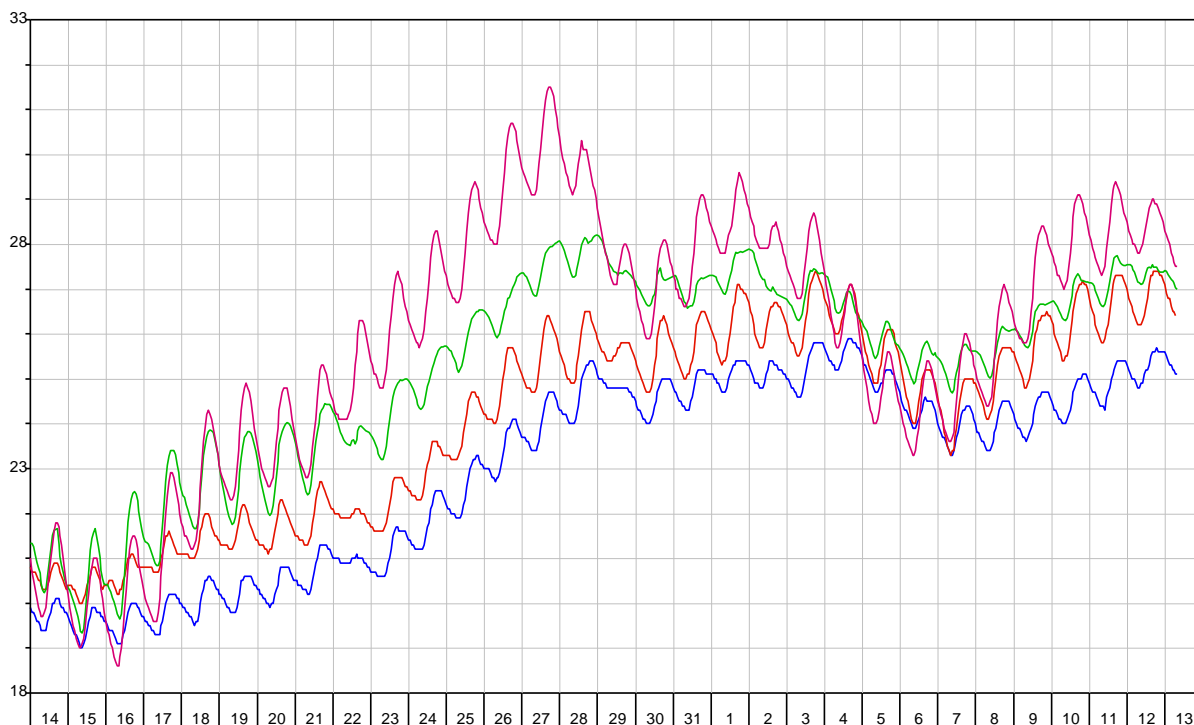


Figure 305: Continuous water temperature (°C) in the Lachlan River

Murrumbidgee River

The river level in the Murrumbidgee River at Maude Weir is around 6,400 ML/day. Discharge at Balranald is slowly decreasing toward 25,000 ML/day (Figure 306). The flood warning for Balranald has eased to minor.

Dissolved oxygen levels in the Murrumbidgee River at Maude Weir are around 7 mg/L. Oxygen levels at Redbank are above 5 mg/L. At Balranald dissolved oxygen is fluctuating between 2 and 4 mg/L (Figure 307).

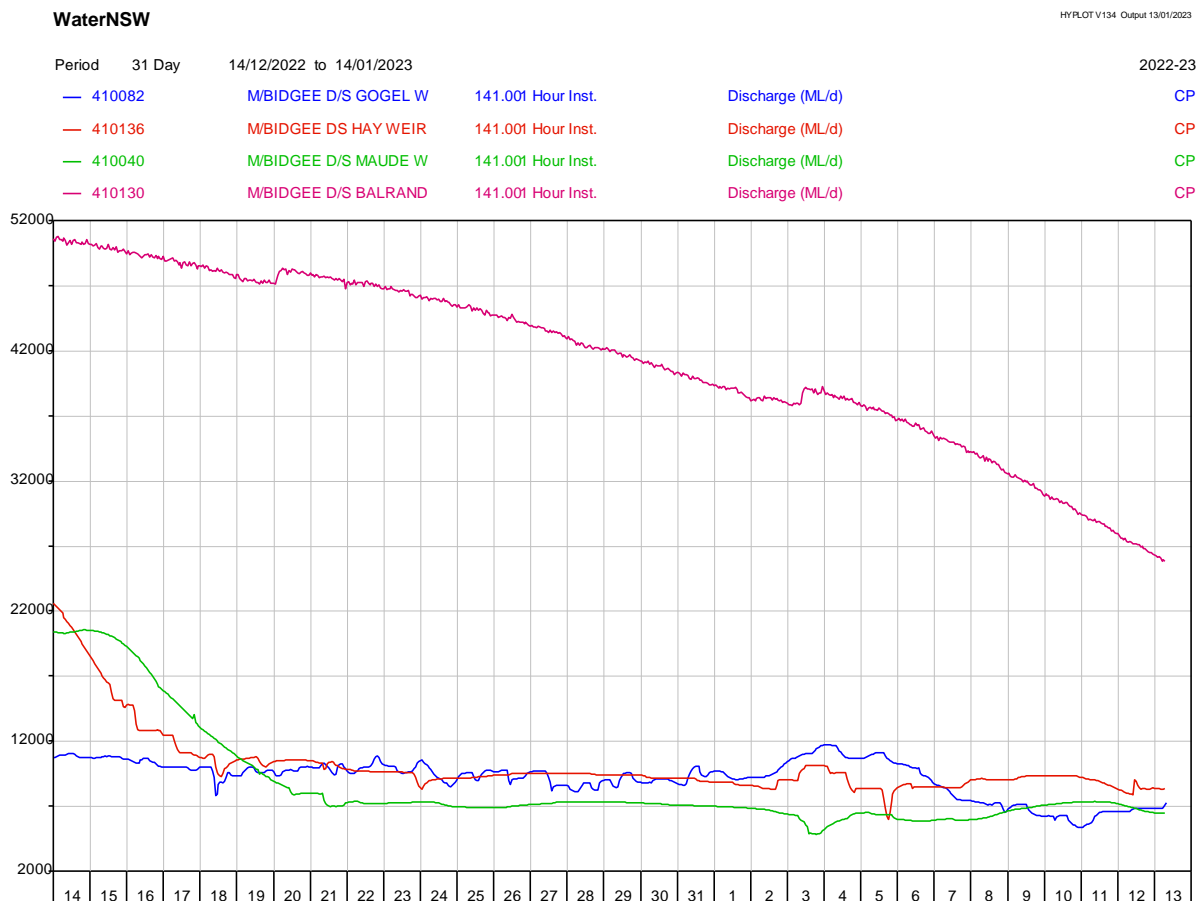


Figure 306: Discharge (ML/day) in the Murrumbidgee River

Period 31 Day 14/12/2022 to 14/01/2023

2022-23

— 410040 M/BIDGEE D/S MAUDE W 2351.001 Hour Inst. DO (mg/l) CP
 — 410041 M/BIDGEE D/S REDBANK 2351.001 Hour Inst. DO (mg/l) CP
 — 410130 M/BIDGEE D/S BALRAND 2351.001 Hour Inst. DO (mg/l) CP

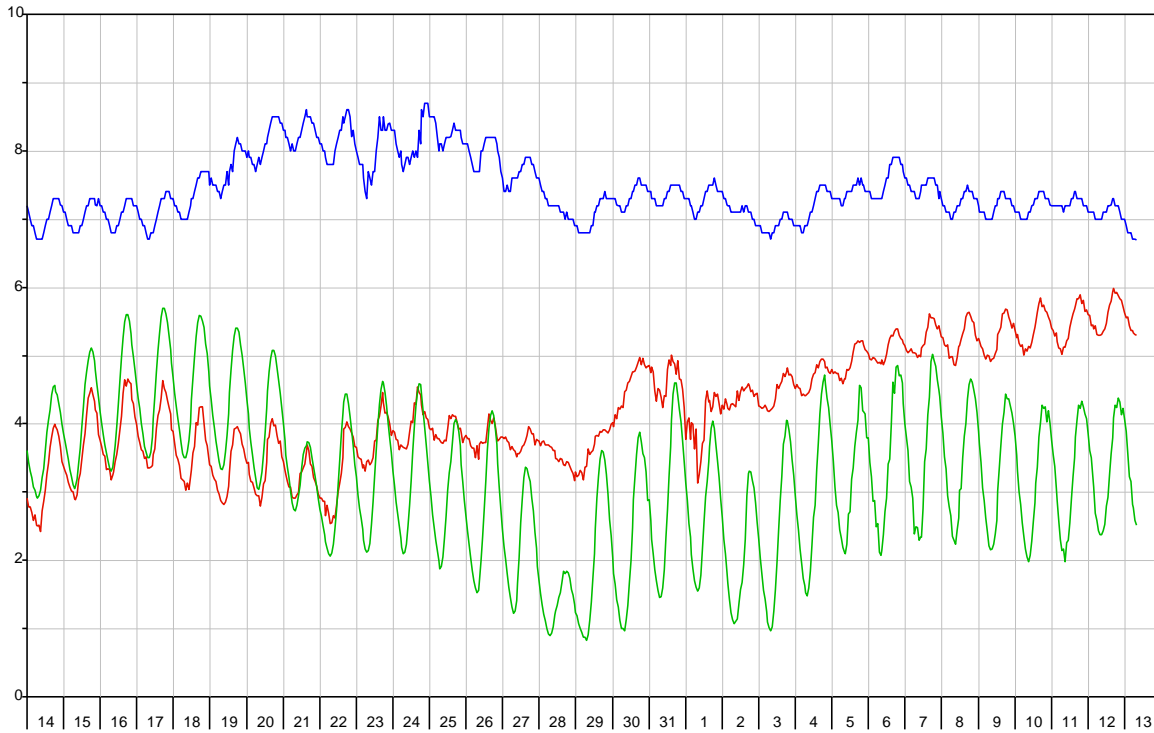


Figure 307: Continuous dissolved oxygen (mg/L) in the Murrumbidgee River

Table 21: Dissolved oxygen readings from Murrumbidgee River - January 2023

Site	Sample Date	DO (mg/L)	Water temp
Murrumbidgee River at Wagga Wagga	10/01/2023 08:25	8.25	19.50
Murrumbidgee River at Carathool	9/01/2023 07:29	6.73	24.92
Murrumbidgee River downstream Hay Weir	10/01/2023 10:51	8.15	26.36
Murrumbidgee River downstream Maude Weir	10/01/2023 10:02	7.03	26.47
Murrumbidgee River at Balranald	9/01/2023 17:00	3.70	28.03
Yanco Creek at Yanco Bridge	9/01/2023 09:38	4.48	25.21
Billabong Creek at Walbundrie	4/01/2023 12:46	7.11	23.85

Site	Sample Date	DO (mg/L)	Water temp
Billabong Creek at Jerilderie	9/01/2023 10:15	5.86	26.65
Billabong Creek at Darlot	10/01/2023 08:21	4.54	25.35

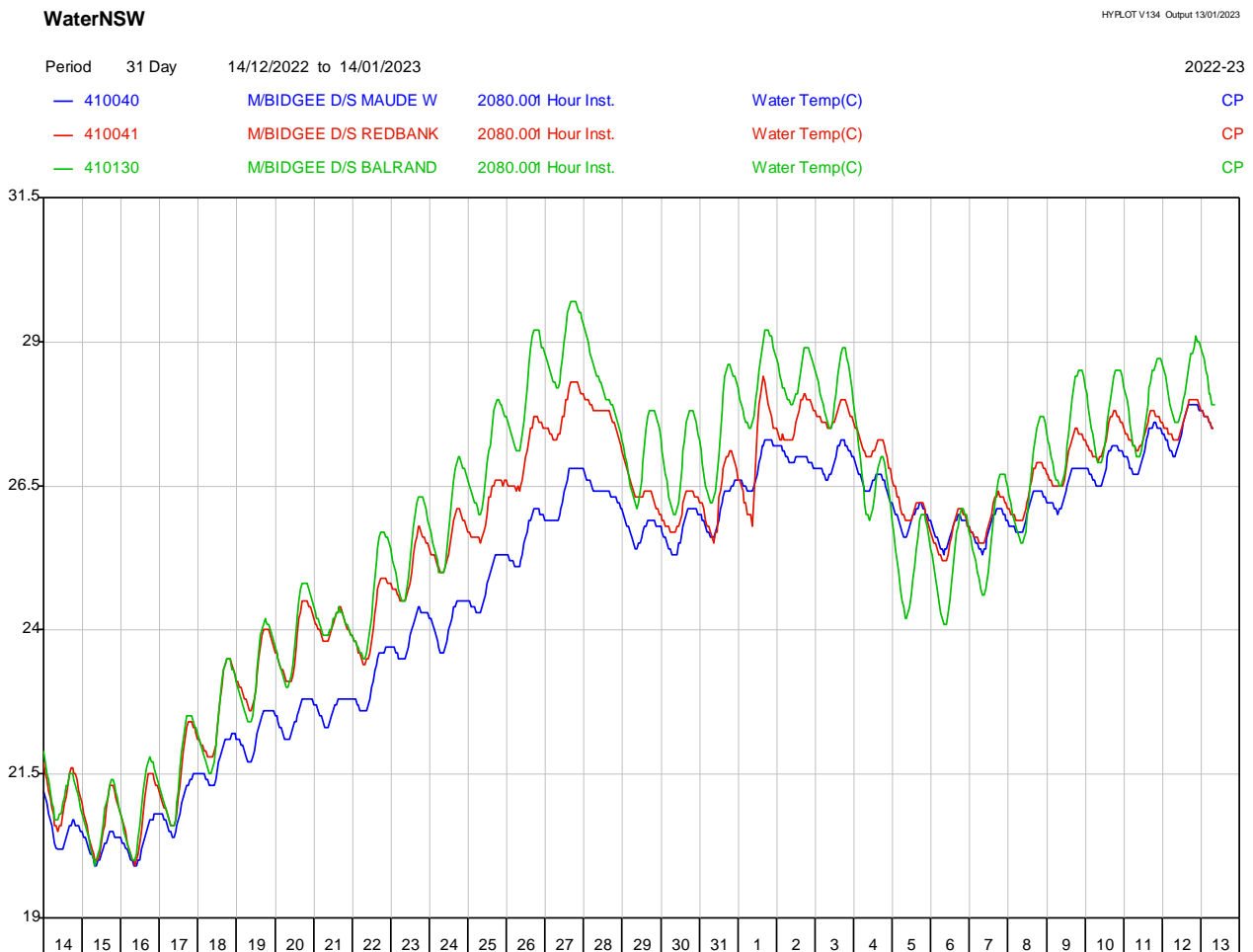


Figure 308: Continuous water temperature (°C) in the Murrumbidgee River

Kolety/Edward River

Discharge in the Kolety/Edward River is continuing to decline (Figure 309). Discharge at Moulamein has now fallen to 3,700 ML/day.

Dissolved oxygen in the Kolety/Edward River at Toonalook and Moulamein has improved above 4 mg/L (Figure 310). Readings from Deniliquin had been above 4 mg/L but have been decreasing below 4 mg/L overnight. Handheld reading at Deniliquin of 6.84 mg/L on 9/01/2023 (11:32) indicates oxygen levels are better closer to the water surface.

WaterNSW

HYFLOT V134 Output 13/01/2023

Period 31 Day 14/12/2022 to 14/01/2023 2022-23

— 409047	EDWARD R @ TOONALOOK	141.001 Hour Inst.	Discharge (ML/d)	CP
— 409023	EDWARD R D/S STEVENS	141.001 Hour Inst.	Discharge (ML/d)	CP
— 409014	EDWARD R @ MOULAMEIN	141.001 Hour Inst.	Discharge (ML/d)	CP
— 410134	BILLABONG @ DARLOT	141.001 Hour Inst.	Discharge (ML/d)	CP

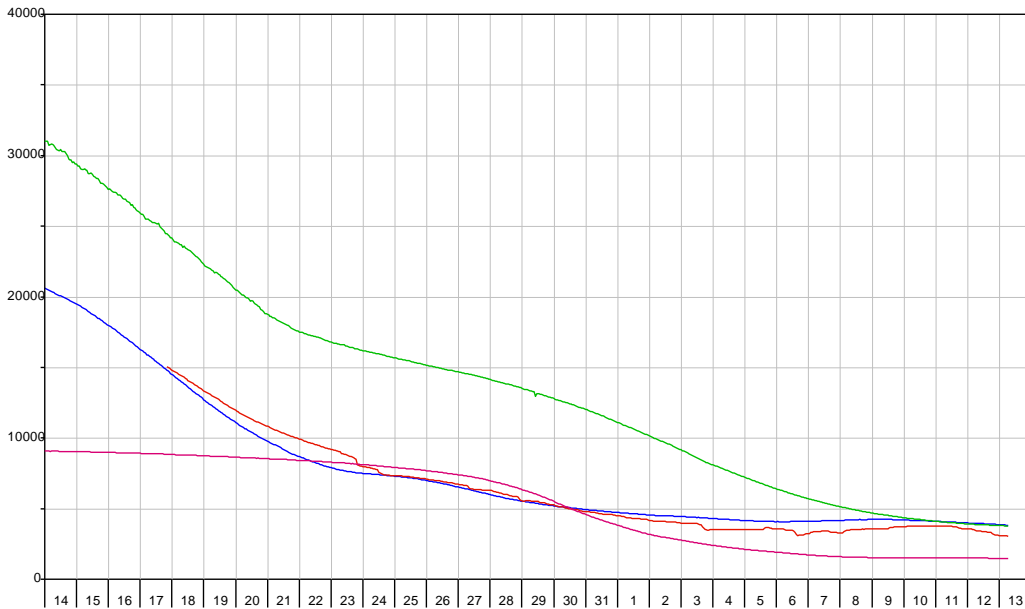


Figure 309: Discharge (ML/day) in the Kolety/Edward River

WaterNSW

HYFLOT V134 Output 13/01/2023

Period 31 Day 14/12/2022 to 14/01/2023 2022-23

— 409047	EDWARD R @ TOONALOOK	2351.001 Hour Inst.	DO (mg/l)	CP
— 409003	EDWARD @ DENILQUIN	2351.001 Hour Inst.	DO (mg/l)	CP
— 409014	EDWARD R @ MOULAMEIN	2351.001 Hour Inst.	DO (mg/l)	CP

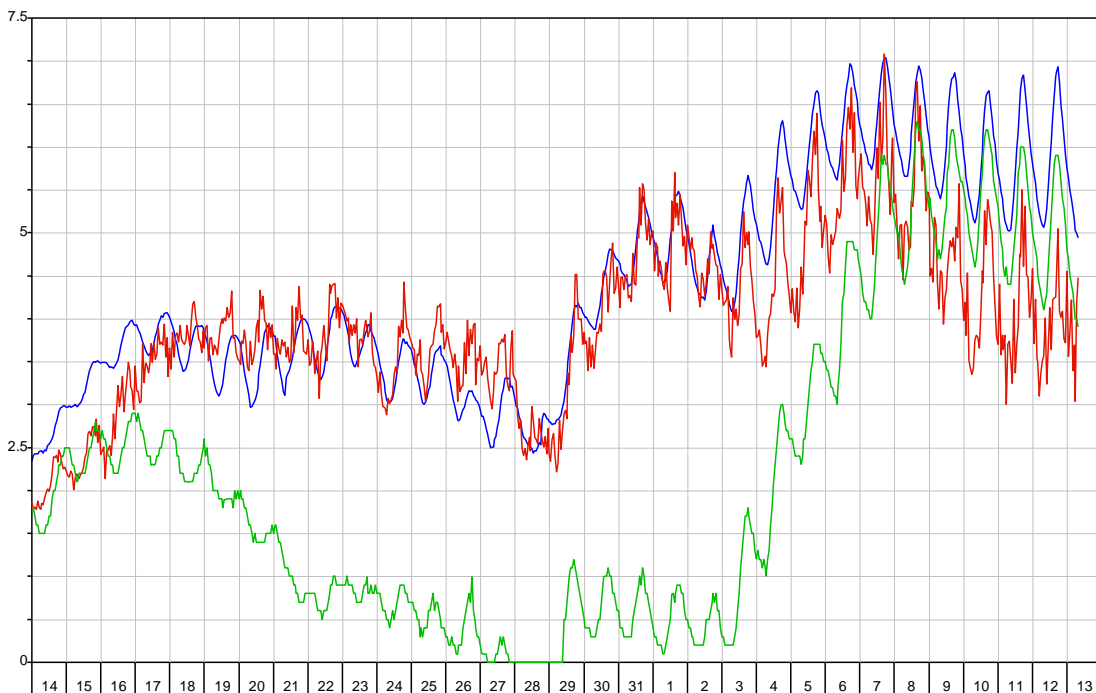


Figure 310: Continuous dissolved oxygen (mg/L) in the Kolety/Edward River

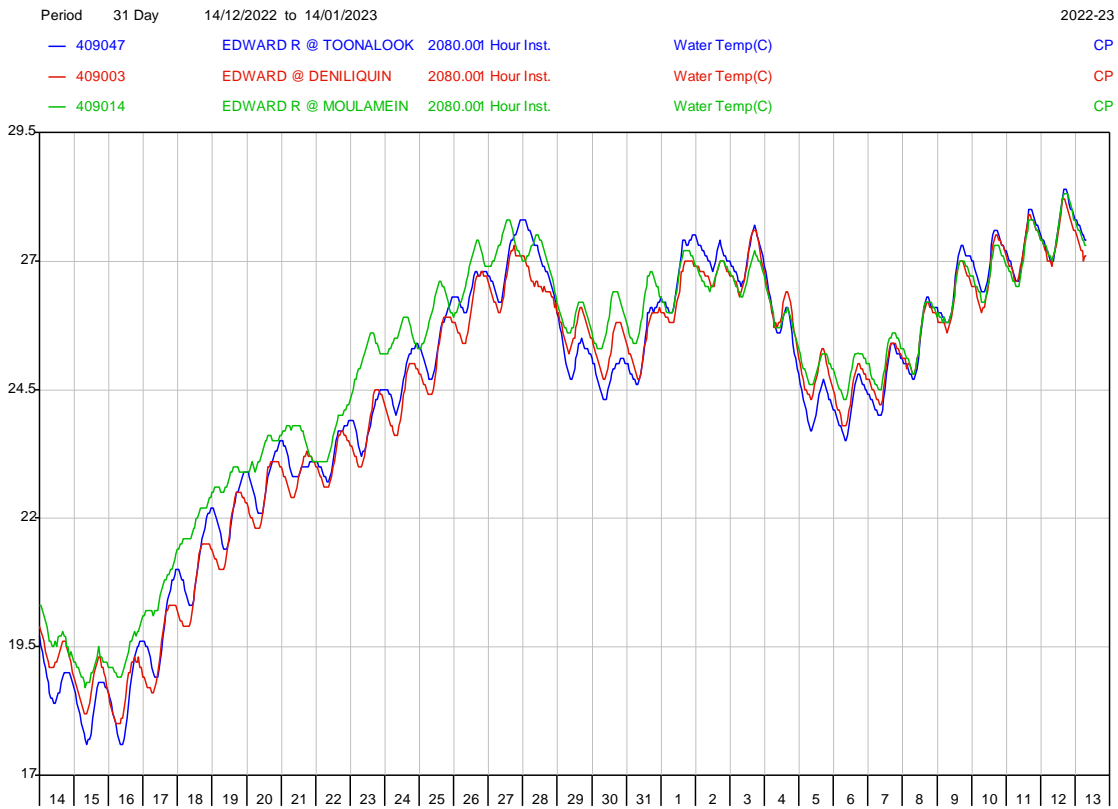


Figure 311: Continuous water temperature (°C) in the Kolety/Edward River

Wakool and Niemur rivers

Discharge in the Wakool River at Coonambit Bridge is just under 7,500 ML/day and at Gee Gee Bridge has dropped to almost 1,800 ML/day. The Niemur River at Mallan School is flowing at 2,800 ML/day (Figure 312).

Figure 18 highlights dissolved oxygen in the Niemur River at Barham-Moulamein Road has improved above 2 mg/L but levels at Mallan School remain low. Results in the Wakool River at Gee Gee Bridge and Stoney Crossing are improving.

WaterNSW

HWPL0T V134 Output 13/01/2023

Period	31 Day	14/12/2022 to 14/01/2023		2022-23
409061	WAKOOL R COONAMIT BR	141.001 Hour Inst.	Discharge (ML/d)	CP
409062	WAKOOL R GEEGEE BR 2	141.001 Hour Inst.	Discharge (ML/d)	CP
409048	NIEMUR R BARH-MLN RD	141.001 Hour Inst.	Discharge (ML/d)	CP
409086	NIEMUR @ MALLAN SCH	141.001 Hour Inst.	Discharge (ML/d)	CP



Figure 312: Discharge (ML/day) in the Wakool and Niemur rivers

WaterNSW

HWPL0T V134 Output 13/01/2023

Period	31 Day	14/12/2022 to 14/01/2023		2022-23
409062	WAKOOL R GEEGEE BR 2	2351.001 Hour Inst.	DO (mg/l)	CP
409013	WAKOOL @ STONEY XING	2351.001 Hour Inst.	DO (mg/l)	CP
409048	NIEMUR R BARH-MLN RD	2351.001 Hour Inst.	DO (mg/l)	CP
409086	NIEMUR @ MALLAN SCH	2351.001 Hour Inst.	DO (mg/l)	CP

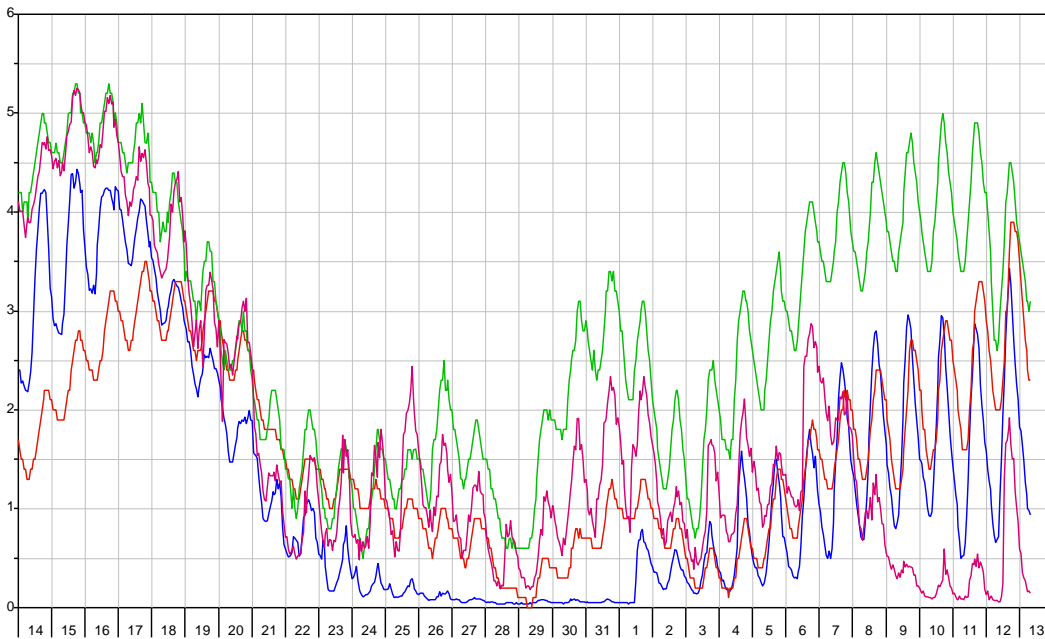


Figure 313: Continuous dissolved oxygen (mg/L) in the Wakool and Niemur rivers

Table 22: Dissolved oxygen readings from Wakool River - January 2023

Site	Sample date	DO (mg/L)	Water Temp
Wakool River at Stoney Crossing	10/01/2023 11:16	2.94	26.97
Wakool River at Kyalite	10/01/2023 10:14	2.17	26.09

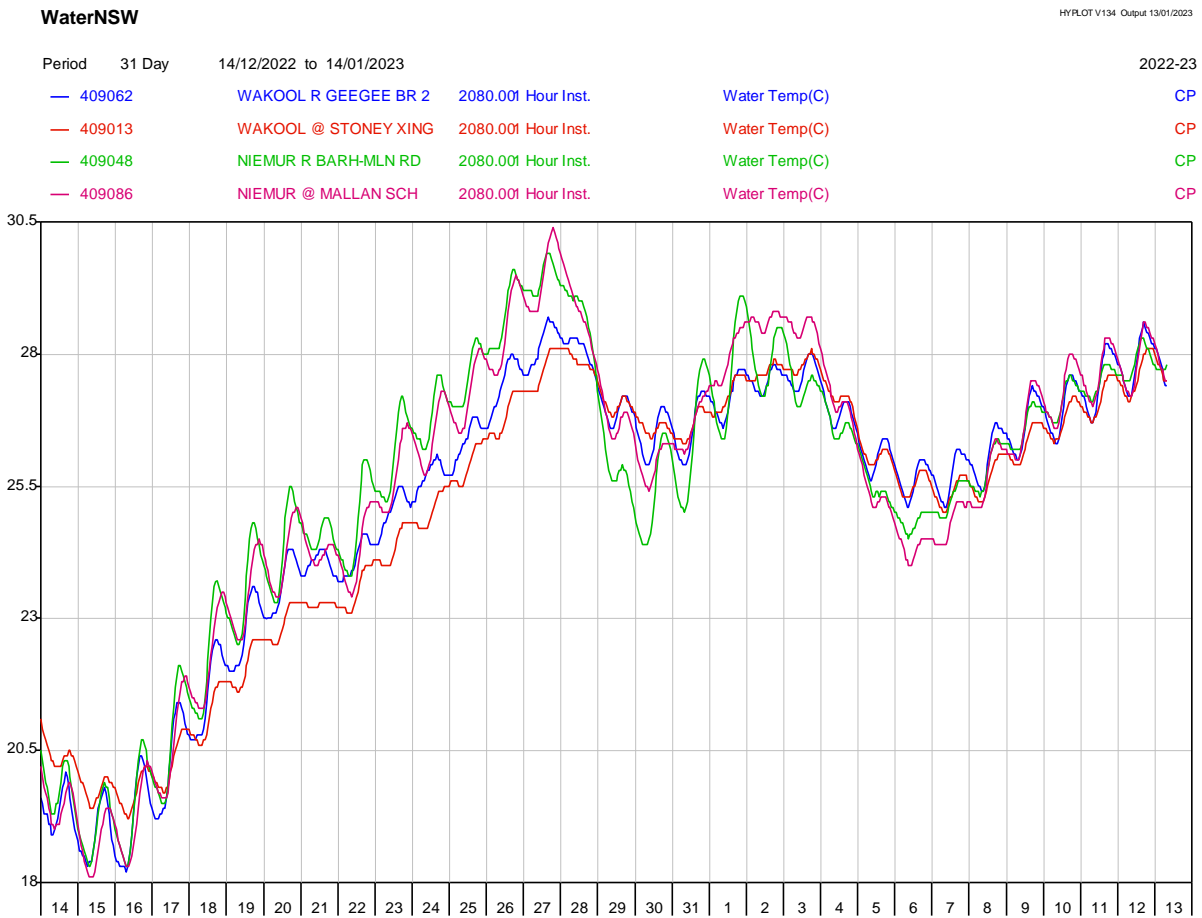


Figure 314: Continuous water temperature (°C) in the Wakool and Niemur rivers

Merran and Little Merran creeks

Figure 315 shows dissolved oxygen levels in Merran and Little Merran have continued to improve. The sensor at Thule Creek appears to be malfunctioning.

WaterNSW

HYPLOT V134 Output 13/01/2023

Period 31 Day 14/12/2022 to 14/01/2023 2022-23

— 409044 LT MERRAN FRANK/ BR 2351.001 Hour Inst. DO (mg/l) CP
— 409036 MERRAN CK U/S WAK R 2351.001 Hour Inst. DO (mg/l) CP

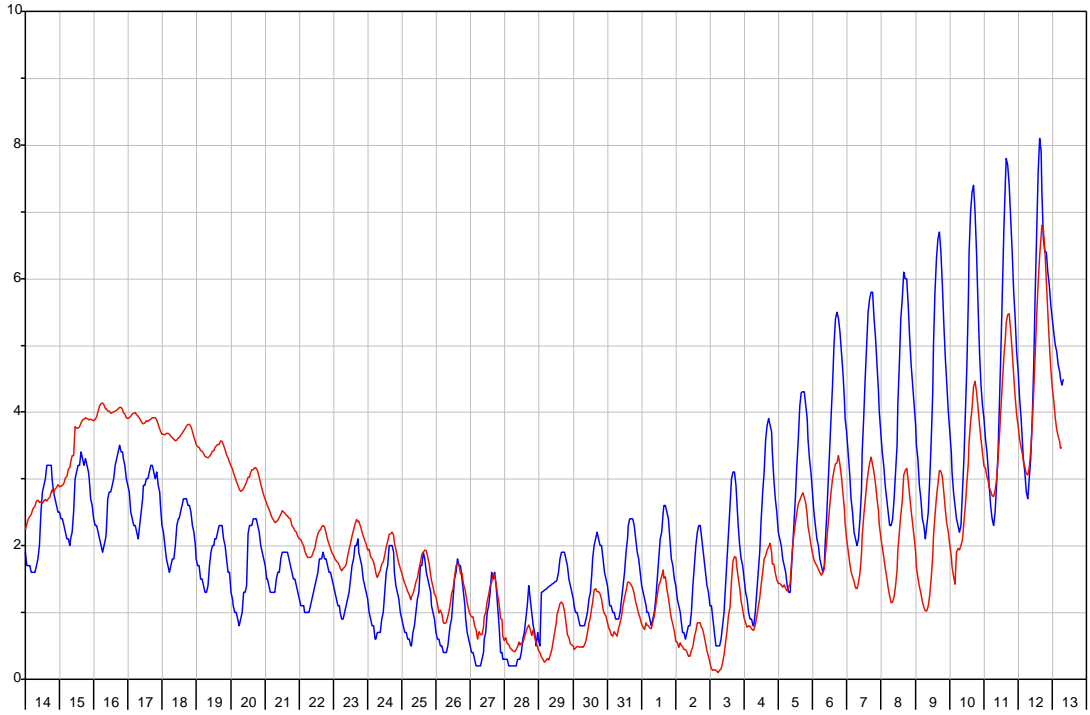


Figure 315: Continuous dissolved oxygen (mg/L) in the Merran and Little Merran creeks

WaterNSW

HYPLOT V134 Output 13/01/2023

Period 31 Day 14/12/2022 to 14/01/2023 2022-23

— 409044 LT MERRAN FRANK/ BR 2080.001 Hour Inst. Water Temp(C) CP
— 409036 MERRAN CK U/S WAK R 2080.001 Hour Inst. Water Temp(C) CP

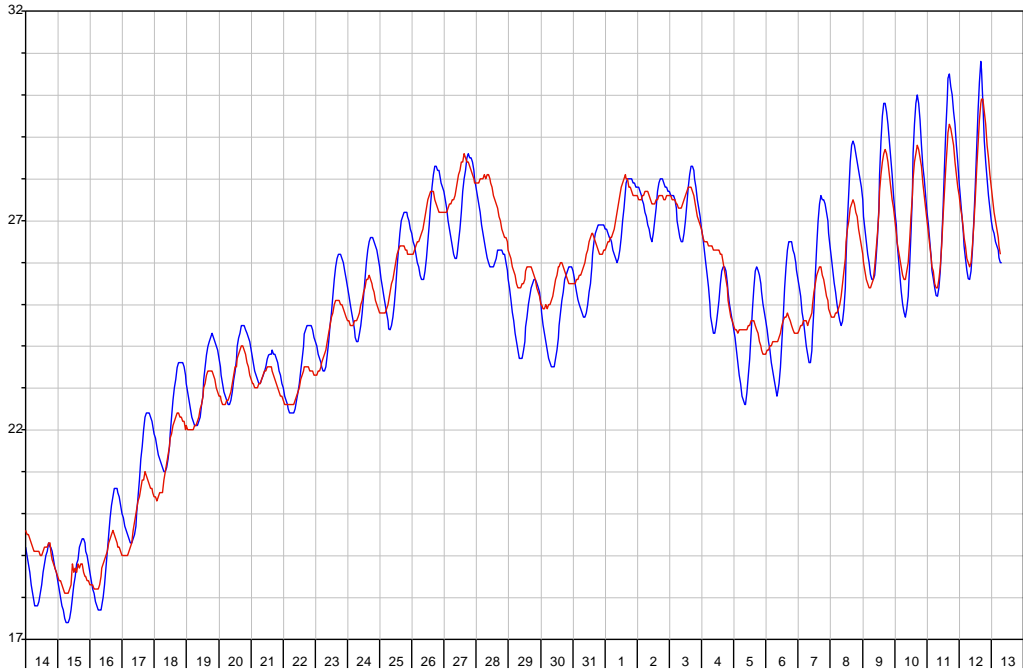


Figure 316: Continuous water temperature (°C) in the Merran and Little Merran creeks

Murray River

The Bureau of Meteorology has downgraded the flood warning for Mildura to minor and maintained a moderate flood warning for Wentworth.

Monitoring by DELWP is showing the Murray River at Tocumwal, upstream of the Barmah/Millewa Forest, is oxygenated (Figure 317). Downstream of the forest at Barmah, dissolved oxygen is 5.5 mg/L. Dissolved oxygen in the Goulburn River at McCoys Bridge is above 6 mg/L and the Campaspe River at Fehrings Lane is around 5 mg/L.

Dissolved oxygen in the Murray River at Barham, Pental Island Pumps and Boundary Bend has improved above 6 mg/L. Monitoring at Wemen shows the mean daily dissolved oxygen is remaining below 4 mg/L. The temporary monitoring site installed on the Murray River downstream of Wentworth was reading 3.6 mg/L on Friday 13 January (10:00).

Table 23: Dissolved oxygen readings from Murray River - January 2023

Site	Sample date	DO (mg/L)	Water Temp
Murray River at Moama	9/01/2023 12:48	6.17	26.80
Murray River at Barham	10/01/2023 13:21	6.47	27.22

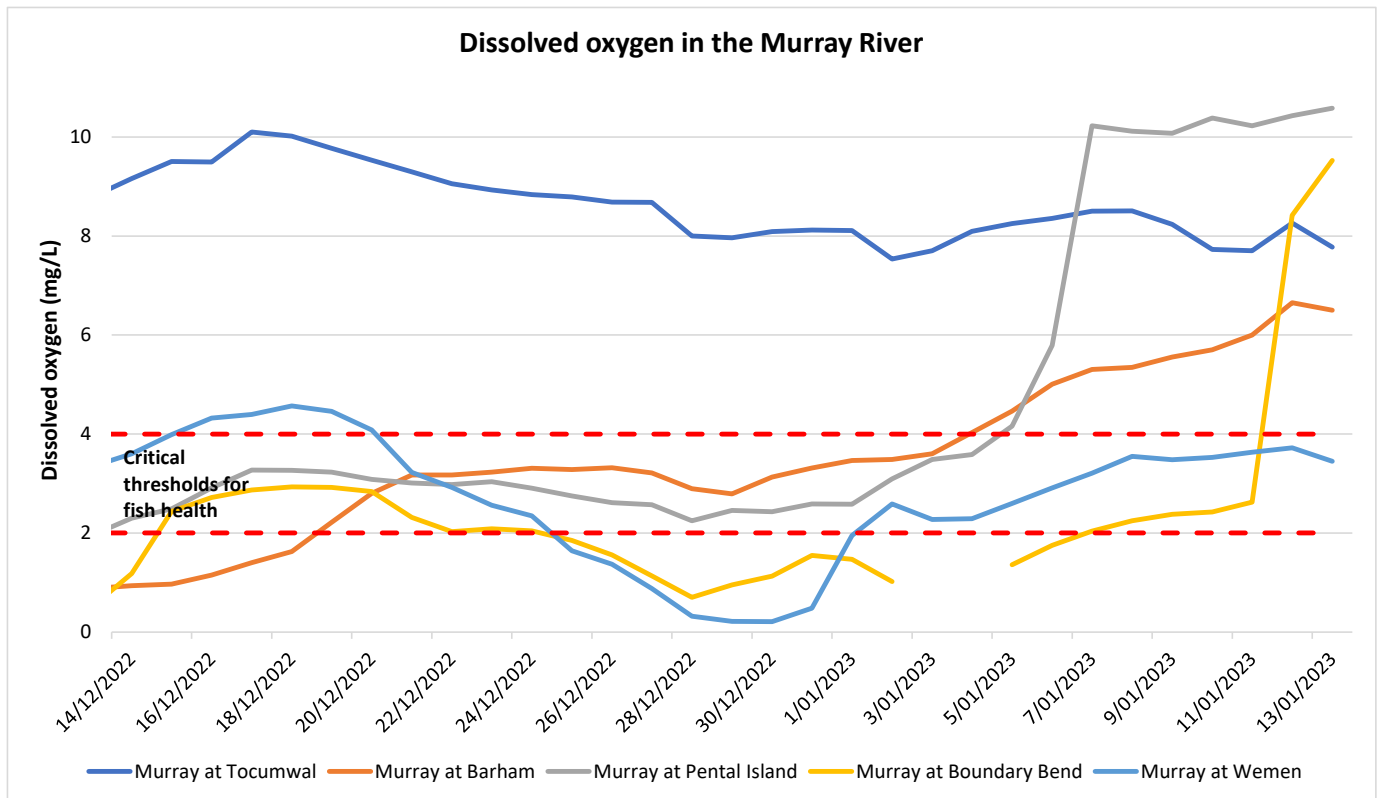


Figure 317: Continuous dissolved oxygen (mg/L) in the Murray River (data courtesy of DELWP)

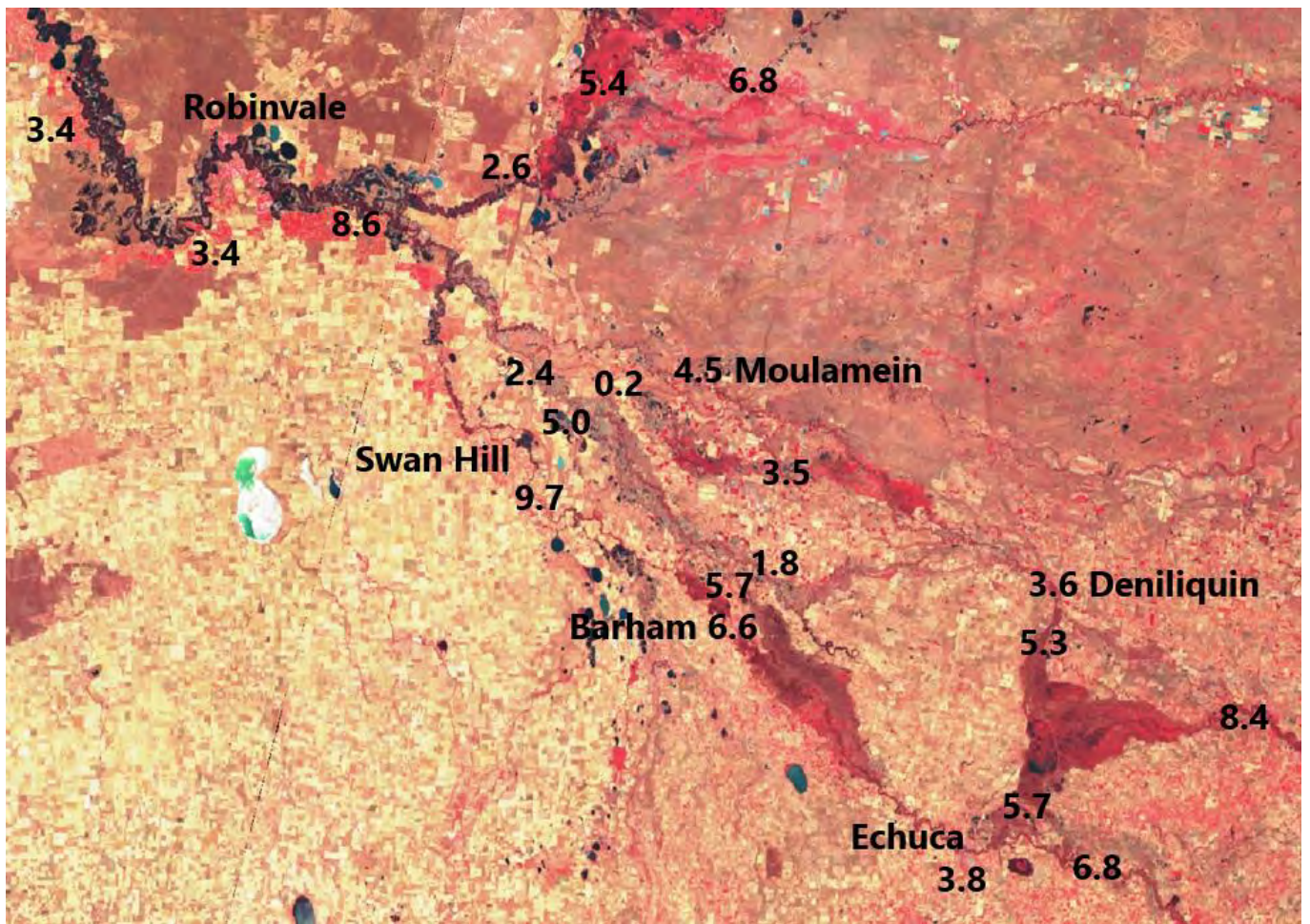


Figure 318: Satellite-derived Sentinel colour infrared image of the lower Murrumbidgee and mid Murray River catchments - 12 January 2023

Weather Outlook

The Bureau of Meteorology 8-day total rain forecast (13 to 20 January) indicates the heaviest falls will be along the coast and the southern Alps, with totals decreasing to the west (Figure 319). Forecast is for air temperatures at Echuca and Mildura to exceed 40°C over the weekend and remain in the mid to high 30's and low 40's until Tuesday next week (Figure 320 and Figure 321). There is low intensity to severe heatwave conditions forecast for most of NSW for Thursday to Saturday this week (Figure 322). Low intensity heatwave conditions will continue for western NSW into early next week.

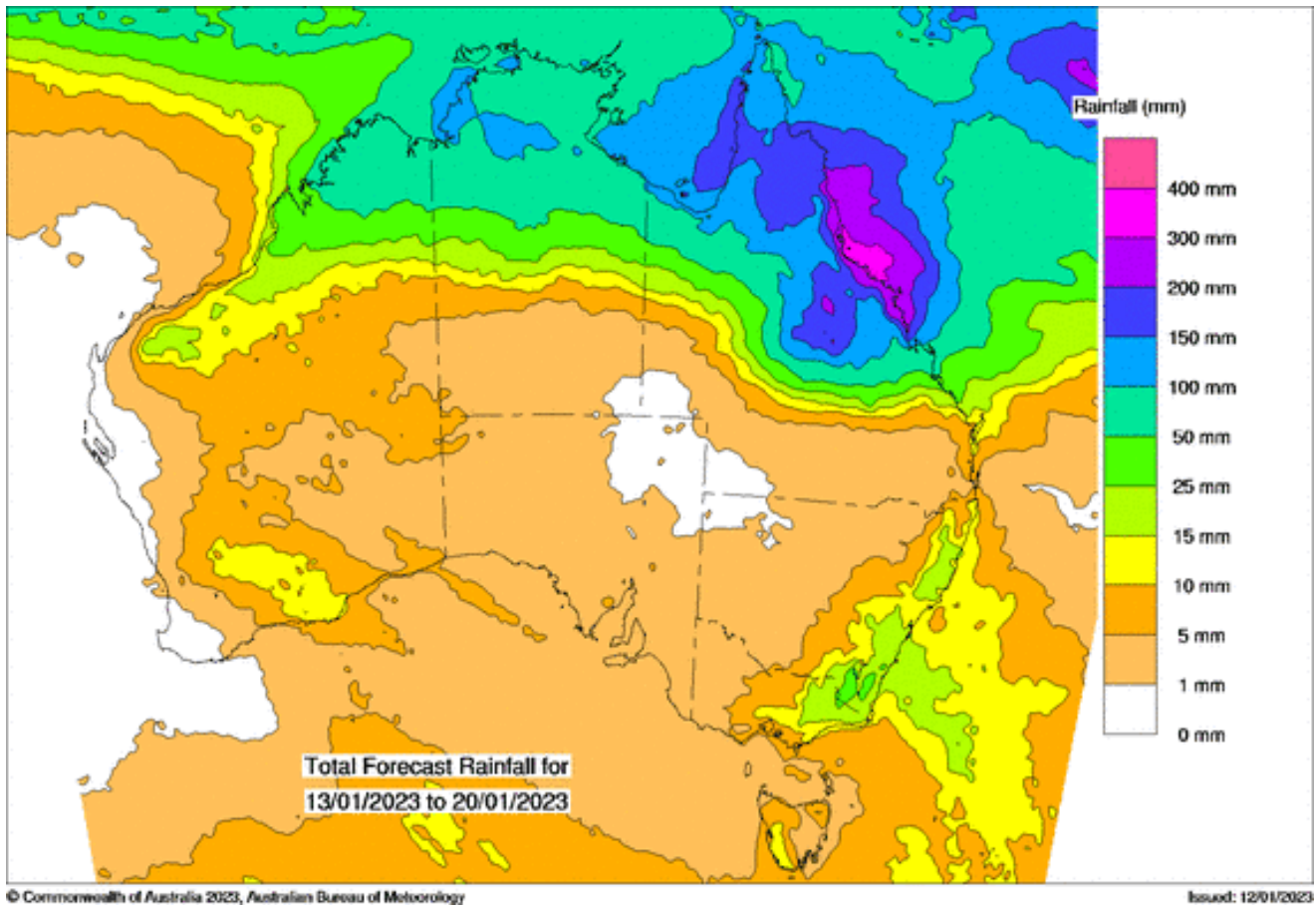


Figure 319: Bureau of Meteorology 8-day total rain forecast (13 to 20 January)

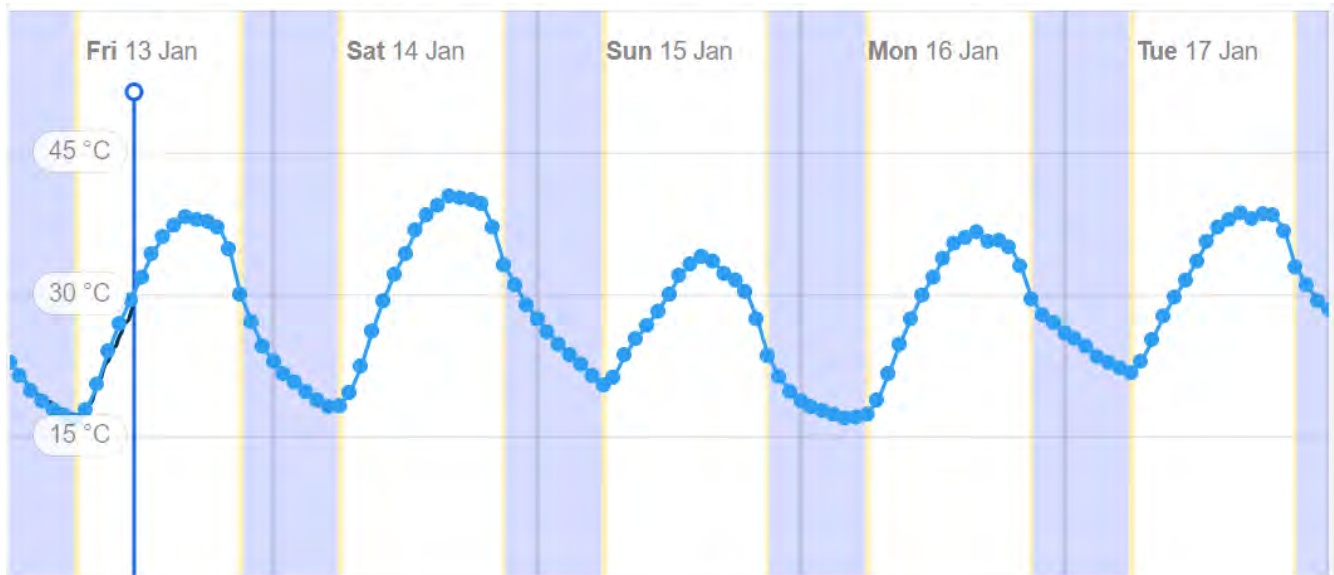


Figure 320: Forecast air temperatures for Echuca 13 to 17 January

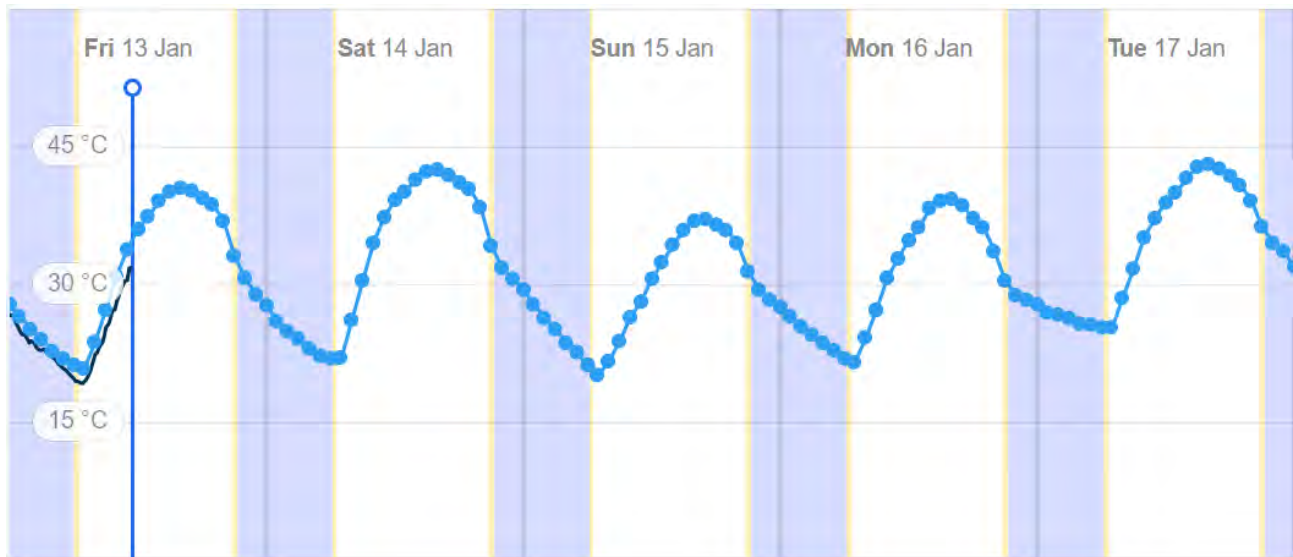


Figure 321: Forecast air temperatures for Mildura 13 to 17 January

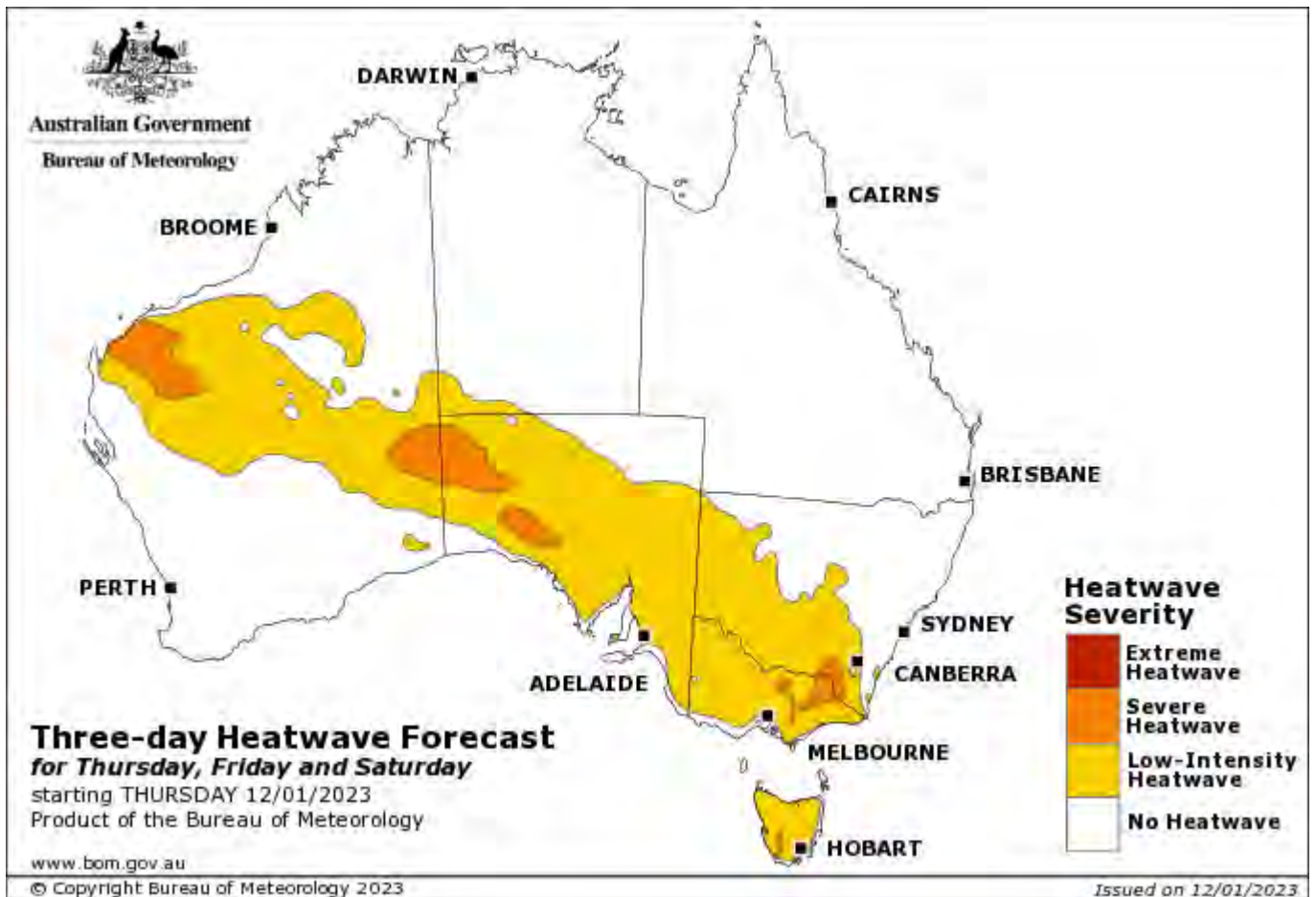


Figure 322: Forecast heat wave conditions for Thursday 12 January to Saturday 14 January 2023

Water quality update, Meeting No. 14 - 23 January 2022

Northern Basin

Barwon River

Discharge in the Barwon River at Brewarrina has decreased to around 3,300 ML/day (Figure 323). Dissolved oxygen results from the automated gauges in the Barwon River at Collarenebri, Geera and Brewarrina have been fluctuating and dipping below 2 mg/L in the evening, before increasing above 2mg/L during the day (Figure 324). Dissolved oxygen at Geera has been declining in the past week. Water temperature is between 28 and 33°C (Figure 325).

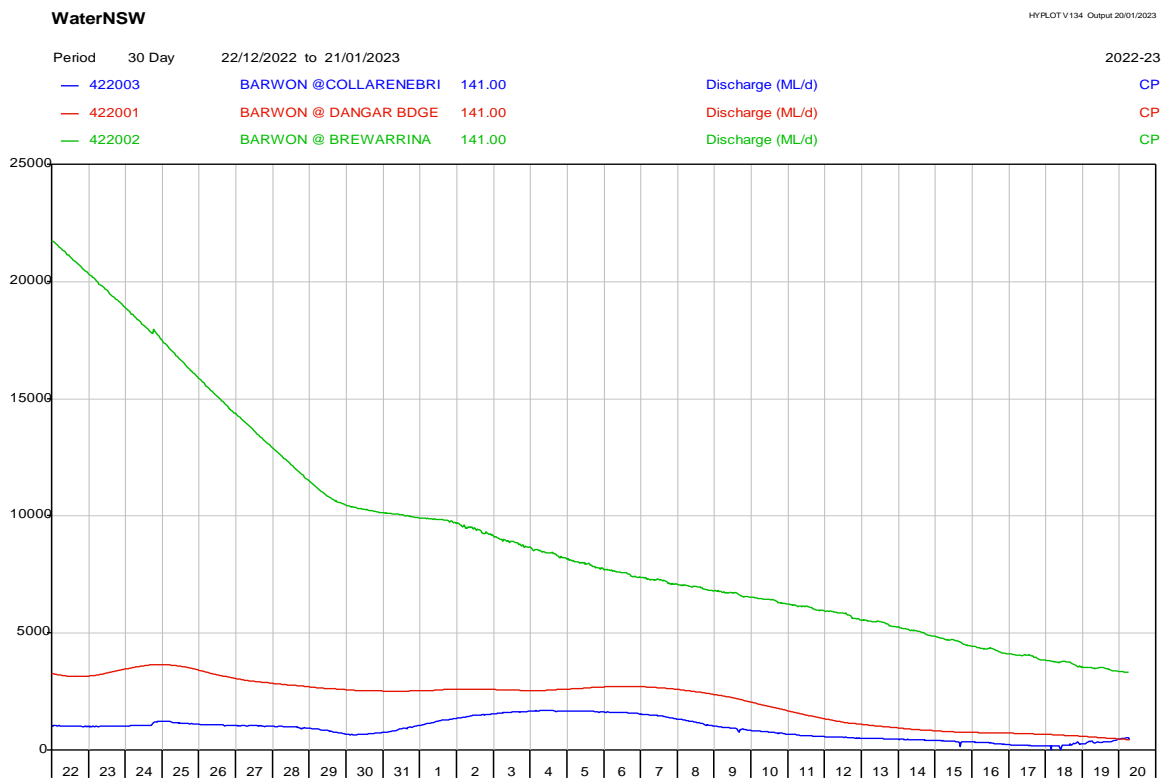


Figure 323: Discharge (ML/day) in the Barwon River

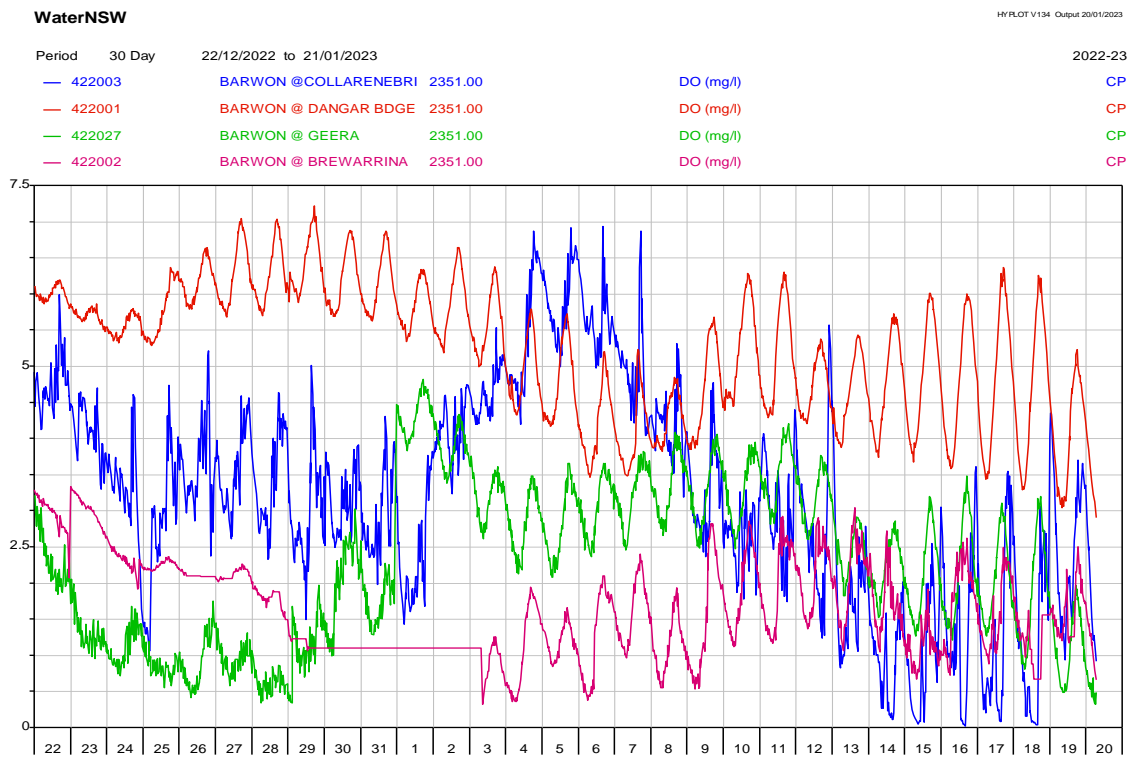


Figure 324: Continuous dissolved oxygen (mg/L) in the Barwon River

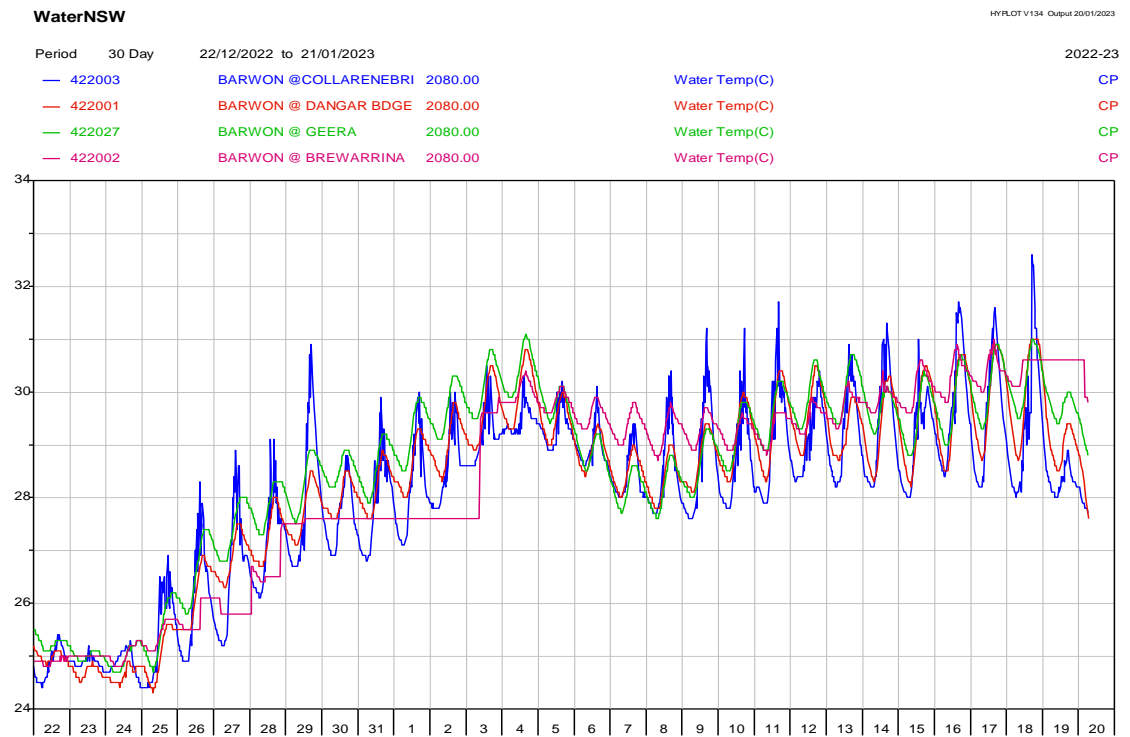


Figure 325: Continuous water temperature (°C) in the Barwon River

Darling River

Discharge at the Wilcannia gauge has decreased to less than 40,000 ML/day while the flow in Talyawalka Creek has dropped below 20,000 ML/day (Figure 326). Major flood warnings continue for Wilcannia, Menindee, Pooncarie and Burtundy. Discharge is increasing at Pooncarie and is just over 22,000 ML/day. Burtundy is around 18,000 ML/day. The Bureau of Meteorology has forecast major flooding at Pooncarie this week and Burtundy in late January.

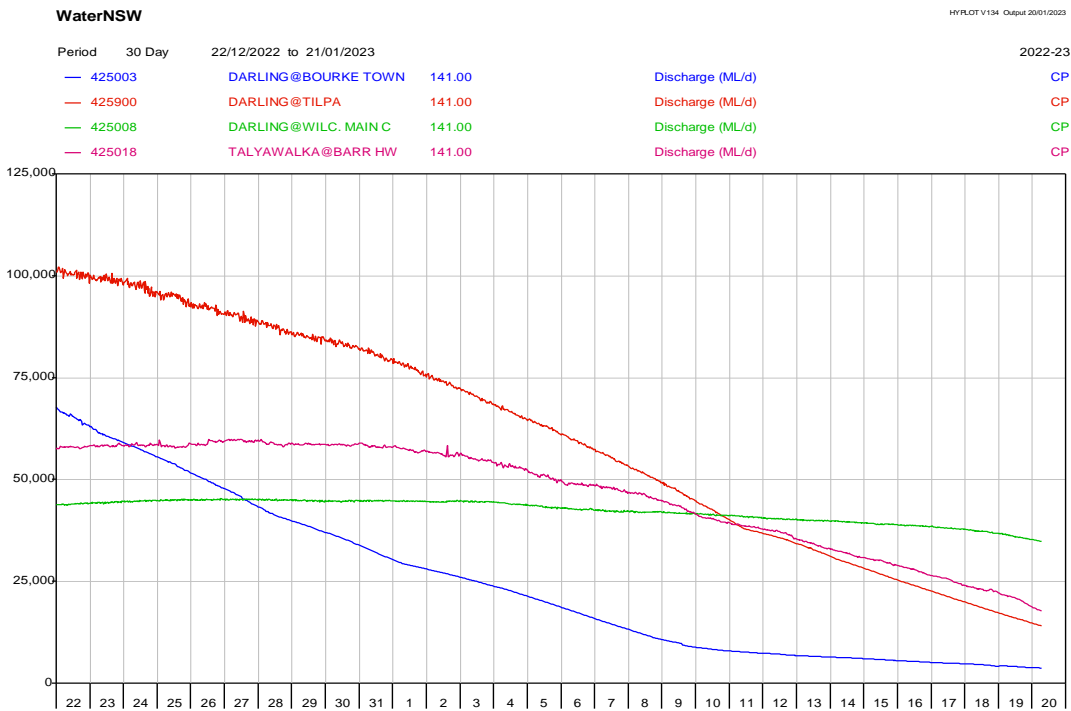


Figure 326: Discharge (ML/day) in the upper Darling River

Dissolved oxygen in the Darling River at Bourke has improved and increased above 2 mg/L over the past week. It appears the sensor may have been serviced on the 9th January (Figure 327). Oxygen readings at Wilcannia have been fluctuating between 1mg/L and 4mg/L. The temporary dissolved oxygen monitoring site at Nellia Gaari on the Darling River upstream of Lake Wetherell has dissolved oxygen readings above 4 mg/L.

At Weir 32 oxygen levels are above 4 mg/L. Burtundy dipped below 4mg/L on 19 January but remains above 5mg/L during the day.

Period	30 Day	22/12/2022 to 21/01/2023			2022-23
—	425003	DARLING@BOURKE TOWN	2351.00	DO (mg/l)	CP
—	425058	Darling R @ Moorabin	2351.00	DO (mg/l)	CP
—	425060	NELLIA GAARI	2351.00	DO (mg/l)	CP
—	425012	DARLING@U/S WEIR 32	2351.00	DO (mg/l)	CP
—	425007	DARLING@BURTUNDY	2351.00	DO (mg/l)	CP

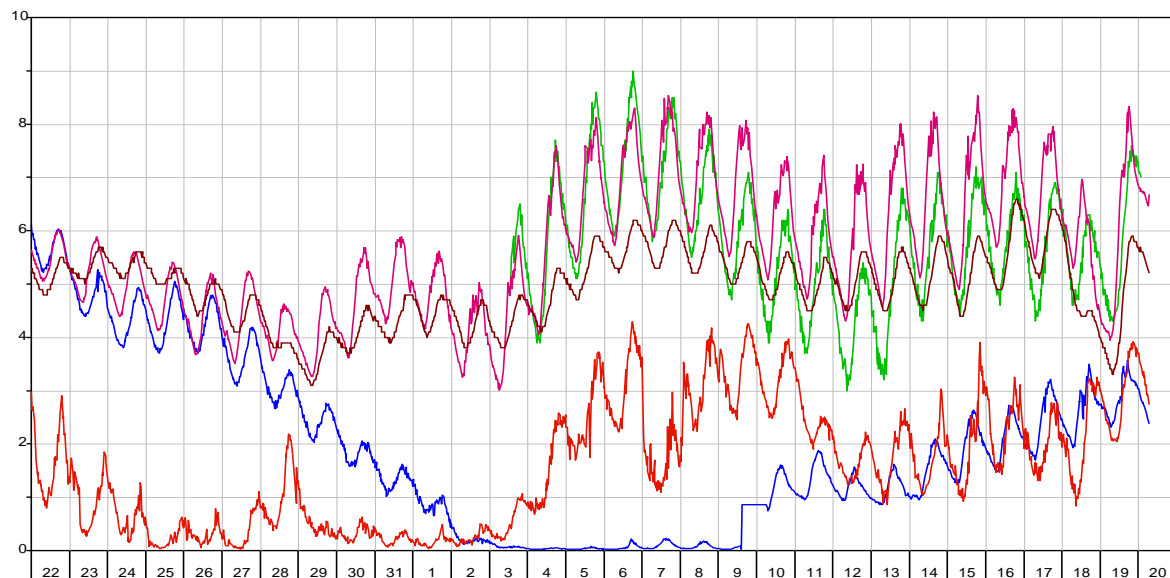


Figure 327: Continuous dissolved oxygen (mg/L) in the Darling River

Table 24: Hand-held dissolved oxygen results (mg/L) from the Darling River

Site	Sample date	Dissolved oxygen (mg/L)
Darling River at Pooncarie	17/01/2023 10:27:00 AM	3.09
Darling River at Ellerslie	17/01/2023 8:55:00 AM	5.12
Darling River at Tapio	17/01/2023 8:33:00 AM	4.88

Figure 328 is a satellite derived colour infrared Sentinel image of Menindee Lakes, highlighting some floodwater is mixing in Lakes Tandure and Pamamaroo with major flooding around Menindee town. Monthly monitoring results also collected on 16 January show dissolved oxygen above 5mg/L at all sites in Menindee Lakes.

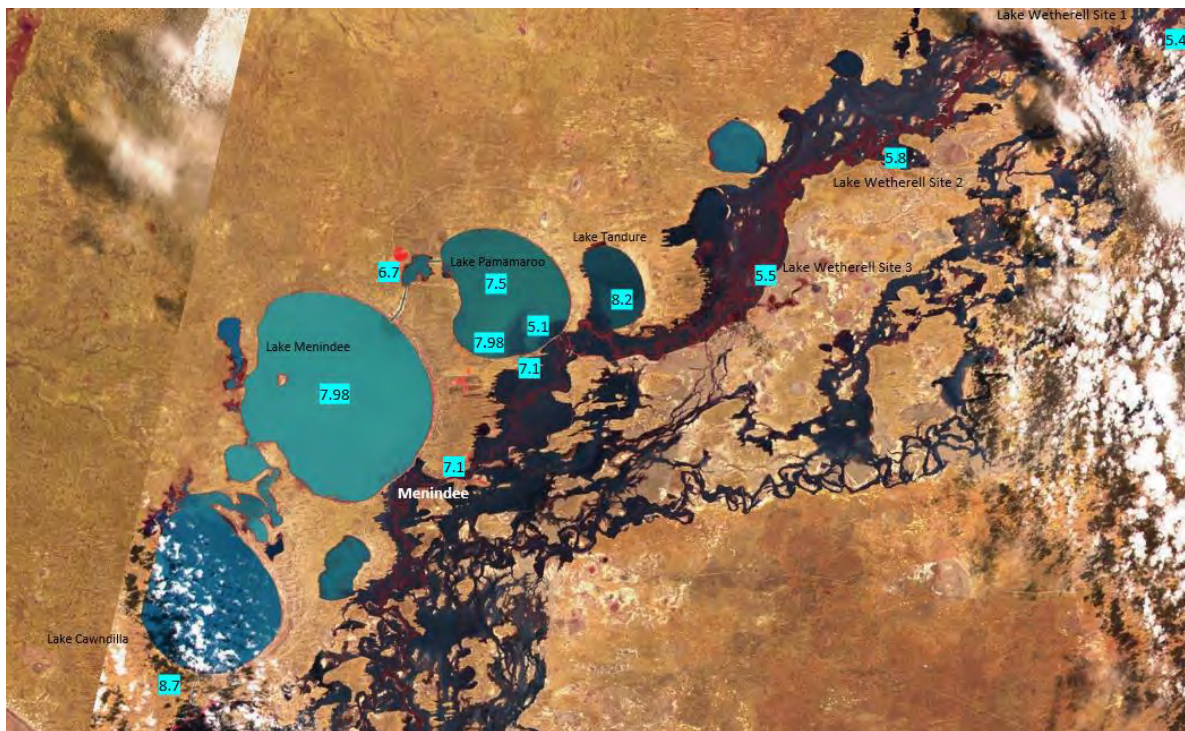


Figure 328: Satellite derived infrared image of Darling River at Menindee Lakes – 16 January 2023

Water temperatures are around 30°C at Bourke, Wilcannia and Weir 32. Burtundy is fluctuating between 28 and 30°C (Figure 7). Water temperatures have become cooler in the past few days.

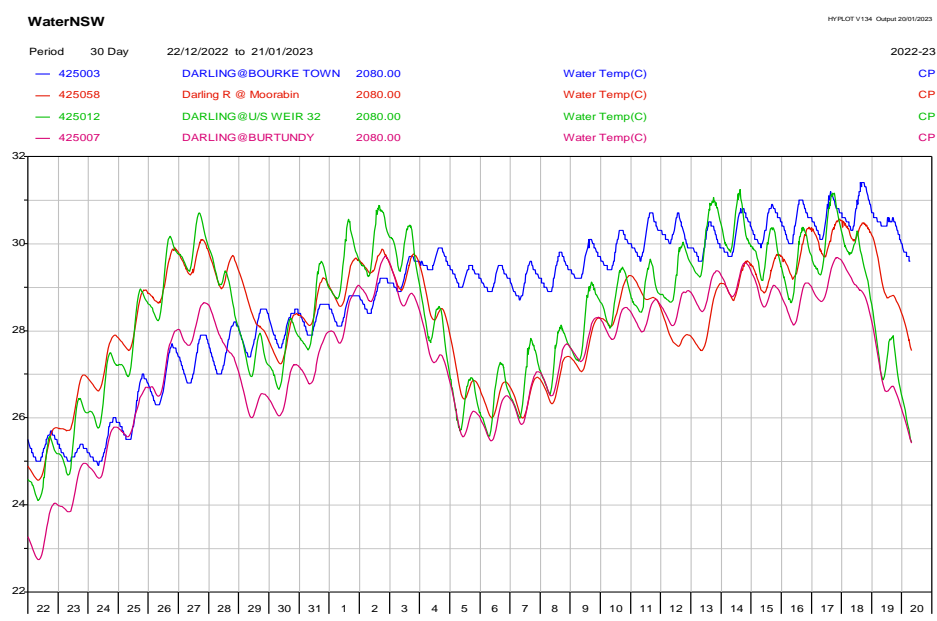


Figure 329: Continuous water temperature (°C) in the Darling River

Southern Basin

Lachlan River

Discharge in the Lachlan River at Willandra Weir is decreasing towards 4,500 ML/day (Figure 330). Minor flooding continues at Booligal and is expected to continue into late January. The Lachlan River at Hillston Weir is now below the minor flood level and continues to fall.

Lachlan Water Quality Allowance releases ceased on Tuesday 10 January.



Figure 330: Discharge (ML/day) in the Lachlan River

Dissolved oxygen in the Lachlan River at Condobolin had been remaining above 5 mg/L but has had overnight drops below 1 mg/L in the past few days. Lake Cargelligo also is recording values below 2 mg/L. These may be due to sensor issues. Booligal is showing good diurnal patterns, fluctuating between 1 mg/L and 5 mg/L (Figure 331).

WaterNSW

HYFLOT V134 Output 20/01/2023

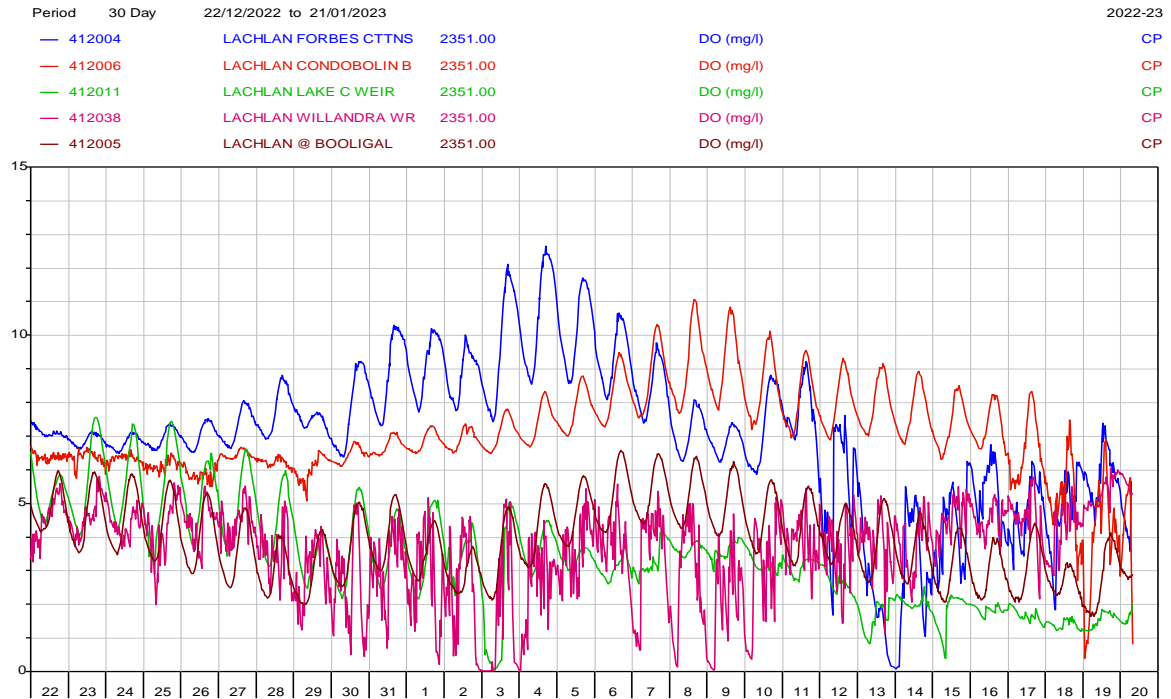


Figure 331: Continuous dissolved oxygen (mg/L) in the Lachlan River

WaterNSW

HYFLOT V134 Output 20/01/2023

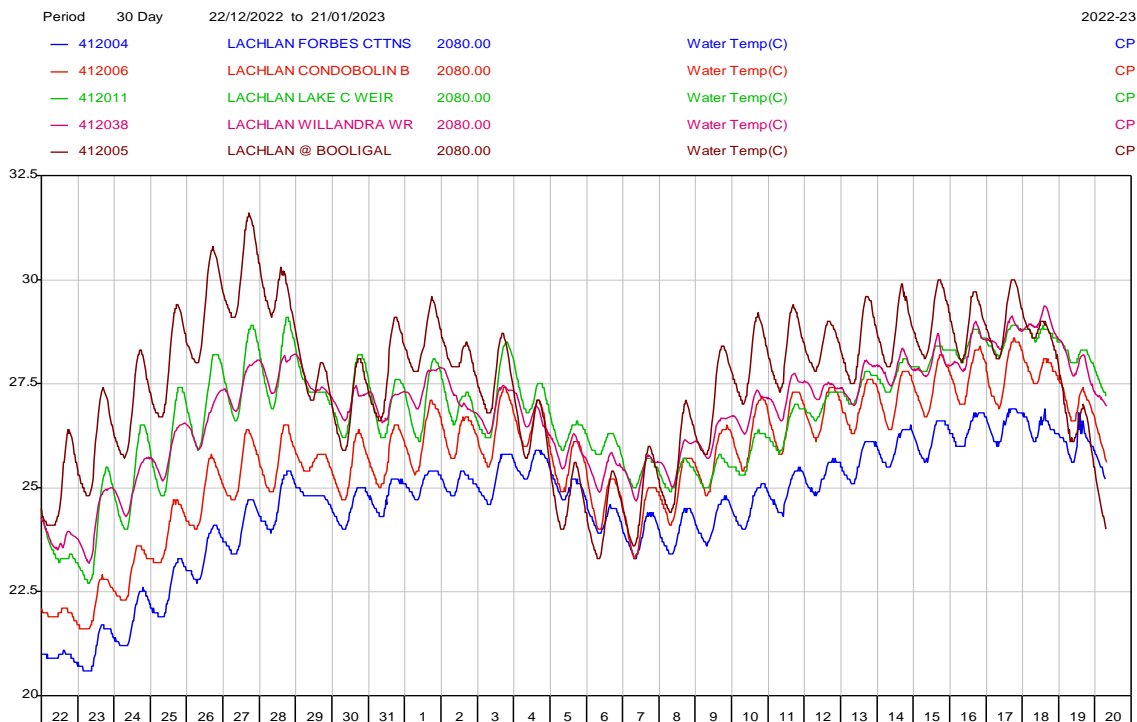


Figure 332: Continuous water temperature (°C) in the Lachlan River

Murrumbidgee River

The river level in the Murrumbidgee River at Maude Weir is around 5,300 ML/day. Discharge at Balranald is slowly decreasing toward 15,000 ML/day (Figure 333). There are no further flood warnings for Balranald.

Dissolved oxygen levels in the Murrumbidgee River at Maude Weir are around 6 mg/L. Oxygen levels at Redbank are above 5 mg/L. At Balranald dissolved oxygen is fluctuating between 2 and 4 mg/L (Figure 334). Hand-held readings at Balranald taken on 16/01/2023 recorded dissolved oxygen levels at 5.12 mg/L (Table 25).

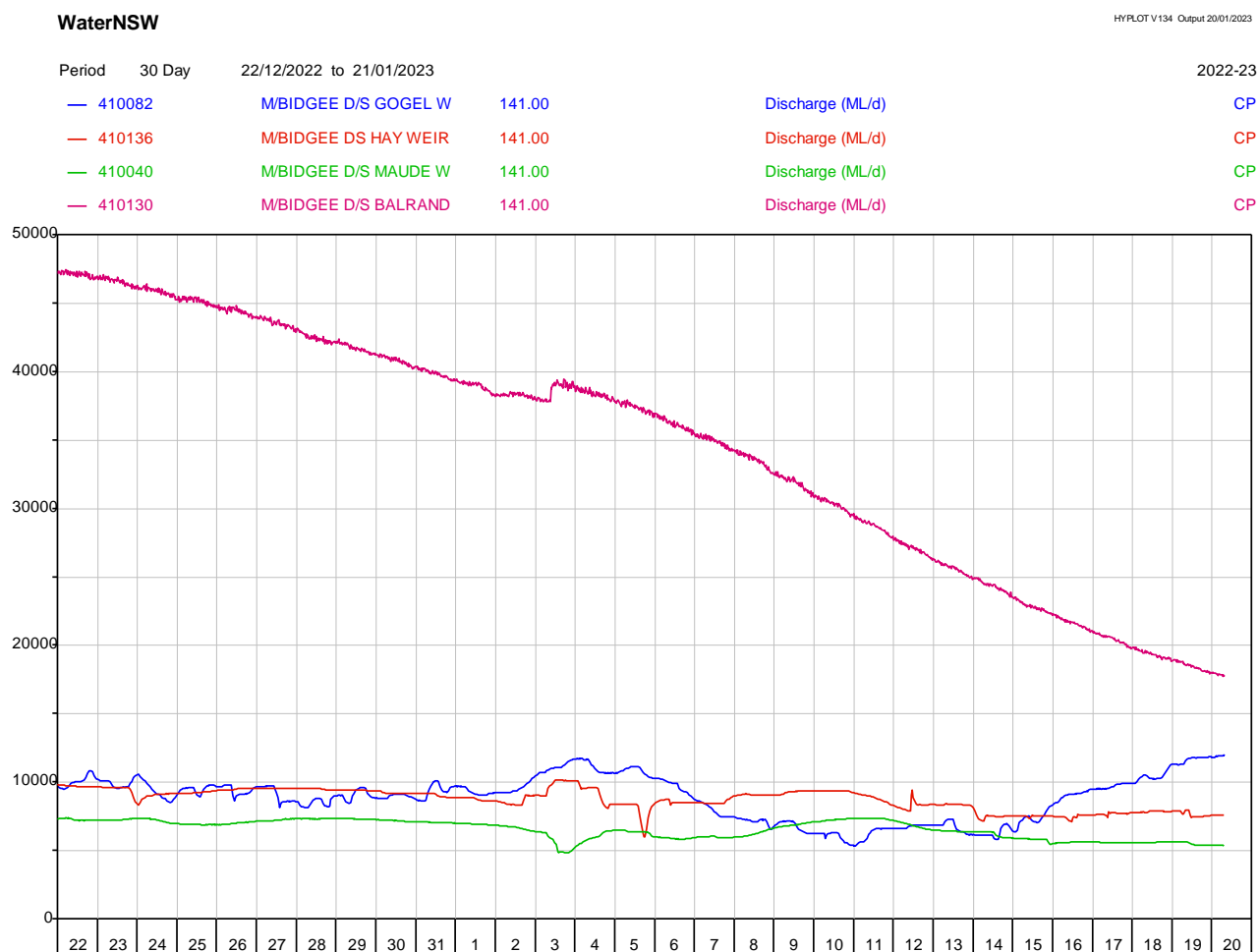


Figure 333: Discharge (ML/day) in the Murrumbidgee River

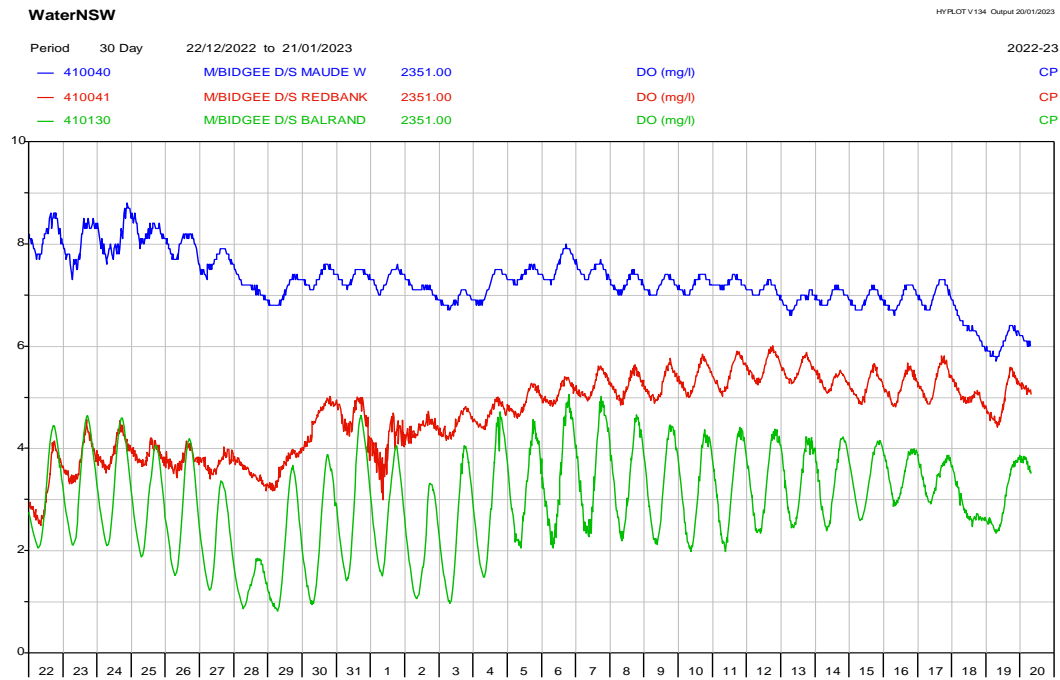


Figure 334: Continuous dissolved oxygen (mg/L) in the Murrumbidgee River
 Table 25: Hand-held dissolved oxygen readings from Murrumbidgee River – 16 January 2023

Site	Sample Date	DO (mg/L)	Water temp
Murrumbidgee River at Balranald	16/01/2023 11:28:00 AM	5.12	27.07

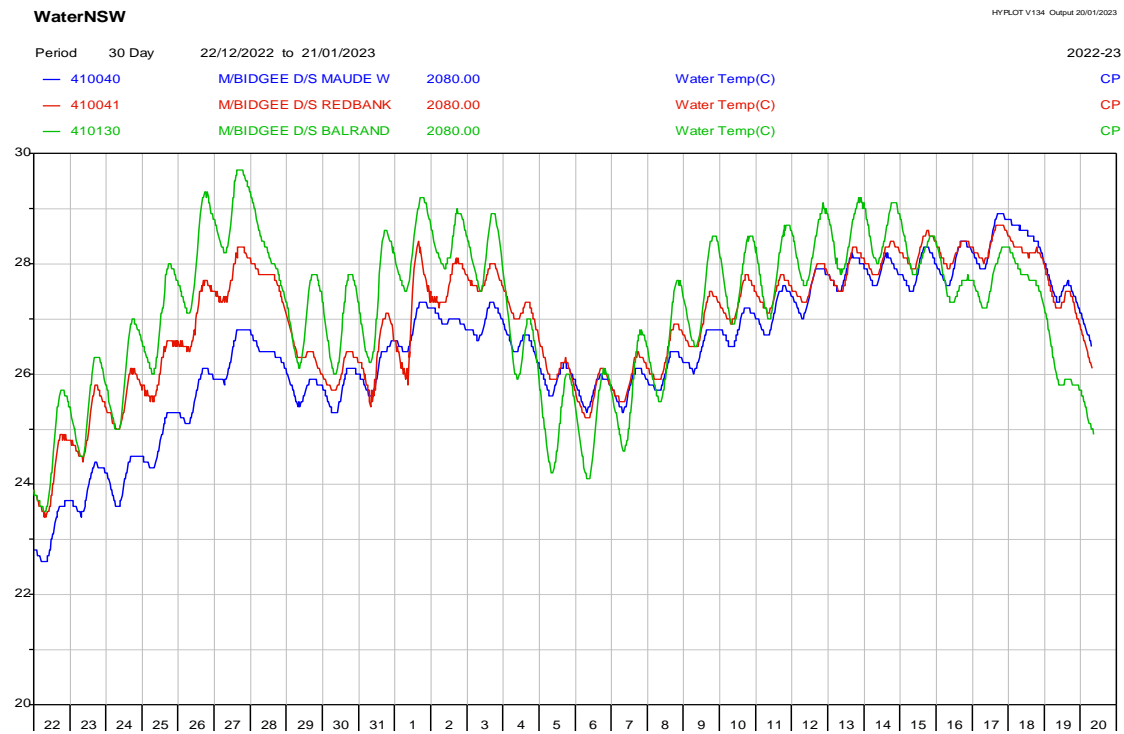


Figure 335: Continuous water temperature (°C) in the Murrumbidgee River

Kolety/Edward River

Discharge in the Kolety/Edward River is continuing to decline (Figure 336). Discharge at Moulamein has now fallen to 3,200 ML/day.

Dissolved oxygen in the Kolety/Edward River has improved (Figure 337). Readings from Moulamein have readings above 4 mg/L during the day but have been decreasing below 4 mg/L overnight. Water temperatures are cooling below 25°C (Figure 338).

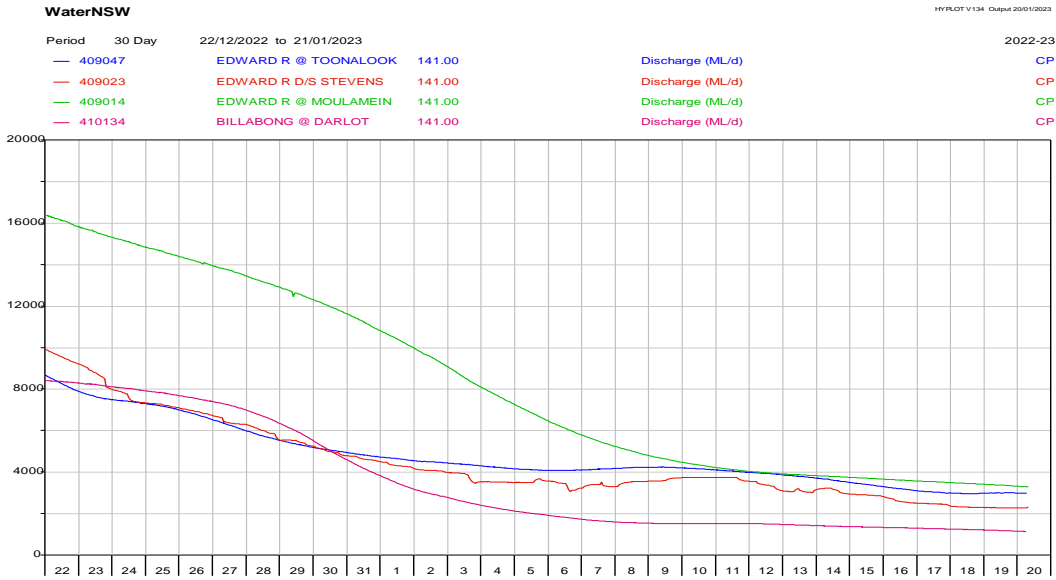


Figure 336: Discharge (ML/day) in the Kolety/Edward River

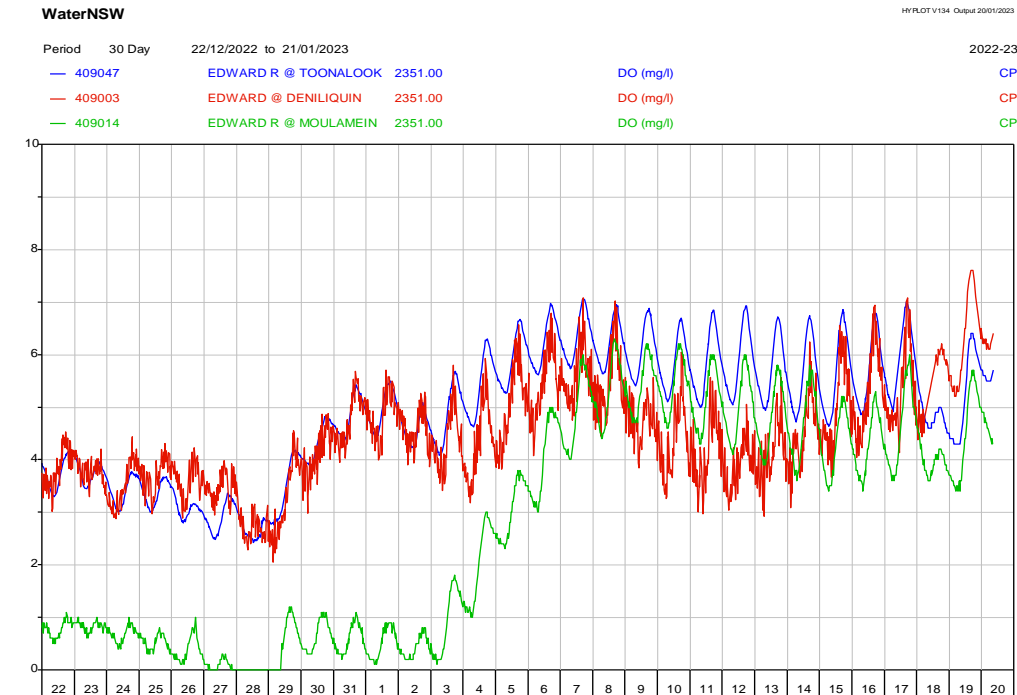


Figure 337: Continuous dissolved oxygen (mg/L) in the Kolety/Edward River

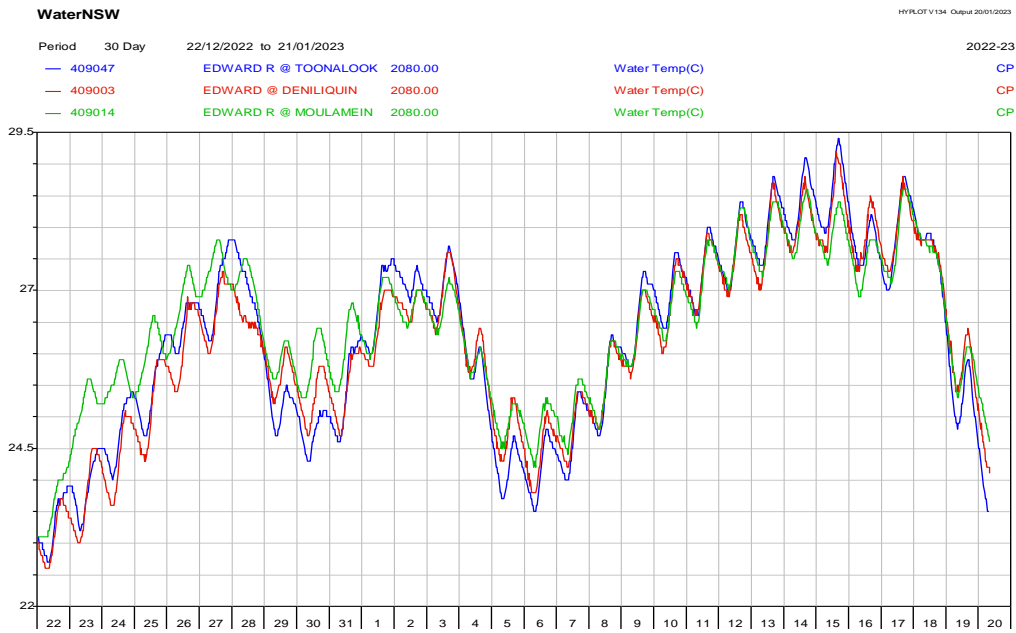


Figure 338: Continuous water temperature (°C) in the Kolety/Edward River

Wakool and Niemur rivers

Discharge in the Wakool River at Coonambit Bridge is just under 4,000 ML/day and at Gee Gee Bridge and has dropped to almost 1,000 ML/day. The Niemur River at Mallan School is flowing at 1,800 ML/day (Figure 339).

Figure 340 highlights dissolved oxygen levels are improving in the Wakool River at Gee Gee Bridge and Stoney Crossing. All sites were below 4mg/L on 18 January. Dissolved oxygen levels at Mallan School remain low.

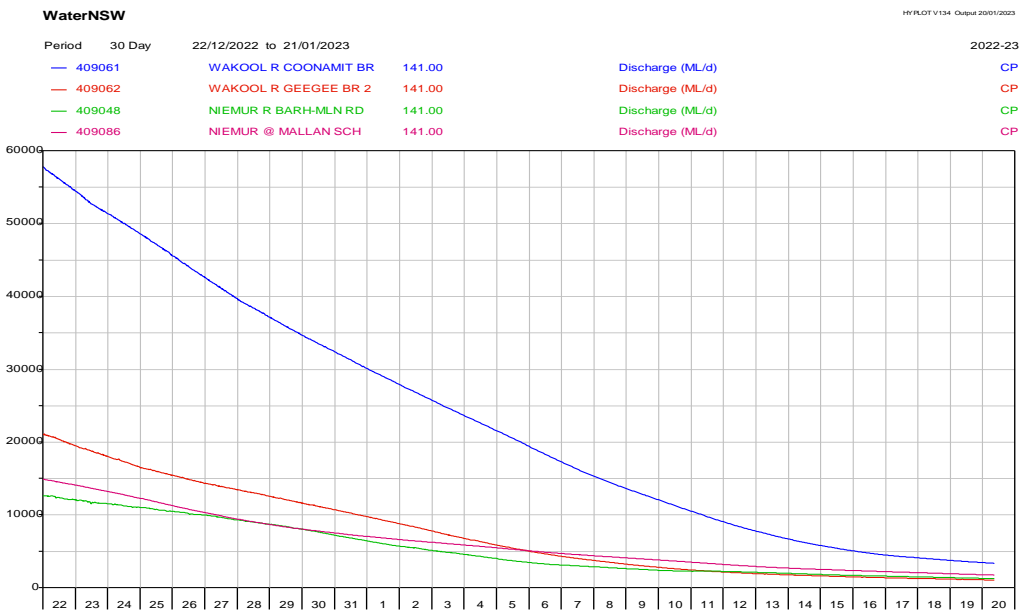


Figure 339: Discharge (ML/day) in the Wakool and Niemur rivers

WaterNSW

HYFLOT V134 Output 20/1/2023

Period	30 Day	22/12/2022 to 21/01/2023			2022-23
—	409062	WAKOOL R GEEGEE BR 2	2351.00	DO (mg/l)	CP
—	409013	WAKOOL @ STONEY XING	2351.00	DO (mg/l)	CP
—	409048	NIEMUR R BARH-MLN RD	2351.00	DO (mg/l)	CP
—	409086	NIEMUR @ MALLAN SCH	2351.00	DO (mg/l)	CP

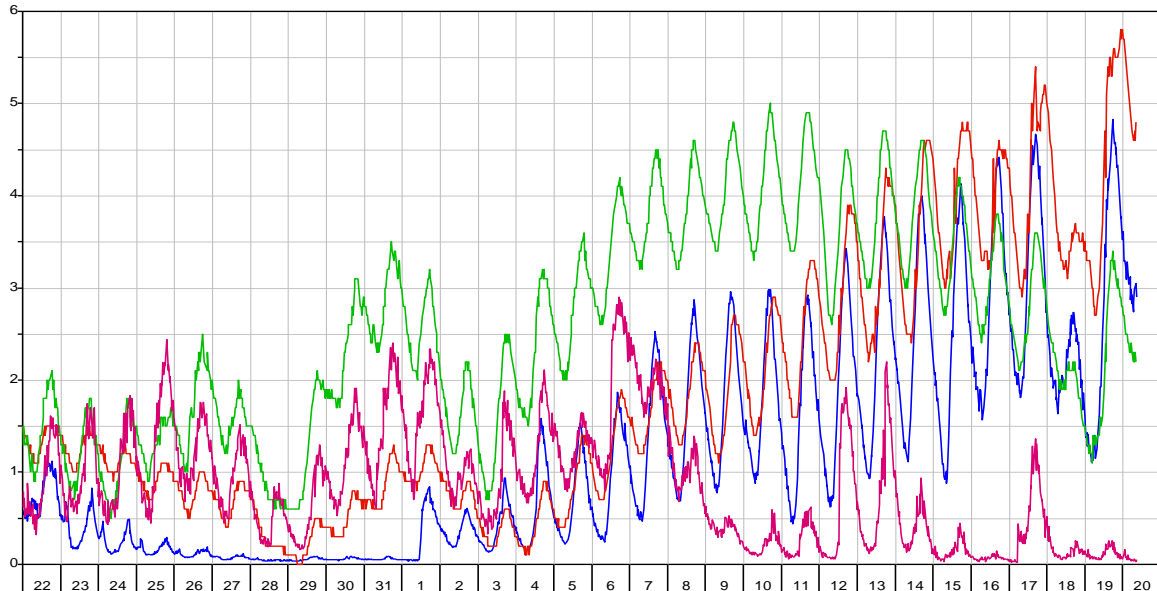


Figure 340: Continuous dissolved oxygen (mg/L) in the Wakool and Niemur rivers

WaterNSW

HYFLOT V134 Output 20/1/2023

Period	30 Day	22/12/2022 to 21/01/2023			2022-23
—	409062	WAKOOL R GEEGEE BR 2	2080.00	Water Temp(C)	CP
—	409013	WAKOOL @ STONEY XING	2080.00	Water Temp(C)	CP
—	409048	NIEMUR R BARH-MLN RD	2080.00	Water Temp(C)	CP
—	409086	NIEMUR @ MALLAN SCH	2080.00	Water Temp(C)	CP

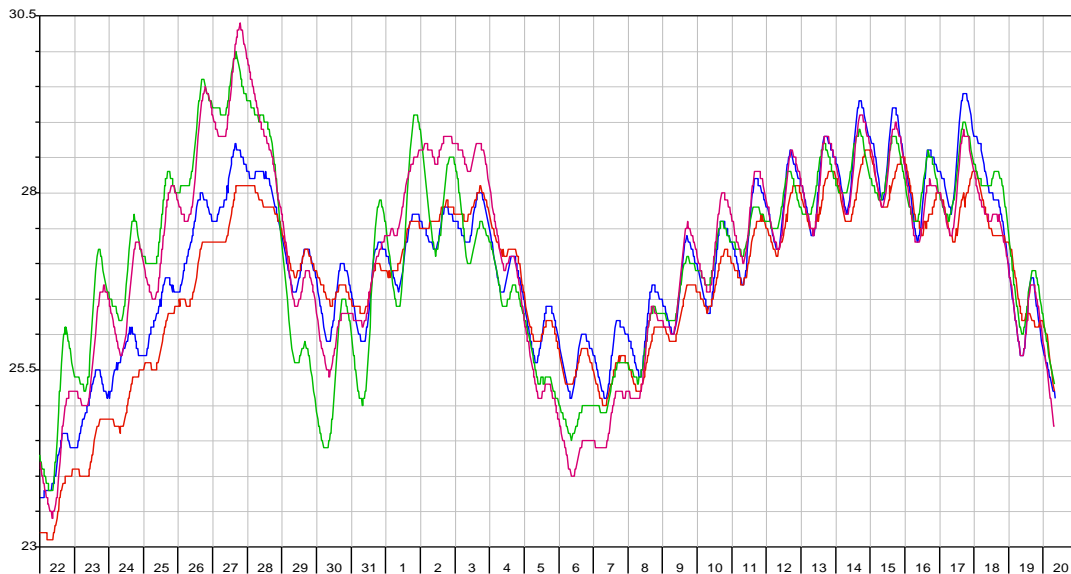


Figure 341: Continuous water temperature (°C) in the Wakool and Niemur rivers

Merran, Little Merran and Barber creeks

Figure 342 shows dissolved oxygen levels in Merran and Little Merran have continued to improve. Barbers Creek at Sandy Bridge has been dropping below 1 mg/L overnight and returning to levels above 4 mg/L during the day.

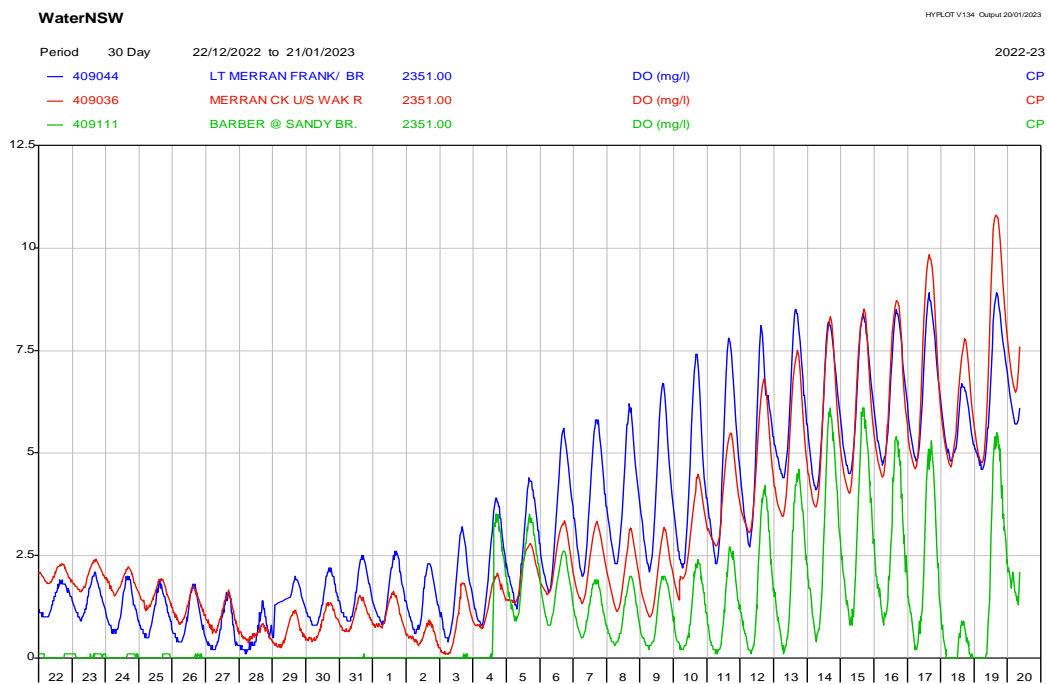


Figure 342: Continuous dissolved oxygen (mg/L) in the Merran, Little Merran and Barber creeks

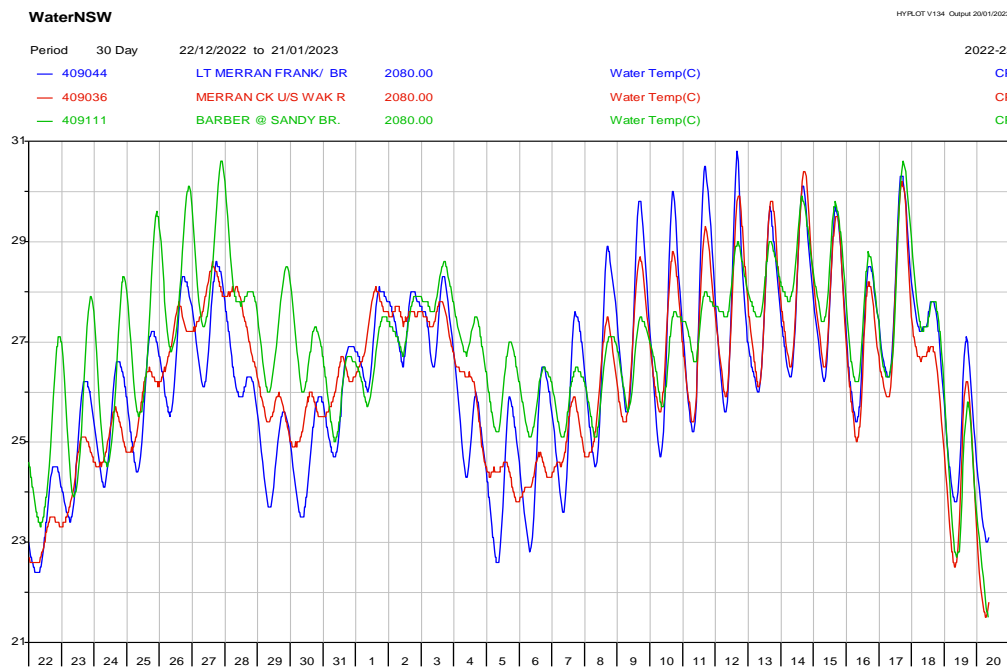


Figure 343: Continuous water temperature (°C) in the Merran, Little Merran and Barber creeks

Murray River

The Bureau of Meteorology has maintained a moderate flood warning for Wentworth. Minor flooding is easing at Mildura.

Monitoring by DELWP is showing the Murray River at Tocumwal, upstream of the Barmah/Millewa Forest, is oxygenated (Figure 344). Downstream of the forest at Barmah, dissolved oxygen is above 6 mg/L. Dissolved oxygen in the Goulburn River at McCoys Bridge is around 6 mg/L and the Campaspe River at Fehrings Lane is above 4 mg/L.

Dissolved oxygen in the Murray River at Barham, Pental Island Pumps, Boundary Bend and Wemen has increased above 6 mg/L. Monitoring at Colignan shows the mean daily dissolved oxygen is remaining below 4 mg/L. The temporary monitoring site installed on the Murray River downstream of Wentworth was reading 4.0 mg/L on Friday 20 January (10:00).

Table 26: Latest hand-held dissolved oxygen readings from Murray River - January 2023

Site	Sample date	DO (mg/L)	Water Temp
Murray River u/s Euston Weir	16/01/2023 1:58:00 PM	4.50	27.57
Murray River at Mt Dispersion	16/01/2023 1:53:00 PM	5.95	26.37
Murray River at Buronga	17/01/2023 1:05:00 PM	5.26	28.11
Murray River at Curlwaa	17/01/2023 7:52:00 AM	4.45	27.86

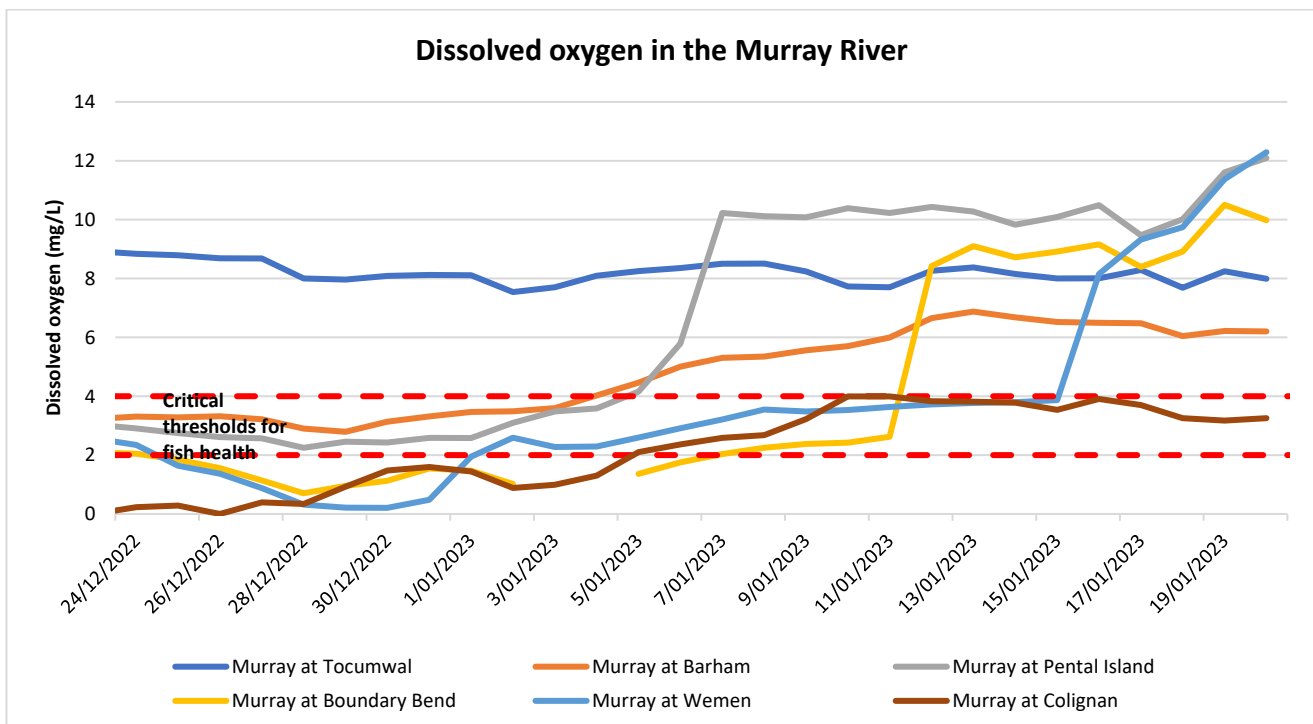


Figure 344: Continuous dissolved oxygen (mg/L) in the Murray River (data courtesy of DELWP)

Weather Outlook

The Bureau of Meteorology 8-day total rain forecast (18 to 25 January) indicates the heaviest falls will be along the coast and the southern Alps, with totals decreasing to the west (Figure 345). Forecast is for air temperatures at Echuca (Figure 346) and Mildura (Figure 347) to remain below 40°C over the week. There are no heatwaves forecast for NSW for Monday 23 January to Wednesday 25 (Figure 348).

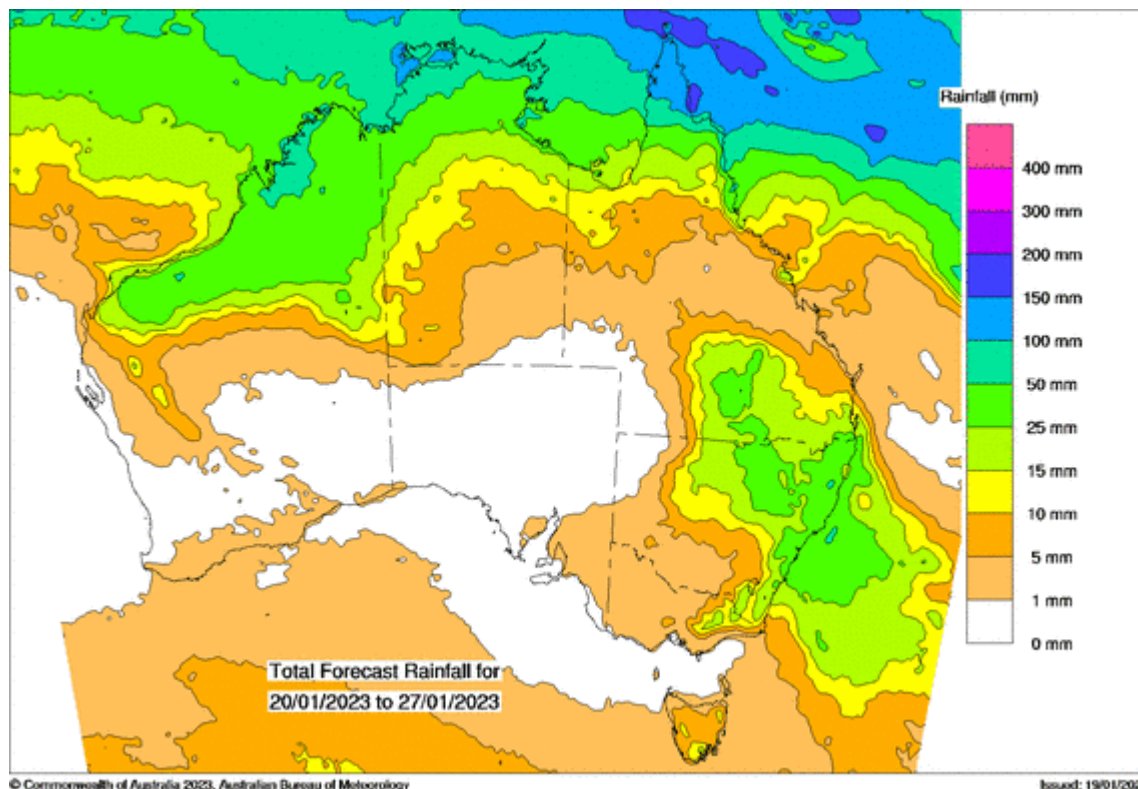


Figure 345: Bureau of Meteorology 8-day total rain forecast (20 to 27 January)








	Fri. 20 Jan	Sat. 21 Jan	Sun. 22 Jan	Mon. 23 Jan	Tue. 24 Jan	Wed. 25 Jan	Thu. 26 Jan
							
	Sunny.	Mostly sunny.	Mostly sunny.	Mostly sunny.	Partly cloudy.	Sunny.	Sunny.
Max. Temperature	28 °C	29 °C	30 °C	30 °C	29 °C	33 °C	31 °C
Min. Temperature		14 °C	15 °C	15 °C	16 °C	14 °C	16 °C

Figure 346: Forecast air temperatures for Echuca 20 to 26 January








	Fri. 20 Jan	Sat. 21 Jan	Sun. 22 Jan	Mon. 23 Jan	Tue. 24 Jan	Wed. 25 Jan	Thu. 26 Jan
							
	Mostly sunny.	Partly cloudy.	Sunny.	Sunny.	Partly cloudy.	Sunny.	Sunny.
Max. Temperature	29 °C	32 °C	33 °C	33 °C	31 °C	35 °C	33 °C
Min. Temperature		17 °C	16 °C	17 °C	16 °C	17 °C	15 °C

Figure 347: Forecast air temperatures for Mildura 20 to 26 January

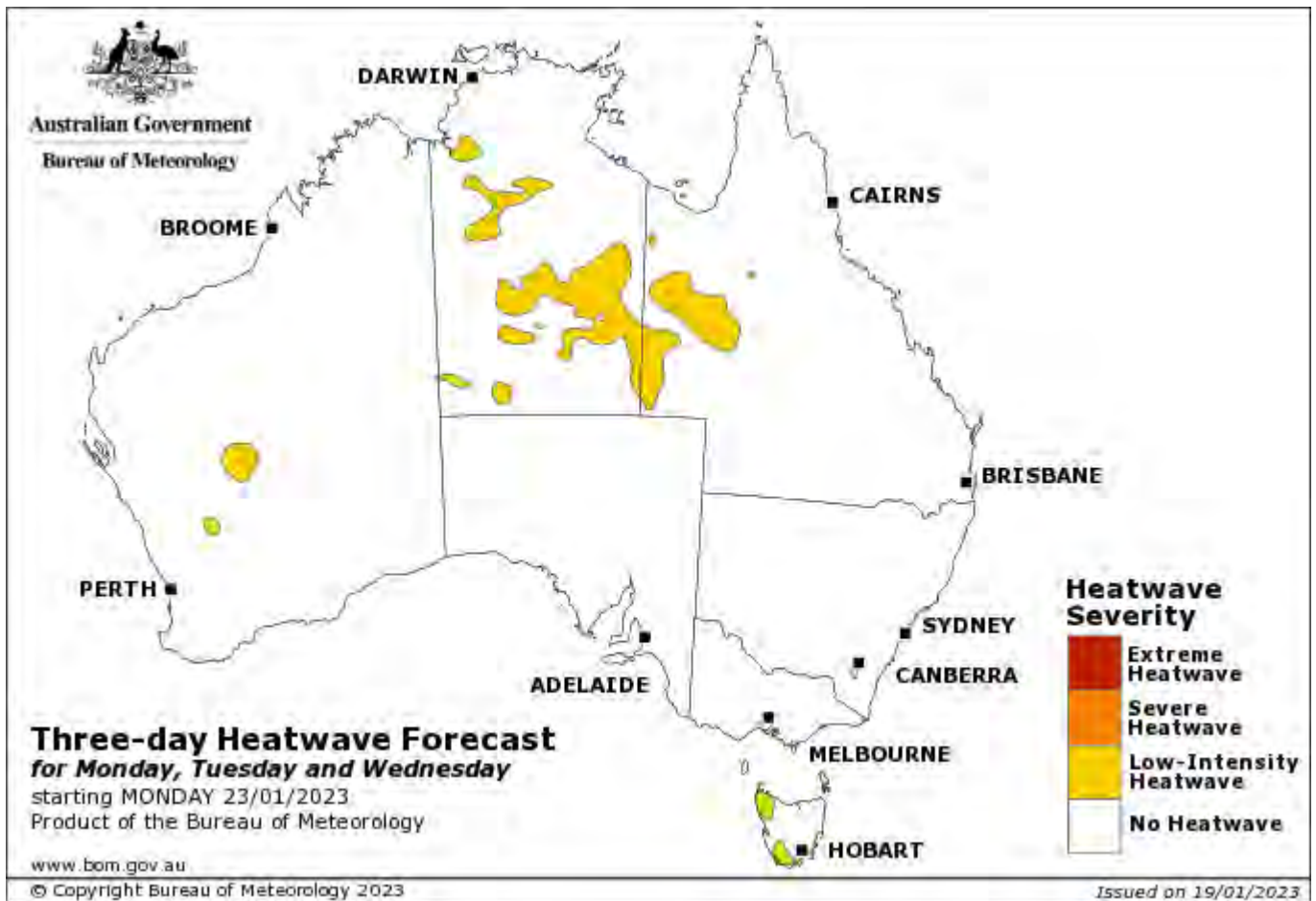


Figure 348: Forecast heat wave conditions for Monday 23 January to Wednesday 25 January 2023

Water quality update, Meeting No. 15 - 30 January 2023

Northern Basin

Barwon River

Discharge in the Barwon River at Brewarrina has decreased to around 2,500 ML/day (Figure 1). Dissolved oxygen results from the automated gauges in the Barwon River are showing large fluctuations. At Collarenebri, Geera and Brewarrina levels have been dropping below 2 mg/L, with better readings at Walgett (Dangar Bridge) (Figure 350). Water temperature is between 26.5 and 30°C (Figure 351).

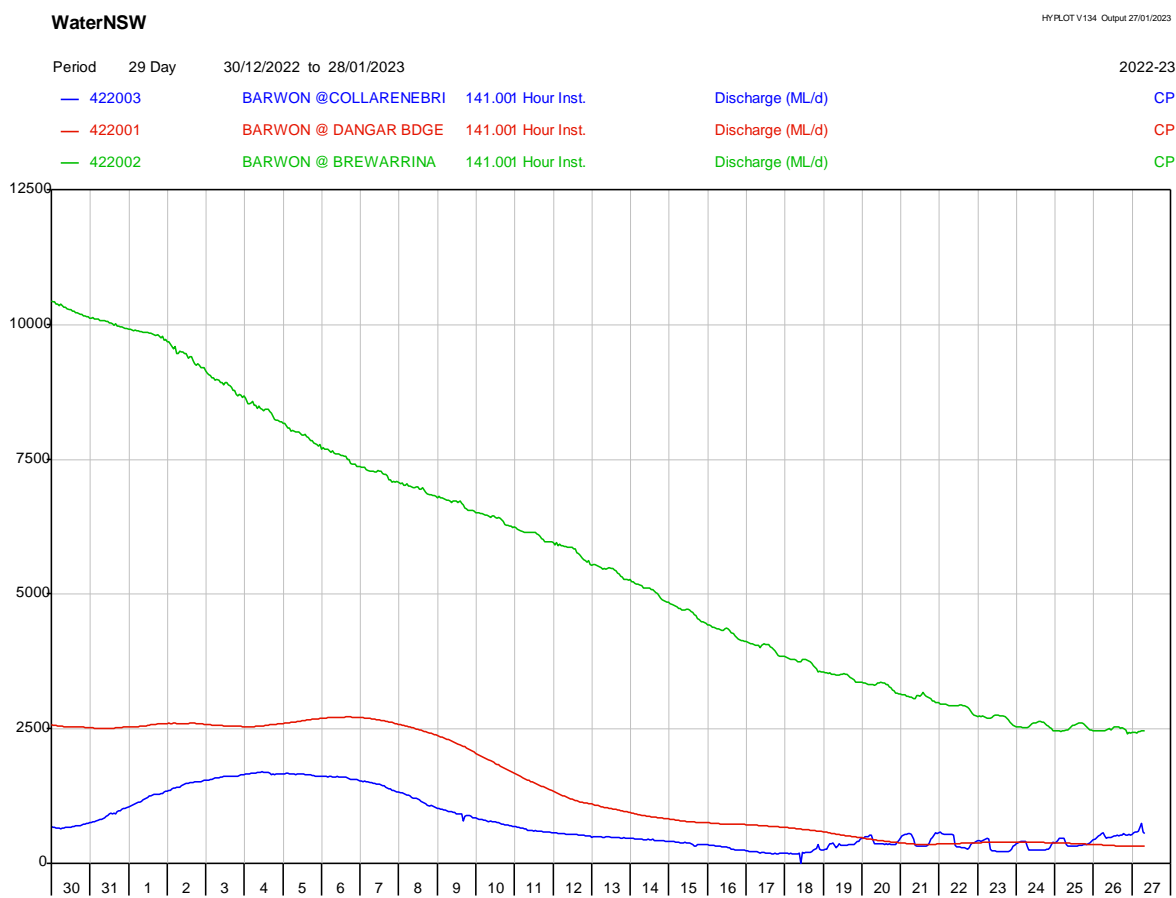


Figure 349: Discharge (ML/day) in the Barwon River

WaterNSW

HYPLOT V134 Output 27/01/2023

Period 29 Day 30/12/2022 to 28/01/2023 2022-23

Inst. ID	Location	Inst. Type	Parameter	CP
422003	BARWON @ COLLARENEBRI	2351.00l Hour Inst.	DO (mg/l)	CP
422001	BARWON @ DANGAR BDGE	2351.00l Hour Inst.	DO (mg/l)	CP
422027	BARWON @ GEERA	2351.00l Hour Inst.	DO (mg/l)	CP
422002	BARWON @ BREWARRINA	2351.00l Hour Inst.	DO (mg/l)	CP

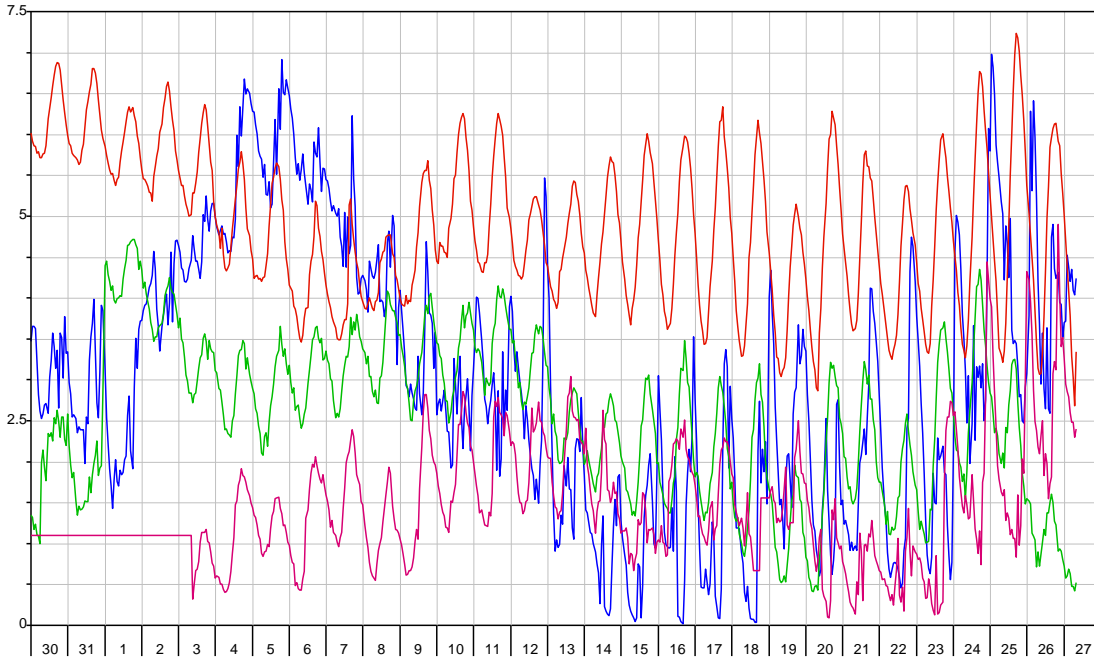


Figure 350: Continuous dissolved oxygen (mg/L) in the Barwon River

WaterNSW

HYPLOT V134 Output 27/01/2023

Period 29 Day 30/12/2022 to 28/01/2023 2022-23

Inst. ID	Location	Inst. Type	Parameter	CP
422003	BARWON @ COLLARENEBRI	2080.00l Hour Inst.	Water Temp(C)	CP
422001	BARWON @ DANGAR BDGE	2080.00l Hour Inst.	Water Temp(C)	CP
422027	BARWON @ GEERA	2080.00l Hour Inst.	Water Temp(C)	CP
422002	BARWON @ BREWARRINA	2080.00l Hour Inst.	Water Temp(C)	CP

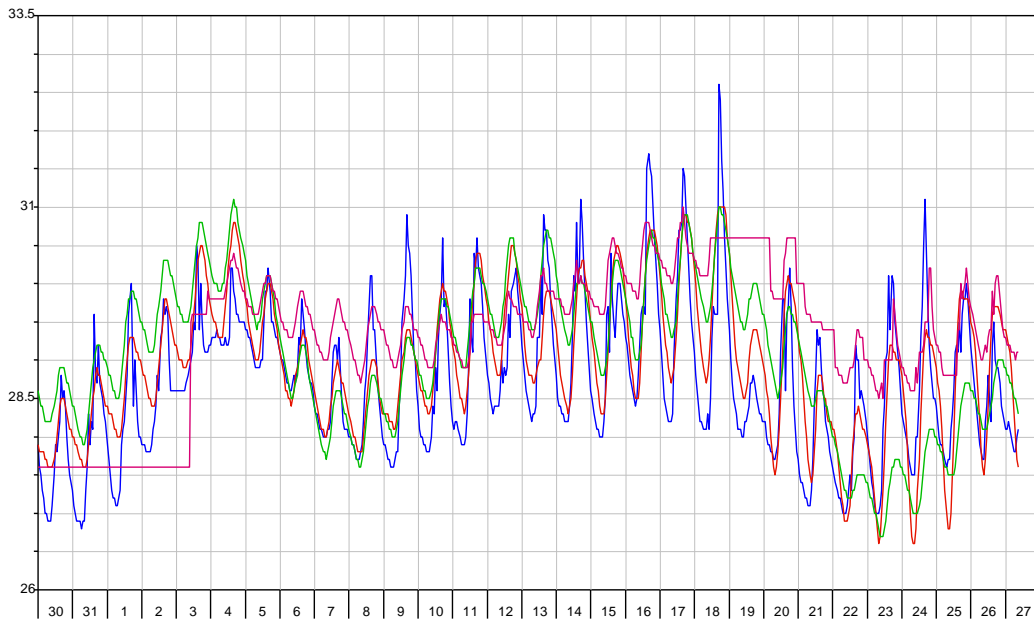


Figure 351: Continuous water temperature (°C) in the Barwon River

Darling River

Discharge at the Wilcannia gauge has decreased to around 22,000 ML/day while the flow in Talyawalka Creek has dropped to almost 7,000 ML/day (Figure 352). Major flood warnings continue for Menindee. There is a moderate flood warning for Pooncarie. Discharge at Pooncarie reached a peak of over 28,000 ML/day during the week. Major flooding is likely at Burtundy with discharge increasing to over 20,000 ML/day (Figure 353).

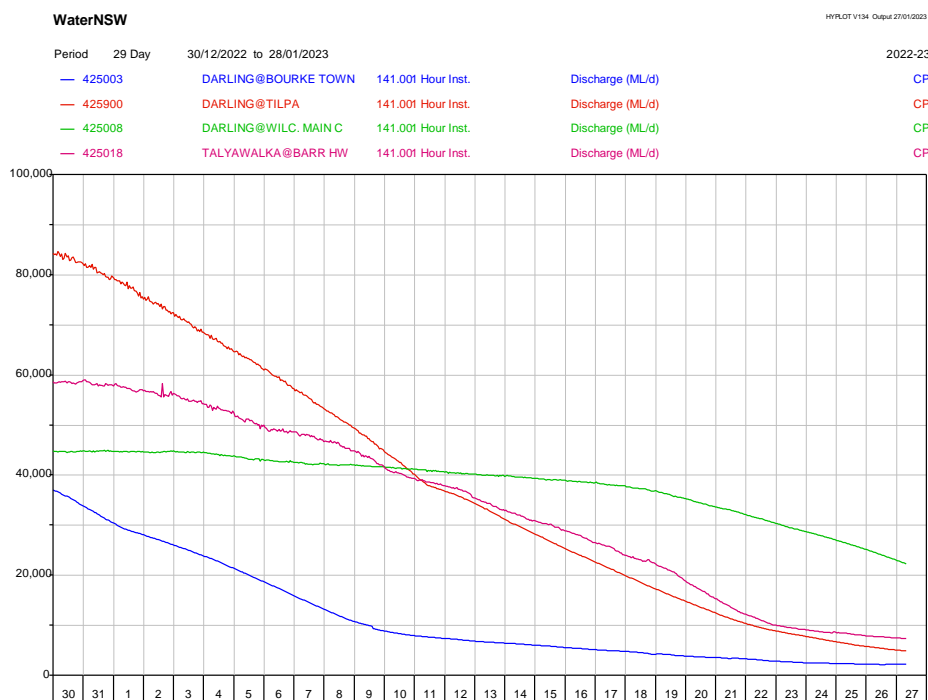


Figure 352: Discharge (ML/day) in the upper Darling River

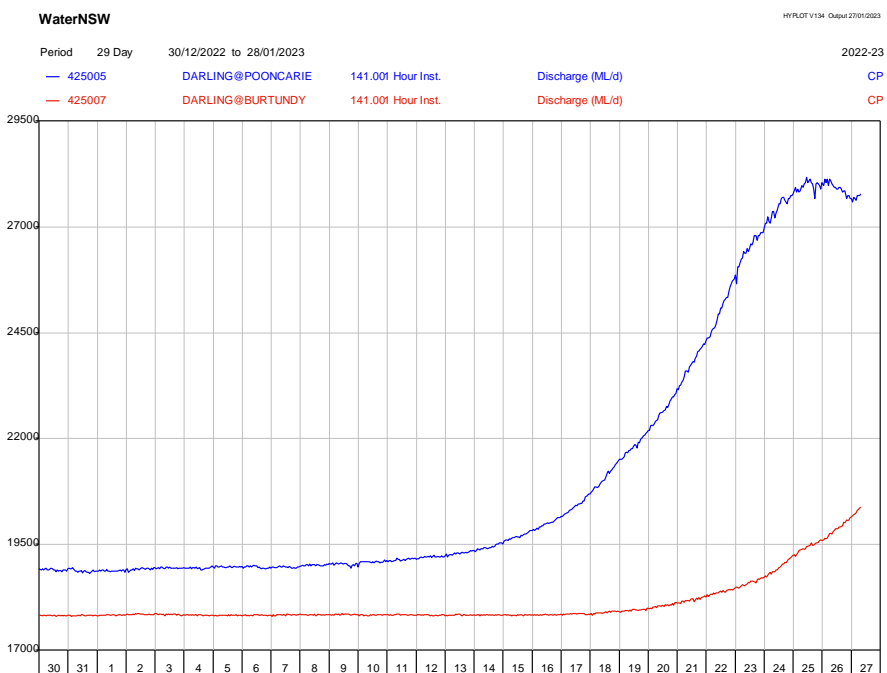


Figure 353: Discharge (ML/day) in the lower Darling River

Dissolved oxygen in the Darling River at Bourke has improved and increased towards 4 mg/L over the past week (Figure 354). Oxygen readings at Wilcannia (Moorabin) have rapidly dropped to around 0 mg/L this week which is in contrast to the the temporary dissolved oxygen monitoring site downstream at Nellia Gaari on the Darling River upstream of Lake Wetherell. Both Nellia Gaari and Weir 32 have dissolved oxygen readings above 4 mg/L. Oxygen levels at Burtundy have dipped below 4 mg/L this week.

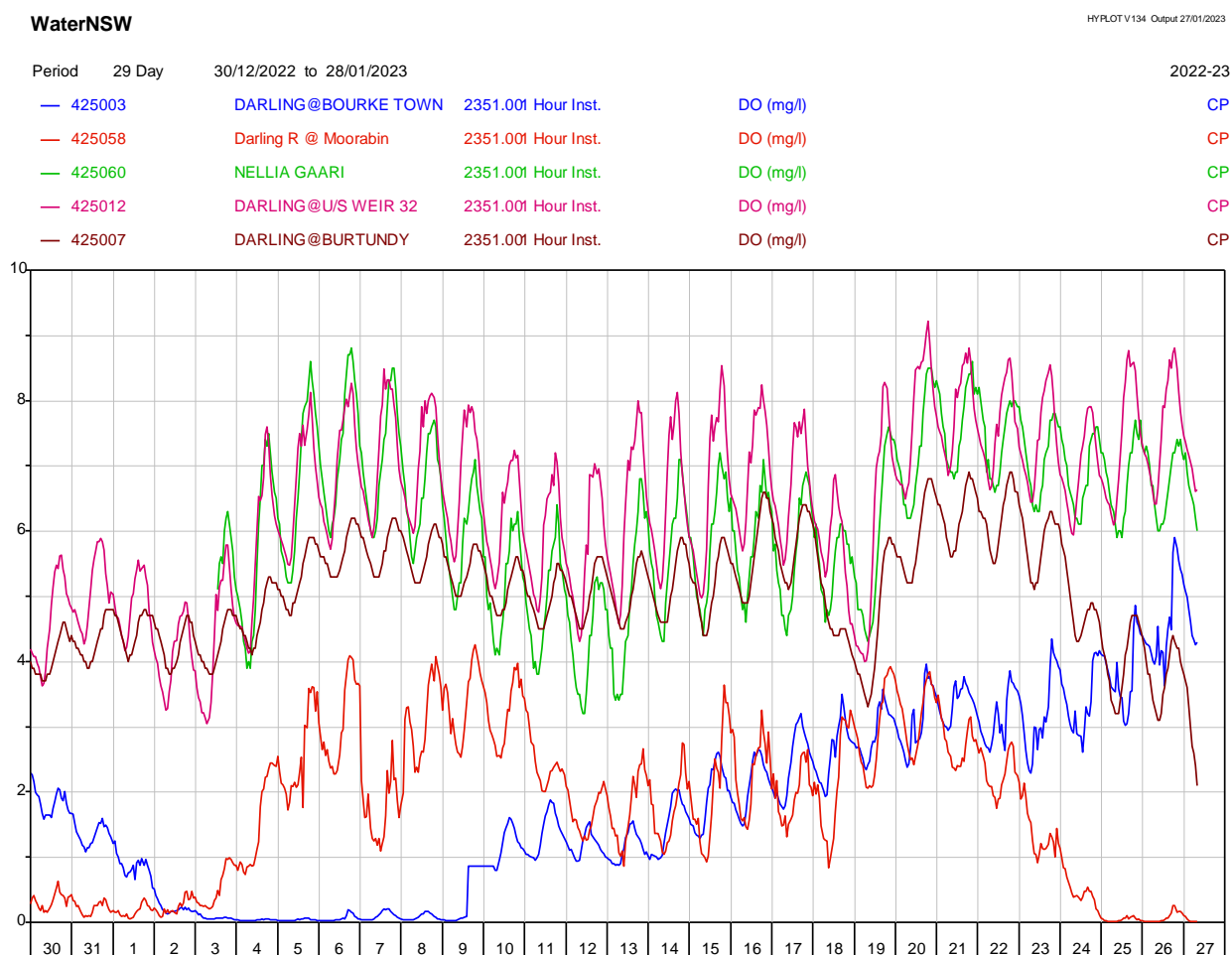


Figure 354: Continuous dissolved oxygen (mg/L) in the Darling River

Table 27: Hand-held dissolved oxygen results (mg/L) from the Darling River

Site	Sample date	Dissolved oxygen (mg/L)
Darling River at Burtundy	23/01/2023 14:36	5.89

Figure 355 is a satellite derived colour infrared Sentinel image of Darling River and Menindee Lakes on 23 January 2023, highlighting some floodwater is mixing in Lakes Tandure and Pamamaroo and major flooding around Menindee town. Monthly monitoring results collected on 16 January showed

dissolved oxygen near the water surface was above 5 mg/L at all monitoring sites in Menindee Lakes.

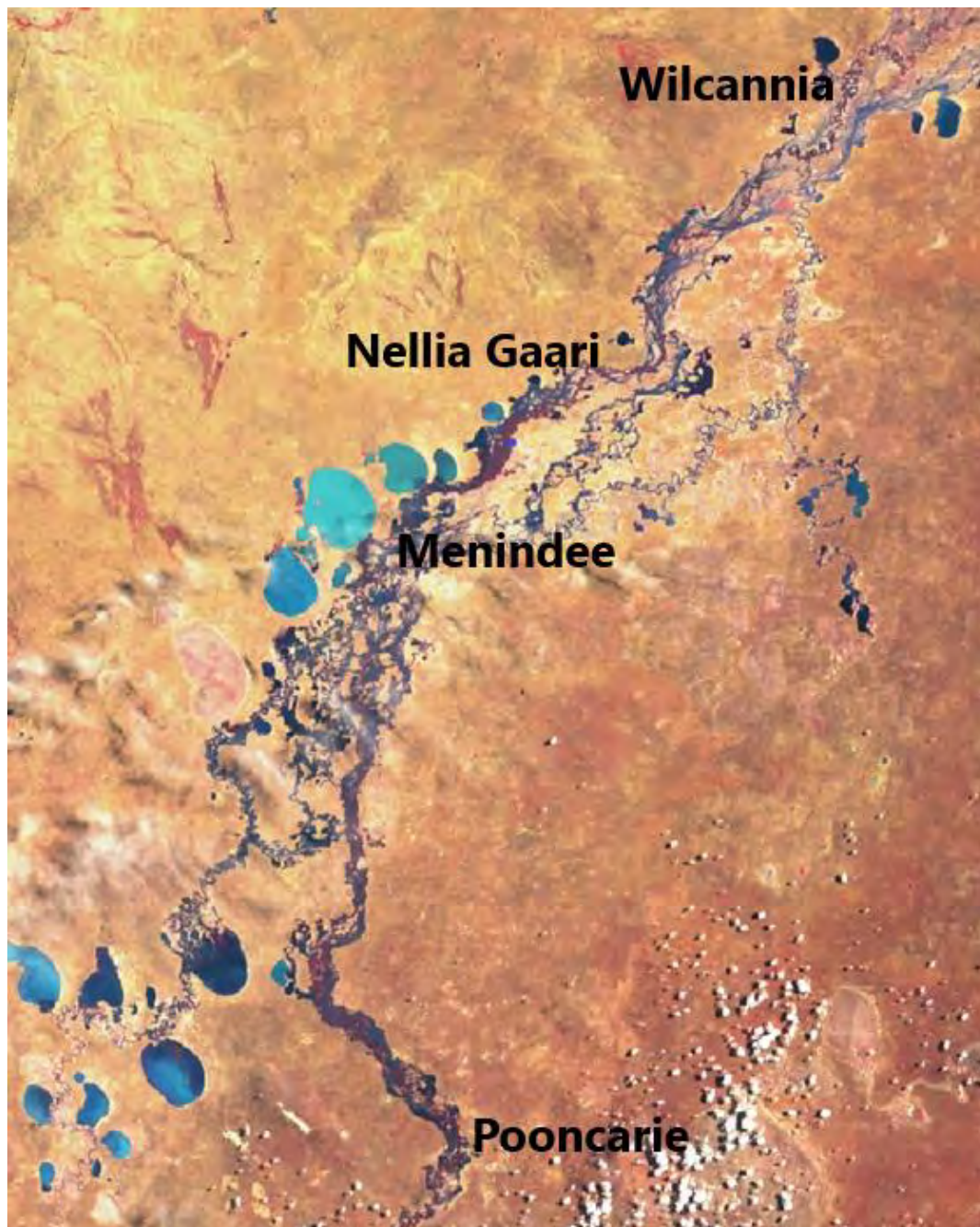


Figure 355: Satellite derived infrared image of Darling River and Menindee Lakes – 23 January 2023

Water temperatures are reaching 30°C at Bourke, and the high 20's at Wilcannia (Moorabin), Nellia Gaari, Weir 32 and Burtundy (Figure 356). Water temperatures have been slowly increasing this week.

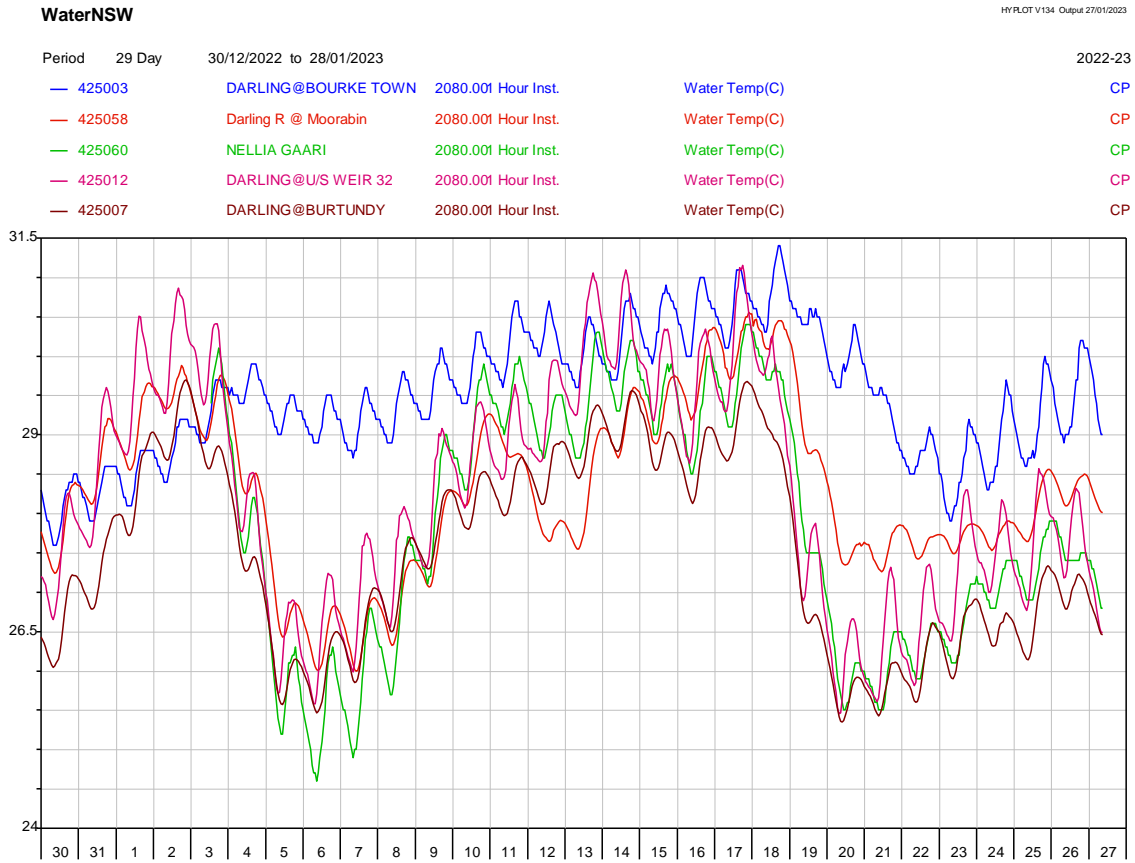


Figure 356: Continuous water temperature (°C) in the Darling River

Southern Basin

Lachlan River

Discharge in the Lachlan River at Hillston is decreasing towards 3,000 ML/day (Figure 357). Minor flooding continues at Booligal and is expected to continue into early February.

Lachlan Water Quality Allowance releases ceased on Tuesday 10 January. With lower releases from Wyangala Dam there is a risk of high electrical conductivity impacting the town water supply in Cowra. The conductivity sensor is currently reading 937 $\mu\text{S}/\text{cm}$ which is at the top end of the good range for drinking water.

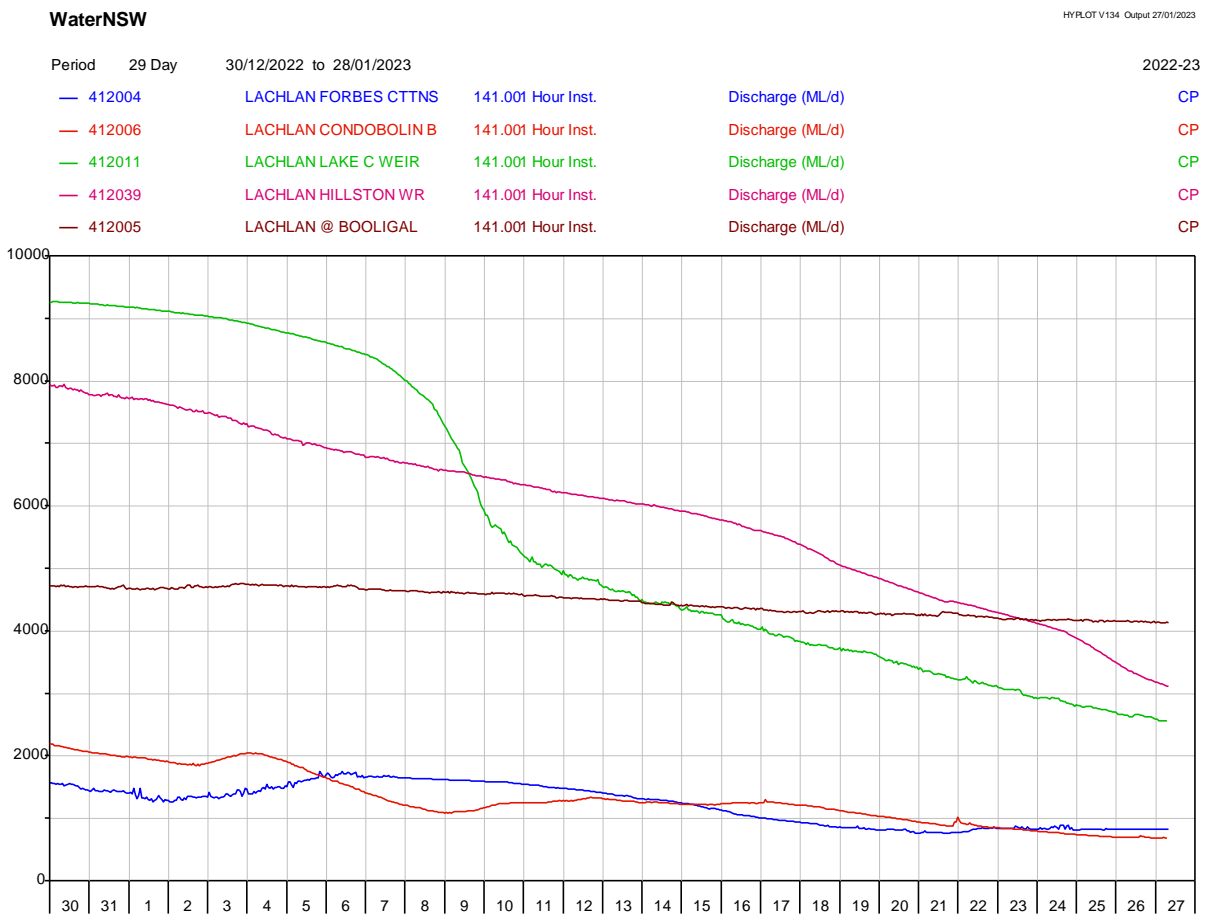


Figure 357: Discharge (ML/day) in the Lachlan River

Dissolved oxygen in the Lachlan River is above 2 mg/L at all monitoring sites. Readings at Condobolin dropped rapidly but have improved again. Booligal is showing good diurnal patterns, fluctuating around 4 mg/L (Figure 358).

WaterNSW

HYPLOT V134 Output 27/01/2023

Period	29 Day	30/12/2022 to 28/01/2023		2022-23
412004	LACHLAN FORBES CTTNS	2351.001 Hour Inst.	DO (mg/l)	CP
412006	LACHLAN CONDOBOLIN B	2351.001 Hour Inst.	DO (mg/l)	CP
412011	LACHLAN LAKE C WEIR	2351.001 Hour Inst.	DO (mg/l)	CP
412039	LACHLAN HILLSTON WR	2351.001 Hour Inst.	DO (mg/l)	CP
412005	LACHLAN @ BOOLIGAL	2351.001 Hour Inst.	DO (mg/l)	CP

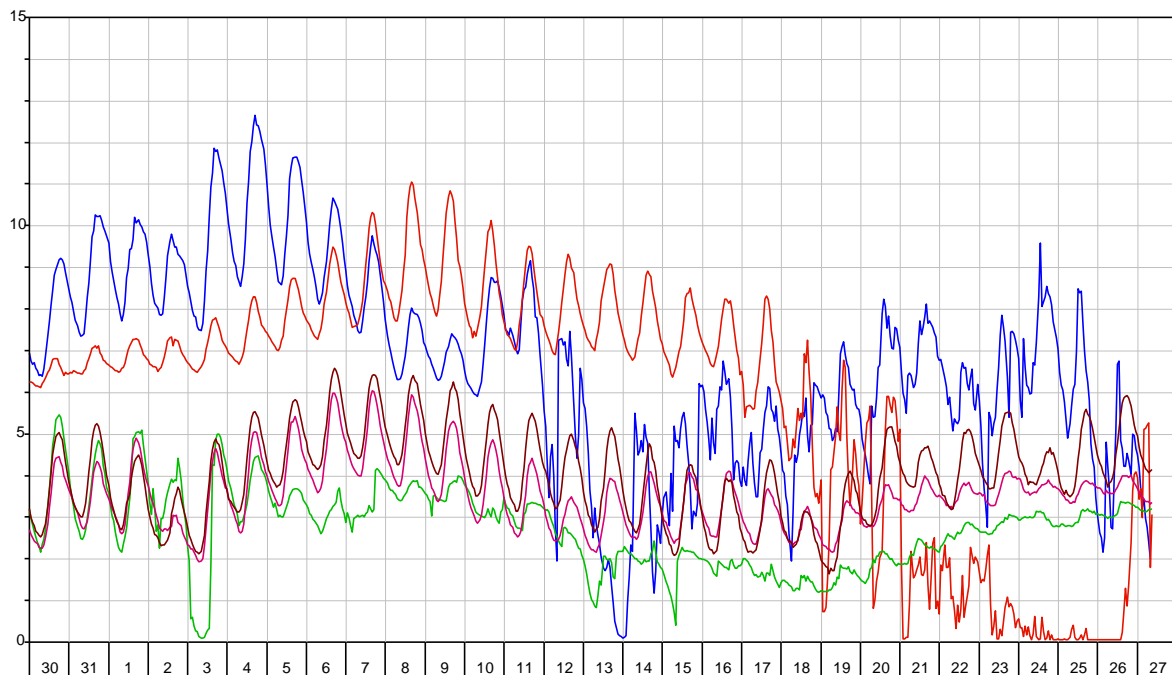


Figure 358: Continuous dissolved oxygen (mg/L) in the Lachlan River

WaterNSW

HYPLOT V134 Output 27/01/2023

Period	29 Day	30/12/2022 to 28/01/2023		2022-23
412004	LACHLAN FORBES CTTNS	2080.001 Hour Inst.	Water Temp(C)	CP
412006	LACHLAN CONDOBOLIN B	2080.001 Hour Inst.	Water Temp(C)	CP
412011	LACHLAN LAKE C WEIR	2080.001 Hour Inst.	Water Temp(C)	CP
412039	LACHLAN HILLSTON WR	2080.001 Hour Inst.	Water Temp(C)	CP
412005	LACHLAN @ BOOLIGAL	2080.001 Hour Inst.	Water Temp(C)	CP

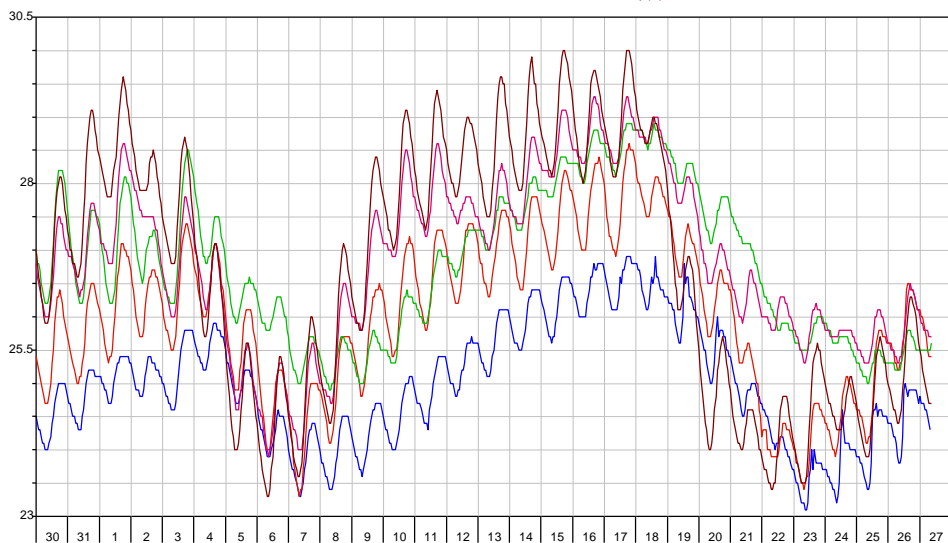


Figure 359: Continuous water temperature (°C) in the Lachlan River

Murrumbidgee River

The river level in the Murrumbidgee River at Maude Weir is around 5,000 ML/day. Discharge at Balranald is slowly decreasing toward 11,000 ML/day (Figure 360).

Dissolved oxygen levels in the Murrumbidgee River at Maude Weir and Redbank are above 5.5 mg/L. At Balranald, dissolved oxygen has improved and is fluctuating around 4 mg/L (Figure 361).

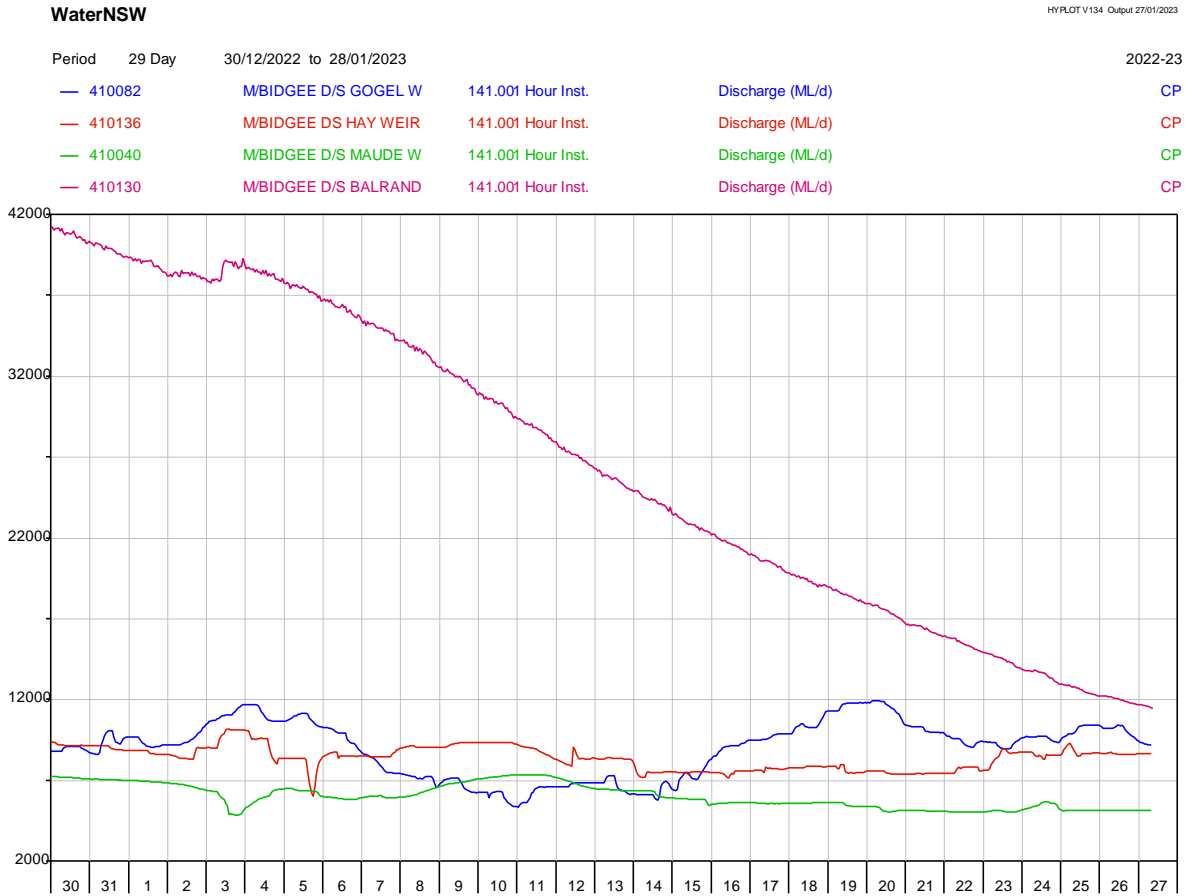


Figure 360: Discharge (ML/day) in the Murrumbidgee River

Period 29 Day 30/12/2022 to 28/01/2023 2022-23

— 410040 M/BIDGEE D/S MAUDE W 2351.00f Hour Inst. DO (mg/l) CP
 — 410041 M/BIDGEE D/S REDBANK 2351.00f Hour Inst. DO (mg/l) CP
 — 410130 M/BIDGEE D/S BALRAND 2351.00f Hour Inst. DO (mg/l) CP

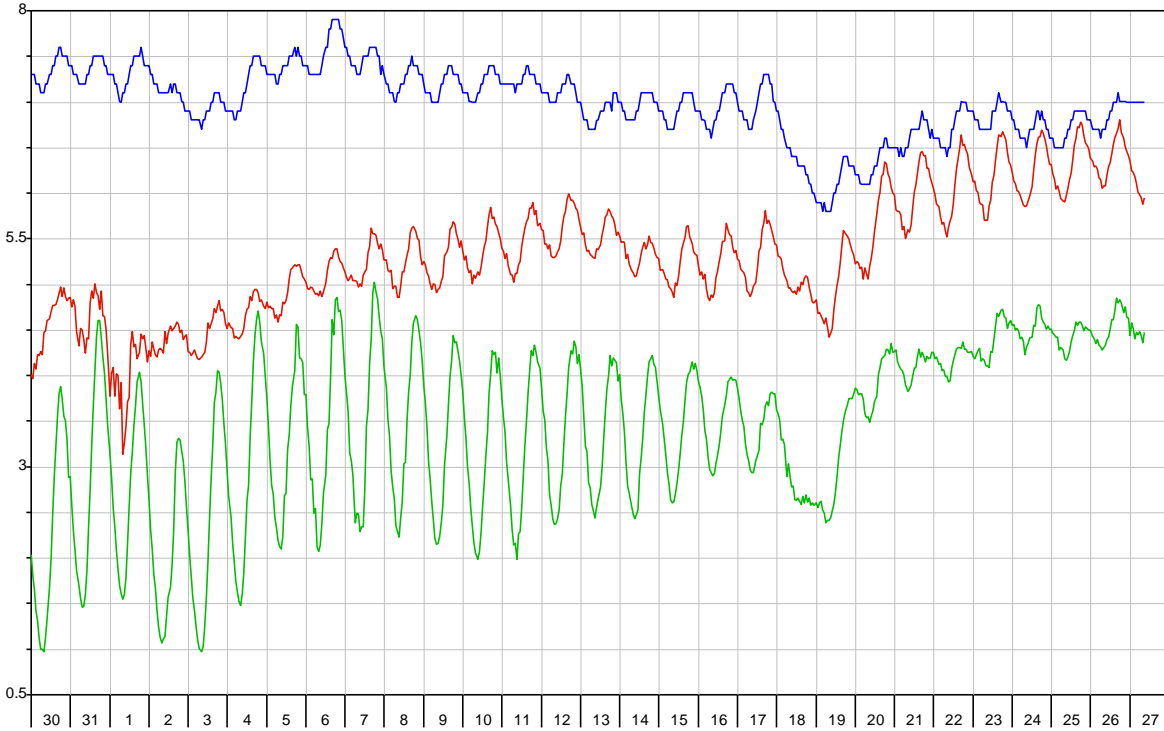


Figure 361: Continuous dissolved oxygen (mg/L) in the Murrumbidgee River

Table 28: Hand-held dissolved oxygen readings from Murrumbidgee River – 16 January 2023

Site	Sample Date	DO (mg/L)	Water temp
Murrumbidgee River at Balranald	23/01/2023 11:36	4.84	25.6
Murrumbidgee River downstream Yanco Weir	18/01/2023 09:52	6.86	24.4
Colombo Creek at Morundah	18/01/2023 11:00	5.32	27.0
Yanco Creek at Morundah	18/01/2023 11:29	4.41	27.1

Period 29 Day 30/12/2022 to 28/01/2023 2022-23

— 410040	M/BIDGEE D/S MAUDE W	2080.001 Hour Inst.	Water Temp(C)	CP
— 410041	M/BIDGEE D/S REDBANK	2080.001 Hour Inst.	Water Temp(C)	CP
— 410130	M/BIDGEE D/S BALRAND	2080.001 Hour Inst.	Water Temp(C)	CP

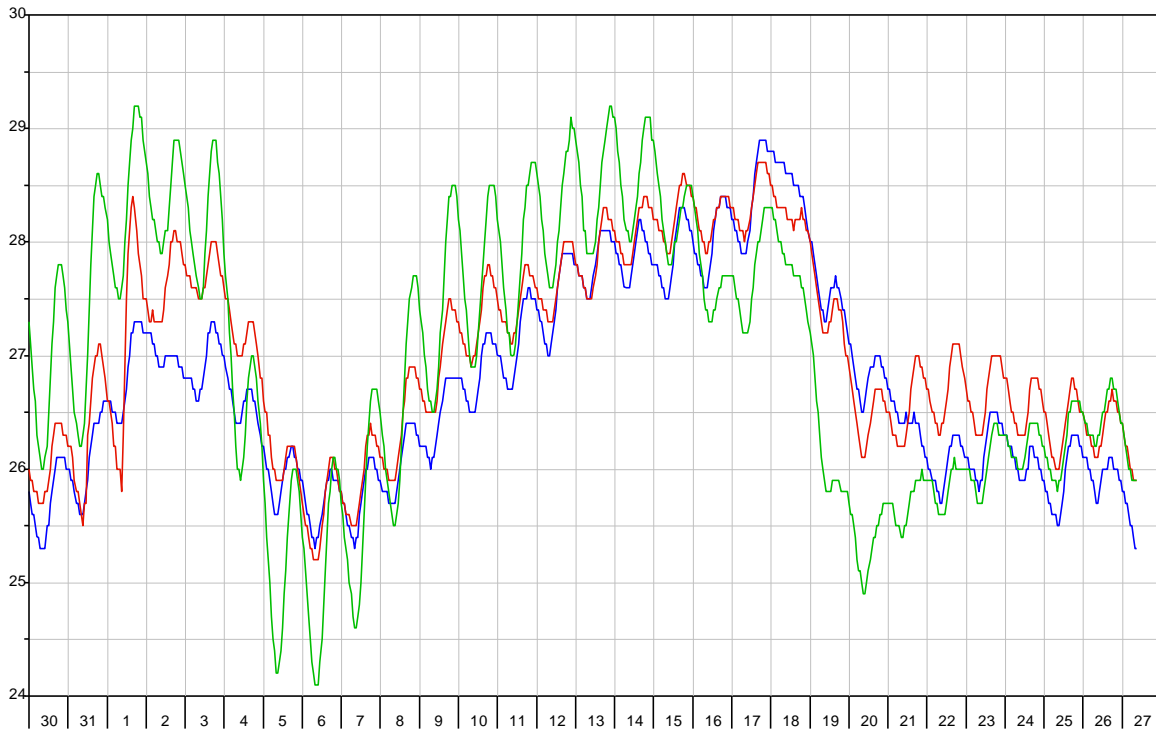


Figure 362: Continuous water temperature (°C) in the Murrumbidgee River

Kolety/Edward River

Discharge in the Kolety/Edward River is continuing to decline (Figure 363). Discharge at Moulamein has now fallen to 2,600 ML/day.

Dissolved oxygen in the Kolety/Edward River has improved (Figure 364). Readings from all three sites are above 5 mg/L. Water temperatures have been reaching over 26°C during the week (Figure 365).

WaterNSW

HYPLOT V134 Output 27/01/2023

Period 29 Day 30/12/2022 to 28/01/2023 2022-23

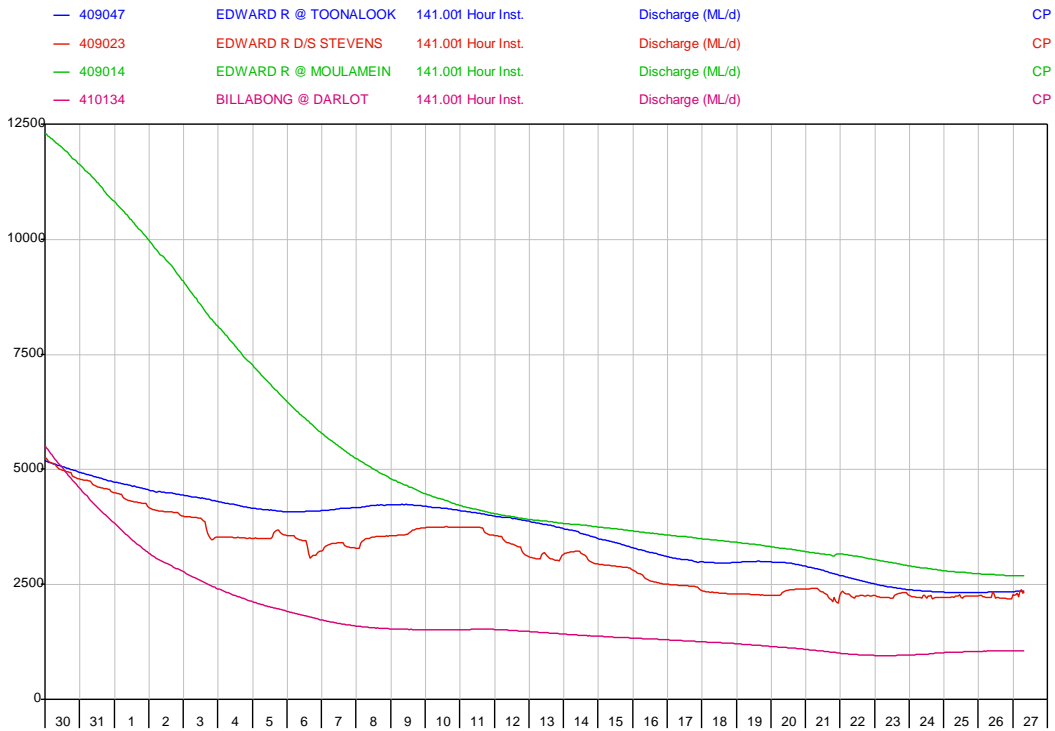


Figure 363: Discharge (ML/day) in the Kolety/Edward River

WaterNSW

HYPLOT V134 Output 27/01/2023

Period 29 Day 30/12/2022 to 28/01/2023 2022-23

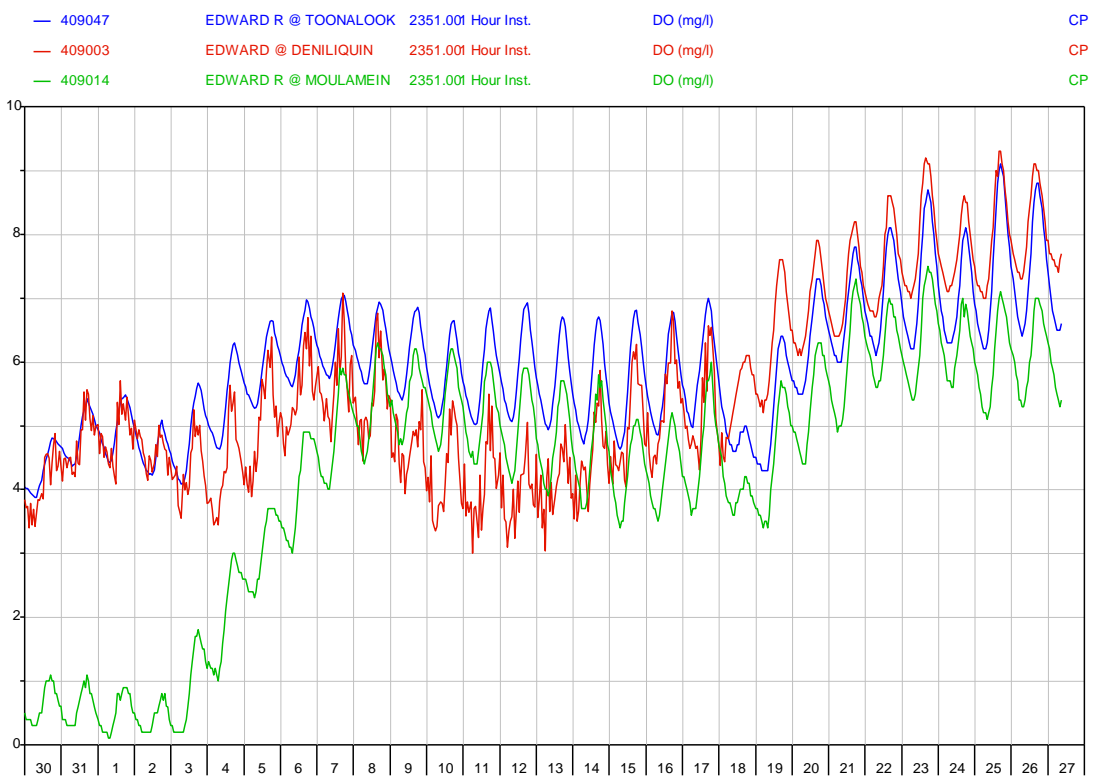


Figure 364: Continuous dissolved oxygen (mg/L) in the Kolety/Edward River

Period 29 Day 30/12/2022 to 28/01/2023 2022-23

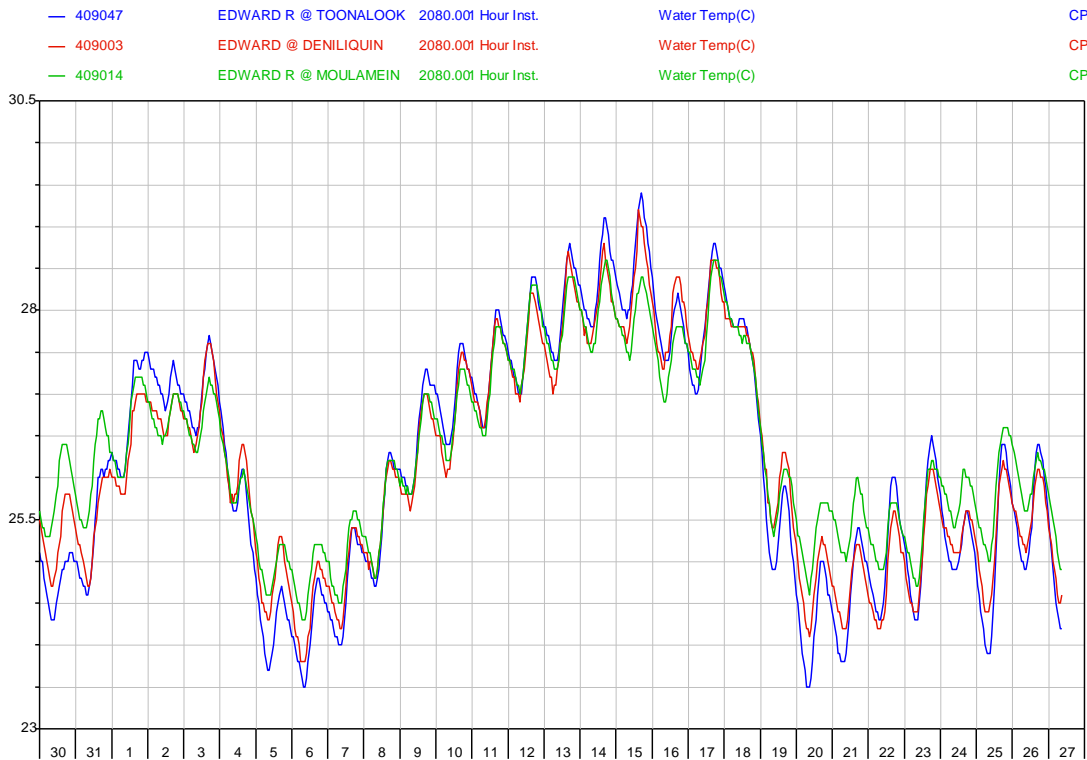


Figure 365: Continuous water temperature (°C) in the Kolety/Edward River

Wakool and Niemur rivers

Discharge in the Wakool River at Coonambit Bridge is just over 2,000 ML/day and at Gee Gee Bridge has dropped to almost 700 ML/day. The Niemur River at Mallan School is flowing at 1,100 ML/day (Figure 366).

Figure 367 highlights dissolved oxygen levels have improved in the Wakool River at Gee Gee Bridge and Stoney Crossing and Niemur River at Barham-Moulamein Road. Dissolved oxygen results from the automated gauging station at Mallan School remain low.

WaterNSW

HYPLOT V134 Output 27/01/2023

Period	29 Day	30/12/2022 to 28/01/2023		2022-23
409061	WAKOOL R COONAMIT BR	141.001 Hour Inst.	Discharge (ML/d)	CP
409062	WAKOOL R GEEGEE BR 2	141.001 Hour Inst.	Discharge (ML/d)	CP
409048	NIEMUR R BARH-MLN RD	141.001 Hour Inst.	Discharge (ML/d)	CP
409086	NIEMUR @ MALLAN SCH	141.001 Hour Inst.	Discharge (ML/d)	CP

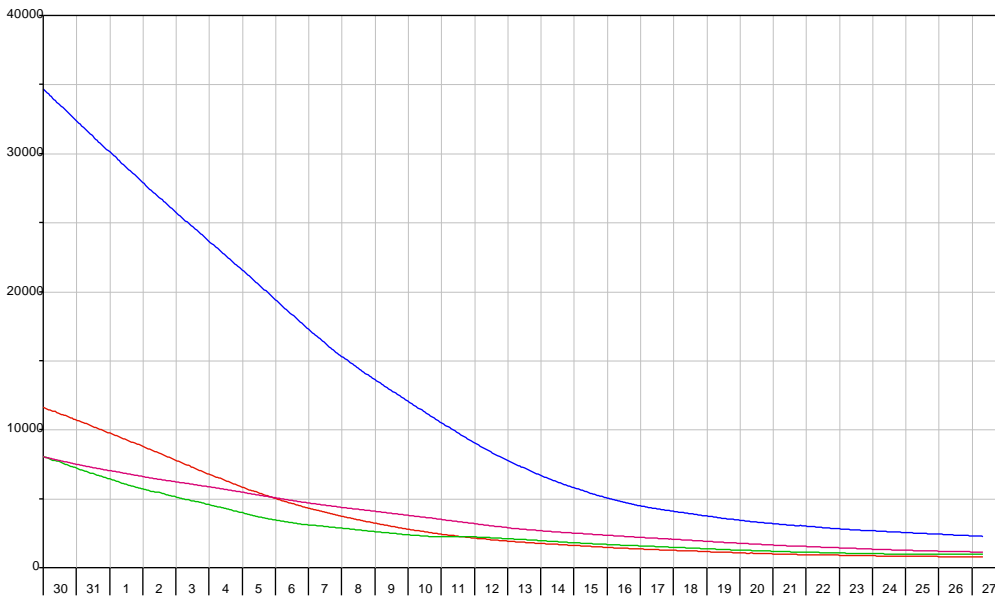


Figure 366: Discharge (ML/day) in the Wakool and Niemur rivers

WaterNSW

HYPLOT V134 Output 27/01/2023

Period	29 Day	30/12/2022 to 28/01/2023		2022-23
409062	WAKOOL R GEEGEE BR 2	2351.001 Hour Inst.	DO (mg/l)	CP
409013	WAKOOL @ STONEY XING	2351.001 Hour Inst.	DO (mg/l)	CP
409048	NIEMUR R BARH-MLN RD	2351.001 Hour Inst.	DO (mg/l)	CP
409086	NIEMUR @ MALLAN SCH	2351.001 Hour Inst.	DO (mg/l)	CP

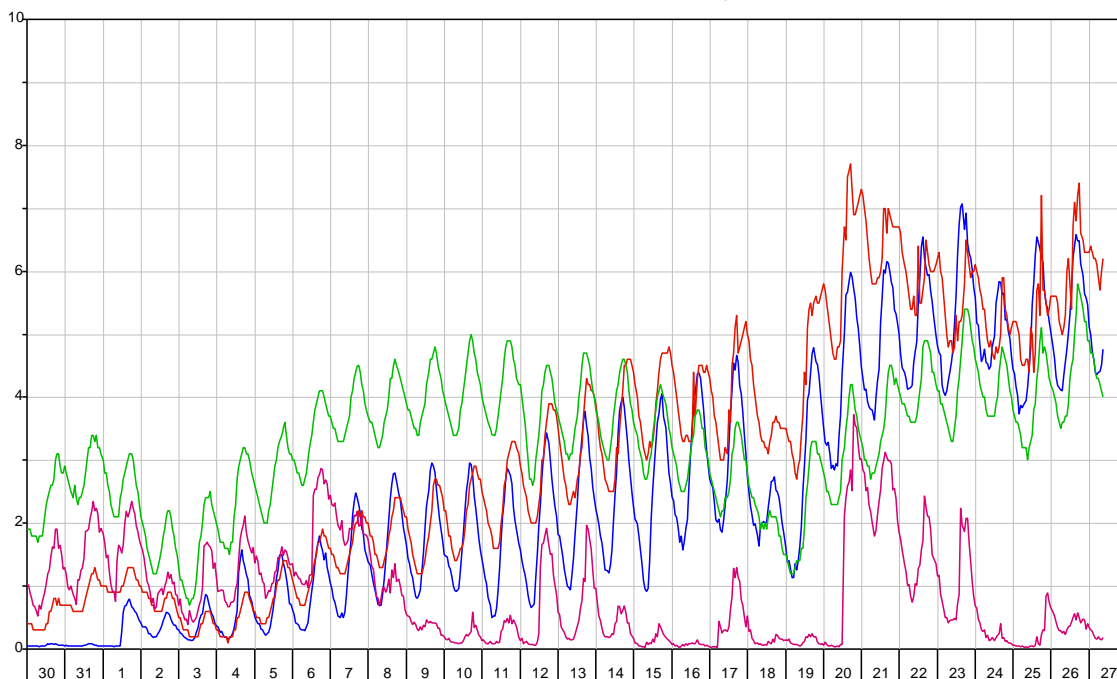


Figure 367: Continuous dissolved oxygen (mg/L) in the Wakool and Niemur rivers

Period 29 Day 30/12/2022 to 28/01/2023

2022-23

409062	WAKOOL R GEEGEE BR 2	2080.001 Hour Inst.	Water Temp(C)	CP
409013	WAKOOL @ STONEY XING	2080.001 Hour Inst.	Water Temp(C)	CP
409048	NIEMUR R BARH-MLN RD	2080.001 Hour Inst.	Water Temp(C)	CP
409086	NIEMUR @ MALLAN SCH	2080.001 Hour Inst.	Water Temp(C)	CP

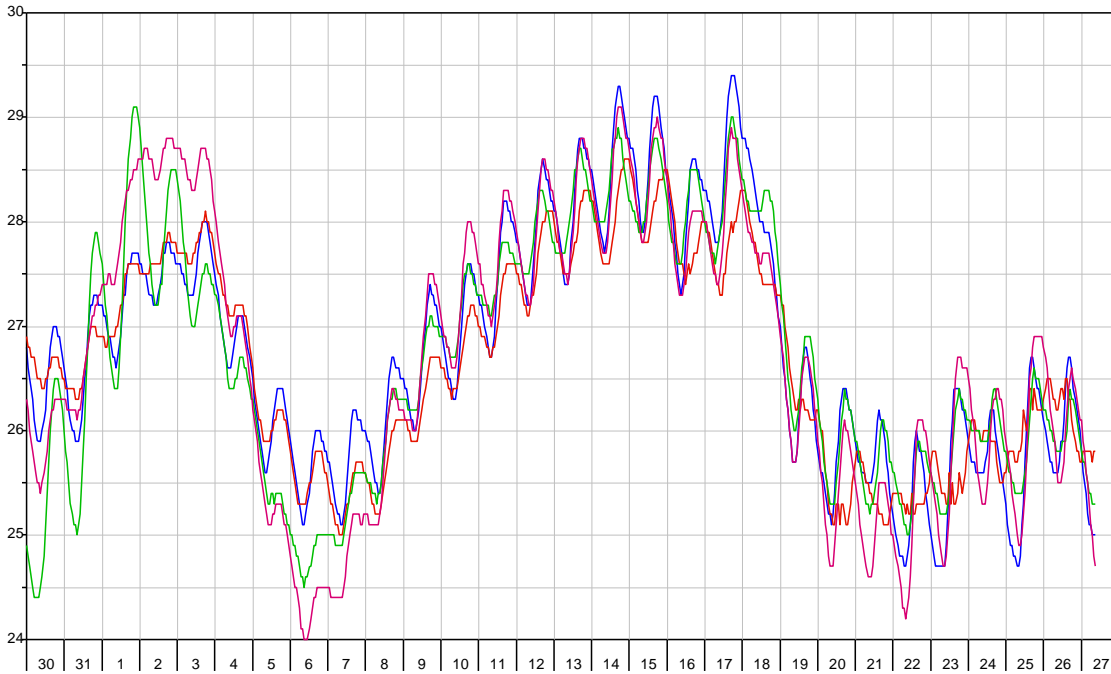


Figure 368: Continuous water temperature (°C) in the Wakool and Niemur rivers

Merran, Little Merran and Barber creeks

Figure 369 shows dissolved oxygen levels in Merran and Little Merran have continued to improve. Barbers Creek at Sandy Bridge has been dropping below 1 mg/L overnight and returning to levels above 4 mg/L during the day.

WaterNSW

HYPLOT V134 Output 27/01/2023

Period 29 Day 30/12/2022 to 28/01/2023 2022-23

— 409044	LT MERRAN FRANK/ BR	2351.001 Hour Inst.	DO (mg/l)	CP
— 409036	MERRAN CK U/S WAK R	2351.001 Hour Inst.	DO (mg/l)	CP
— 409111	BARBER @ SANDY BR.	2351.001 Hour Inst.	DO (mg/l)	CP

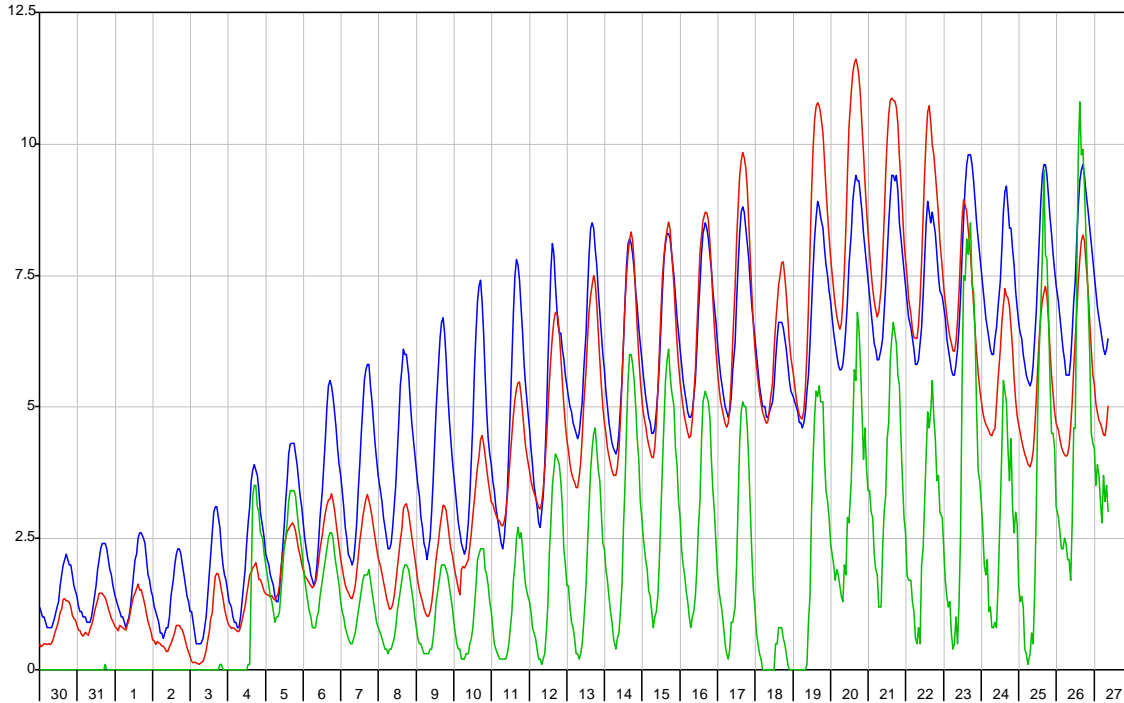


Figure 369: Continuous dissolved oxygen (mg/L) in the Merran, Little Merran and Barber creeks

WaterNSW

HYPLOT V134 Output 27/01/2023

Period 29 Day 30/12/2022 to 28/01/2023 2022-23

— 409044	LT MERRAN FRANK/ BR	2080.001 Hour Inst.	Water Temp(C)	CP
— 409036	MERRAN CK U/S WAK R	2080.001 Hour Inst.	Water Temp(C)	CP
— 409111	BARBER @ SANDY BR.	2080.001 Hour Inst.	Water Temp(C)	CP

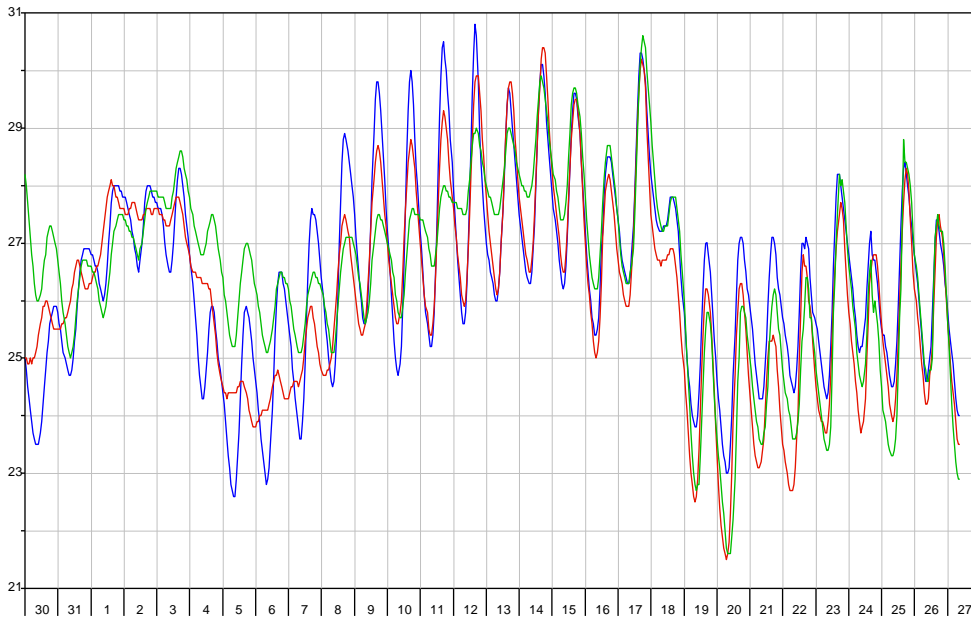


Figure 370: Continuous water temperature (°C) in the Merran, Little Merran and Barber creeks

Murray River

Water levels in the Murray River at Wentworth have fallen below the minor flood warning.

Monitoring by DELWP is showing the Murray River at Tocumwal, upstream of the Barmah/Millewa Forest, is oxygenated (Figure 371). Downstream of the forest at Barmah, dissolved oxygen is above 6 mg/L. Dissolved oxygen in the Goulburn River at McCoys Bridge is around 7 mg/L and the Campaspe River at Fehrings Lane is above 5 mg/L.

Dissolved oxygen in the Murray River at Barham and Wemen has increased above 6 mg/L. Monitoring at Colignan shows the mean daily dissolved oxygen is above 4 mg/L. The temporary monitoring site installed on the Murray River downstream of Wentworth was reading 4.8 mg/L on Friday 27 January (11:00).

The high dissolved oxygen results observed at Pental Island Pumps, Boundary Bend and Wemen appear to be due to the sensors coming out of the water.

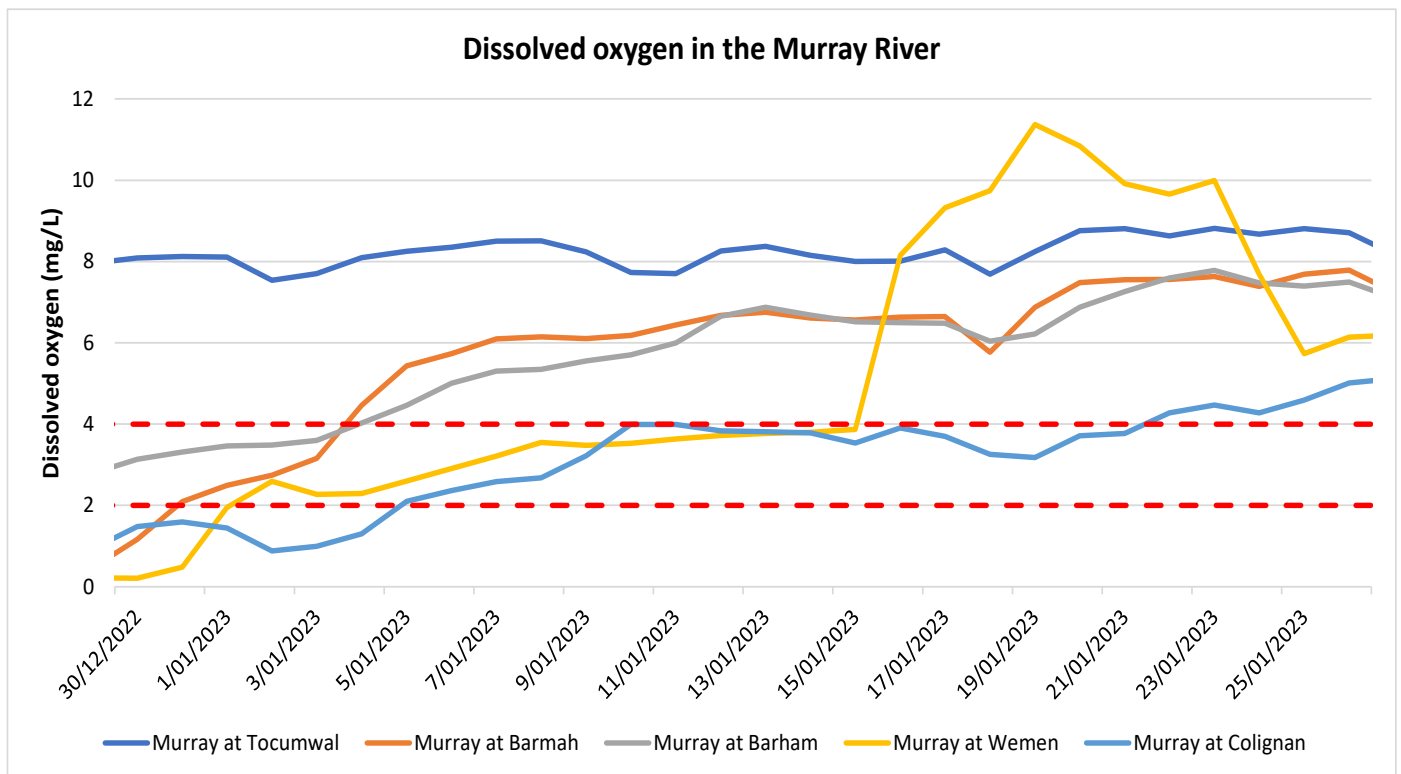


Figure 371: Continuous dissolved oxygen (mg/L) in the Murray River (data courtesy of DELWP)

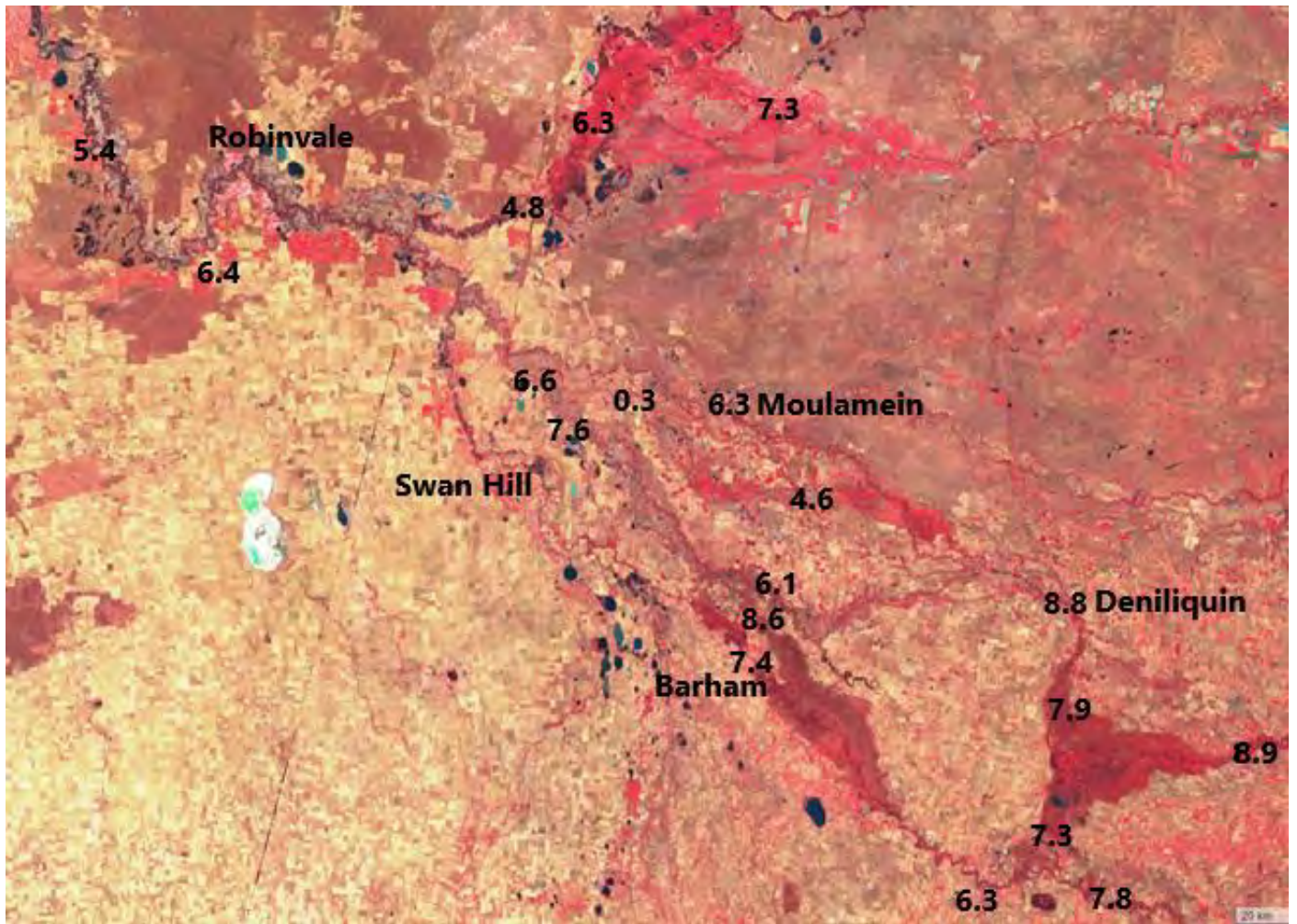


Figure 372: Satellite-derived Sentinel colour infrared image of the lower Murrumbidgee and mid Murray River catchments - 25 January 2023. Dissolved oxygen results 27 January 2023

Weather Outlook

The Bureau of Meteorology 8-day total rain forecast (27 January to 3 February) indicates the heaviest falls will be along the north coast, with totals decreasing toward the southwest corner of NSW (Figure 373). Forecast is for air temperatures at Echuca (Figure 374) and Mildura (Figure 375) to be above 30°C at the start of the week and slowly decreasing as the week progresses. There are no heatwaves forecast for NSW for Monday 30 January to Wednesday 1 February.

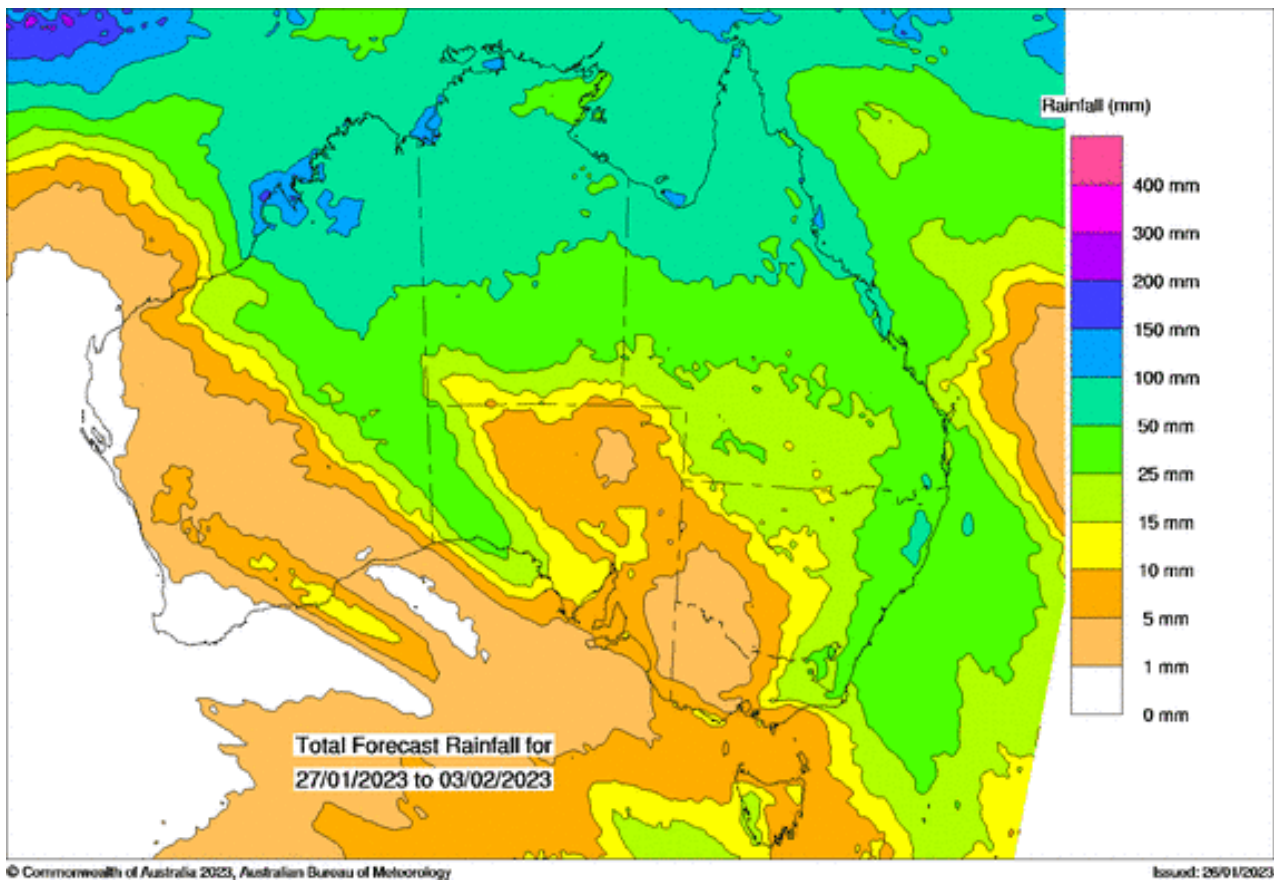


Figure 373: Bureau of Meteorology 8-day total rain forecast (27 January to 3 February)

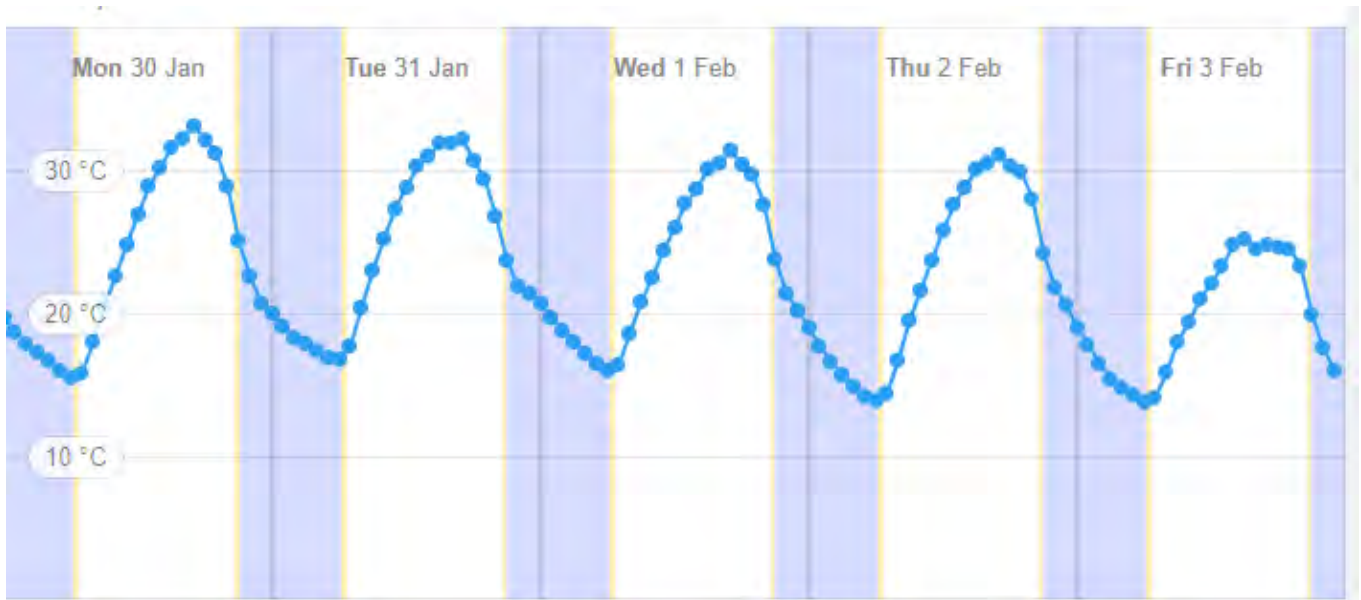


Figure 374: Forecast air temperatures for Echuca - 30 January to 3 February

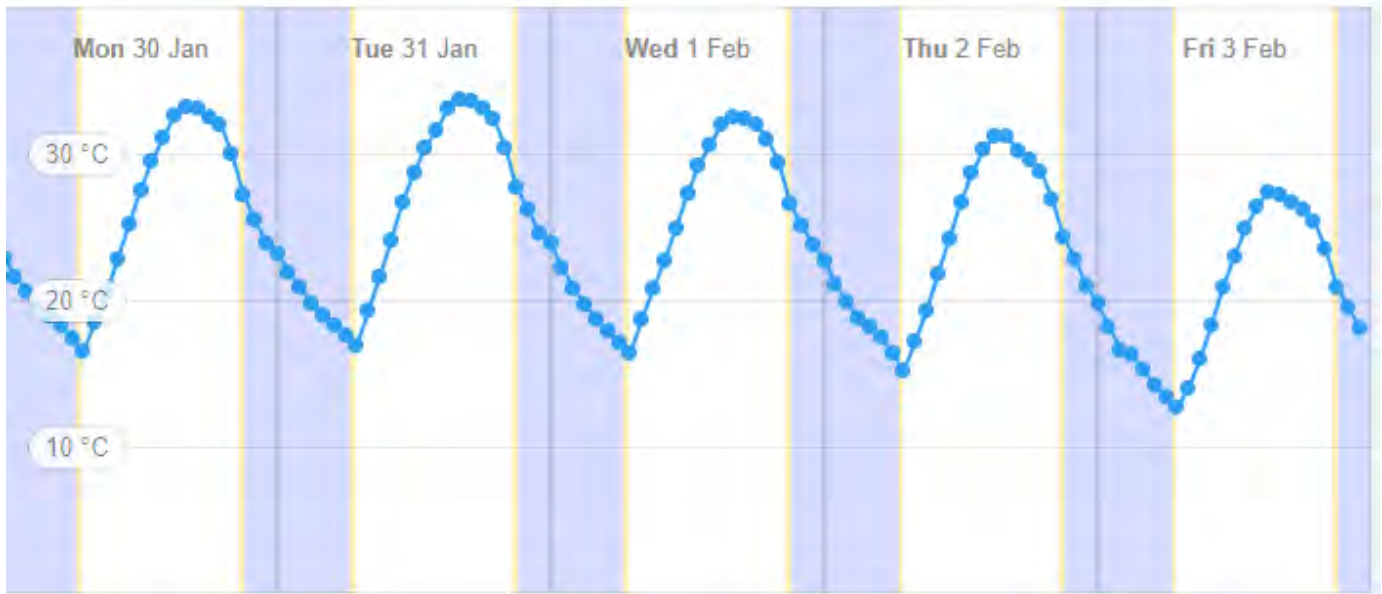


Figure 375: Forecast air temperatures for Mildura - 30 January to 3 February

Water quality update Meeting No. 16 – 6 February 2023

Northern Basin

Barwon River

Discharge in the Barwon River at Brewarrina has decreased to around 2,200 ML/day.

Dissolved oxygen results from the automated gauges in the Barwon River are showing diurnal fluctuations at Walgett (Dangar Bridge) and Brewarrina (Figure 376). At Geera levels have been dropping below 2 mg/L, with better readings at Walgett (Dangar Bridge) and Brewarrina. Water temperature is remaining between 27 and 31°C (Figure 377).

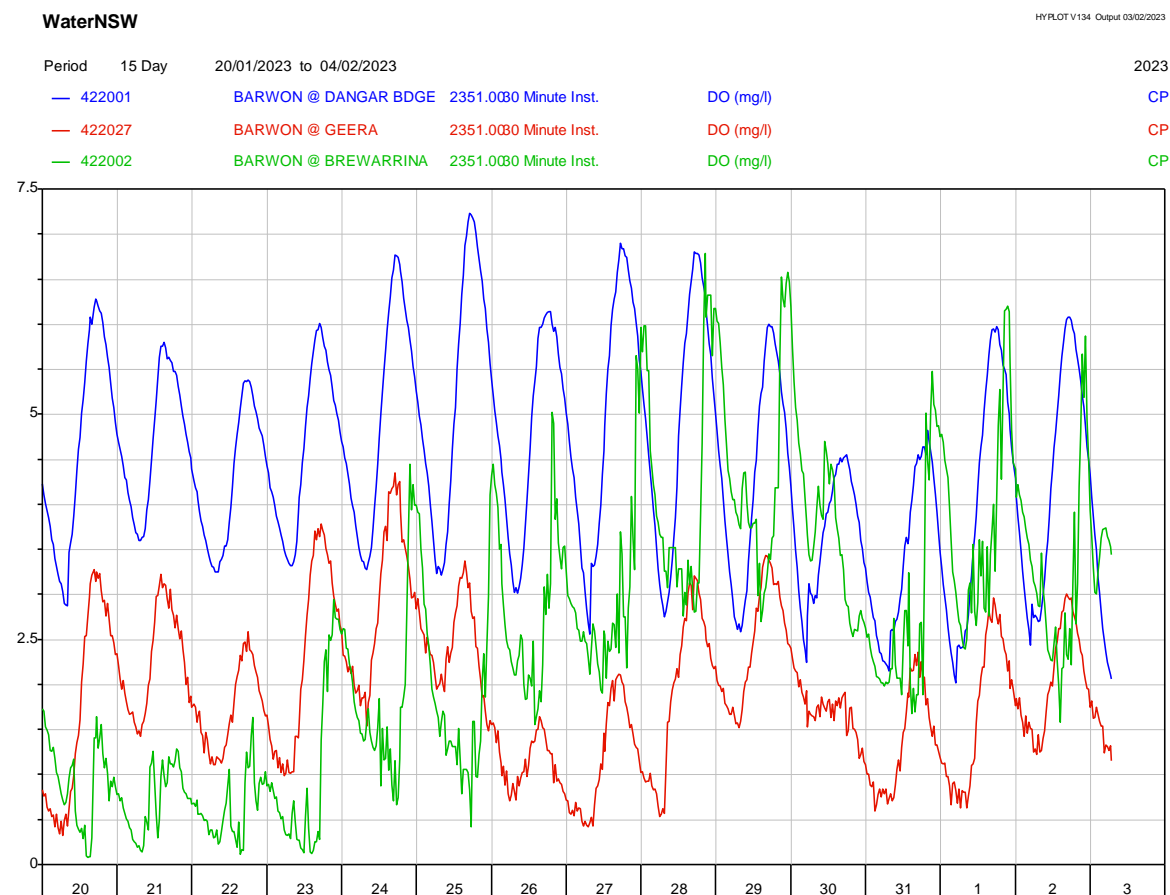


Figure 376: Continuous dissolved oxygen (mg/L) in the Barwon River

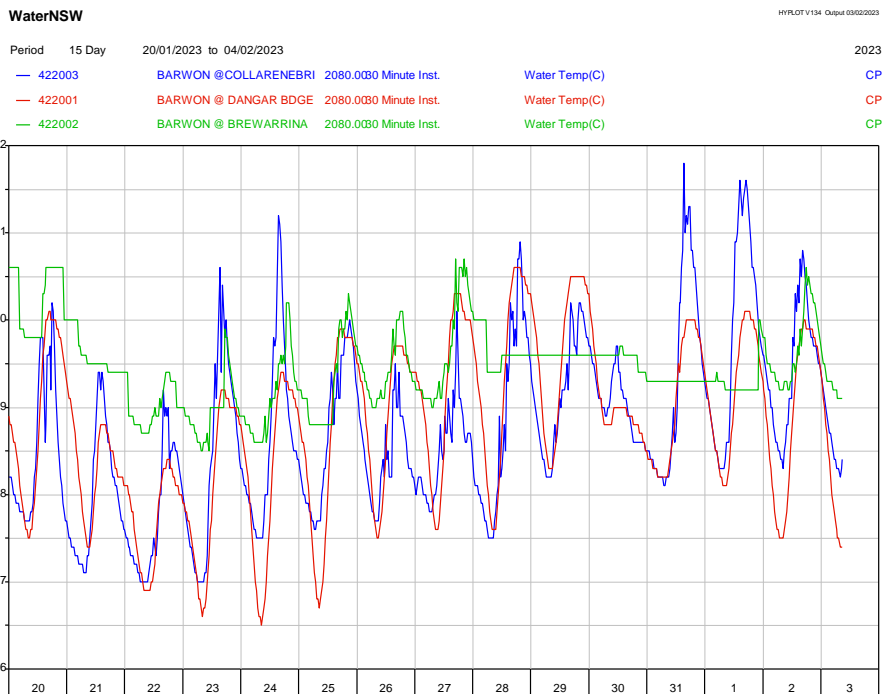


Figure 377: Continuous water temperature (°C) in the Barwon River

Darling River

Discharge at the Wilcannia gauge has decreased to around 10,800 ML/day while the flow in Talyawalka Creek has dropped to almost 5,000 ML/day (Figure 378).

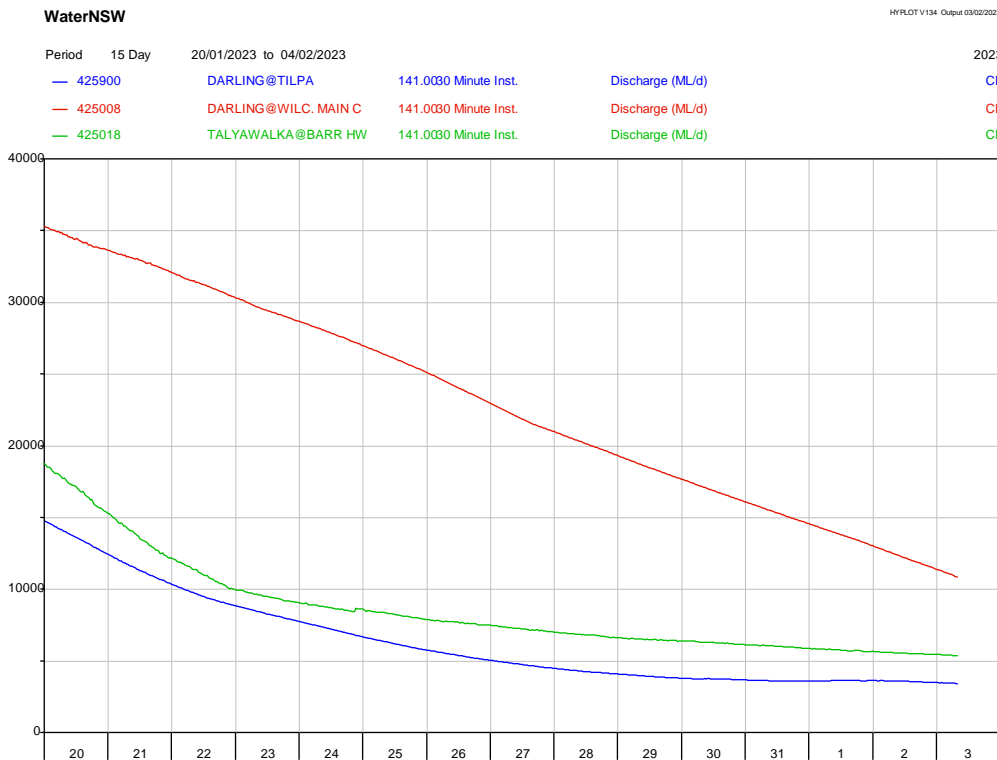


Figure 378: Discharge (ML/day) in the upper Darling River

Major flood warnings continue for Burtundy. There is a moderate flood warning for Menindee and Pooncarie. Discharge at Pooncarie is over 26,000 ML/day and increasing to over 25,000 ML/day at Burtundy (Figure 379).

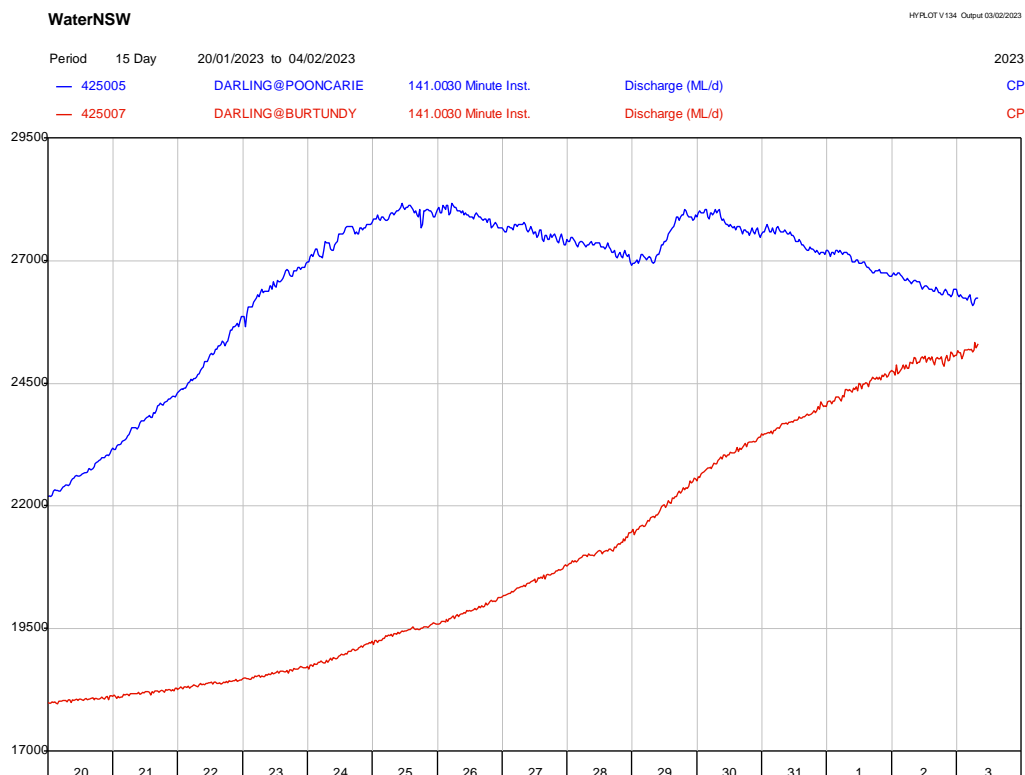


Figure 379: Discharge (ML/day) in the lower Darling River

Dissolved oxygen in the Darling River at Bourke and Louth has improved and increased above 4 mg/L over the past week (Figure 380). Oxygen readings at Wilcannia (Moorabin) had dropped to around 0 mg/L but have improved during the week (Figure 381). The readings from the temporary dissolved oxygen monitoring site downstream at Nellia Gaari on the Darling River upstream of Lake Wetherell have been declining until the sensor came out of the water on 2 February. Weir 32 has dissolved oxygen readings above 4 mg/L. Oxygen results at Burtundy had dipped below 2 mg/L but improved following sensor maintenance on 1 February.

WaterNSW

HYPLOT V134 Output 03/02/2023

Period 15 Day 20/01/2023 to 04/02/2023 2023
— 425003 DARLING@BOURKE TOWN 2351.0030 Minute Inst. DO (mg/l) CP
— 425004 DARLING@LOUTH 2351.0030 Minute Inst. DO (mg/l) CP

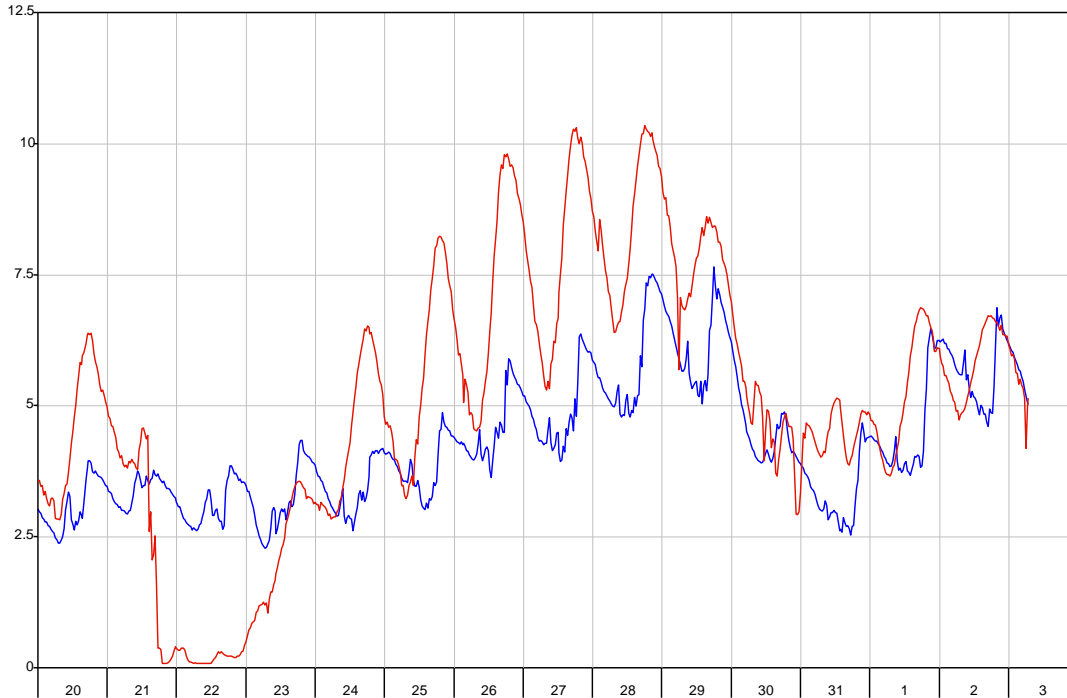


Figure 380: Continuous dissolved oxygen (mg/L) in the Darling River at Bourke and Louth

WaterNSW

HYPLOT V134 Output 03/02/2023

Period 15 Day 20/01/2023 to 04/02/2023 2023
— 425058 Darling R @ Moorabin 2351.0030 Minute Inst. DO (mg/l) CP
— 425060 NELLIA GAARI 2351.0030 Minute Inst. DO (mg/l) CP
— 425012 DARLING@US WEIR 32 2351.0030 Minute Inst. DO (mg/l) CP
— 425007 DARLING@BURTUNDY 2351.0030 Minute Inst. DO (mg/l) CP

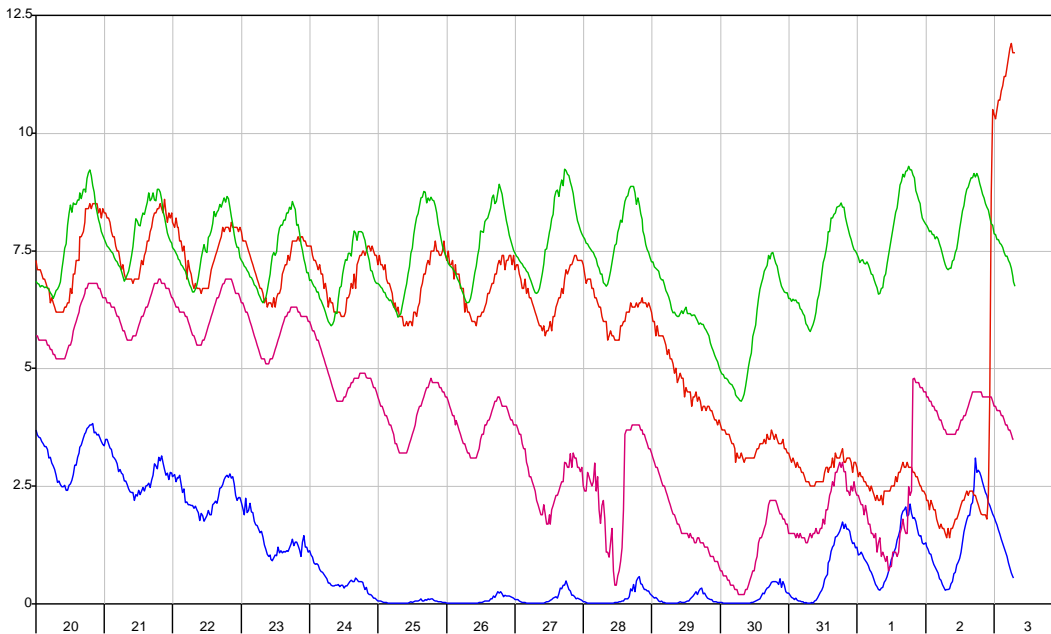


Figure 381: Continuous dissolved oxygen (mg/L) in the Darling River

Table 29: Hand-held dissolved oxygen results (mg/L) from the Darling River

Site	Sample date	Dissolved oxygen (mg/L)
Darling River at Pooncarie	30/01/2023 11:01	3.87
Darling River at Burtundy	31/01/2023 9:42	3.05
Darling River at Ellerslie	31/01/2023 9:06	2.62
Darling River at Tapio	31/01/2023 8:44	3.15

Figure 382 is a satellite derived colour infrared Sentinel image of Darling River and Menindee Lakes on 2 February 2023, highlighting floodwater has largely returned to the main river channel. Some water is pushing from Lake Wetherell into Lakes Tandure and Pamamaroo.

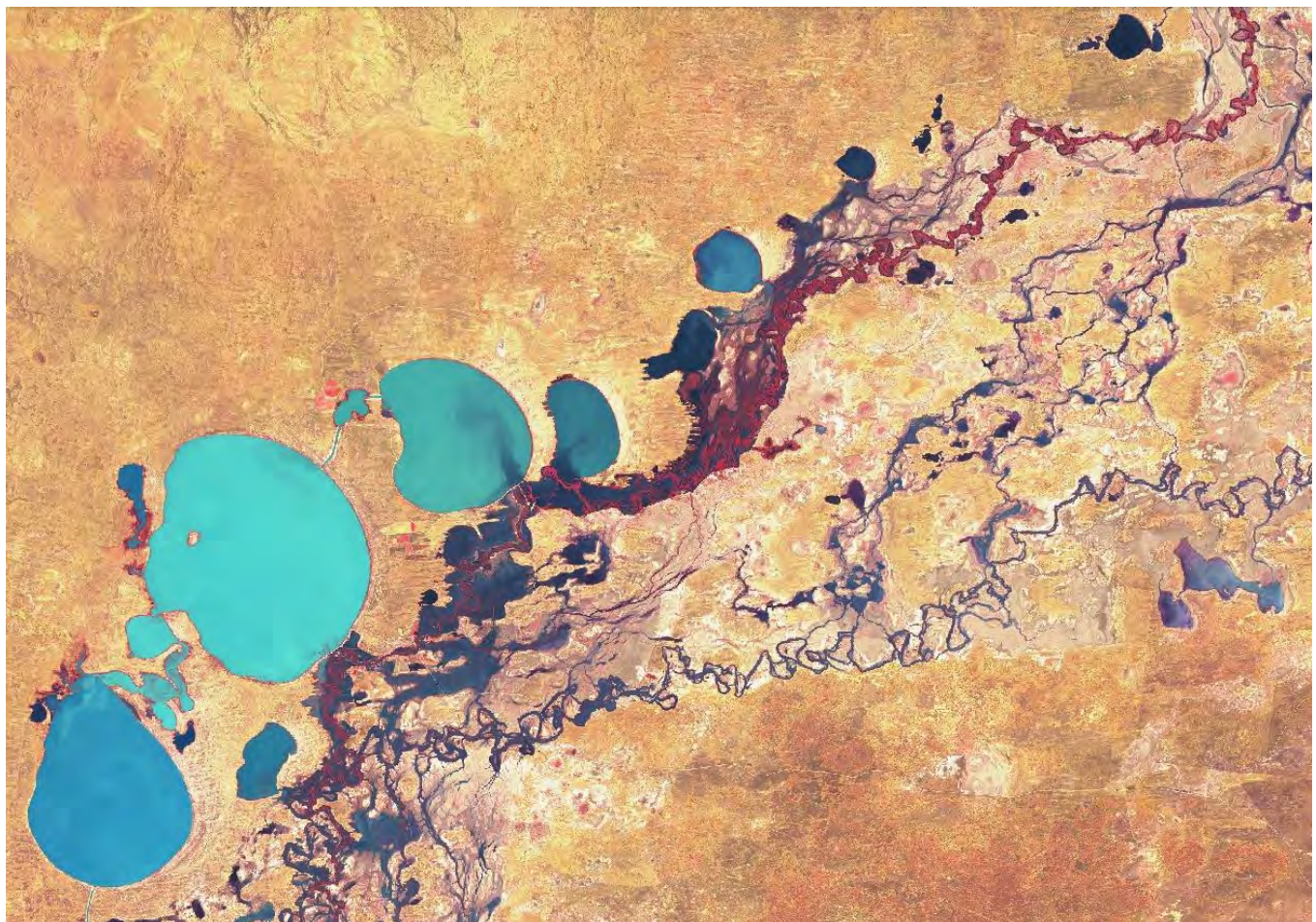


Figure 382: Satellite derived infrared image of Darling River and Menindee Lakes – 2 February 2023

Water temperatures are reaching 30°C at Bourke, and the high 20's at Wilcannia (Moorabin). The cool change has caused water temperatures at Weir 32 and Burtundy to decrease toward the low 20's (Figure 383).

WaterNSW

HYPLOT V134 Output 03/02/2023

Period 15 Day 20/01/2023 to 04/02/2023 2023

— 425003	DARLING@BOURKE TOWN	2080.000 Minute Inst.	Water Temp(C)	CP
— 425058	Darling R @ Moorabin	2080.000 Minute Inst.	Water Temp(C)	CP
— 425012	DARLING@US WEIR 32	2080.000 Minute Inst.	Water Temp(C)	CP
— 425007	DARLING@BURTUNDY	2080.000 Minute Inst.	Water Temp(C)	CP

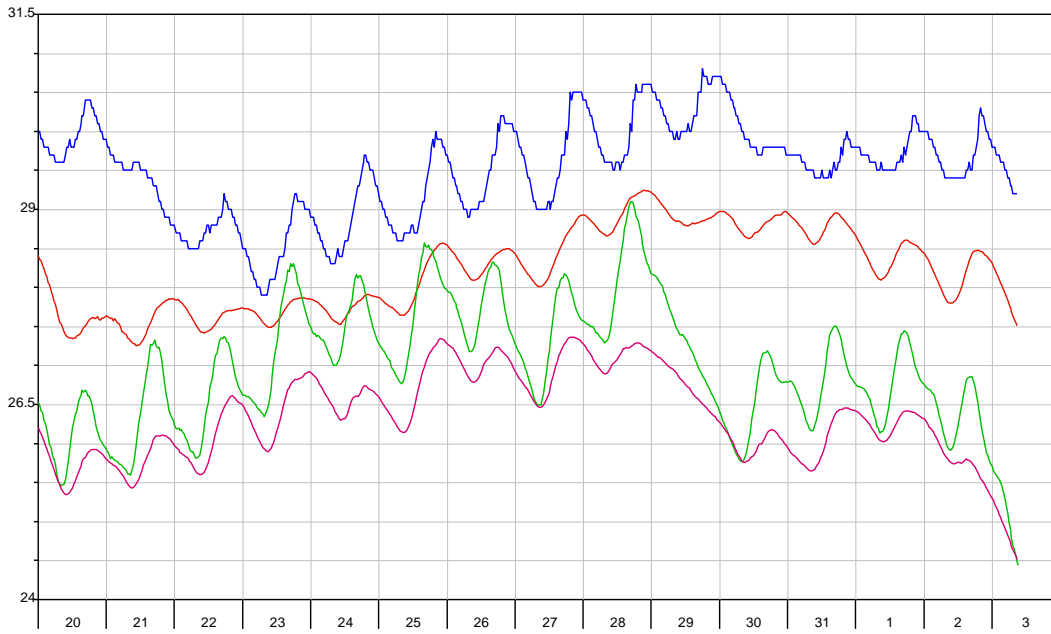


Figure 383: Continuous water temperature (°C) in the Darling River

Southern Basin

Lachlan River

Discharge in the Lachlan River at Forbes and Condobolin is around 700 ML/day. Discharge at Hillston is decreasing towards 2,000 ML/day (Figure 384). Minor flooding continues at Booligal with discharge remaining at around 4,000 ML/day.

With lower releases from Wyangala Dam there is a risk of high electrical conductivity impacting the town water supply in Cowra. Electrical conductivity was 954 $\mu\text{S}/\text{cm}$ on 1 February, which is getting into the Fair range for drinking water. Proposing the release of 100 ML/day from Wyangala Dam in addition to existing releases.

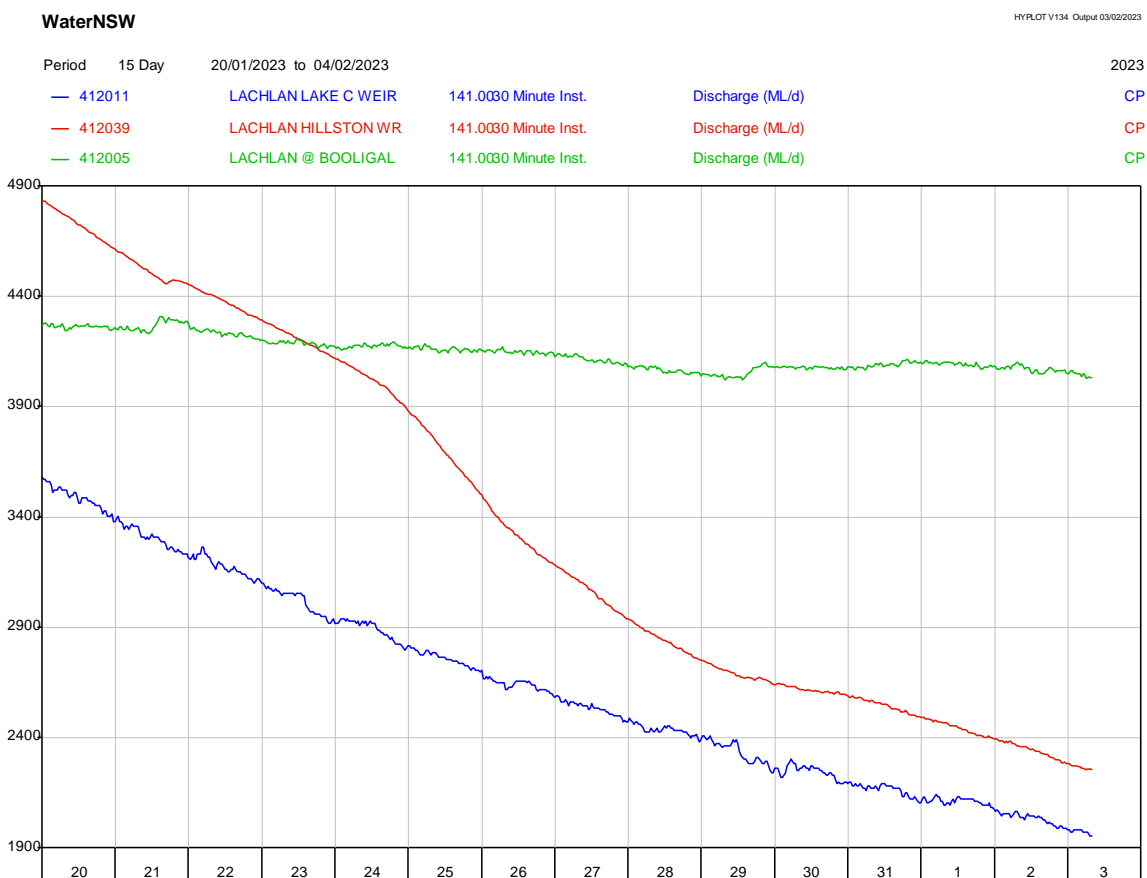


Figure 384: Discharge (ML/day) in the Lachlan River

Dissolved oxygen in the Lachlan River is above 3 mg/L at most monitoring sites. Readings at Condobolin had dropped rapidly but have improved again. Booligal is showing good diurnal patterns, fluctuating around 4 mg/L (Figure 385).

WaterNSW

HYPLOT V134 Output 03/02/2023

Period	15 Day	20/01/2023 to 04/02/2023			2023
—	412004	LACHLAN FORBES CTTNS	2351.0030 Minute Inst.	DO (mg/l)	CP
—	412006	LACHLAN CONDOBOLIN B	2351.0030 Minute Inst.	DO (mg/l)	CP
—	412011	LACHLAN LAKE C WEIR	2351.0030 Minute Inst.	DO (mg/l)	CP
—	412039	LACHLAN HILLSTON WR	2351.0030 Minute Inst.	DO (mg/l)	CP
—	412005	LACHLAN @ BOOLIGAL	2351.0030 Minute Inst.	DO (mg/l)	CP

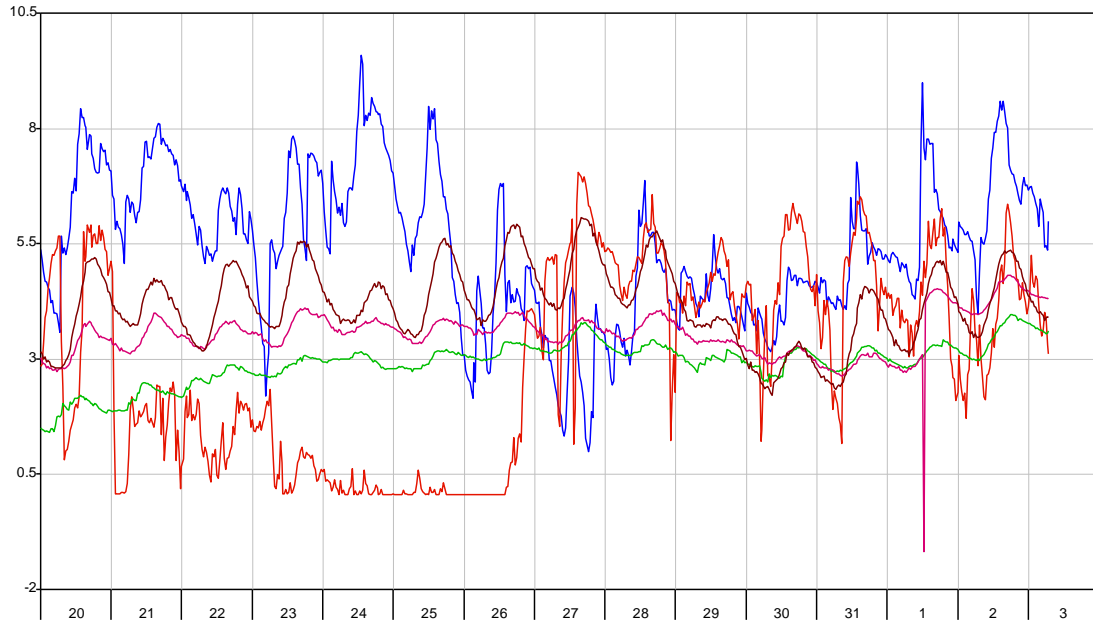


Figure 385: Continuous dissolved oxygen (mg/L) in the Lachlan River

WaterNSW

HYPLOT V134 Output 03/02/2023

Period	15 Day	20/01/2023 to 04/02/2023			2023
—	412004	LACHLAN FORBES CTTNS	2080.0030 Minute Inst.	Water Temp(C)	CP
—	412011	LACHLAN LAKE C WEIR	2080.0030 Minute Inst.	Water Temp(C)	CP
—	412039	LACHLAN HILLSTON WR	2080.0030 Minute Inst.	Water Temp(C)	CP
—	412005	LACHLAN @ BOOLIGAL	2080.0030 Minute Inst.	Water Temp(C)	CP

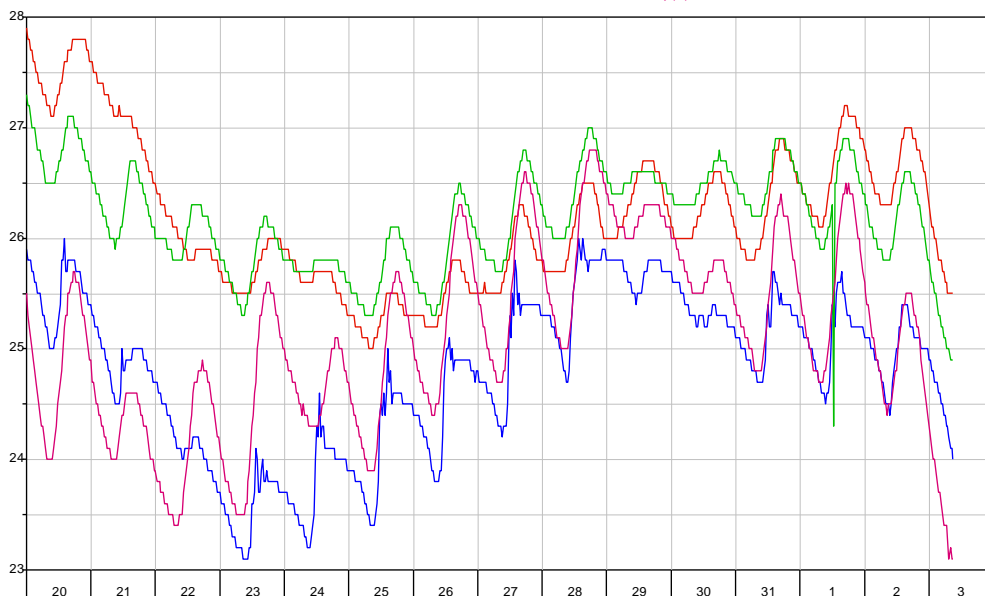


Figure 386: Continuous water temperature (°C) in the Lachlan River

Murrumbidgee River

The river level in the Murrumbidgee River at Maude Weir is around 5,700 ML/day. Discharge at Balranald has slowly decreased below 9,000 ML/day (Figure 387).

Dissolved oxygen levels in the Murrumbidgee River at Redbank and Balranald are above 5.5 mg/L. (Figure 388).

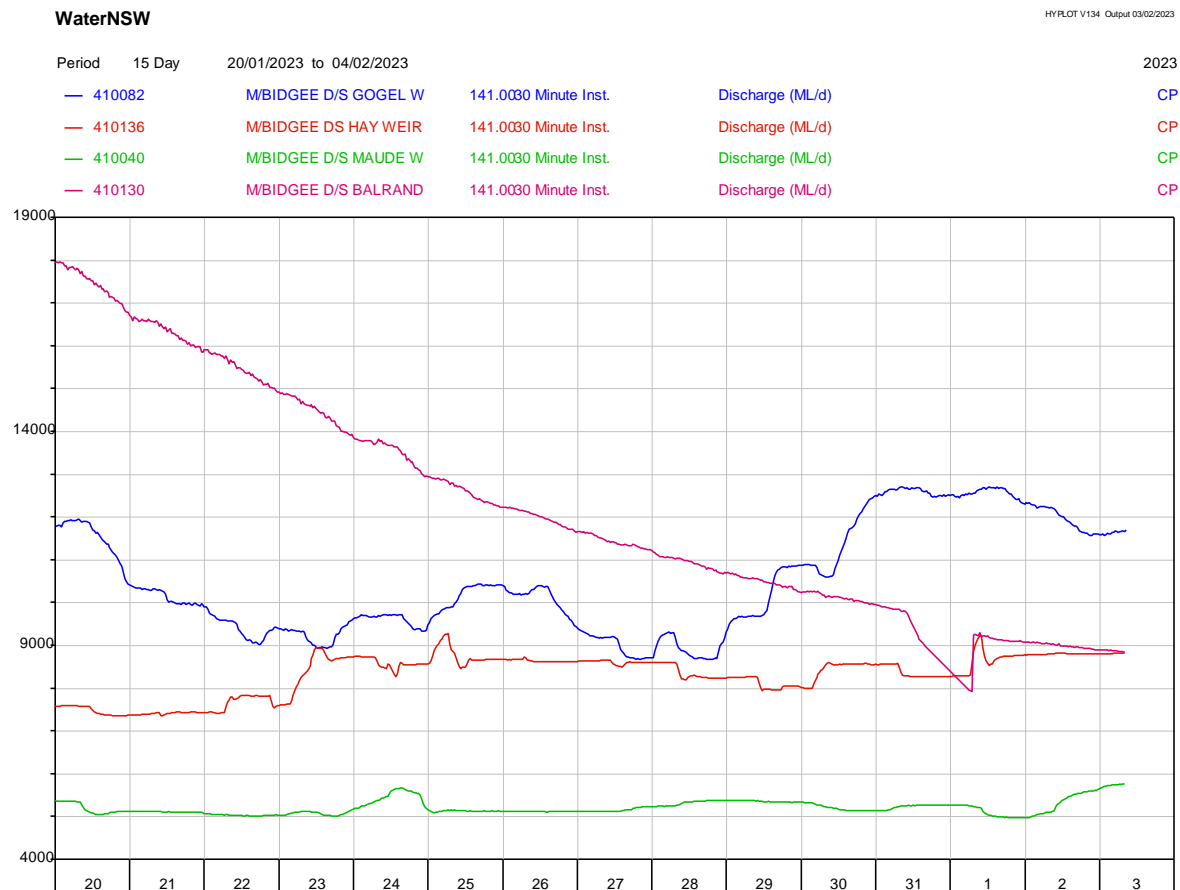


Figure 387: Discharge (ML/day) in the Murrumbidgee River

WaterNSW

HY/LOT V134 Output 03/02/2023

Period 15 Day 20/01/2023 to 04/02/2023 2023

- 410040 MBIDGEE D/S MAUDE W 2351.00B0 Minute Inst. DO (mg/l) CP
- 410041 MBIDGEE D/S REDBANK 2351.00B0 Minute Inst. DO (mg/l) CP
- 410130 MBIDGEE D/S BALRAND 2351.00B0 Minute Inst. DO (mg/l) CP

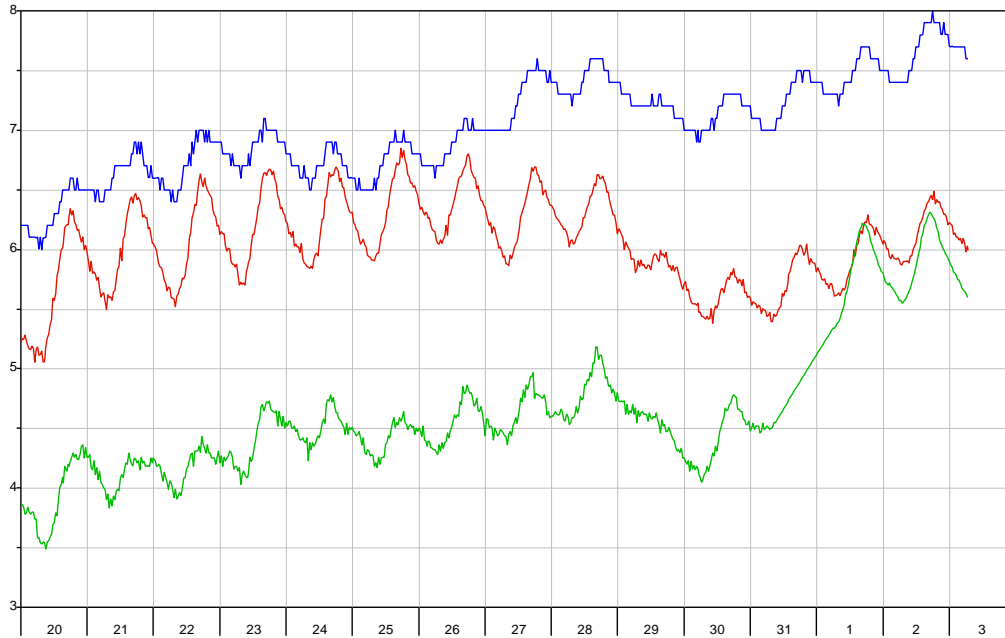


Figure 388: Continuous dissolved oxygen (mg/L) in the Murrumbidgee River
 Table 30: Hand-held dissolved oxygen readings from Murrumbidgee River

Site	Sample Date	DO (mg/L)
Murrumbidgee River at Balrand	30/01/2023 14:08	4.83

WaterNSW

HY/LOT V134 Output 03/02/2023

Period 15 Day 20/01/2023 to 04/02/2023 2023

- 410040 MBIDGEE D/S MAUDE W 2080.00B0 Minute Inst. Water Temp(C) CP
- 410041 MBIDGEE D/S REDBANK 2080.00B0 Minute Inst. Water Temp(C) CP
- 410130 MBIDGEE D/S BALRAND 2080.00B0 Minute Inst. Water Temp(C) CP

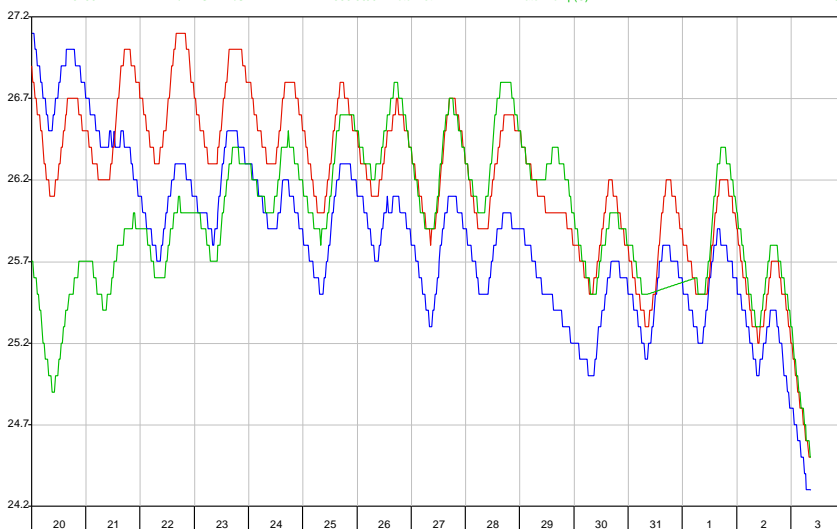


Figure 389: Continuous water temperature (°C) in the Murrumbidgee River

Kolety/Edward River

Discharge in the Kolety/Edward River is steady at over 2,000 ML/day down the system.

Dissolved oxygen in the Kolety/Edward River has improved (Figure 390). Readings from all three sites are above 5 mg/L. Water temperatures have decreased below 25°C (Figure 391).

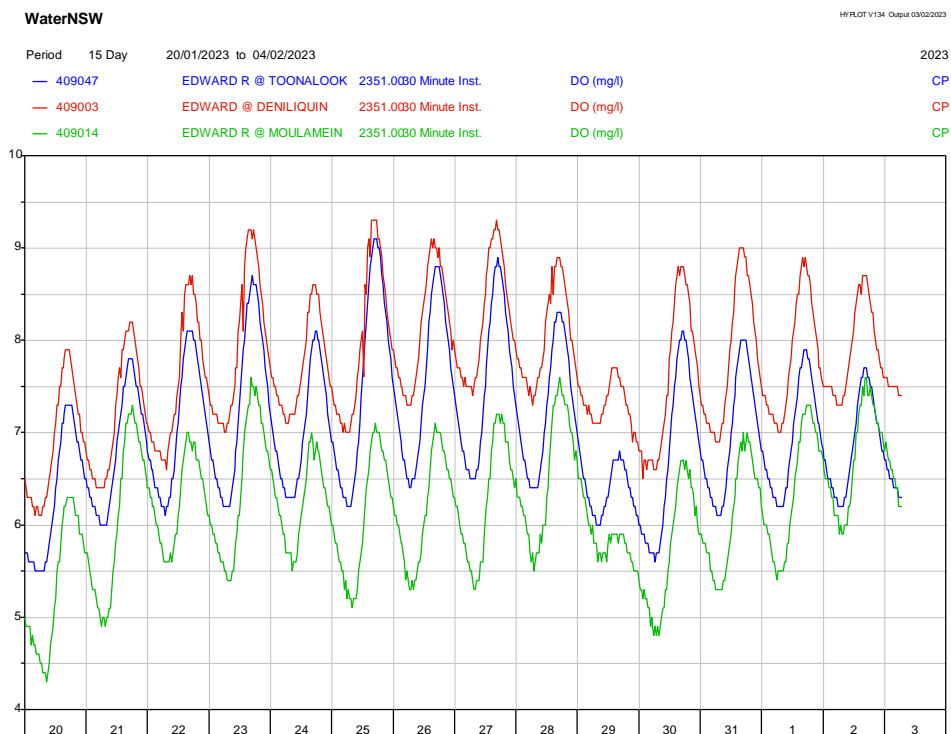


Figure 390: Continuous dissolved oxygen (mg/L) in the Kolety/Edward River

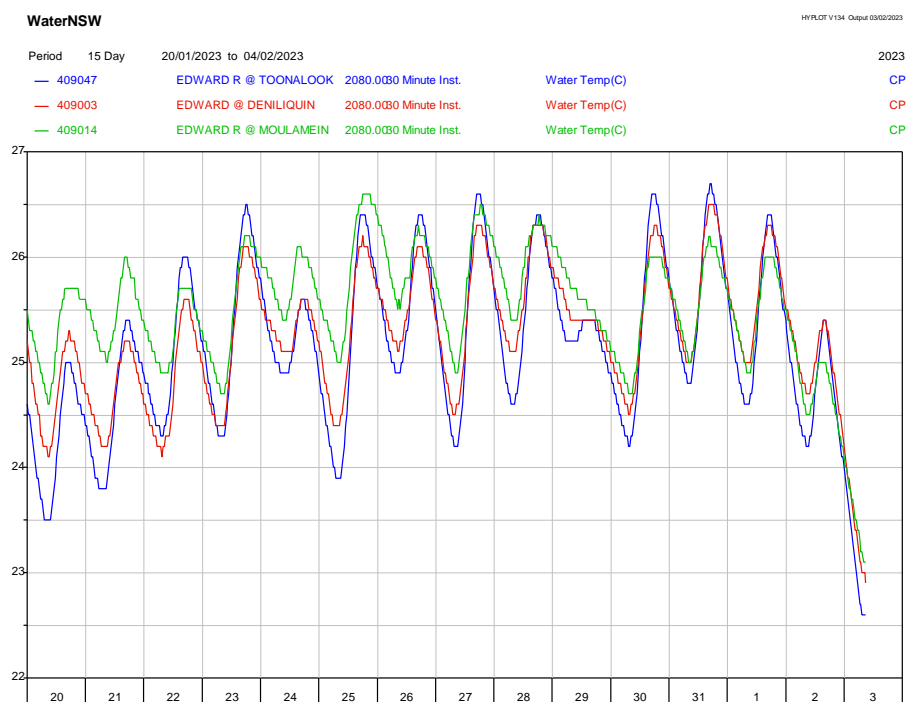


Figure 391: Continuous water temperature (°C) in the Kolety/Edward River

Wakool and Niemur rivers

Discharge in the Wakool River at Coonambit Bridge is stable at 2,000 ML/day and at Gee Gee Bridge has dropped to almost 500 ML/day. The Niemur River at Barham-Moulamein Road and Mallan School is flowing at just over 1,000 ML/day.

Figure 392 highlights dissolved oxygen levels have improved in the Wakool River at Gee Gee Bridge and Stoney Crossing and Niemur River at Barham-Moulamein Road. Dissolved oxygen results from the automated gauging station at Mallan School have also improved but remain low.

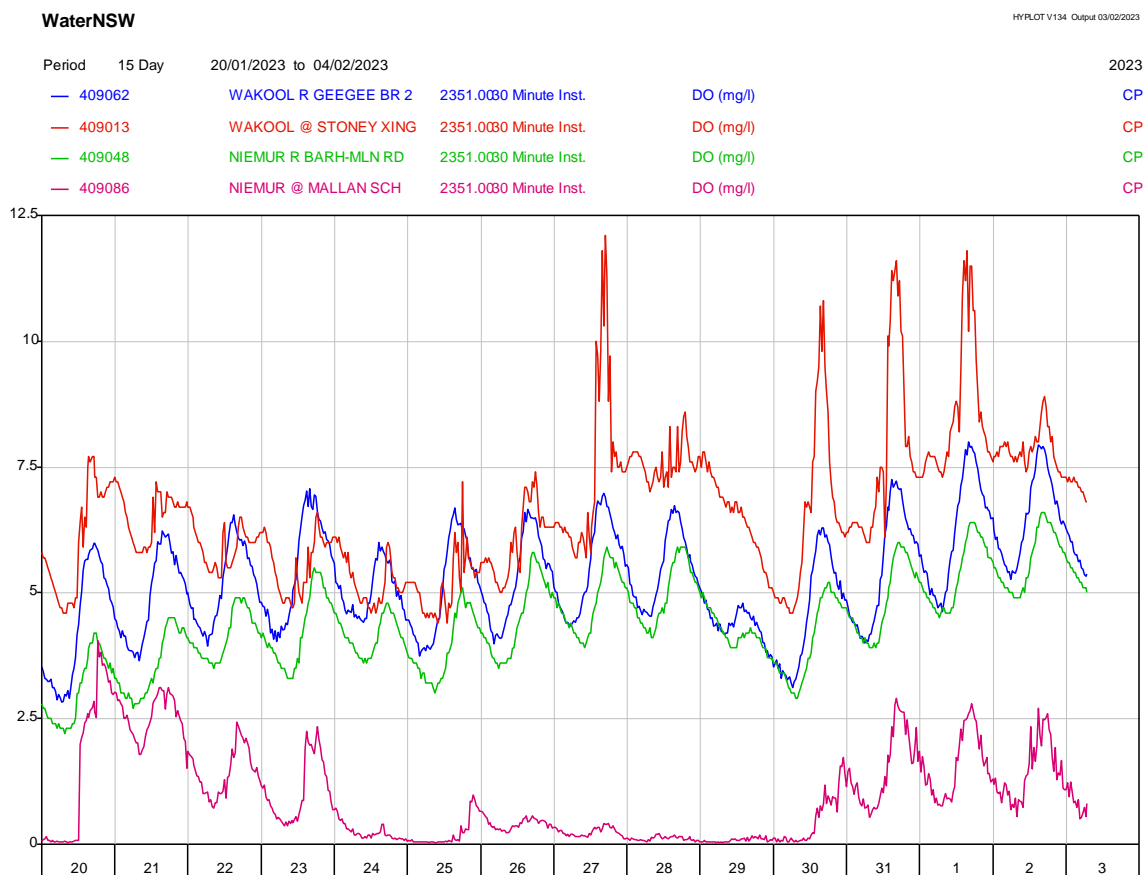


Figure 392: Continuous dissolved oxygen (mg/L) in the Wakool and Niemur rivers

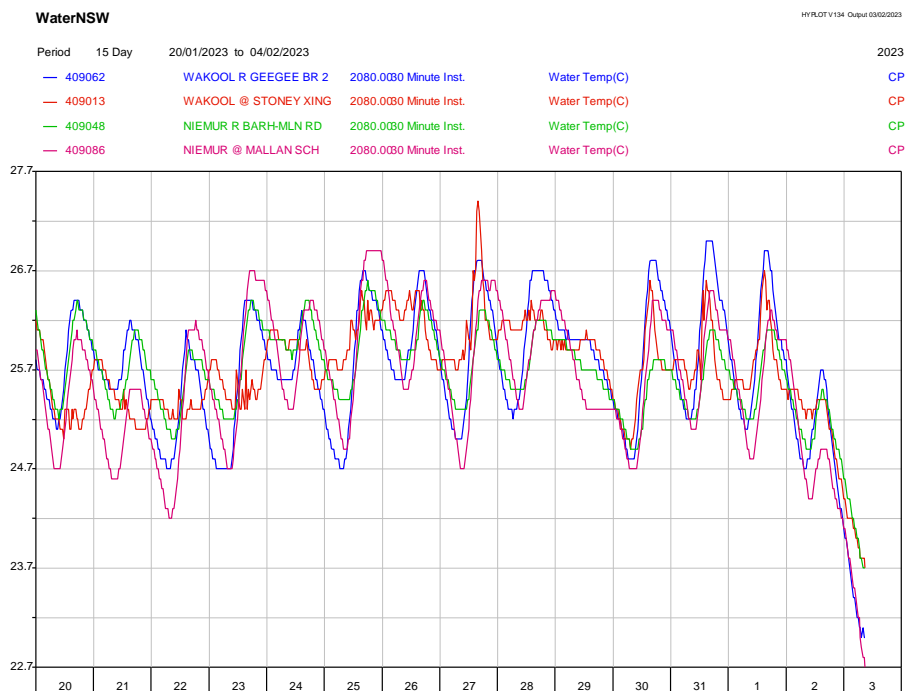


Figure 393: Continuous water temperature (°C) in the Wakool and Niemur rivers

Merran, Little Merran and Barber creeks

Figure 394 shows dissolved oxygen levels in Merran and Little Merran are remaining above 4 mg/L. Barbers Creek at Sandy Bridge has improved and showing large diurnal fluctuations.

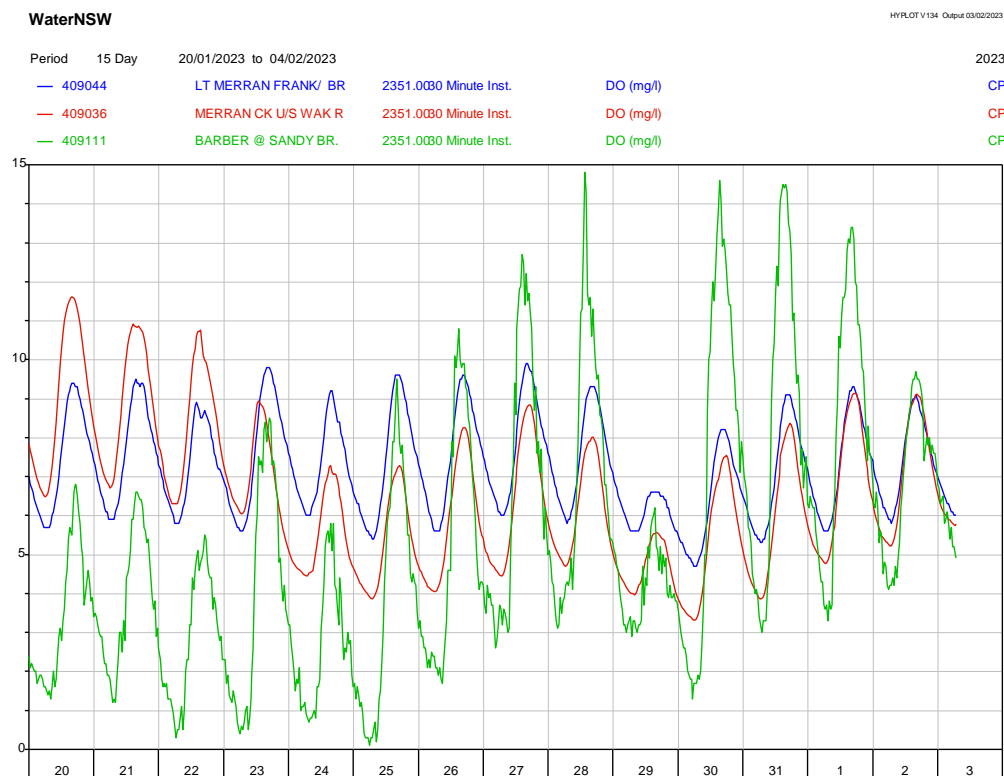


Figure 394: Continuous dissolved oxygen (mg/L) in the Merran, Little Merran and Barber creeks

Murray River

Monitoring by DELWP is showing the Murray River at Tocumwal, upstream of the Barmah/Millewa Forest, is oxygenated (Figure 395). Downstream of the forest at Barmah, dissolved oxygen is above 7 mg/L. Dissolved oxygen in the Goulburn River at McCoys Bridge is around 7.1 mg/L and the Campaspe River at Fehrings Lane is 5.8 mg/L.

Dissolved oxygen in the Murray River at Barham and Wemen has increased above 6 mg/L. Monitoring at Colignan shows the mean daily dissolved oxygen has reached 5 mg/L. The temporary monitoring site installed on the Murray River downstream of Wentworth was reading 6.4 mg/L on Friday 3 February (13:00).

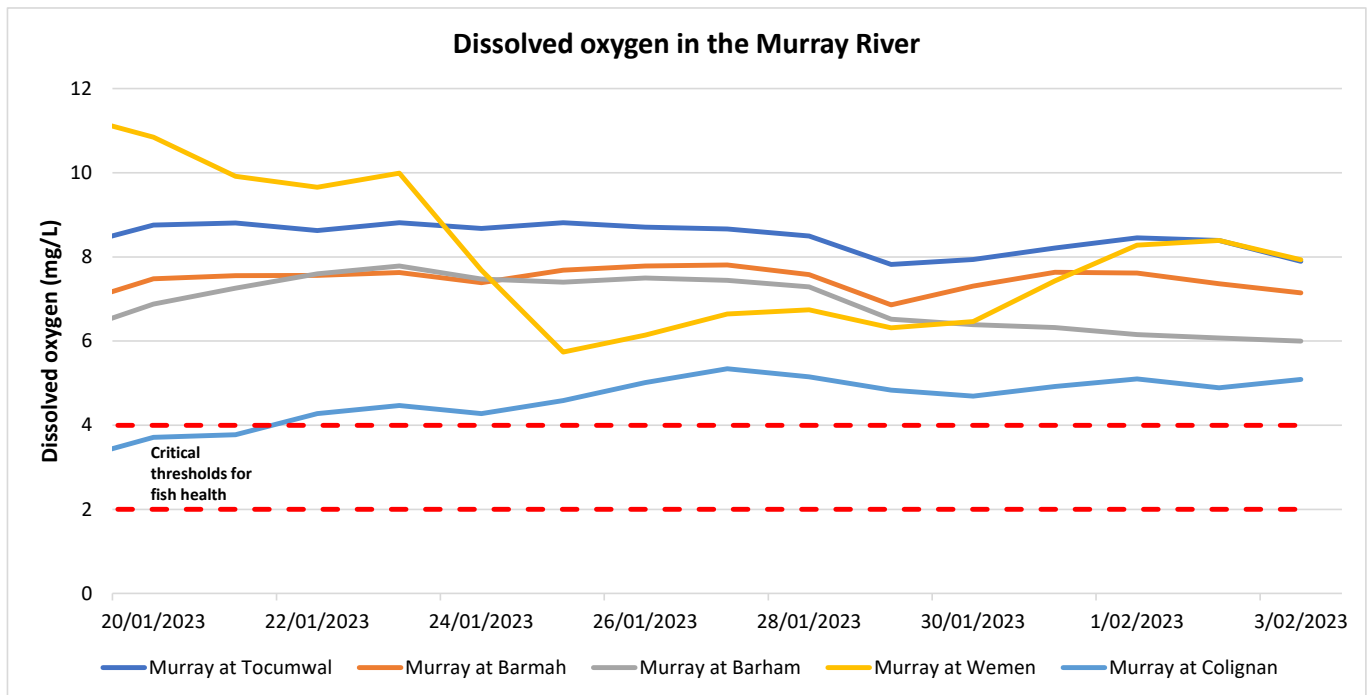


Figure 395: Continuous dissolved oxygen (mg/L) in the Murray River (data courtesy of DELWP)

Table 31: Hand-held dissolved oxygen readings from Murray River– 31 January 2023

Site	Sample date	DO (mg/L)
Murray River U/S Euston Weir	31/01/2023 10:45	6.22
Murray River at Mt Dispersion	31/01/2023 12:25	6.89
Murray River at Buronga	31/01/2023 13:38	6.57
Murray River at Curlwaa	31/01/2023 8:08	5.42

Weather Outlook

The Bureau of Meteorology 8-day total rain forecast (3 to 10 February) indicates the heaviest falls will be along the far north and south coasts, with totals decreasing toward the southwest corner of NSW (Figure 396). Forecast is for maximum air temperatures at Menindee (Figure 397) and Mildura (Figure 398) to be above 30°C next week. There are no heatwaves forecast for western NSW.

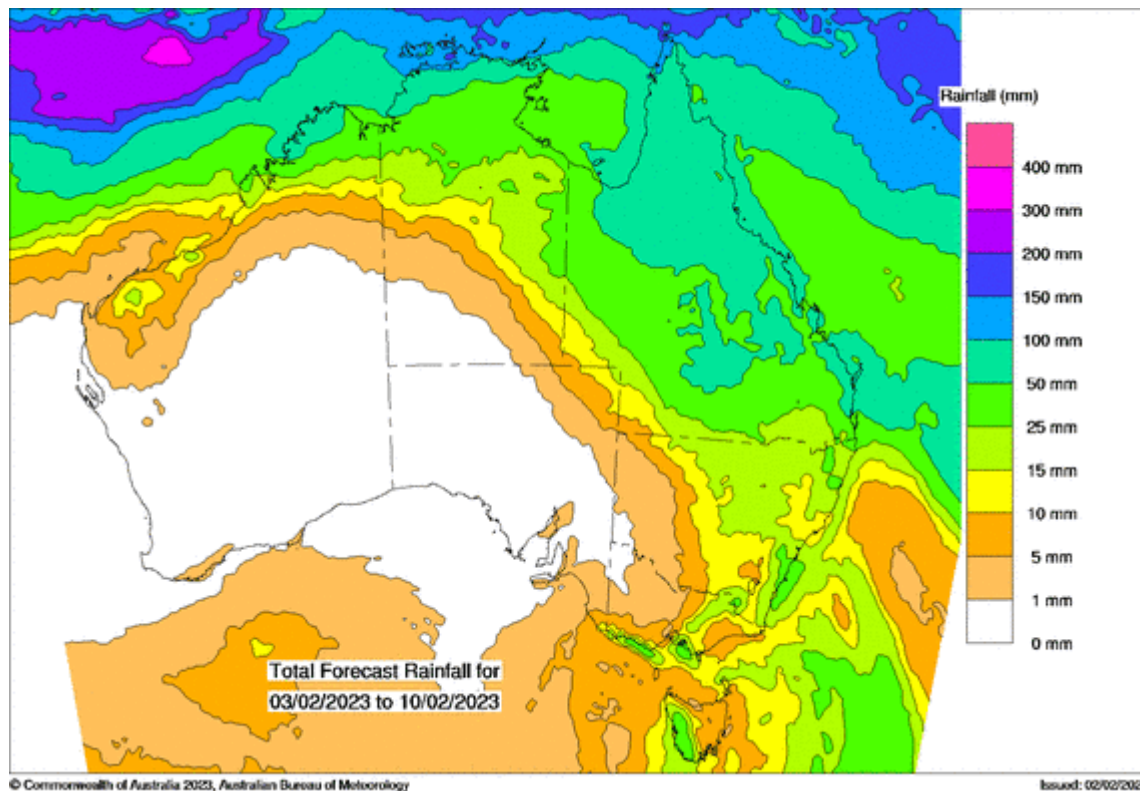


Figure 396: Bureau of Meteorology 8-day total rain forecast (3 to 10 February)

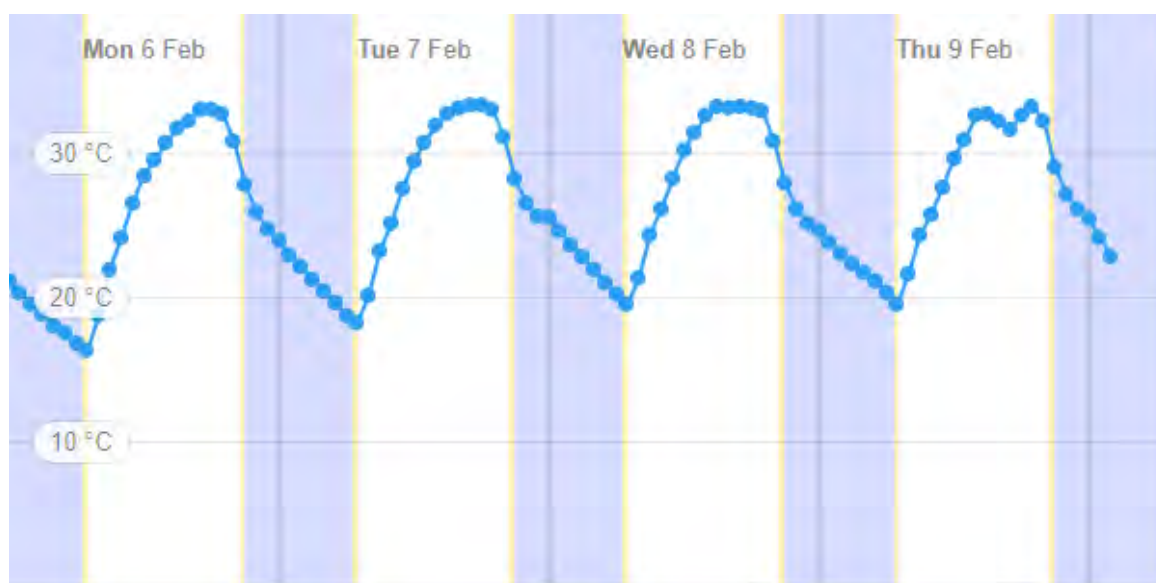


Figure 397: Forecast air temperatures for Menindee – 6 to 9 February

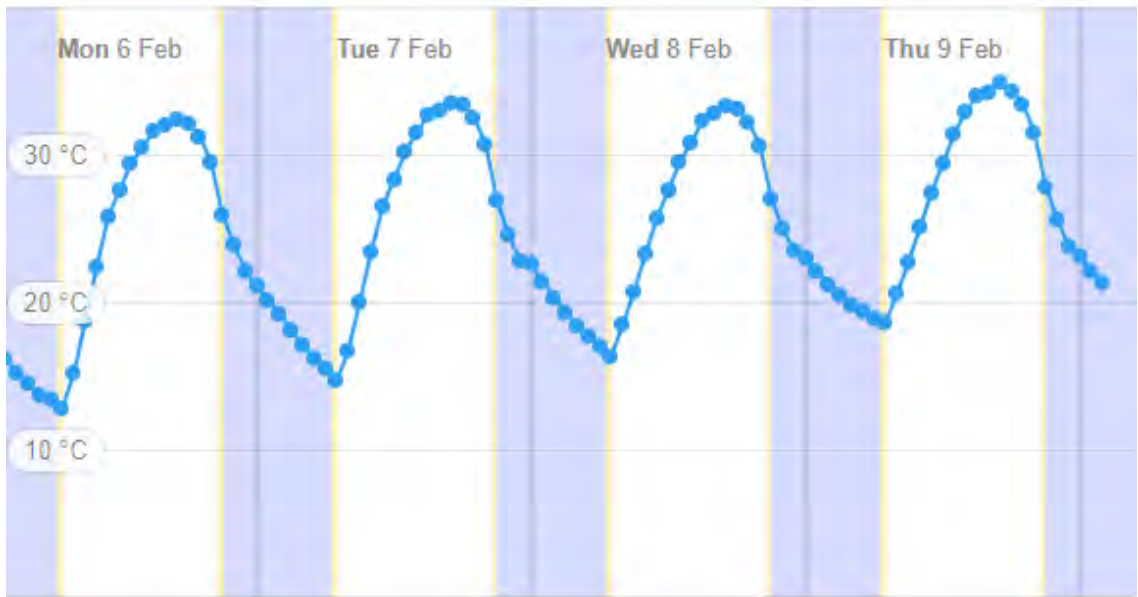


Figure 398: Forecast air temperatures for Mildura – 6 to 9 February

Water quality update Meeting No. 17 – 13 February 2023

Northern Basin

Barwon River

Discharge in the Barwon River at Brewarrina has decreased to around 2,300 ML/day.

Dissolved oxygen results from the automated gauges in the Barwon River are showing levels at Collarenebri have dropped below 2 mg/L with better readings at Walgett (Dangar Bridge) and Brewarrina (Figure 399). Water temperature is remaining between 27 and 31°C (Figure 400). Handheld readings confirm the lower dissolved oxygen at Collarenebri (Table 32).

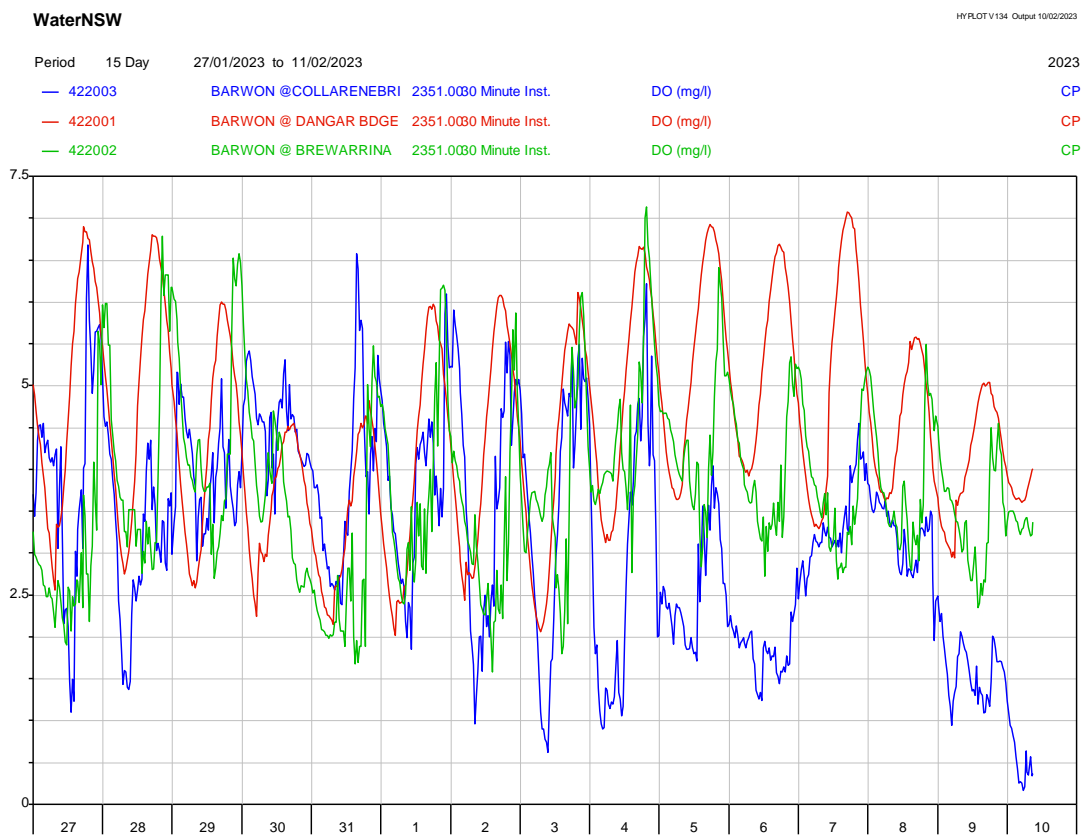


Figure 399: Continuous dissolved oxygen (mg/L) in the Barwon River

Table 32: Hand-held dissolved oxygen results (mg/L) from the Barwon River and tributaries

Site	Sample date	Dissolved oxygen (mg/L)
Weir River at Talwood	6/02/2023 13:47	2.98
Barwon River at Mungindi	6/02/2023 11:45	5.18
Gil Gil Creek at Collarenebri Road Bridge	6/02/2023 10:35	7.18
Moomin Creek at Iffley	6/02/2023 8:36	5.53
Mehi River at Bronte	6/02/2023 8:52	5.00
Barwon River at Collarenebri	6/02/2023 9:33	2.98
Namoi River at Walgett	7/02/2023 10:54	9.91
Barwon River at Dangar Bridge (Walgett)	7/02/2023 10:27	5.6
Barwon River at Brewarrina	7/02/2023 15:58	8.44

Period 15 Day 27/01/2023 to 11/02/2023

2023

- 422003 BARWON @ COLLARENEBRI 2080.0030 Minute Inst. Water Temp(C) CP
- 422001 BARWON @ DANGAR BDGE 2080.0030 Minute Inst. Water Temp(C) CP
- 422002 BARWON @ BREWARRINA 2080.0030 Minute Inst. Water Temp(C) CP

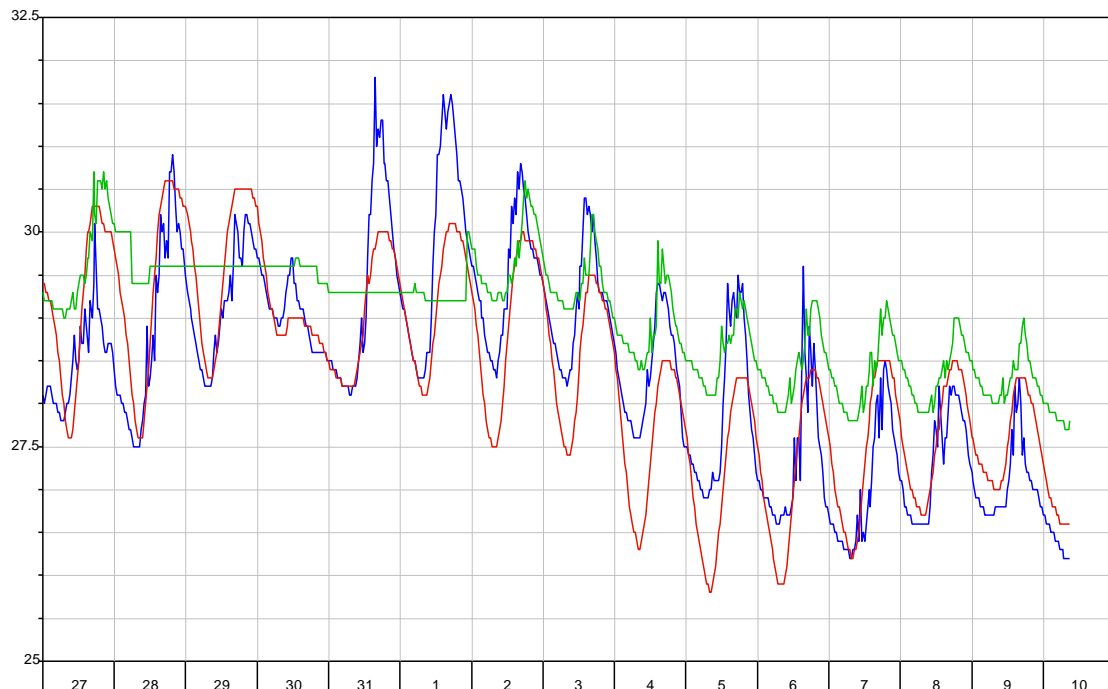


Figure 400: Continuous water temperature (°C) in the Barwon River

Table 33: Hand-held dissolved oxygen results (mg/L) from the Intersecting Streams

Site	Sample date	Dissolved oxygen (mg/L)
Narran River at New Angledool	7/02/2023 12:19	5.58
Bokhara River at Goodooga	7/02/2023 13:20	3.73
Birrie River at Near Goodooga	7/02/2023 13:40	7.74
Culgoa River at Brenda	7/02/2023 14:12	1.82
Warrego River at Fords Bridge Bywash	8/02/2023 6:59	1.87
Paroo River at Willara Crossing	8/02/2023 9:39	2.12

Darling River

Discharge at the Wilcannia gauge has decreased to around 3,300 ML/day while the flow in Talyawalka Creek has dropped to almost 4,000 ML/day (Figure 401). There is a moderate flood warning for Pooncarie. Major flood warning continues for Burtundy. Discharge at Pooncarie is over 23,000 ML/day and over 24,000 ML/day at Burtundy.

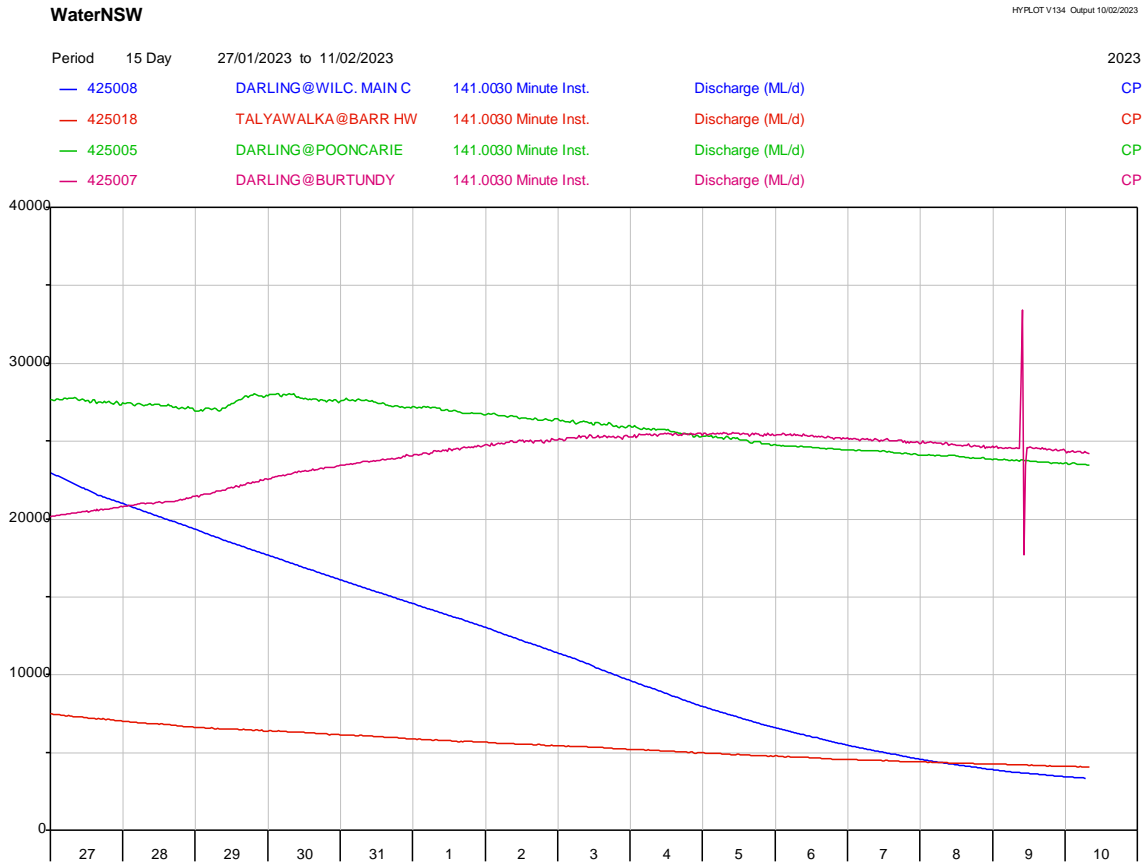


Figure 401: Discharge (ML/day) in the lower Darling River

Dissolved oxygen in the Darling River at Bourke has declined but remaining above 4 mg/L at Louth (Figure 402). Hand held readings show more oxygenated water near the surface (Table 34).

Period 15 Day 27/01/2023 to 11/02/2023

2023

— 425003 DARLING@BOURKE TOWN 2351.0080 Minute Inst. DO (mg/l) CP
 — 425004 DARLING@LOUTH 2351.0080 Minute Inst. DO (mg/l) CP

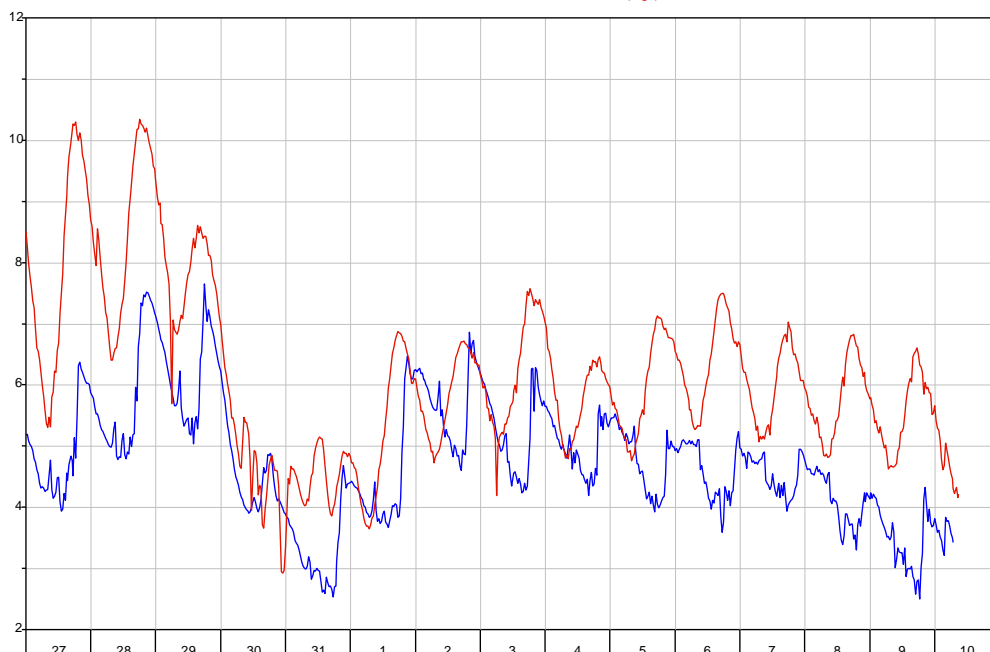


Figure 402: Continuous dissolved oxygen (mg/L) in the Darling River at Bourke and Louth

Table 34: Hand-held dissolved oxygen results (mg/L) from the Darling River

Site	Sample date	Dissolved oxygen (mg/L)
Darling River at North Bourke Bridge (Boat Ramp)	8/02/2023 15:39	6.54
Darling River at Bourke	8/02/2023 14:52	7.93
Darling River at Louth	8/02/2023 13:06	6.92

Oxygen readings at Wilcannia (Moorabin) had dropped to 0 mg/L but have continued to improve during the week (Figure 403). The readings from the temporary dissolved oxygen monitoring site downstream at Nellia Gaari on the Darling River upstream of Lake Wetherell had been declining until the sensor came out of the water on 2 February. The sensor was returned to deeper water on 7 February, with dissolved oxygen remaining low. At Weir 32 dissolved oxygen has slowly declined below 4 mg/L. Oxygen results at Burtundy had dipped below 2 mg/L during the hot weather but improved following the cool change last week and sensor maintenance on 6 February.

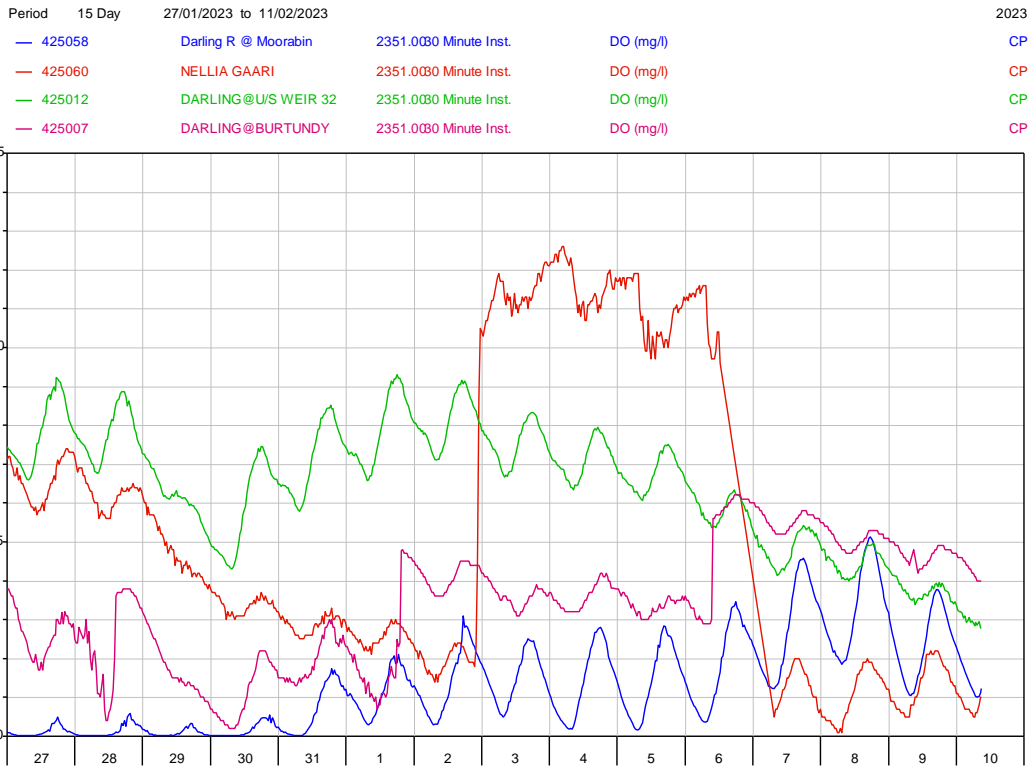


Figure 403: Continuous dissolved oxygen (mg/L) in the Darling River

Table 35: Hand-held dissolved oxygen results (mg/L) from the Darling River

Site	Sample date	Dissolved oxygen (mg/L)
Darling River at Burtundy	6/02/2023 14:10	5.57

Figure 404 is a satellite derived colour infrared Sentinel image of Darling River and Menindee Lakes on 7 February 2023, highlighting floodwater has largely returned to the main river channel. Some water is pushing from Lake Wetherell into Lakes Tandure and Pamamaroo. Additional readings collected by WaterNSW on 8 and 9 February confirm low dissolved oxygen in the upper reaches of Lake Wetherell and more oxygenated water in the other lakes.

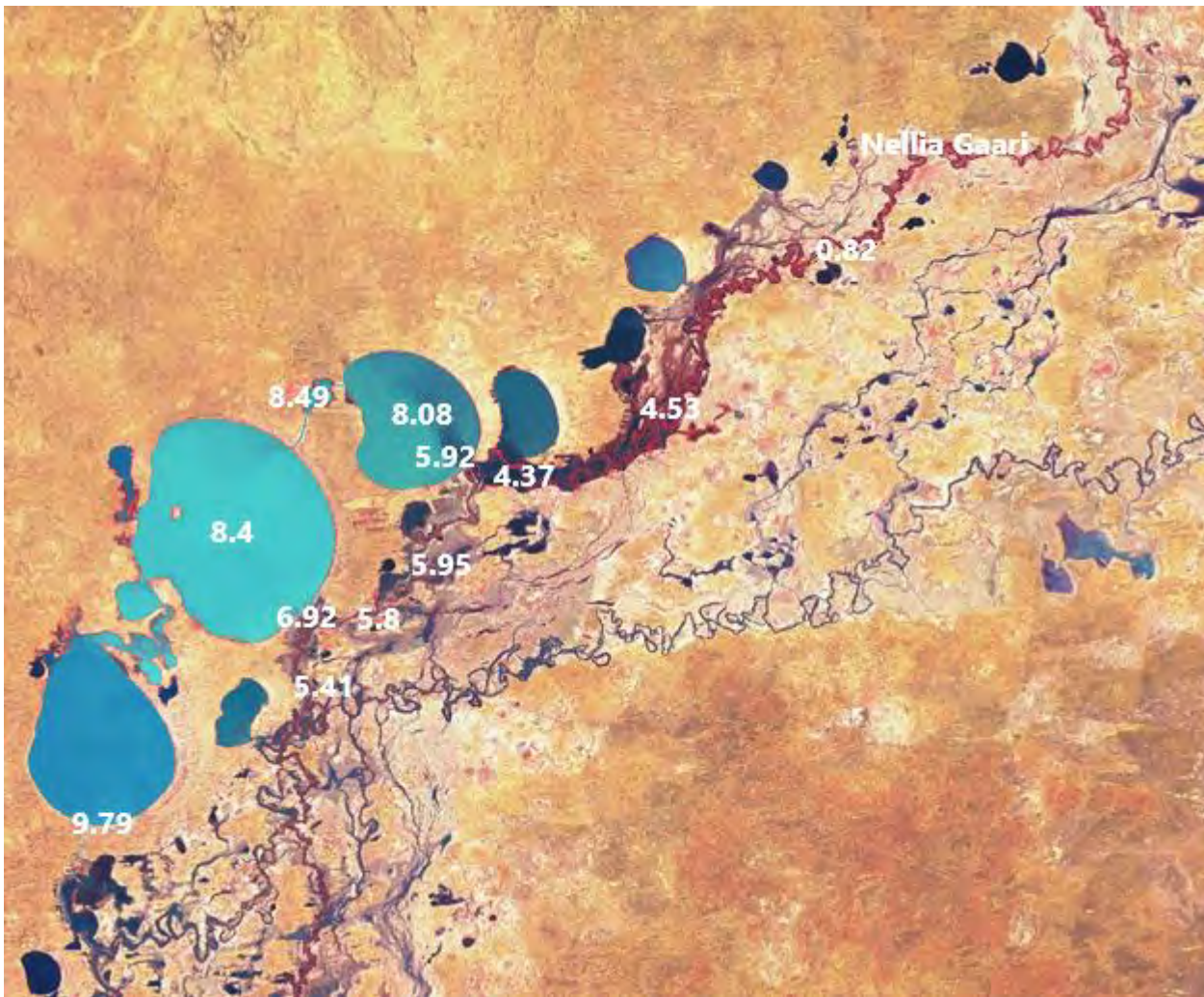


Figure 404: Satellite derived infrared image of Darling River and Menindee Lakes – 7 February 2023. Dissolved oxygen results (mg/L) collected 8 and 9 February 2023 (WaterNSW)

Water temperatures are above 27°C at Bourke and Wilcannia (Moorabin). The cool change last week caused water temperatures at Weir 32 and Burtundy to decrease to low 20's. Water temperature has now increased back above 25°C (Figure 405).

WaterNSW

HYPLOT V134 Output 10/02/2023

Period 15 Day 27/01/2023 to 11/02/2023 2023

425003	DARLING@BOURKE TOWN	2080.0030 Minute Inst.	Water Temp(C)	CP
425058	Darling R @ Moorabin	2080.0030 Minute Inst.	Water Temp(C)	CP
425012	DARLING@U/S WEIR 32	2080.0030 Minute Inst.	Water Temp(C)	CP
425007	DARLING@BURTUNDY	2080.0030 Minute Inst.	Water Temp(C)	CP

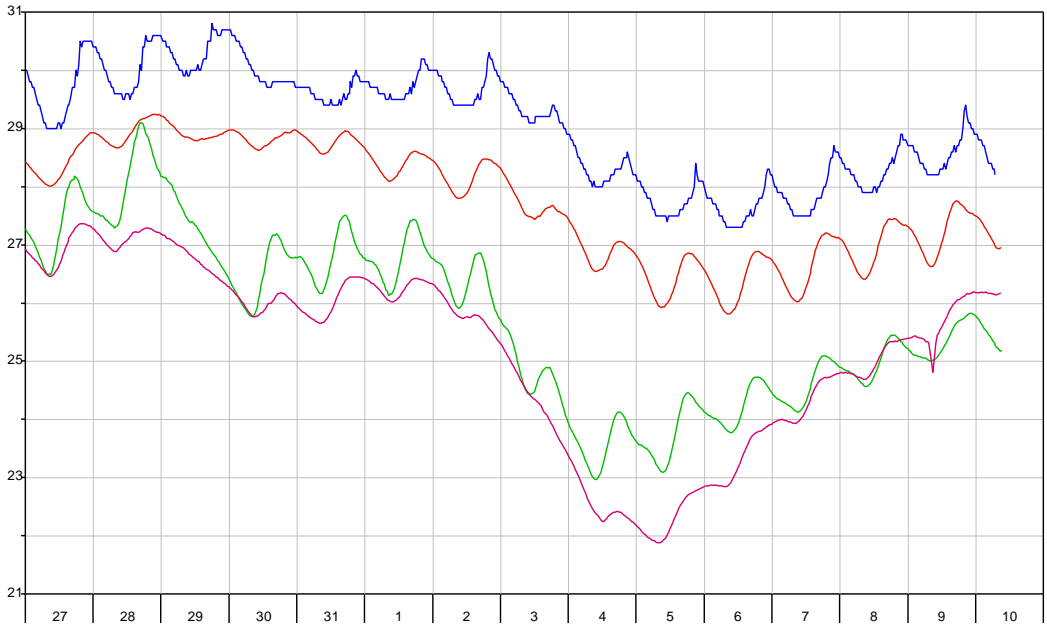


Figure 405: Continuous water temperature (°C) in the Darling River

Southern Basin

Lachlan River

Discharge in the Lachlan River at Forbes and Condobolin is over 600 ML/day. Discharge at Hillston is decreasing towards 1,800 ML/day (Figure 406). Minor flooding continues at Booligal with discharge remaining at around 2,800 ML/day.

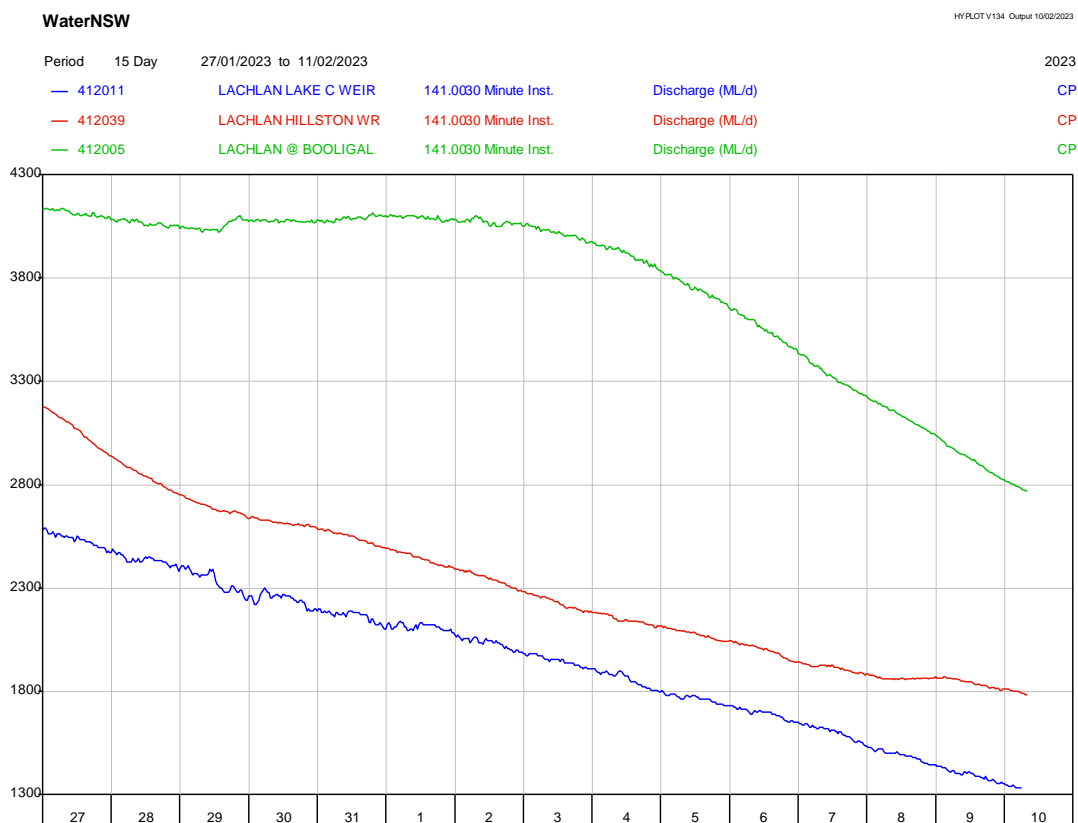


Figure 406: Discharge (ML/day) in the Lachlan River

Dissolved oxygen in the Lachlan River is above 4 mg/L at most monitoring sites. Readings at Condobolin have been erratic but stabilised during the week (Figure 407). Water temperature is increasing above 25°C in the lower Lachlan River (Figure 408).

WaterNSW

HYFLOT V134 Output 10/02/2023

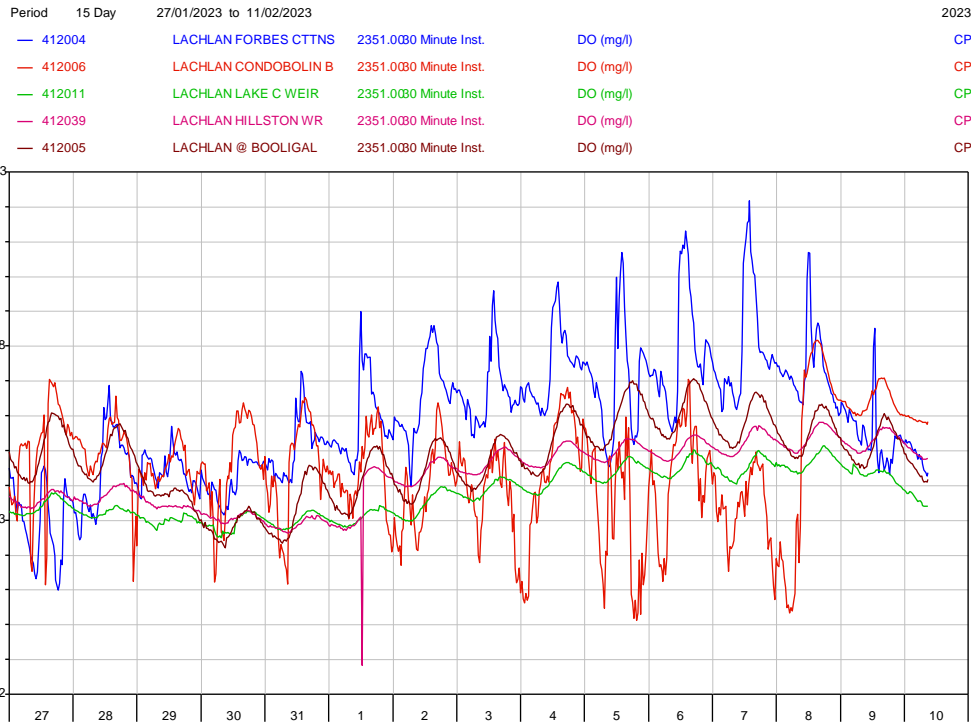


Figure 407: Continuous dissolved oxygen (mg/L) in the Lachlan River

WaterNSW

HYFLOT V134 Output 10/02/2023

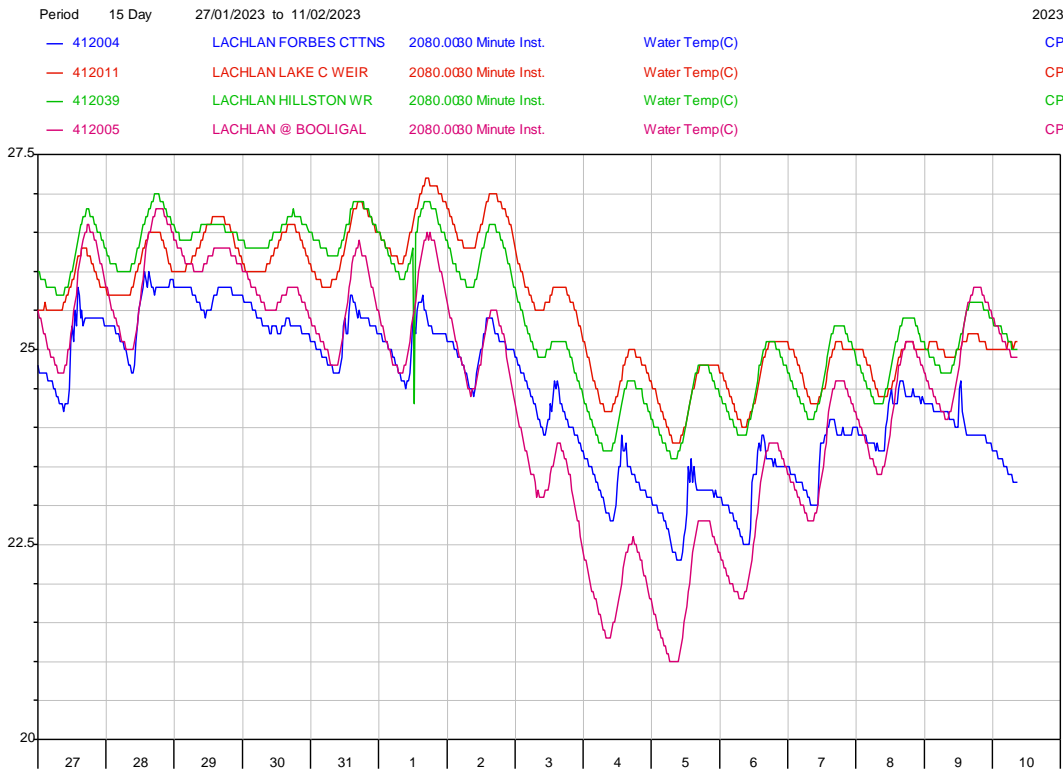


Figure 408: Continuous water temperature (°C) in the Lachlan River

Murrumbidgee River

The river level in the Murrumbidgee River at Maude Weir is around 7,000 ML/day. Discharge at Balranald had been decreasing but is now 6,500 ML/day (Figure 409).

Dissolved oxygen levels in the Murrumbidgee River at Redbank and Balranald are above 6.5 mg/L. (Figure 410) and water temperatures are increasing toward 25°C (Figure 411).

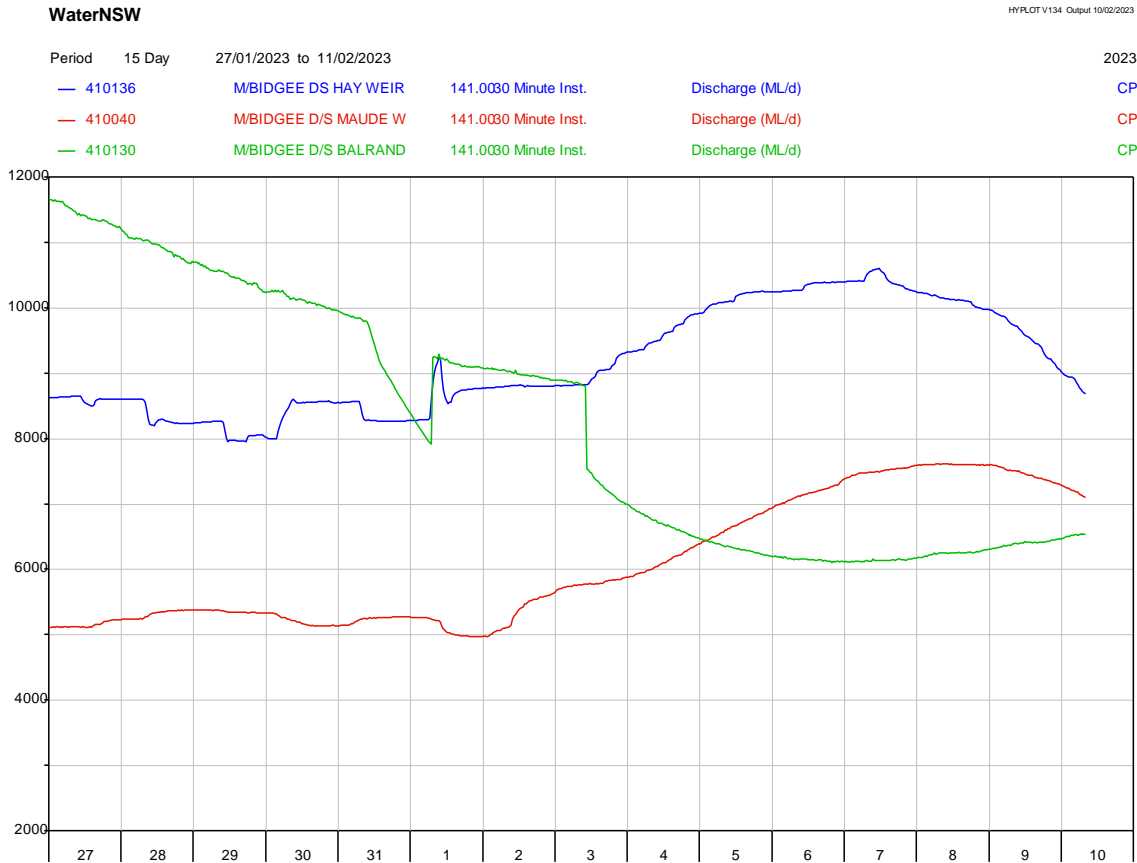


Figure 409: Discharge (ML/day) in the lower Murrumbidgee River

Period 15 Day 27/01/2023 to 11/02/2023

2023

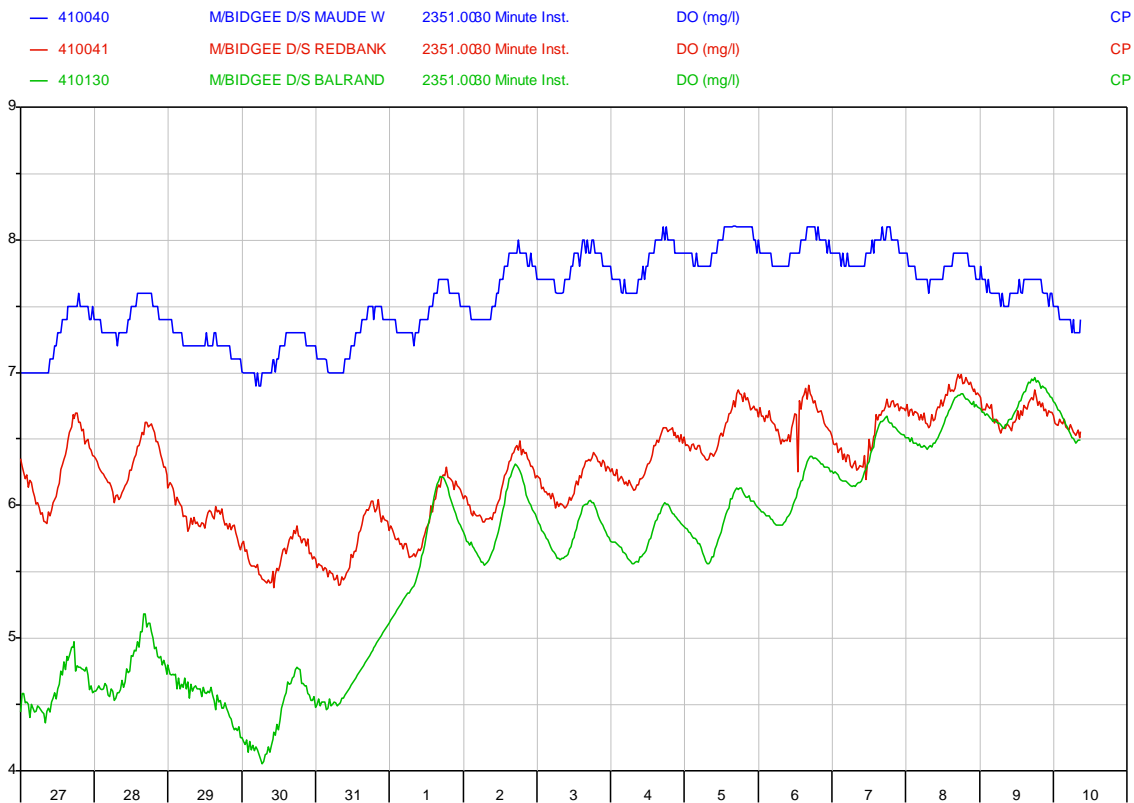


Figure 410: Continuous dissolved oxygen (mg/L) in the Murrumbidgee River

Table 36: Hand-held dissolved oxygen readings from Murrumbidgee River and Yanco-Billabong system

Site	Sample Date	DO (mg/L)
Murrumbidgee River at Balranald	6/02/2023 11:15	5.3
Yanco Creek at Yanco Bridge	6/02/2023 11:55	5.34
Billabong Creek at Jerilderie	6/02/2023 12:42	8.19
Billabong Creek at Darlot	7/02/2023 8:21	6.81

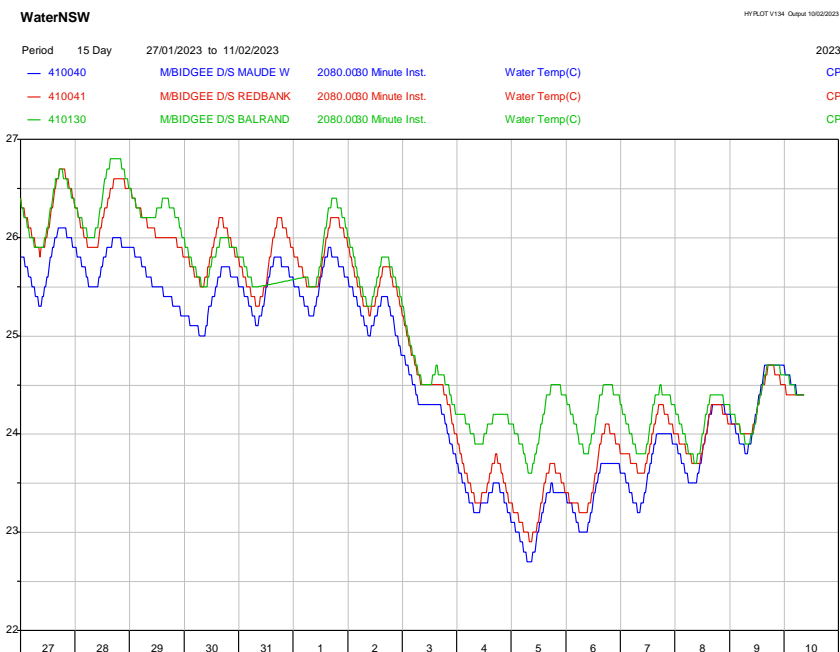


Figure 411: Continuous water temperature (°C) in the Murrumbidgee River

Kolety/Edward River

Discharge in the Kolety/Edward River is steady at over 2,000 ML/day down the system.

Dissolved oxygen levels in the Kolety/Edward River are stable (Figure 412). Readings from all three sites are above 5 mg/L. Water temperatures are increasing toward 25°C (Figure 413).

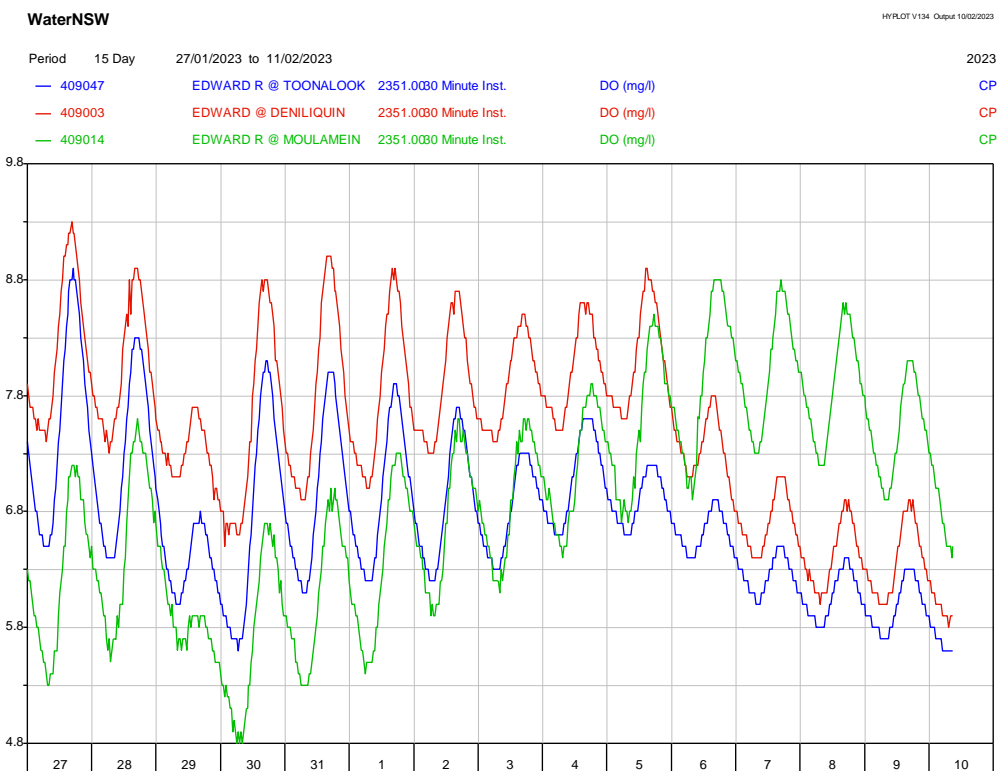


Figure 412: Continuous dissolved oxygen (mg/L) in the Kolety/Edward River

Table 37: Hand-held dissolved oxygen readings from Kolety/Edward River

Site	Sample Date	DO (mg/L)
Kolety/Edward River at Deniliquin	6/02/2023 14:54	7.38
Kolety/Edward River at Old Morago	6/02/2023 14:11	8.05
Kolety/Edward River at Moulamein	7/02/2023 8:56	7.21

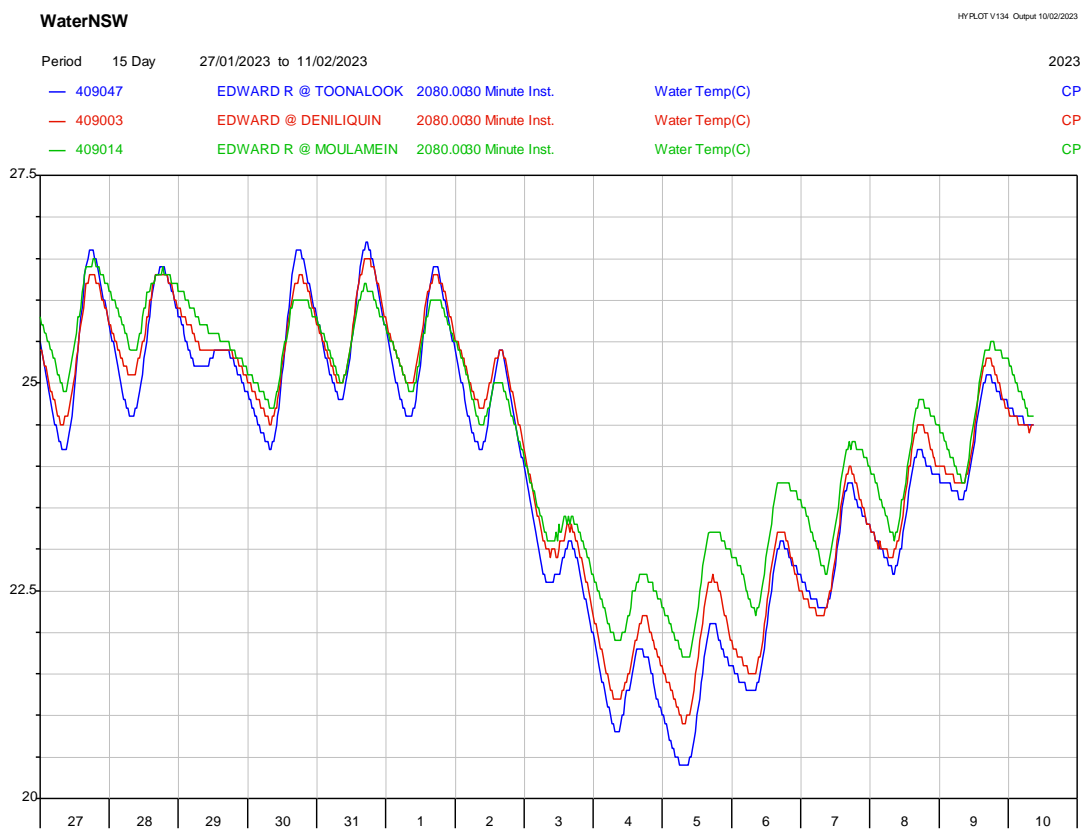


Figure 413: Continuous water temperature (°C) in the Kolety/Edward River

Wakool and Niemur rivers

Discharge in the Wakool River at Coonambit Bridge is stable at 1,600 ML/day and at Gee Gee Bridge just over 500 ML/day. The Niemur River at Barham-Moulamein Road and Mallan School is flowing at just over 850 and 1,000 ML/day respectively.

Figure 414 highlights dissolved oxygen levels in the Wakool River at Gee Gee Bridge and Stoney Crossing and Niemur River at Barham-Moulamein Road are remaining above 4 mg/L. Dissolved oxygen results from the automated gauging station at Mallan School improved to safe levels for fish health on 8 February.

Period 15 Day 27/01/2023 to 11/02/2023

2023

409062	WAKOOL R GEEGEE BR 2	2351.0030 Minute Inst.	DO (mg/l)	CP
409013	WAKOOL @ STONEY XING	2351.0030 Minute Inst.	DO (mg/l)	CP
409048	NIEMUR R BARH-MLN RD	2351.0030 Minute Inst.	DO (mg/l)	CP
409086	NIEMUR @ MALLAN SCH	2351.0030 Minute Inst.	DO (mg/l)	CP

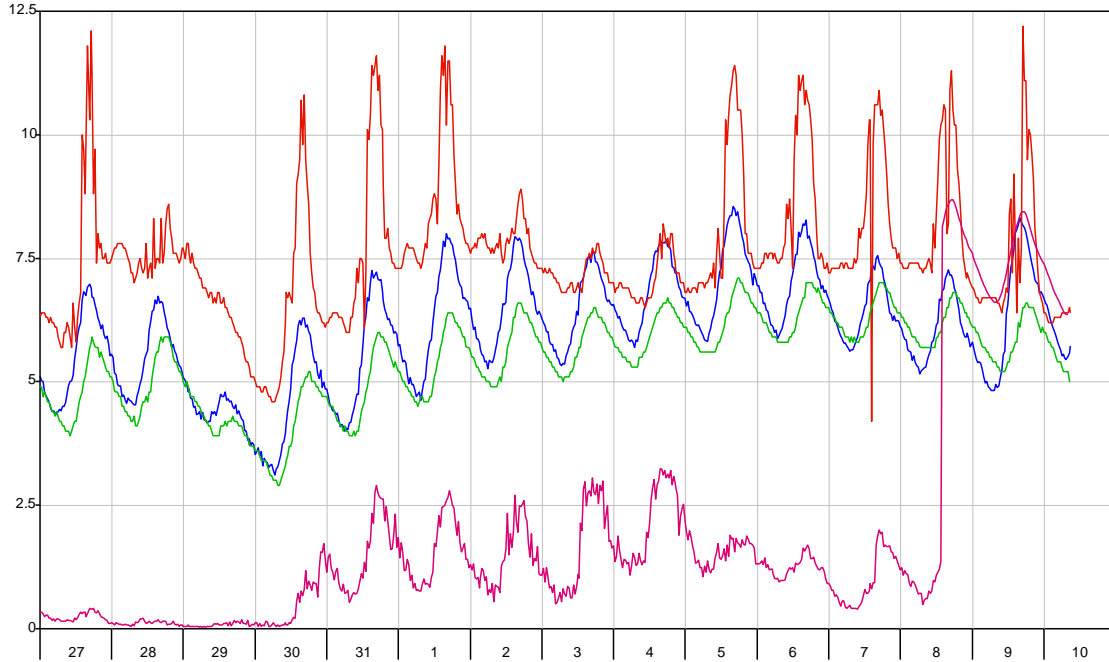


Figure 414: Continuous dissolved oxygen (mg/L) in the Wakool and Niemur rivers

Table 38: Hand-held dissolved oxygen readings from Wakool River

Site	Sample Date	DO (mg/L)
Wakool River at Wakool-Barham Road	7/02/2023 14:03	7.65
Wakool River at Stoney Crossing	7/02/2023 10:57	8.30
Wakool River at Kyalite	7/02/2023 9:50	6.88

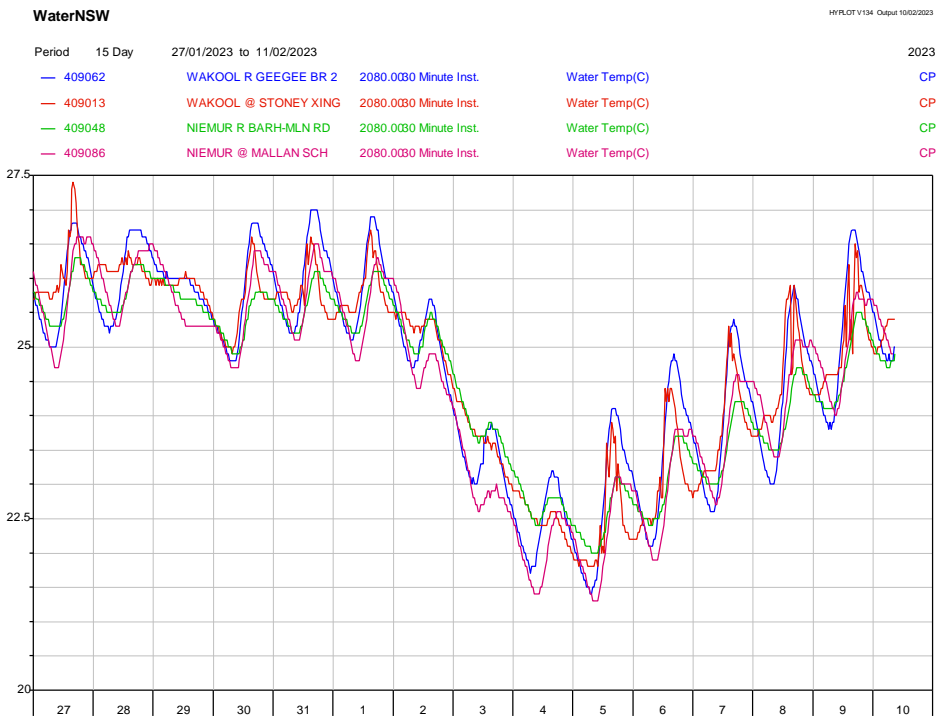


Figure 415: Continuous water temperature (°C) in the Wakool and Niemur rivers

Merran, Little Merran and Barber creeks

Figure 416 shows dissolved oxygen levels in Merran and Little Merran are remaining above 4 mg/L. Barbers Creek at Sandy Bridge is continuing to show large diurnal fluctuations.

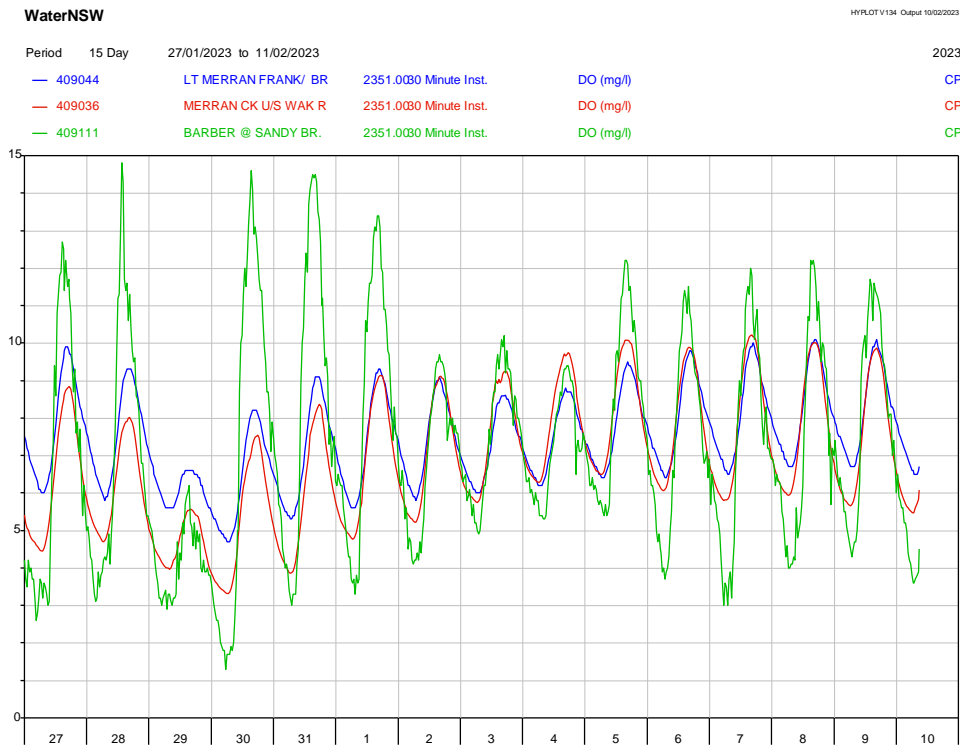


Figure 416: Continuous dissolved oxygen (mg/L) in the Merran, Little Merran and Barber creeks

Murray River

Monitoring by DELWP is showing the Murray River at Tocumwal, upstream of the Barmah/Millewa Forest, is oxygenated (Figure 417). Downstream of the forest at Barmah, dissolved oxygen is above 6 mg/L. Dissolved oxygen in the Goulburn River at McCoys Bridge is around 6.4 mg/L and the Campaspe River at Fehrings Lane is 5.1 mg/L.

Dissolved oxygen in the Murray River at Barham, Wemen and Colignan is above 6 mg/L. The temporary monitoring site installed on the Murray River downstream of Wentworth was reading 6.4 mg/L on Friday 3 February (11:00).

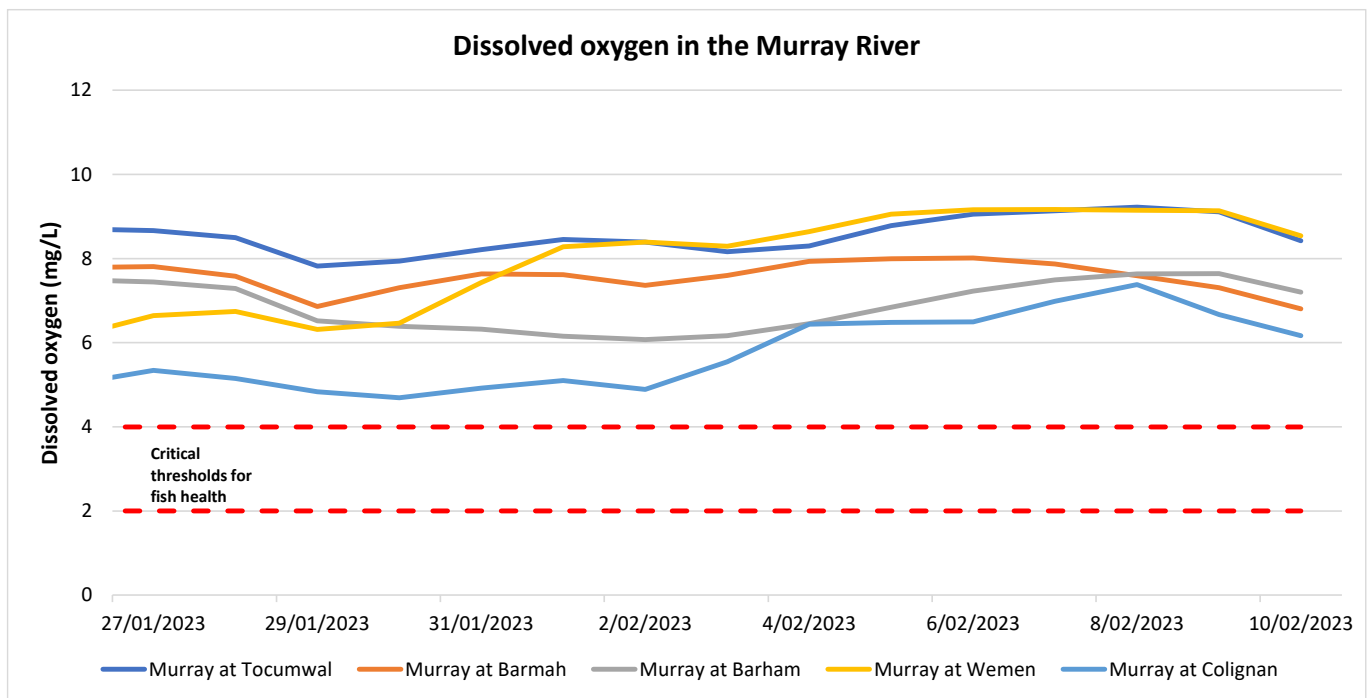


Figure 417: Continuous dissolved oxygen (mg/L) in the Murray River (data courtesy of DELWP)

Table 39: Hand-held dissolved oxygen readings from Murray River

Site	Sample date	DO (mg/L)
Murray River at Picnic Point	6/02/2023 7:24	8.37
Gulpa Creek at Mathoura	6/02/2023 7:51	6.50
Murray River at Moama	6/02/2023 6:33	7.66
Murray River at Barham	7/02/2023 13:36	7.86
Murray River at Murray Downs	7/02/2023 12:09	9.48
Murray River at Tooleybuc	7/02/2023 10:23	8.41

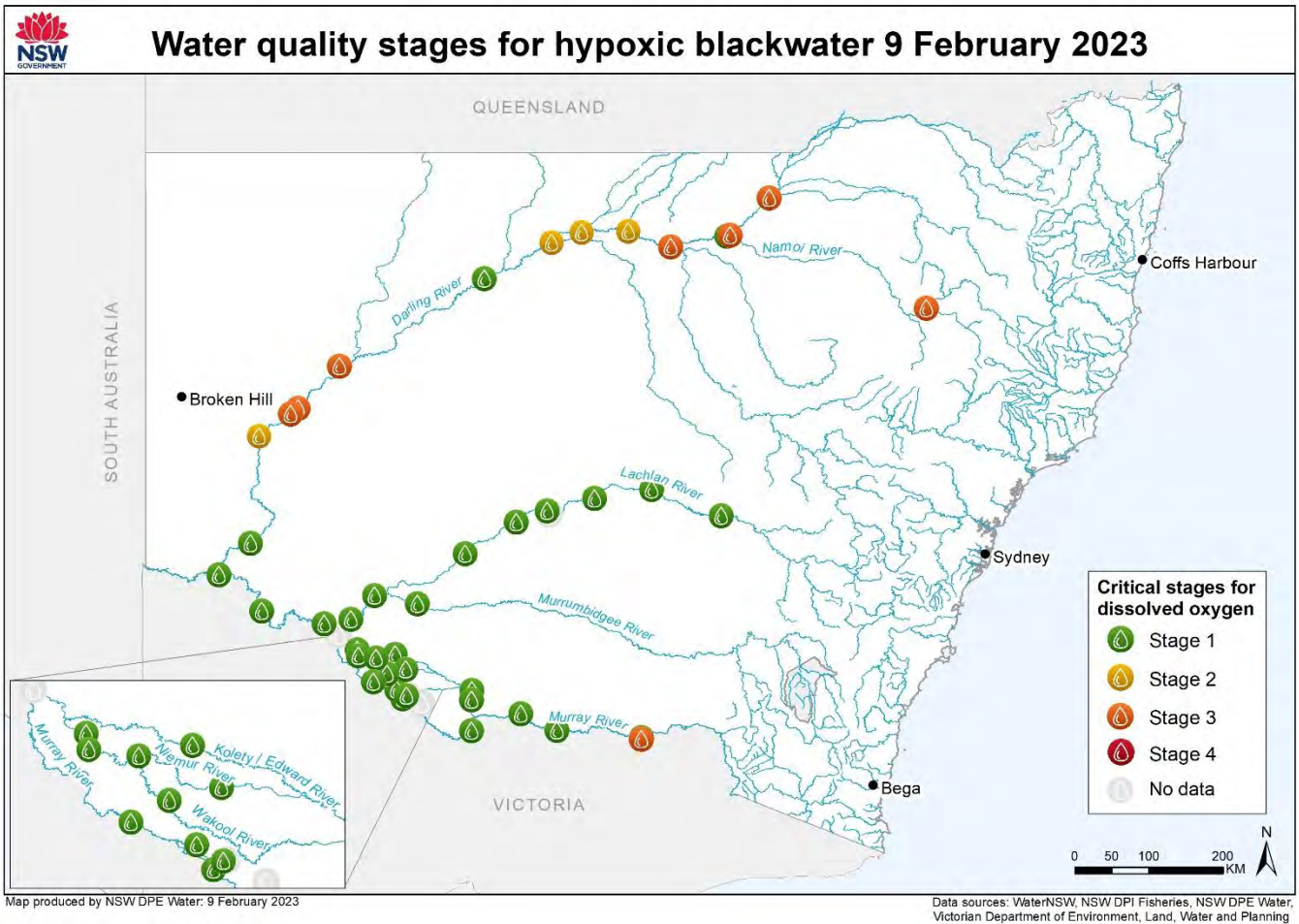


Figure 418: Critical stages for dissolved oxygen - 9 February 2023

Weather Outlook

The Bureau of Meteorology 8-day total rain forecast (10 to 17 February) indicates NSW will be dry with some showers along the east coast (Figure 419). Forecast is for maximum air temperatures at Menindee (Figure 420) and Mildura (Figure 421) to reach over 40°C on Friday 10 February before dropping back to 30°C early next week. There are low intensity heatwave conditions forecast for small areas along the NSW/Queensland border over the weekend and early next week.

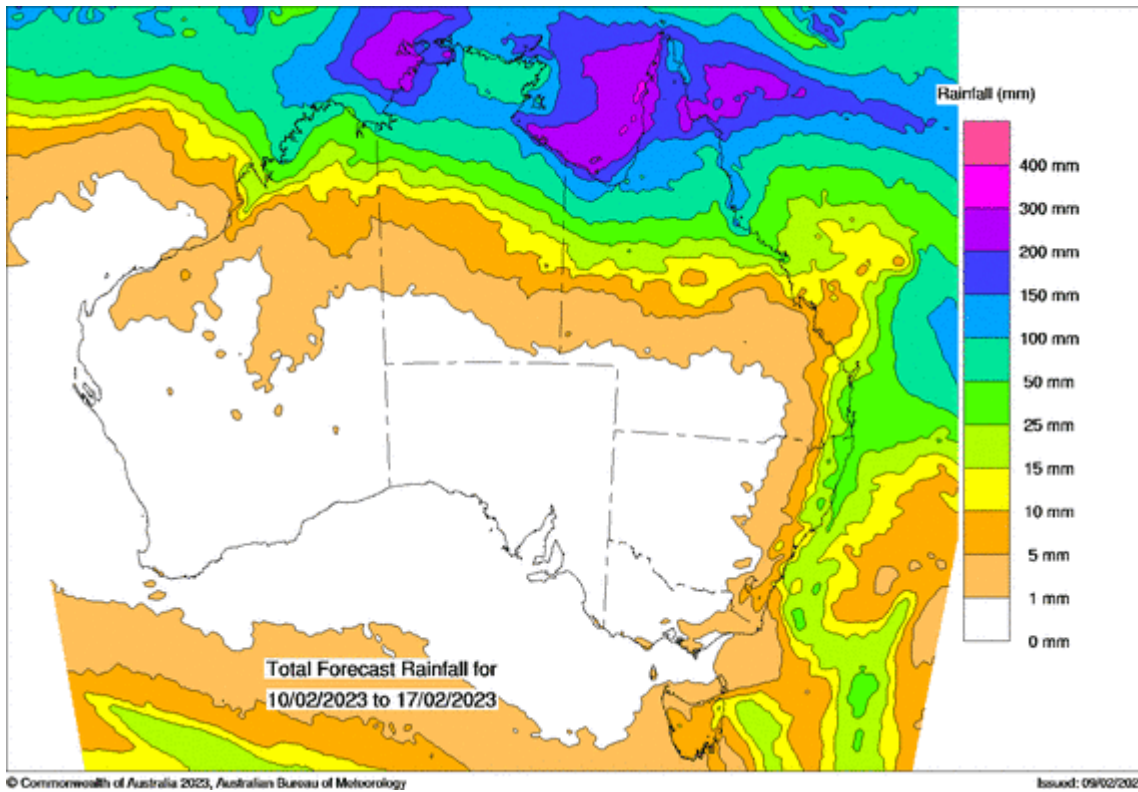


Figure 419: Bureau of Meteorology 8-day total rain forecast (10 to 17 February)

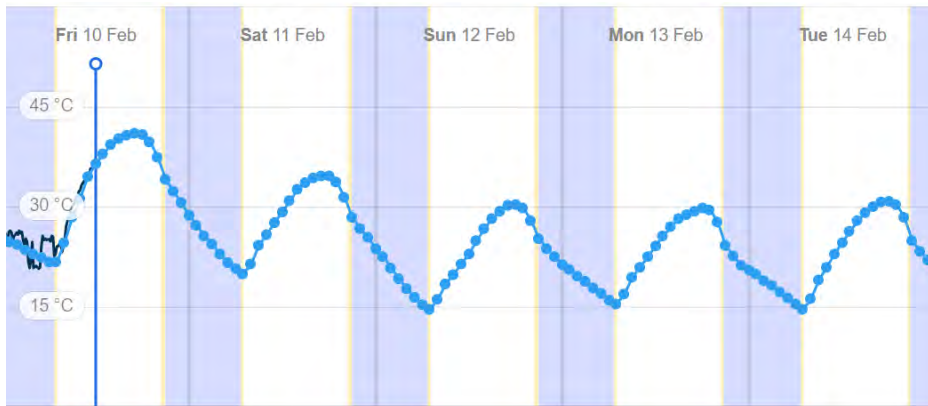


Figure 420: Forecast air temperatures for Menindee – 10 to 14 February

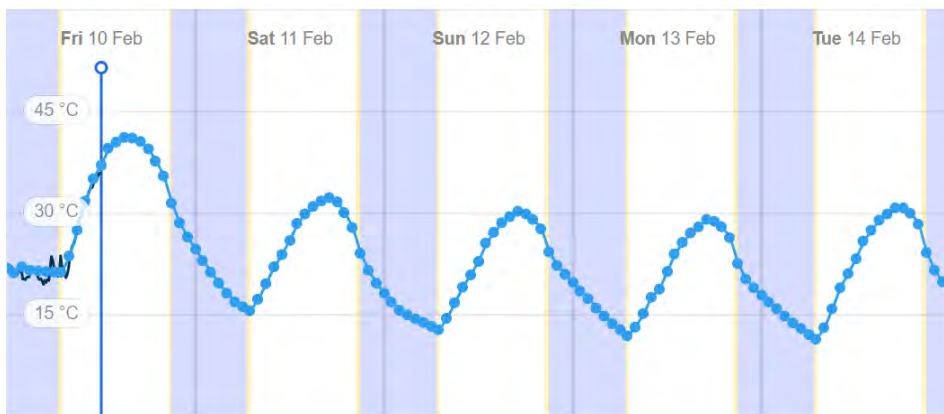


Figure 421: Forecast air temperatures for Mildura – 10 to 14 February

Water quality update, Meeting No. 18 – 23 February 2023

Northern Basin

Barwon River

Discharge in the Barwon River at Brewarrina is over 2,200 ML/day.

Dissolved oxygen results in the Barwon River are showing levels at the Collarenebri gauging station have been quite erratic and dropping below 2 mg/L, which could be in response to fouling of the sensor. There are better oxygen levels at Walgett (Dangar Bridge) and Brewarrina (Figure 422). Water temperature is remaining between 27 and 31°C (Figure 423).

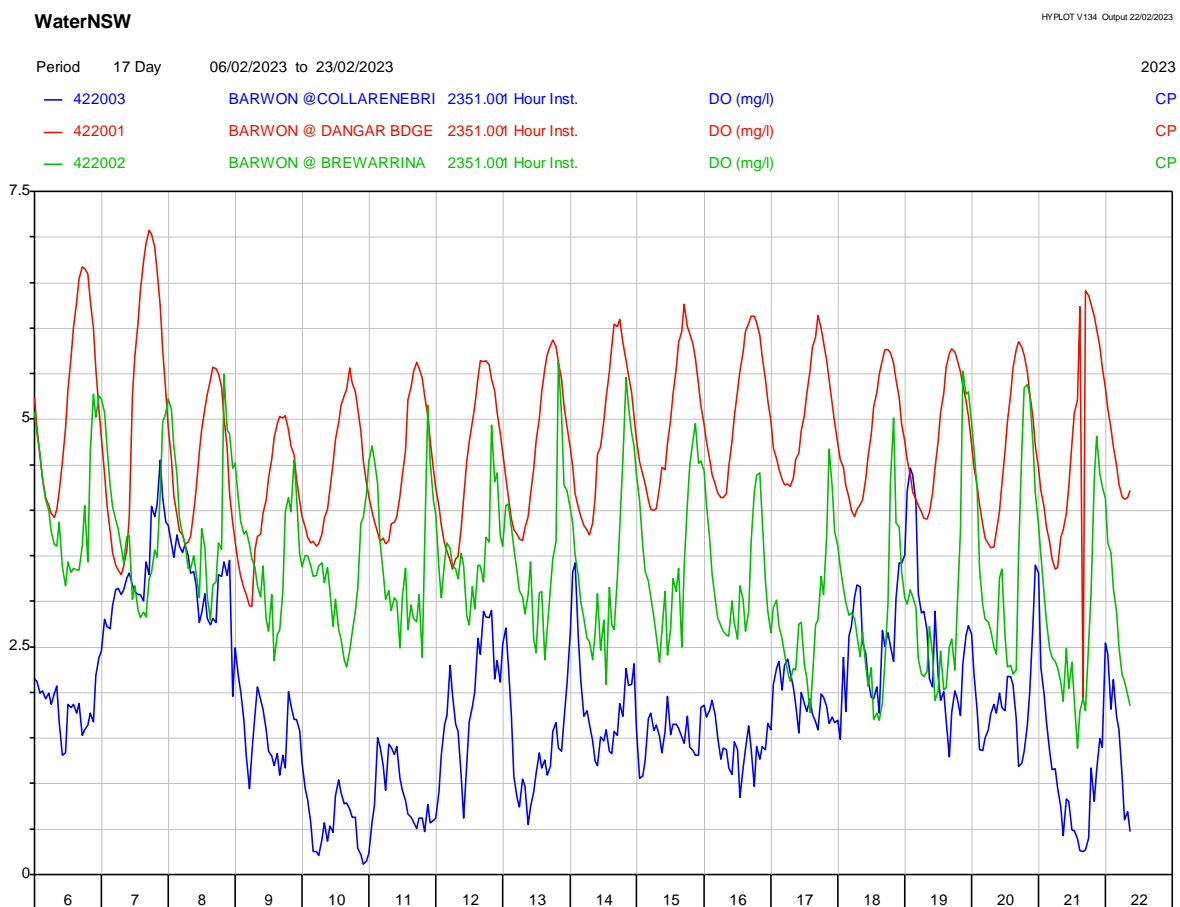


Figure 422: Continuous dissolved oxygen (mg/L) in the Barwon River

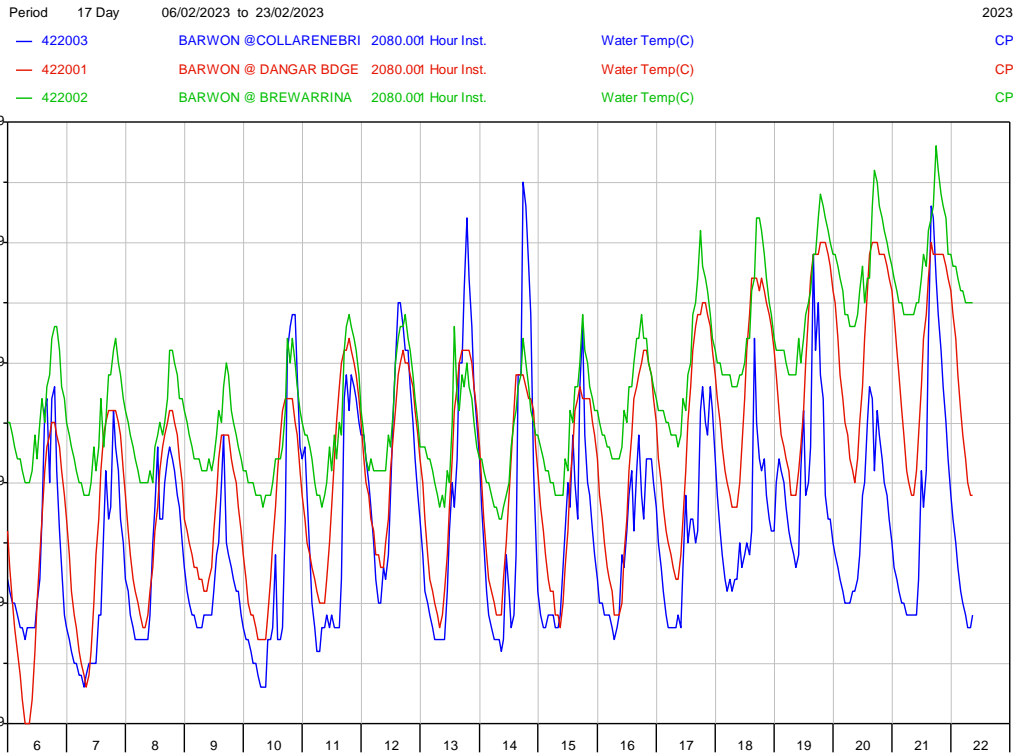


Figure 423: Continuous water temperature (°C) in the Barwon River

Darling River

Discharge at the Wilcannia gauge has decreased to around 1,800 ML/day while the flow in Talyawalka Creek has dropped to almost 2,600 ML/day (Figure 424). WaterNSW are transitioning from flood operations to normal operations at Menindee Lakes as reduction in releases occur. There is a minor flood warning for Pooncarie. Major flood warning continues for Burtundy. Discharge at Pooncarie is over 18,800 ML/day and over 20,000 ML/day at Burtundy.

WaterNSW

HYPLOT V134 Output 22/02/2023

Period 17 Day 06/02/2023 to 23/02/2023 2023

— 425008	DARLING@WILC. MAIN C	141.001 Hour Inst.	Discharge (ML/d)	CP
— 425018	TALYAWALKA@BARR HW	141.001 Hour Inst.	Discharge (ML/d)	CP
— 425005	DARLING@POONCARIE	141.001 Hour Inst.	Discharge (ML/d)	CP
— 425007	DARLING@BURTUNDY	141.001 Hour Inst.	Discharge (ML/d)	CP

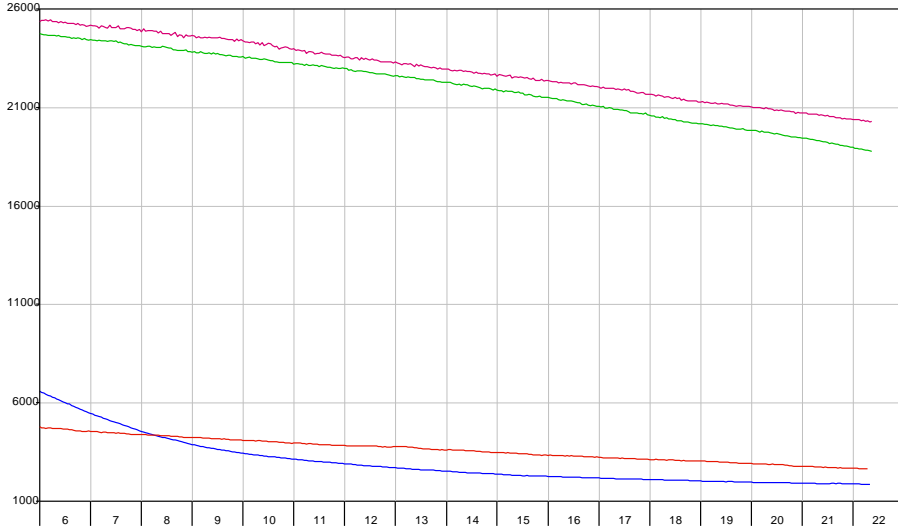


Figure 424: Discharge (ML/day) in the lower Darling River

Dissolved oxygen levels in the Darling River at Bourke are fluctuating between 2 and 4 mg/L. Results at Louth are above 4 mg/L and at Wilcannia (Moorabin) dissolved oxygen has been continuing to recover over recent weeks (Figure 425).

WaterNSW

HYPLOT V134 Output 22/02/2023

Period 17 Day 06/02/2023 to 23/02/2023 2023

— 425003	DARLING@BOURKE TOWN	2351.001 Hour Inst.	DO (mg/l)	CP
— 425004	DARLING@LOUTH	2351.001 Hour Inst.	DO (mg/l)	CP
— 425058	Darling R @ Moorabin	2351.001 Hour Inst.	DO (mg/l)	CP

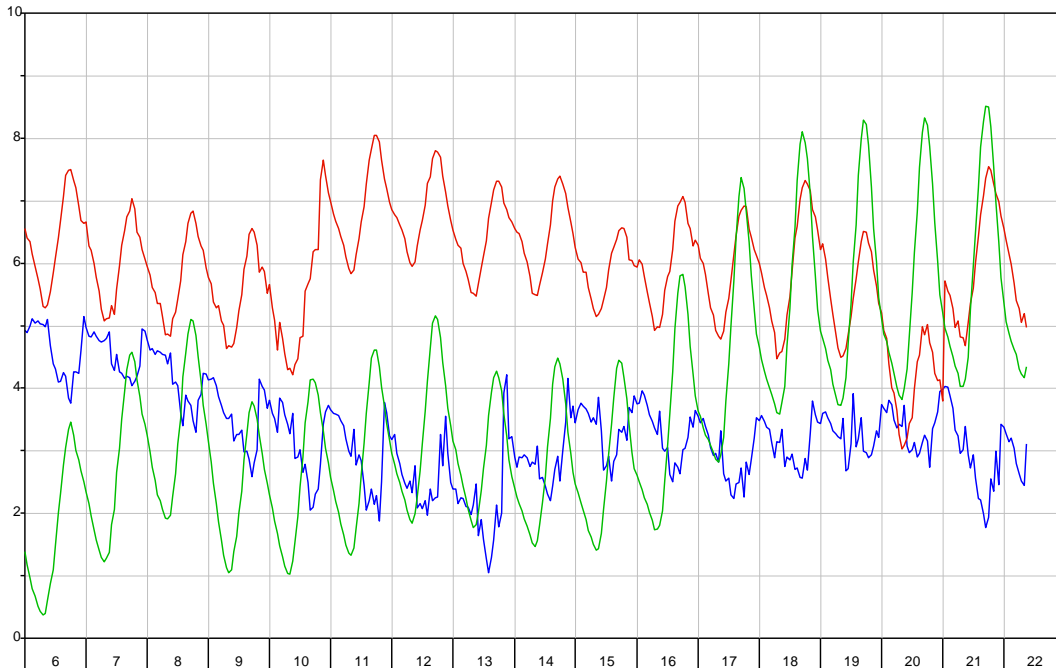


Figure 425: Continuous dissolved oxygen (mg/L) in the Darling River at Bourke and Louth

The temporary dissolved oxygen monitoring sensor at Nellia Gaari on the Darling River upstream of Lake Wetherell came out of the water on 12 February. The sensor was returned to deeper water on 15 February. Dissolved oxygen is dropping to less than 1 mg/L overnight and recovering to over 2.5 mg/L during the day (Figure 426). At Weir 32 dissolved oxygen has been stable at above 2.5 mg/L. Oxygen results at Burtundy have been fluctuating between 3 and 5 mg/L.

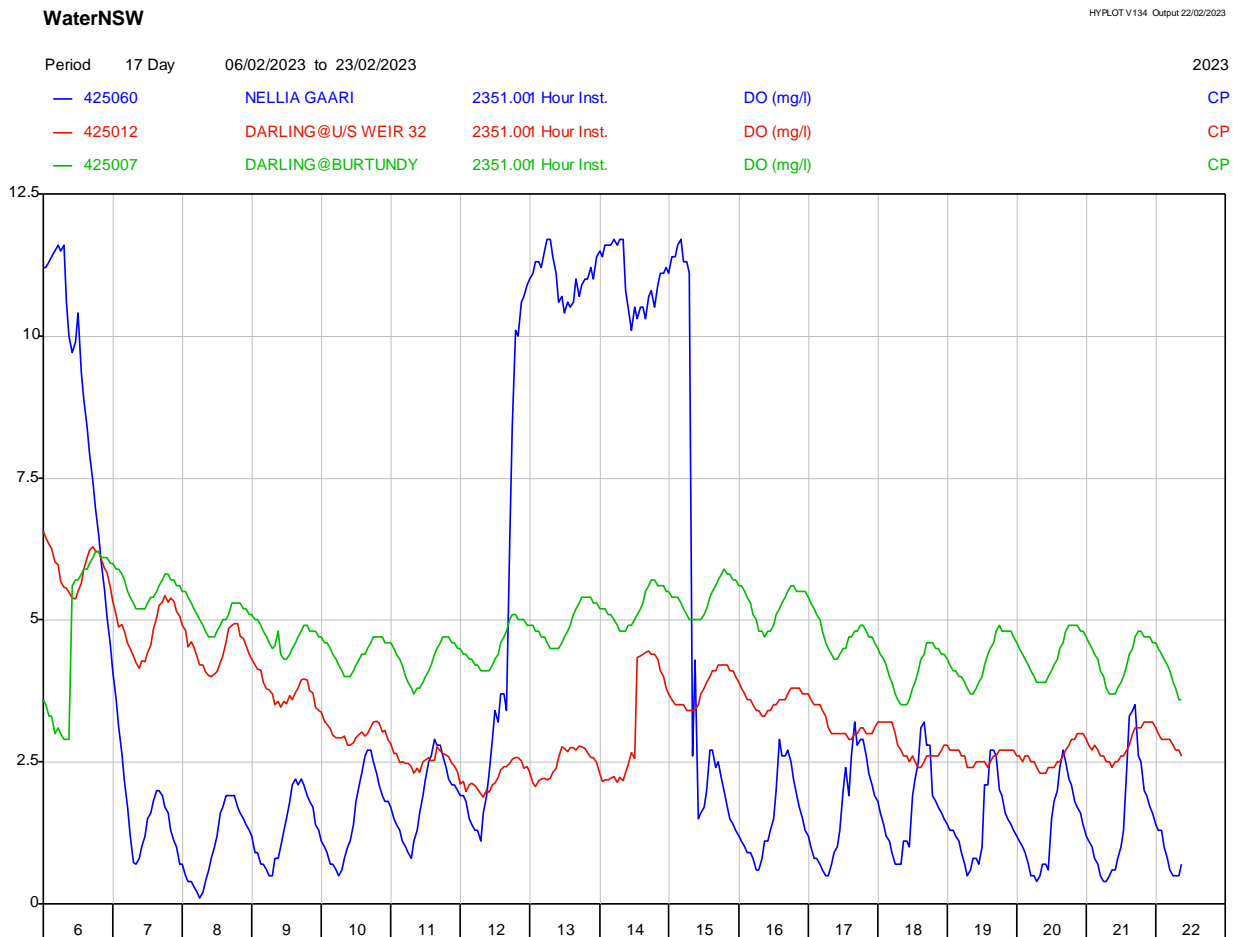


Figure 426: Continuous dissolved oxygen (mg/L) in the Darling River

Figure 427 is a satellite derived colour infrared Sentinel image of Darling River and Menindee Lakes on 17 February 2023, highlighting floodwater has largely returned to the main river channel. Some water is pushing from Lake Wetherell into Lakes Tandure and Pamamaroo. Additional readings collected by WaterNSW on 16 and 17 February confirm low dissolved oxygen in the upper reaches of Lake Wetherell and more oxygenated water in the other lakes.

Floodwaters in the Darling River upstream of Pooncarie are returning back into the main river channel (Figure 428).

Water temperatures are above 30°C at Bourke and above 28°C at Wilcannia (Moorabin). Water temperatures are slightly lower at Weir 32 and Burtundy (Figure 429).

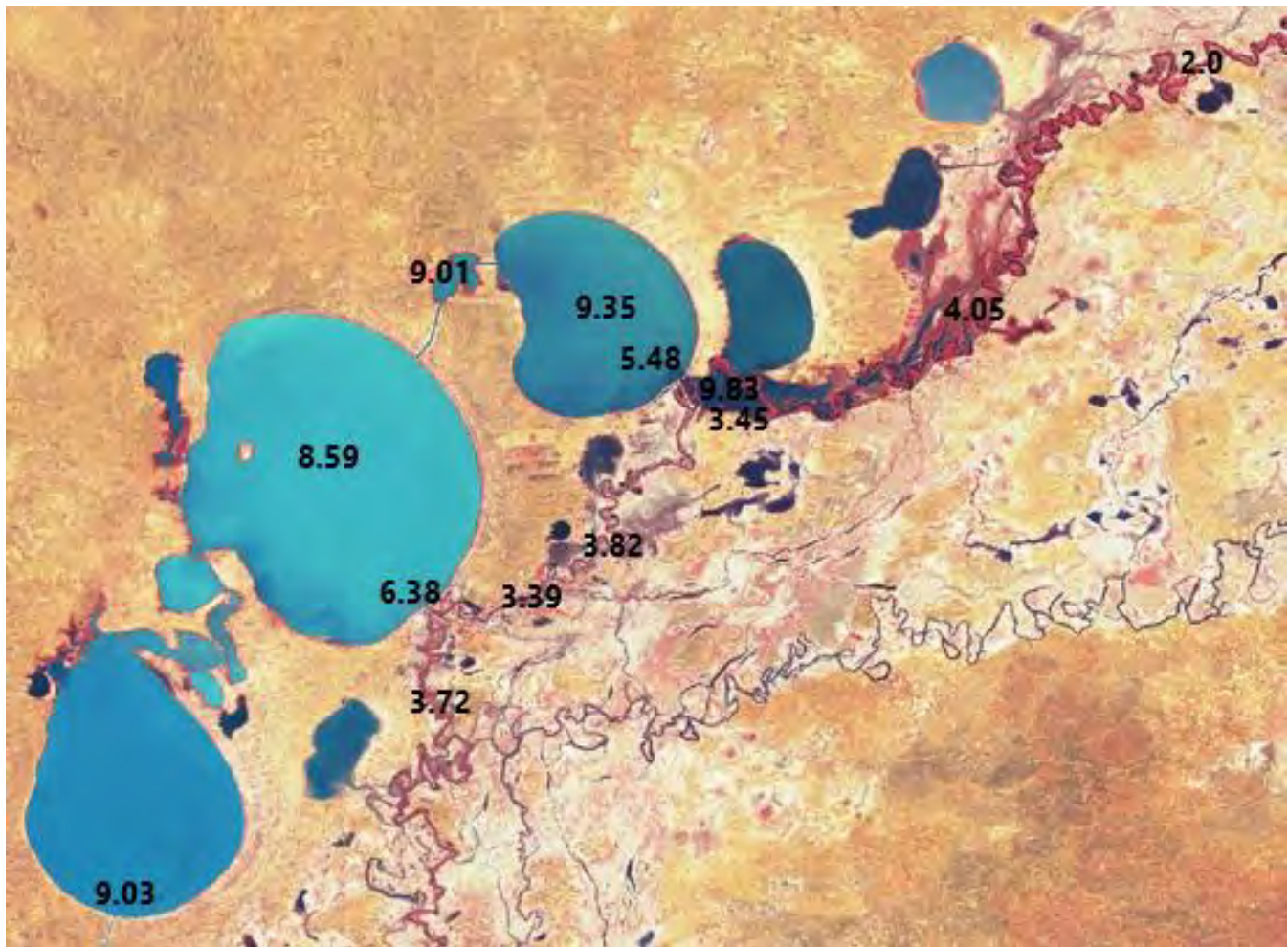


Figure 427: Satellite derived Sentinel colour infrared image – Image 17 February. Dissolved oxygen data 16-17 February

Table 40: Dissolved oxygen and water temperature data from Menindee Lakes, 16-17 February

Site	Sample date	Dissolved oxygen (mg/L)
Lake Wetherell Site 2	17/02/2023 10:35	2.00
Lake Wetherell Site 3	17/02/2023 11:22	4.05
Lake Wetherell Site 4 (Main Weir)	16/02/2023 12:42	3.45
Lake Wetherell Site 4 (Wetherell offtake)	16/02/2023 12:48	9.83
Lake Wetherell Site 4 (Wetherell outlet)	16/02/2023 12:51	3.37
Pamamaroo Inlet (D/S regulator)	16/02/2023 12:56	5.48
Pamamaroo Inlet (U/S regulator)	16/02/2023 12:58	8.09

Site	Sample date	Dissolved oxygen (mg/L)
Centre Lake Pamamaroo	16/02/2023 10:27	9.35
Copi Hollow	16/02/2023 10:34	9.01
Centre Lake Menindee	16/02/2023 9:19	8.59
Lake Menindee outlet	16/02/2023 13:54	6.38
Cawndilla Regulator	16/02/2023 13:34	9.03
Darling River at Pumping Station at Menindee	16/02/2023 14:36	3.82
Darling River at Menindee Town	16/02/2023 14:08	3.39
425012 Darling River at Weir 32	16/02/2023 14:22	3.72

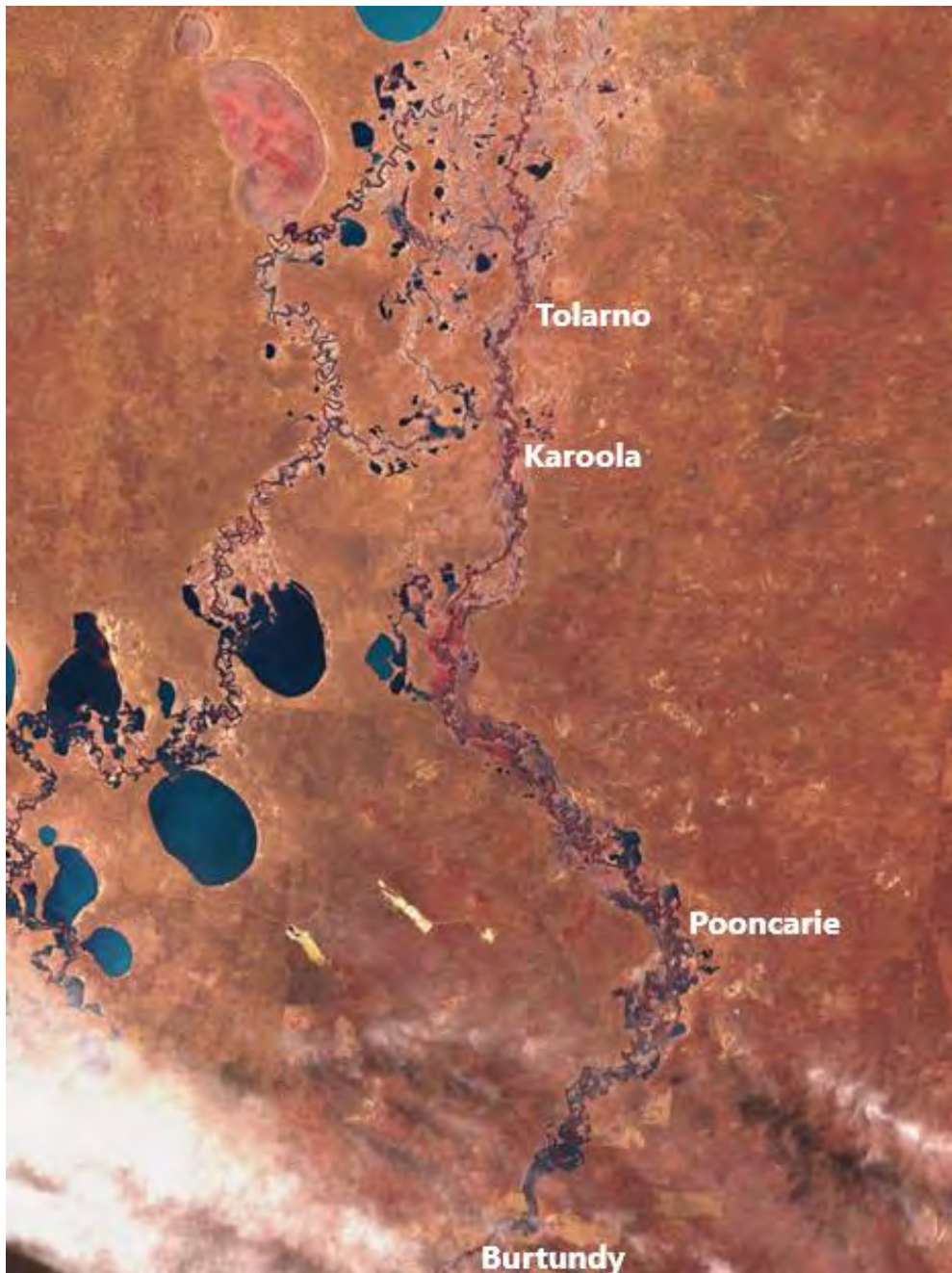


Figure 428: Landsat colour infrared image – Image 21 February

Table 41: Hand-held dissolved oxygen results (mg/L) from the lower Darling River

Site	Sample date	Dissolved oxygen (mg/L)
Darling River at Weir 32	17/02/2023 8:59	2.70
Darling River at Tolarno	17/02/2023 10:36	2.39
Darling River at Pooncarie	17/02/2023 11:38	5.73
Darling River at Burtundy	21/02/2023 10:24	3.77

Period 17 Day 06/02/2023 to 23/02/2023 2023

— 425003	DARLING@BOURKE TOWN	2080.001 Hour Inst.	Water Temp(C)	CP
— 425058	Darling R @ Moorabin	2080.001 Hour Inst.	Water Temp(C)	CP
— 425012	DARLING@U/S WEIR 32	2080.001 Hour Inst.	Water Temp(C)	CP
— 425007	DARLING@BURTUNDY	2080.001 Hour Inst.	Water Temp(C)	CP

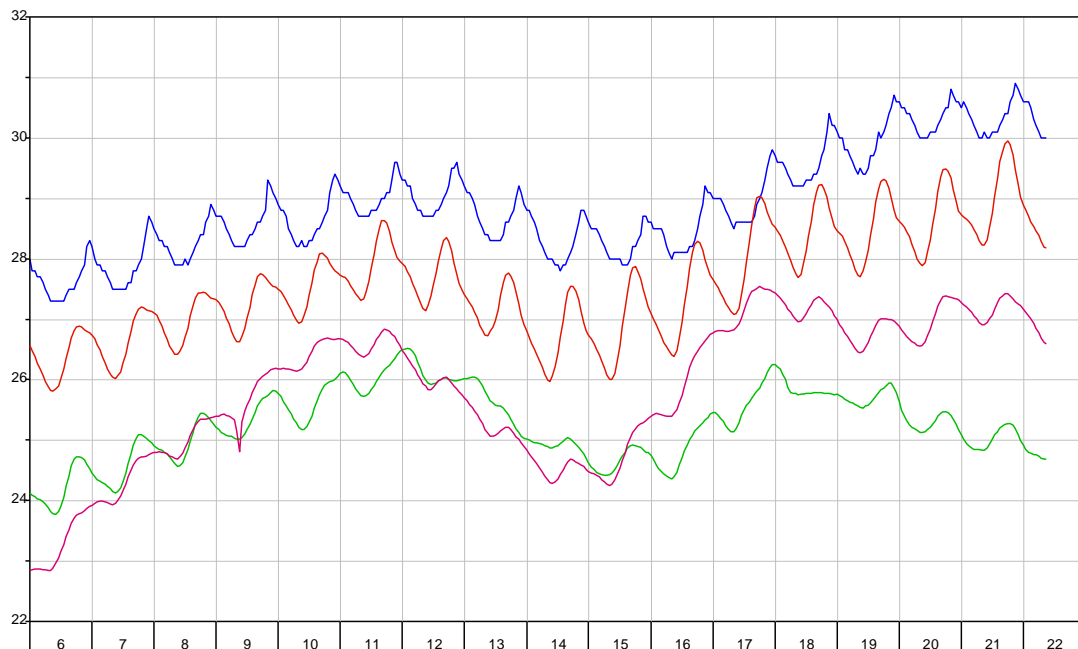


Figure 429: Continuous water temperature (°C) in the Darling River

Southern Basin

Lachlan River

The Lachlan water quality allowance is being used to increase releases from Wyangala Dam up to 150 ML/day to dilute salinity in the Lachlan River at Cowra. Electrical conductivity has decreased from 1,000 $\mu\text{S}/\text{cm}$ to less than 700 $\mu\text{S}/\text{cm}$.

Dissolved oxygen in the Lachlan River is above 4 mg/L at most monitoring sites. There are lower readings at Booligal, possibly as the last of the floodwaters drain back into the main channel (Figure 430Figure 8). Handheld readings taken downstream of Booligal at Corrong show low dissolved oxygen (Table 42). Water temperature is increasing above 25°C (Figure 431).

Period	17 Day	06/02/2023 to 23/02/2023		2023
— 412004	LACHLAN FORBES CTNS	2351.00l Hour Inst.	DO (mg/l)	CP
— 412006	LACHLAN CONDOBOLIN B	2351.00l Hour Inst.	DO (mg/l)	CP
— 412038	LACHLAN WILLANDRA WR	2351.00l Hour Inst.	DO (mg/l)	CP
— 412039	LACHLAN HILLSTON WR	2351.00l Hour Inst.	DO (mg/l)	CP
— 412005	LACHLAN @ BOOLIGAL	2351.00l Hour Inst.	DO (mg/l)	CP

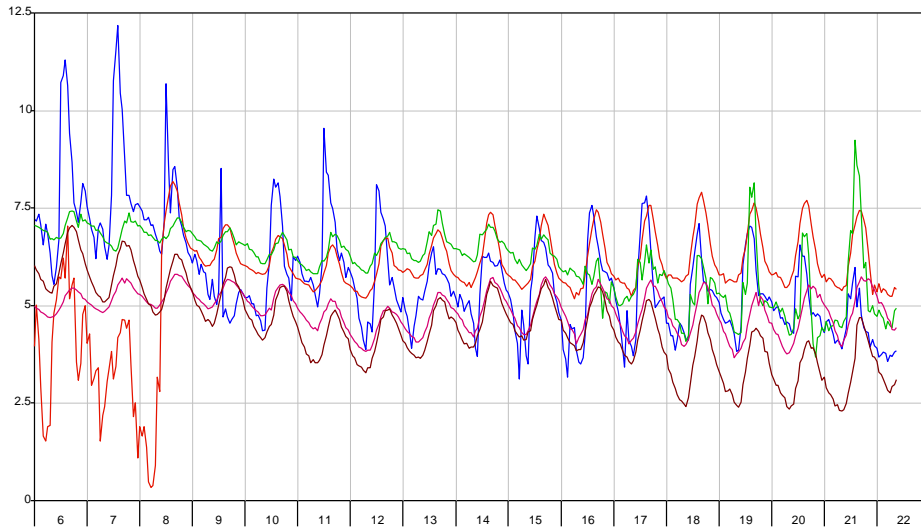


Figure 430: Continuous dissolved oxygen (mg/L) in the Lachlan River

Table 42: Hand-held dissolved oxygen results (mg/L) from the lower Lachlan River

Site	Sample date	Dissolved oxygen (mg/L)
Lachlan River at Booligal	15/02/2023 12:06	5.74
Lachlan River at Corrong	15/02/2023 10:55	2.67

Period	17 Day	06/02/2023 to 23/02/2023		2023
— 412004	LACHLAN FORBES CTNS	2080.00l Hour Inst.	Water Temp(C)	CP
— 412011	LACHLAN LAKE C WEIR	2080.00l Hour Inst.	Water Temp(C)	CP
— 412039	LACHLAN HILLSTON WR	2080.00l Hour Inst.	Water Temp(C)	CP
— 412005	LACHLAN @ BOOLIGAL	2080.00l Hour Inst.	Water Temp(C)	CP

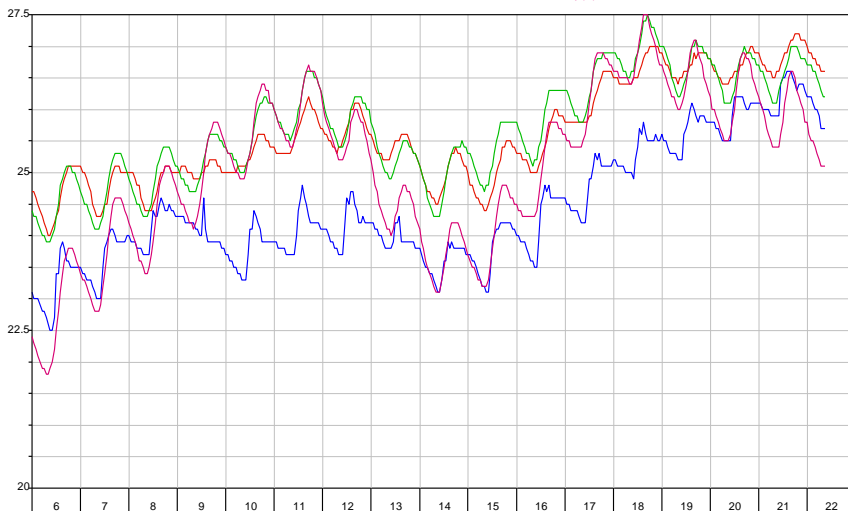


Figure 431: Continuous water temperature (°C) in the Lachlan River

Murrumbidgee River

Discharge in the Murrumbidgee River at Maude Weir is around 2,000 ML/day and has decreased to 3,000 ML/day at Balranald (Figure 432). Dissolved oxygen levels in the Murrumbidgee River are above 4.7 mg/L. (Figure 433) and water temperatures are above 25.5°C (Figure 434).

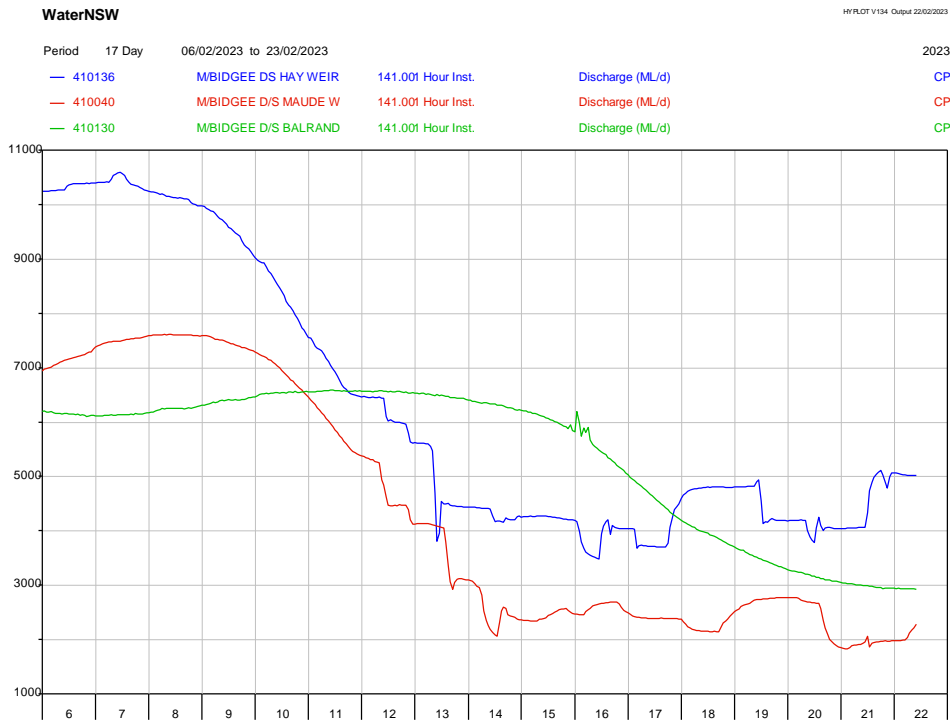


Figure 432: Discharge (ML/day) in the lower Murrumbidgee River

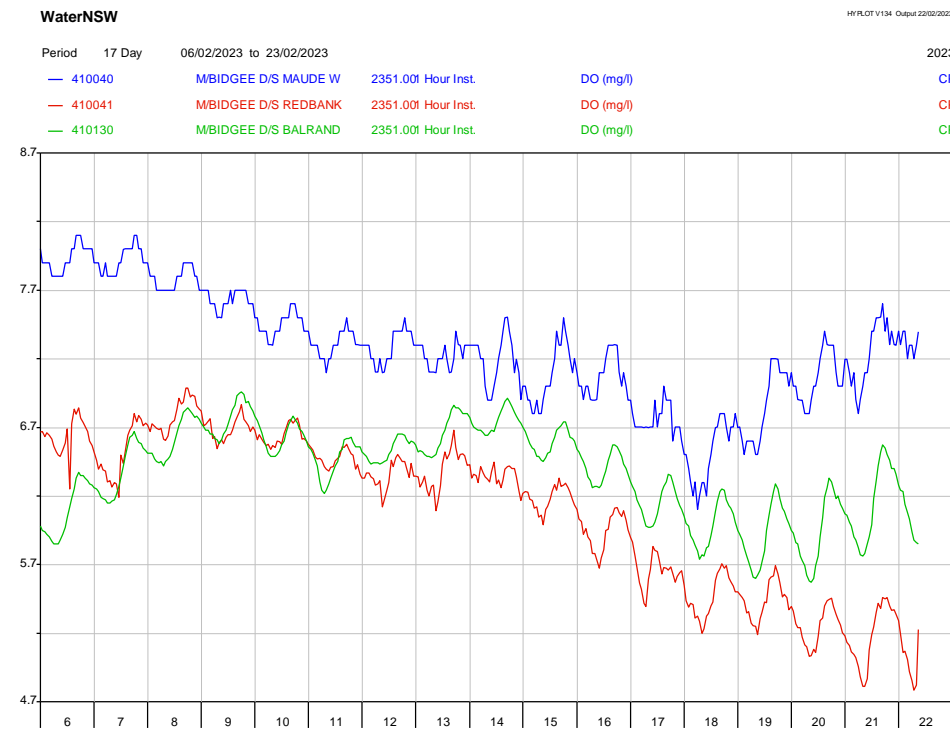


Figure 433: Continuous dissolved oxygen (mg/L) in the Murrumbidgee River

WaterNSW

HYPLOT V134 Output 22/02/2023

Period 17 Day 06/02/2023 to 23/02/2023 2023

— 410040	MBIDGEE D/S MAUDE W	2080.001 Hour Inst.	Water Temp(C)	CP
— 410041	MBIDGEE D/S REDBANK	2080.001 Hour Inst.	Water Temp(C)	CP
— 410130	MBIDGEE D/S BALRAND	2080.001 Hour Inst.	Water Temp(C)	CP

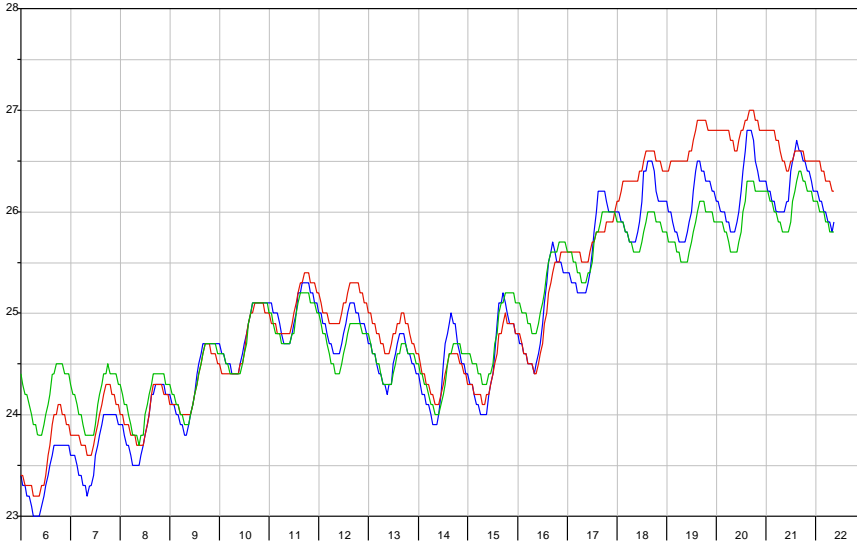


Figure 434: Continuous water temperature (°C) in the Murrumbidgee River

Koety/Edward River

Discharge in the Koety/Edward River is steady at around 2,000 ML/day down the system. Dissolved oxygen levels are stable with readings from all three sites above 5 mg/L (Figure 435). Water temperatures are increasing toward 25°C (Figure 436).

WaterNSW

HYPLOT V134 Output 22/02/2023

Period 17 Day 06/02/2023 to 23/02/2023 2023

— 409047	EDWARD R @ TOONALOOK	2351.001 Hour Inst.	DO (mg/l)	CP
— 409003	EDWARD @ DENILIQUIN	2351.001 Hour Inst.	DO (mg/l)	CP
— 409014	EDWARD R @ MOULAMEIN	2351.001 Hour Inst.	DO (mg/l)	CP

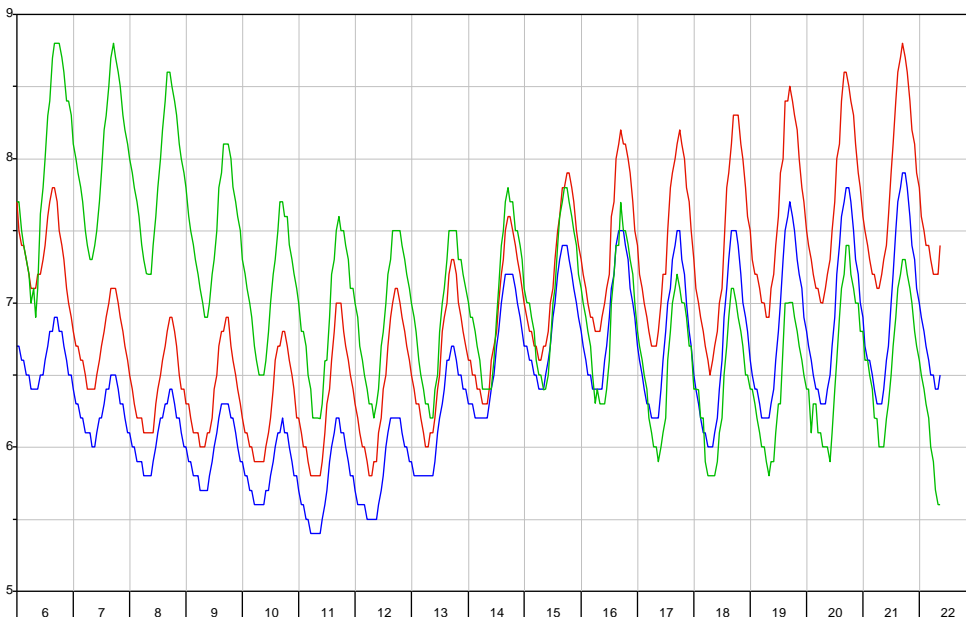


Figure 435: Continuous dissolved oxygen (mg/L) in the Koety/Edward River

WaterNSW

HY/PL07 v1134 Output 22/02/2023

Period 17 Day 06/02/2023 to 23/02/2023 2023

— 409047	EDWARD R @ TOONALOOK	2080.00l Hour Inst.	Water Temp(C)	CP
— 409003	EDWARD @ DENLIQUIN	2080.00l Hour Inst.	Water Temp(C)	CP
— 409014	EDWARD R @ MOULAMEIN	2080.00l Hour Inst.	Water Temp(C)	CP

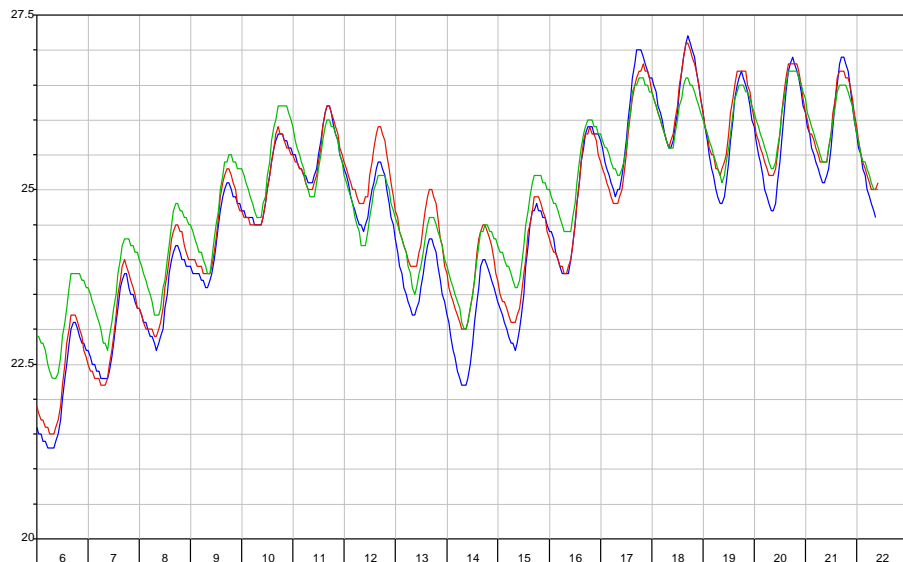


Figure 436: Continuous water temperature (°C) in the Kolety/Edward River

Wakool and Niemur rivers

Discharge in the Wakool River at Coonambit Bridge is 1,200 ML/day and at Gee Gee Bridge just over 300 ML/day. The Niemur River at Barham-Moulamein Road and Mallan School is flowing at over 380 and 500 ML/day respectively. Figure 437 highlights dissolved oxygen levels in the Wakool and Niemur rivers are remaining above 4 mg/L.

WaterNSW

HY/PL07 v1134 Output 22/02/2023

Period 17 Day 06/02/2023 to 23/02/2023 2023

— 409062	WAKOOL R GEEGEE BR 2	2351.00l Hour Inst.	DO (mg/l)	CP
— 409013	WAKOOL @ STONEY XING	2351.00l Hour Inst.	DO (mg/l)	CP
— 409048	NIEMUR R BARH-MLN RD	2351.00l Hour Inst.	DO (mg/l)	CP
— 409086	NIEMUR @ MALLAN SCH	2351.00l Hour Inst.	DO (mg/l)	CP

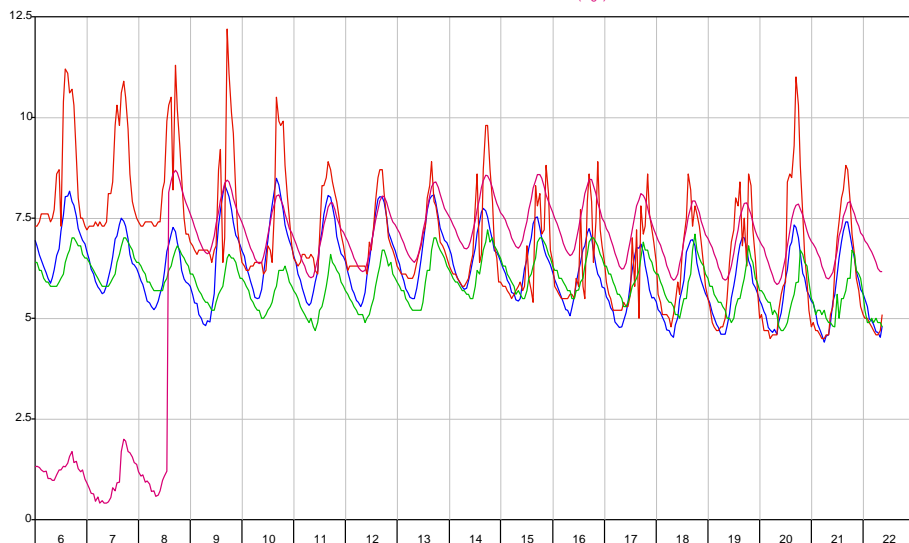


Figure 437: Continuous dissolved oxygen (mg/L) in the Wakool and Niemur rivers

WaterNSW

HYRLOT V134 Output 22/02/2023

Period 17 Day 06/02/2023 to 23/02/2023 2023

— 409062	WAKOOL R GEEGEE BR 2	2080.001 Hour Inst.	Water Temp(C)	CP
— 409048	NIEMUR R BARH-MLN RD	2080.001 Hour Inst.	Water Temp(C)	CP
— 409086	NIEMUR @ MALLAN SCH	2080.001 Hour Inst.	Water Temp(C)	CP

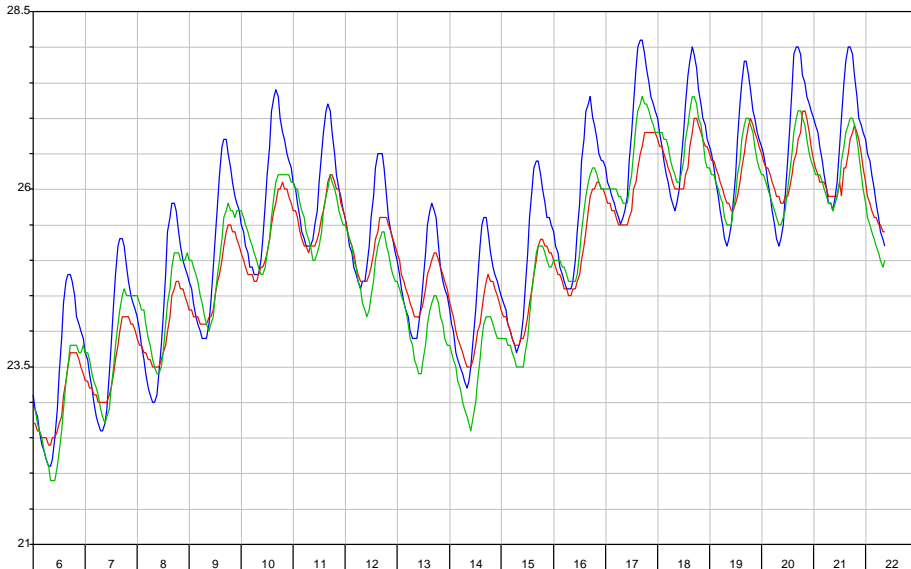


Figure 438: Continuous water temperature (°C) in the Wakool and Niemur rivers

Merran, Little Merran and Barber creeks

Figure 439 shows dissolved oxygen levels in Merran and Little Merran are remaining above 4 mg/L. Barbers Creek at Sandy Bridge is continuing to show large diurnal fluctuations.

WaterNSW

HYRLOT V134 Output 22/02/2023

Period 17 Day 06/02/2023 to 23/02/2023 2023

— 409044	LT MERRAN FRANK/ BR	2351.001 Hour Inst.	DO (mg/l)	CP
— 409036	MERRAN CK U/S WAK R	2351.001 Hour Inst.	DO (mg/l)	CP
— 409111	BARBER @ SANDY BR.	2351.001 Hour Inst.	DO (mg/l)	CP

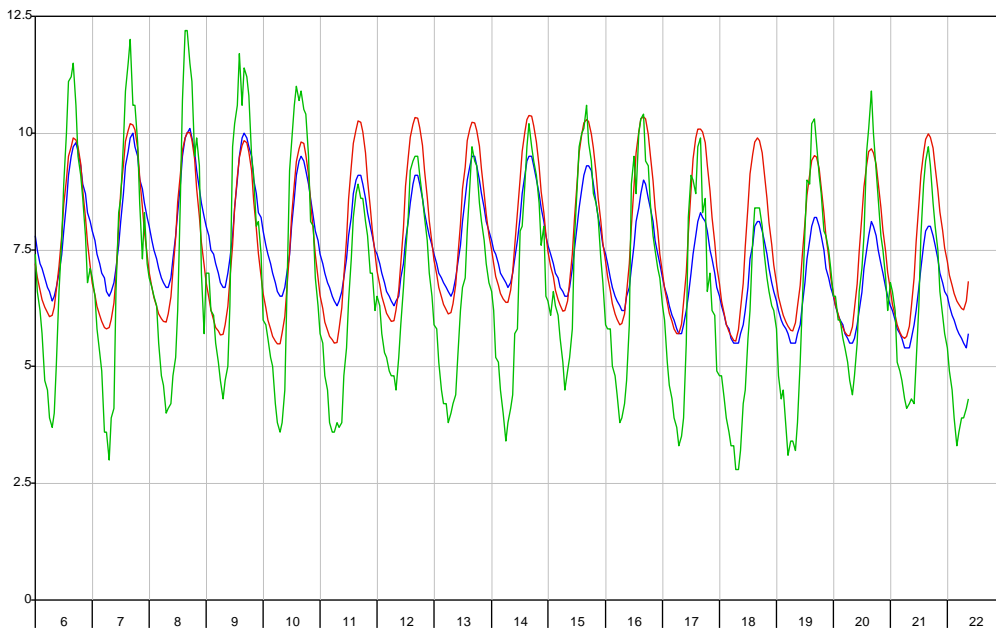


Figure 439: Continuous dissolved oxygen (mg/L) in the Merran, Little Merran and Barber creeks

Murray River

Monitoring by DELWP is showing the Murray River at Tocumwal, upstream of the Barmah/Millewa Forest, is oxygenated (Figure 440). Downstream of the forest at Barmah, dissolved oxygen is above 6 mg/L. Dissolved oxygen in the Goulburn River at McCoys Bridge is around 6.8 mg/L and the Campaspe River at Fehrings Lane 5.0 mg/L.

Dissolved oxygen in the Murray River at Barham, Wemen and Colignan is above 6 mg/L. The temporary monitoring site installed on the Murray River downstream of Wentworth was reading 6.1 mg/L on Wednesday 22 February (12:00).

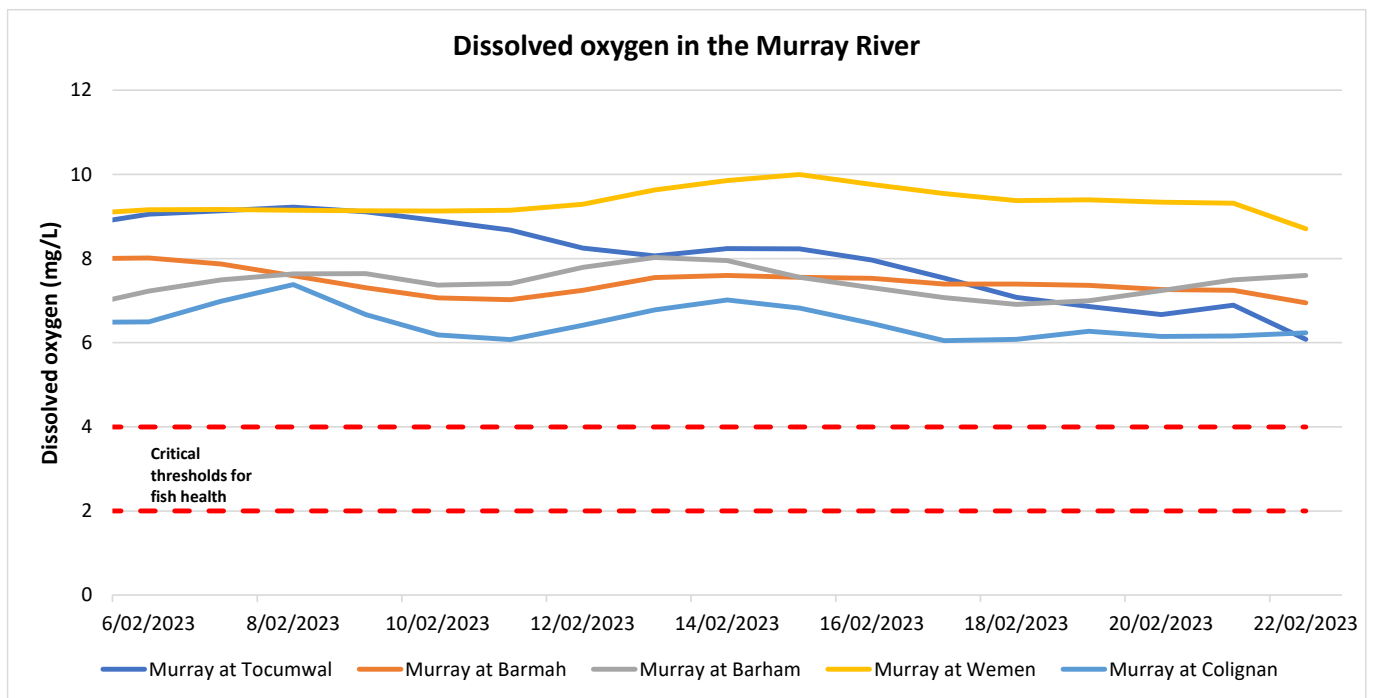


Figure 440: Continuous dissolved oxygen (mg/L) in the Murray River (data courtesy of DELWP)

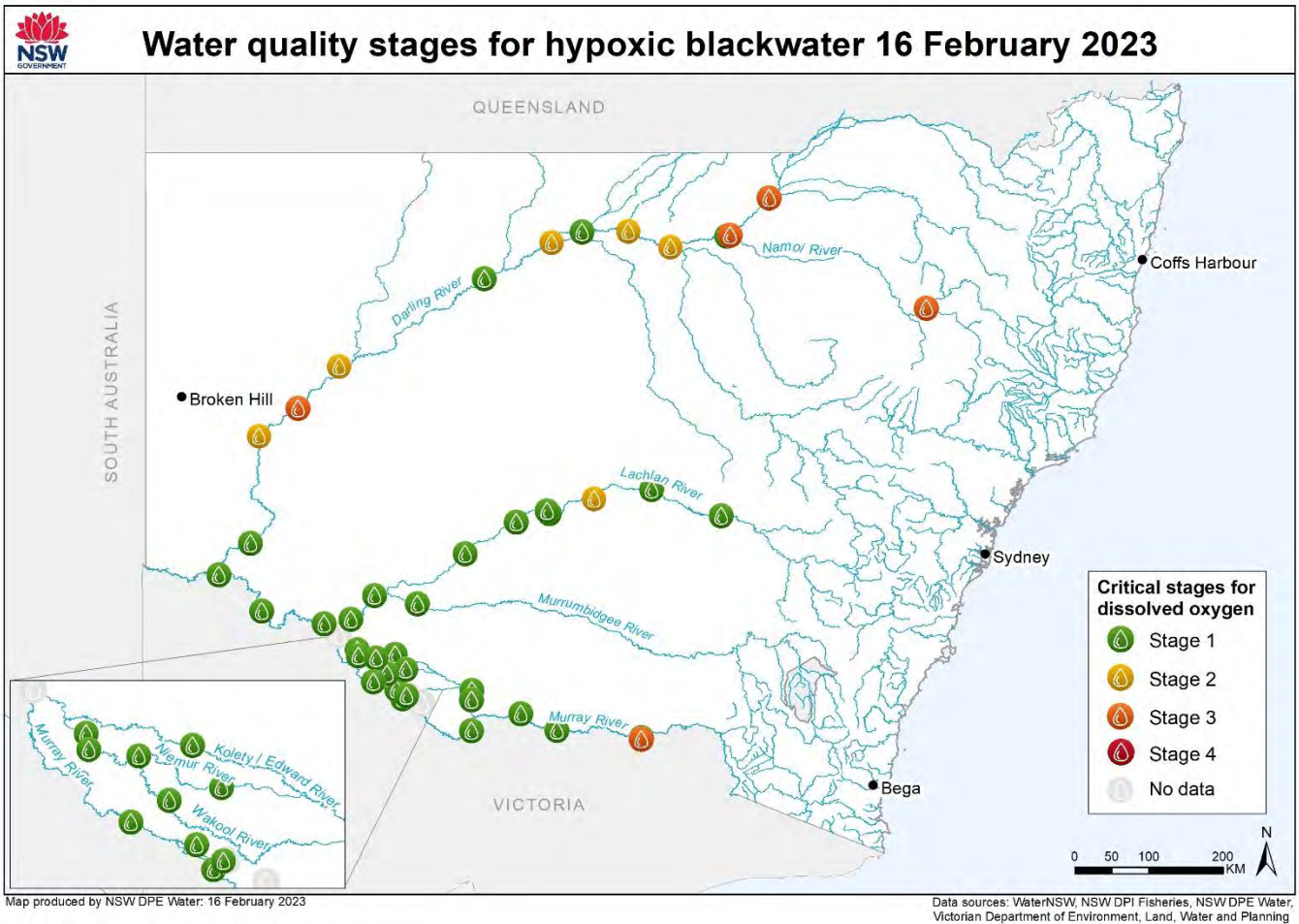


Figure 441: Critical stages for dissolved oxygen - 16 February 2023

Weather Outlook

The Bureau of Meteorology 8-day total rain forecast (22 February to 1 March) indicates most of NSW will be dry with some heavier showers along the east coast (Figure 442). Forecast is for maximum air temperatures at Menindee (Figure 443) and Mildura (Figure 444) to remain in the mid to high 30's this week before dropping back to low 30's early next week. There are low intensity heatwave conditions forecast for the south west corner of NSW this week (Figure 445).

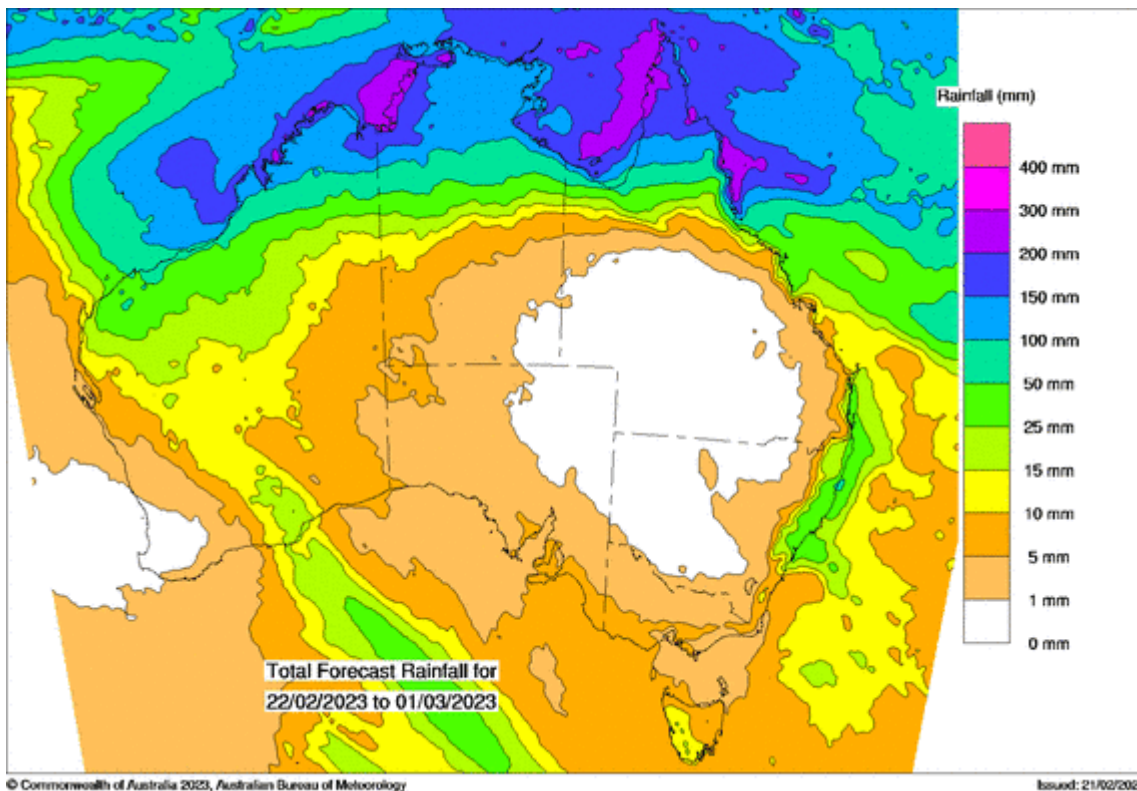


Figure 442: Bureau of Meteorology 8-day total rain forecast (22 February to 1 March)

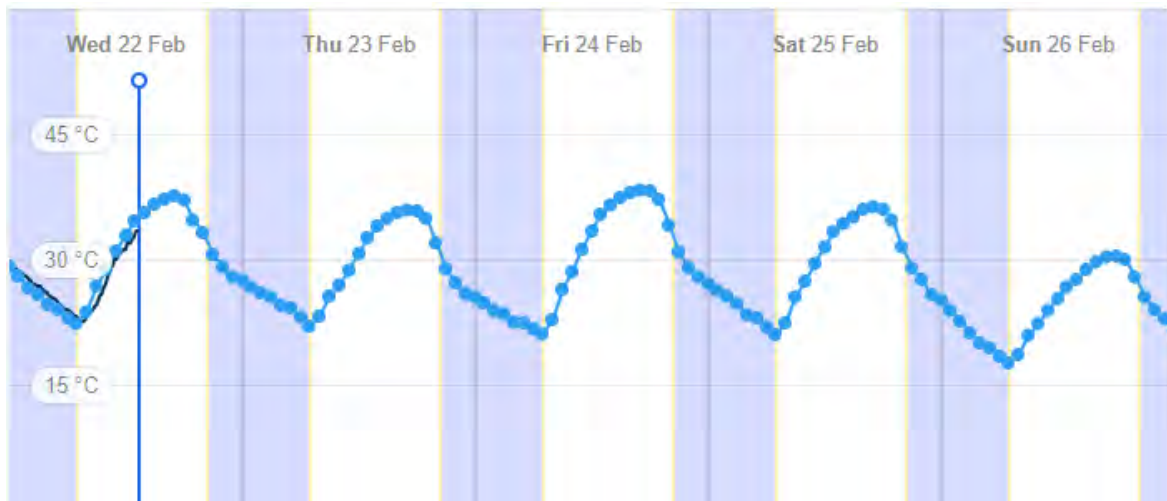


Figure 443: Forecast air temperatures for Menindee – 22 to 26 February

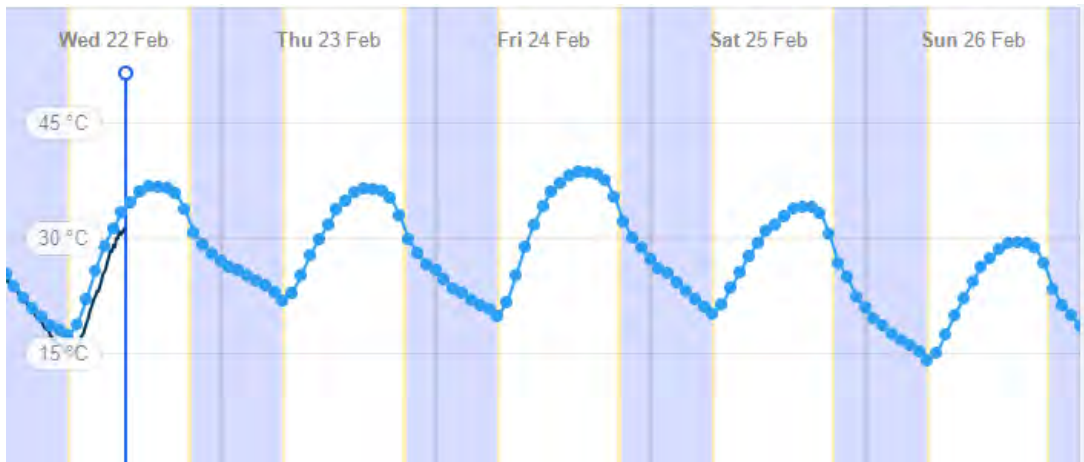


Figure 444: Forecast air temperatures for Mildura – 22 to 26 February

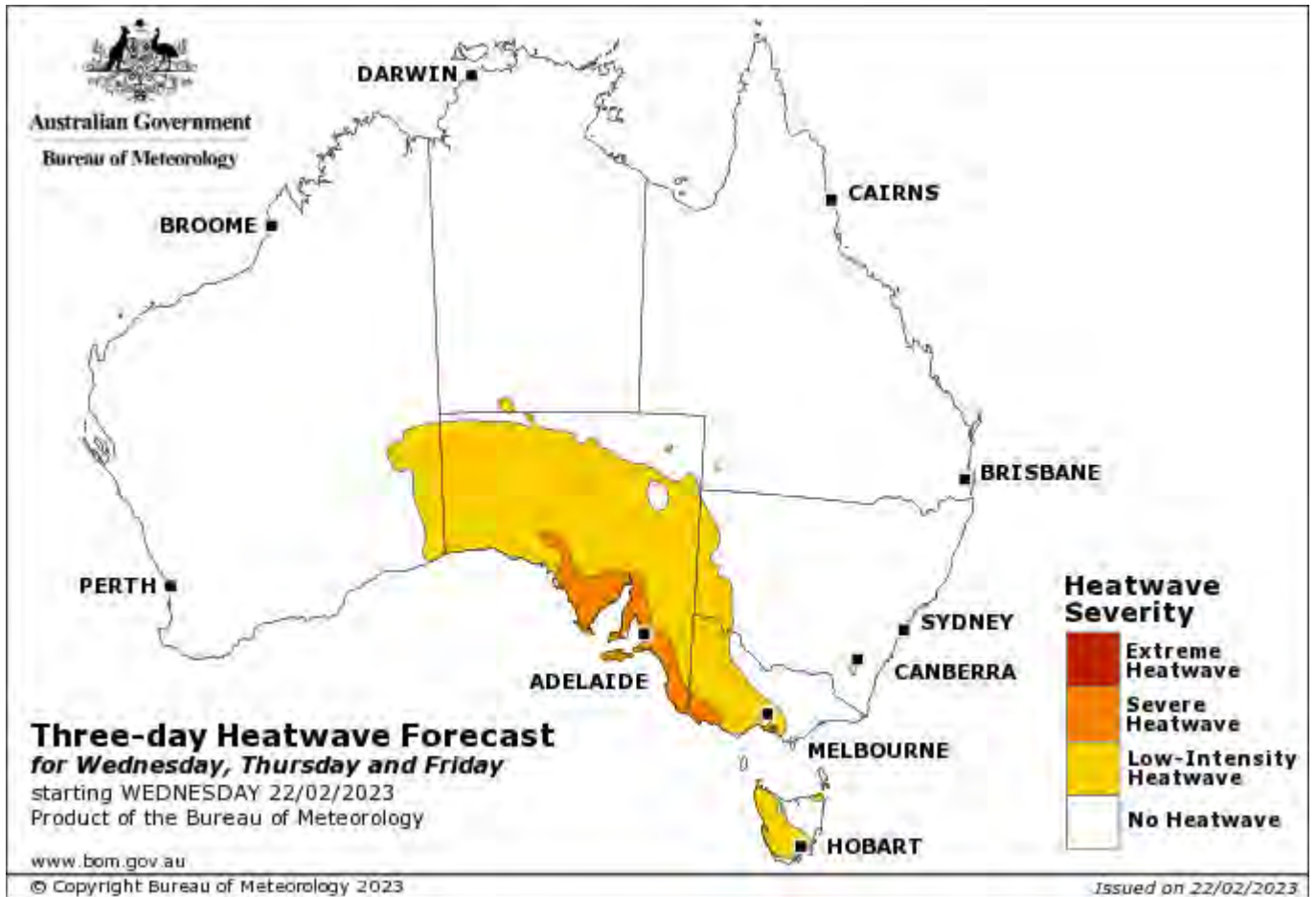


Figure 445: Predicted heatwave conditions for 22 to 29 February 2023

Water quality update Meeting No. 19 – 7 March 2023

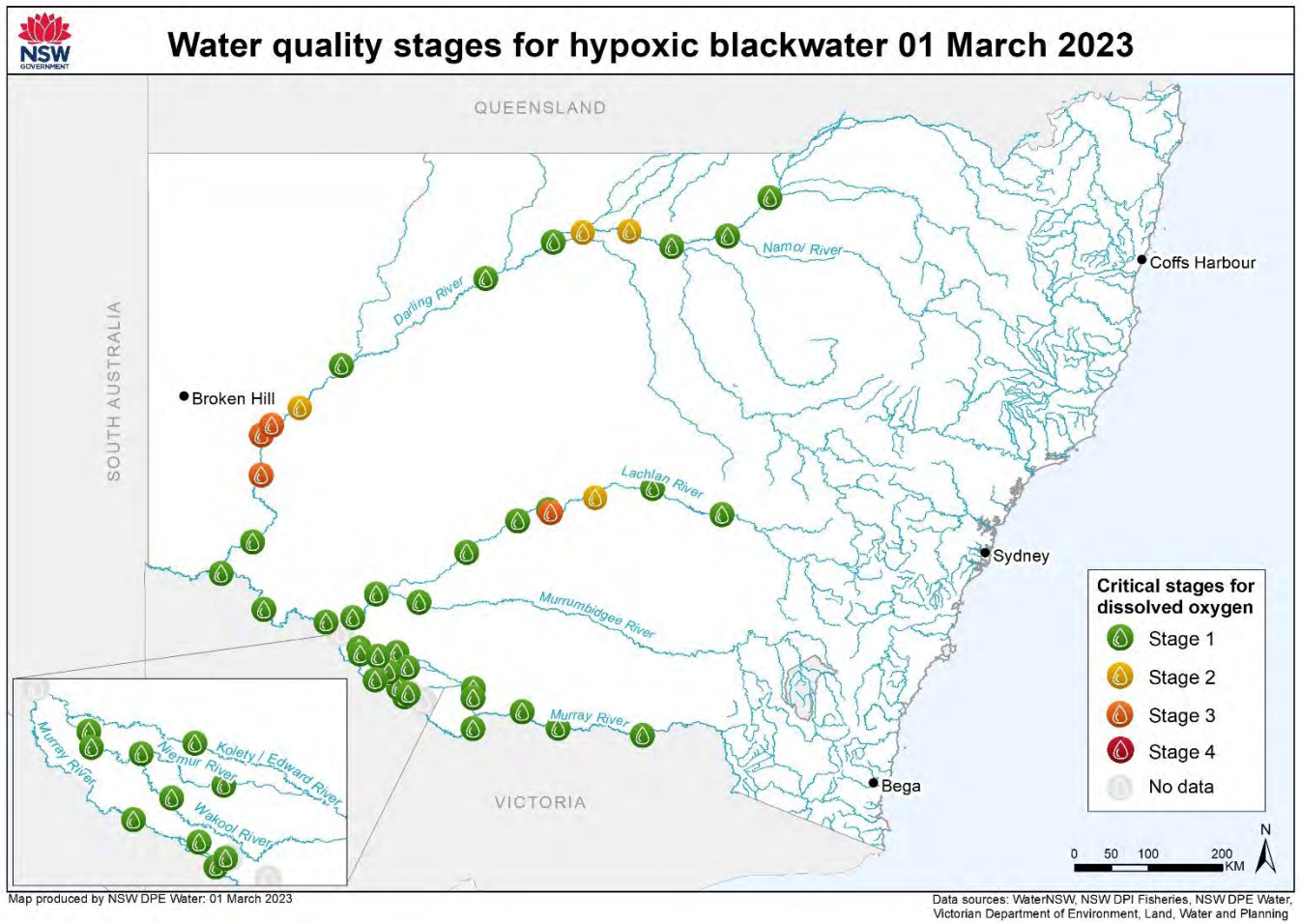


Figure 446: NSW water quality stages for hypoxic blackwater – 1 March 2023

Darling River and Menindee Lakes

Discharge in the Darling River and Tallyawalka Creek at Wilcannia is 1,524 and 1,573 ML/day respectively. Discharge in the Darling River at Pooncarie has declined to 11,572 ML/day and 15,002 ML/day at Burtundy.

Dissolved oxygen levels at both Wilcannia and Nelia Gaari are dropping to low levels overnight and then recovering during the day (Figure 447 and Figure 448). The high dissolved oxygen readings during the day at Nelia Gaari could be due to high algal growth at the site.

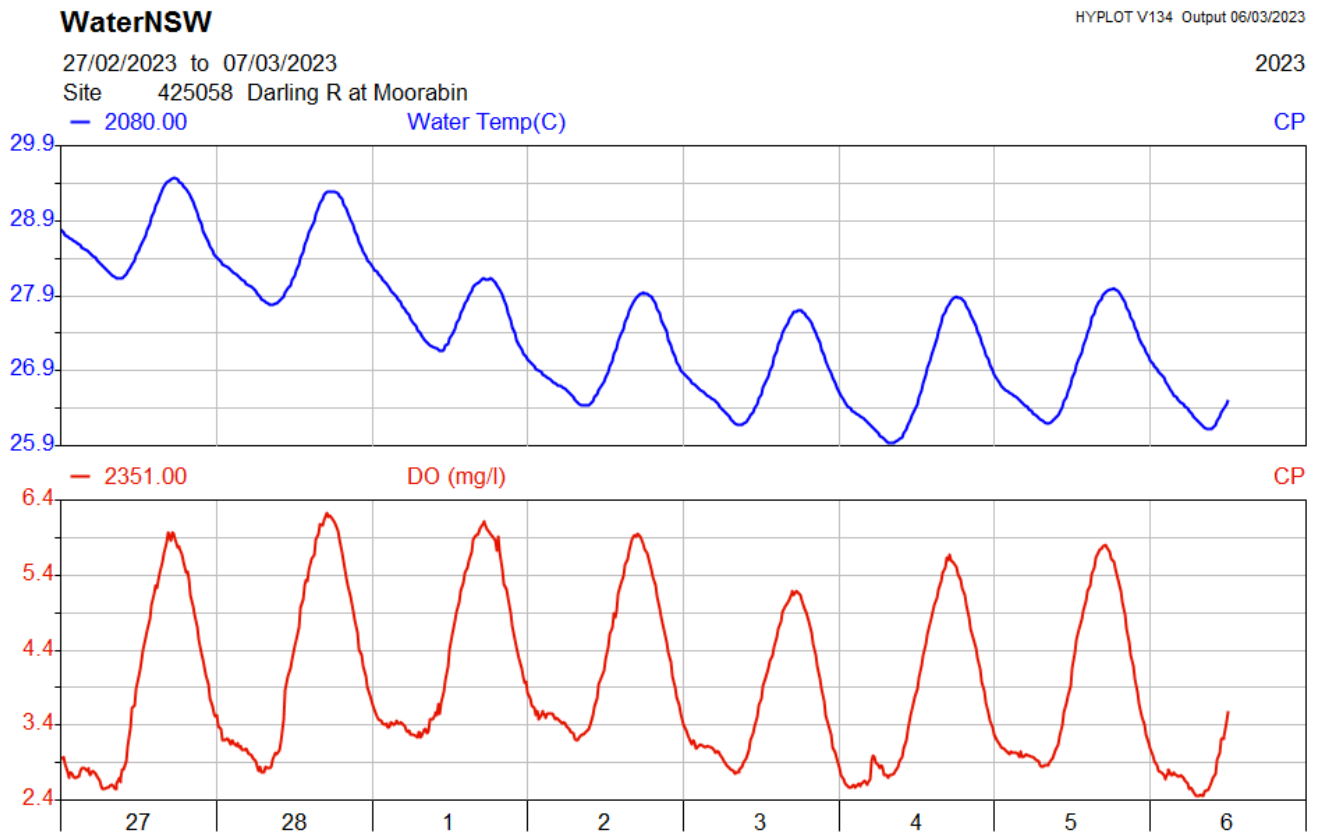


Figure 447: Continuous dissolved oxygen (mg/L) and water temperature (°C) in the Darling River at Wilcannia (Moorabin)

27/02/2023 to 07/03/2023

2023

Site 425060 DARLING RIVER @ NELIA GAARI

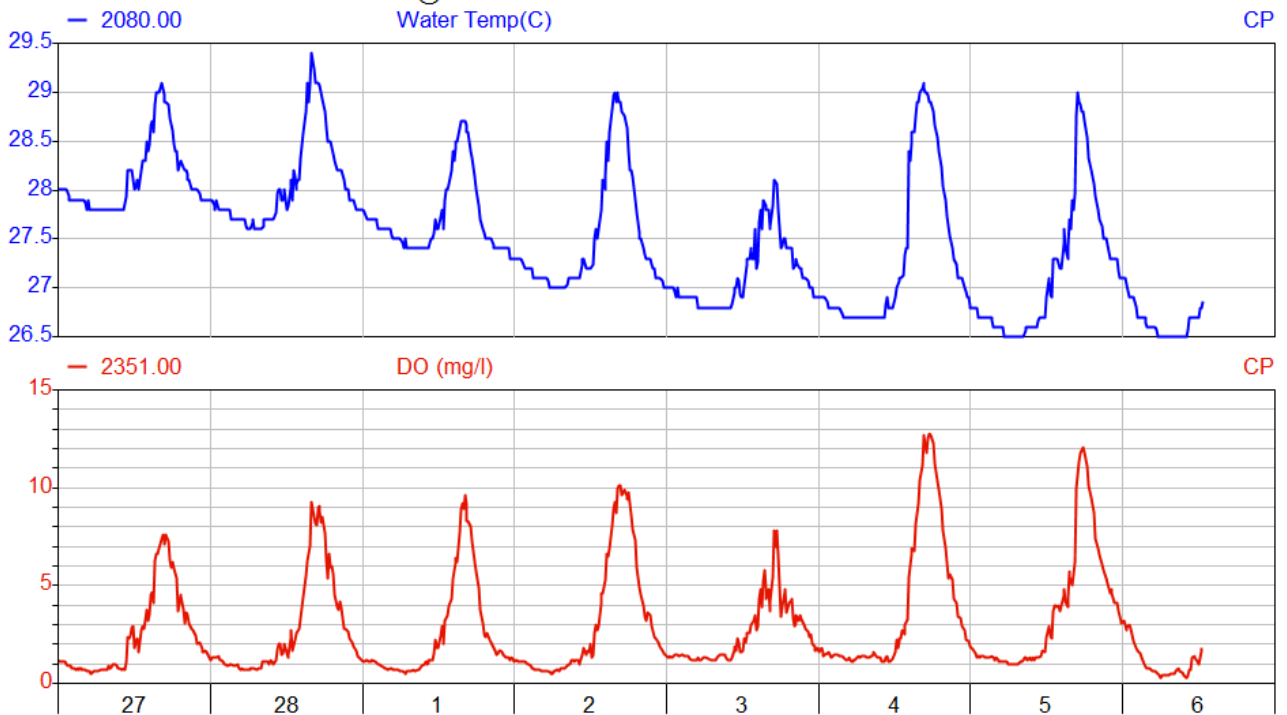


Figure 448: Continuous dissolved oxygen (mg/L) and water temperature (°C) in the Darling River at Nelia Gaari

Figure 449 is a satellite-derived Sentinel image showing the Darling River and Menindee Lakes at Menindee on 4 March. Dissolved oxygen monitoring results (mg/L) collected on 2 March are shown on Figure 450 and in Table 43.

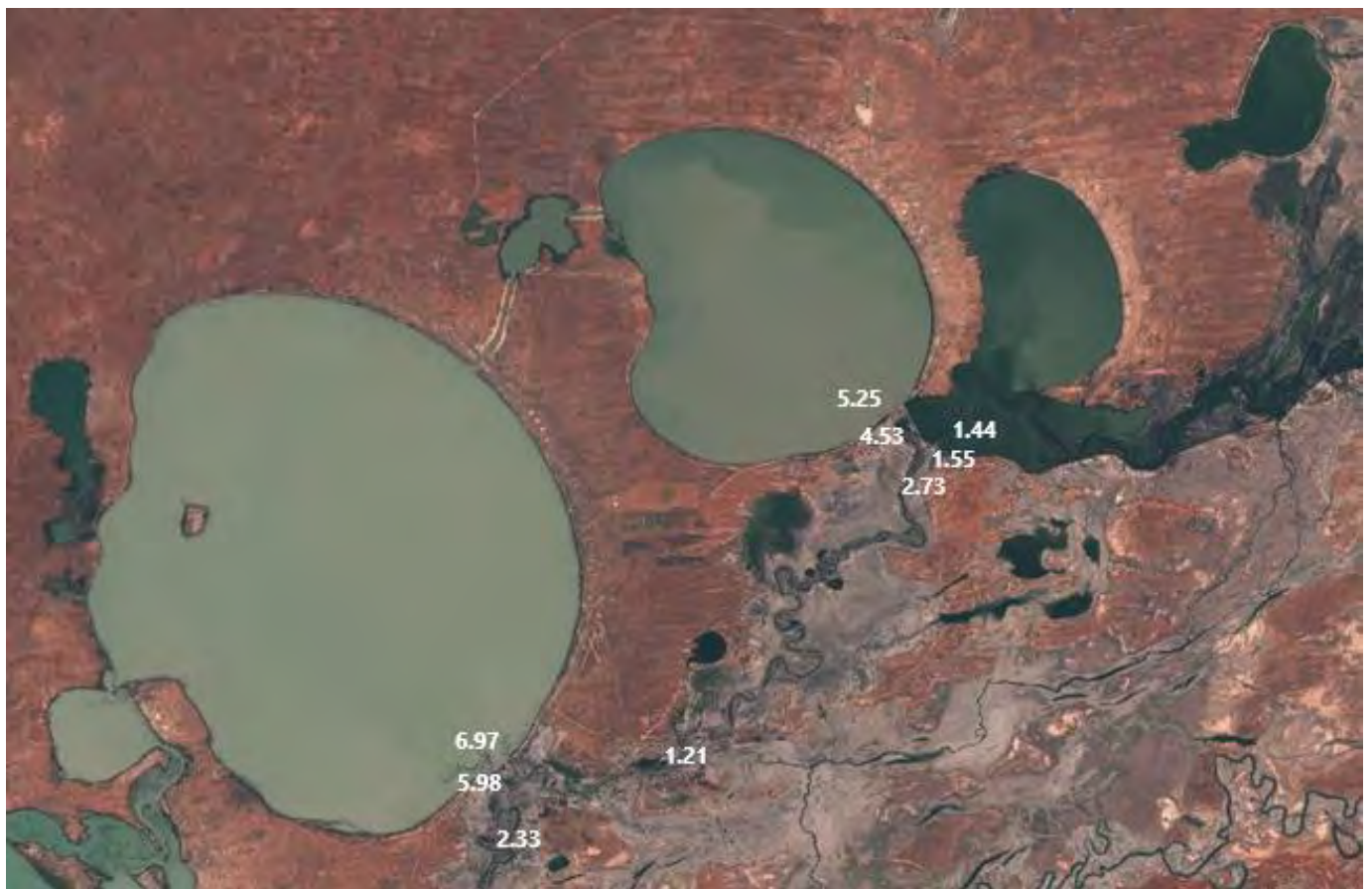


Figure 449: Satellite derived Sentinel colour infrared image – Image 4 March. Data collected 2 March (mg/L)

Table 43: Dissolved oxygen (mg/L) data from Menindee Lakes, (EHG, MDBA, WaterNSW)

Site	28 February AM	28 February PM	1 March AM	2 March PM
Darling River U/S main weir	1.86	2.52		1.44
Darling River D/S main weir	0.54	1.23	1.40	1.55
U/S Pamamaroo outlet	5.10	5.32	6.13	5.25
D/S Pamamaroo outlet	3.96	3.90		4.53
Junction Main Weir outlet/Pamamaroo outlet	2.60	2.90		2.73
Darling River at Pumping Station at Menindee		2.43	1.31	
Darling River at Menindee Town	0.37	1.20	1.10	1.21
Lake Menindee U/S outlet	6.44	7.13		6.97
Lake Menindee D/S outlet	4.84	6.27		5.98

WaterNSW

HYPLOT V134 Output 06/03/2023

27/02/2023 to 07/03/2023

2023

Site 425012 DARLING RIVER AT MENINDEE UPSTREAM WEIR 32

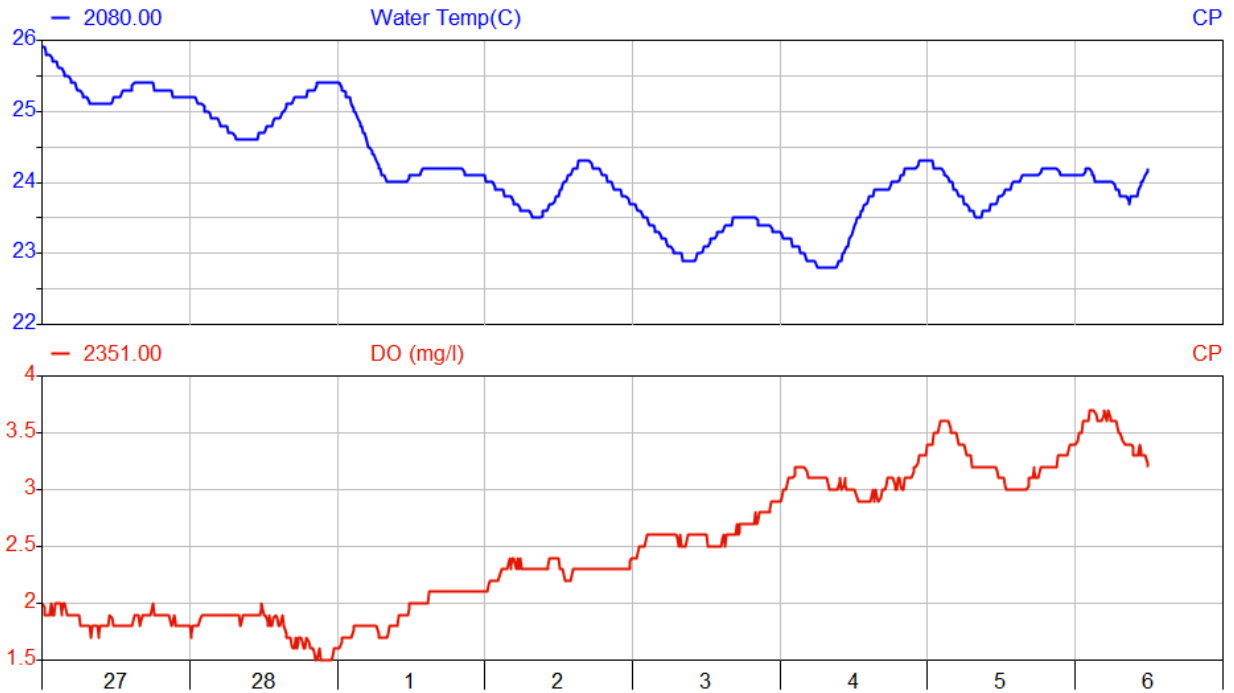


Figure 450: Continuous dissolved oxygen (mg/L) and water temperature (°C) in the Darling River at Weir 32

WaterNSW

HYPLOT V134 Output 06/03/2023

27/02/2023 to 07/03/2023

2023

Site 425007 DARLING RIVER AT BURTUNDY

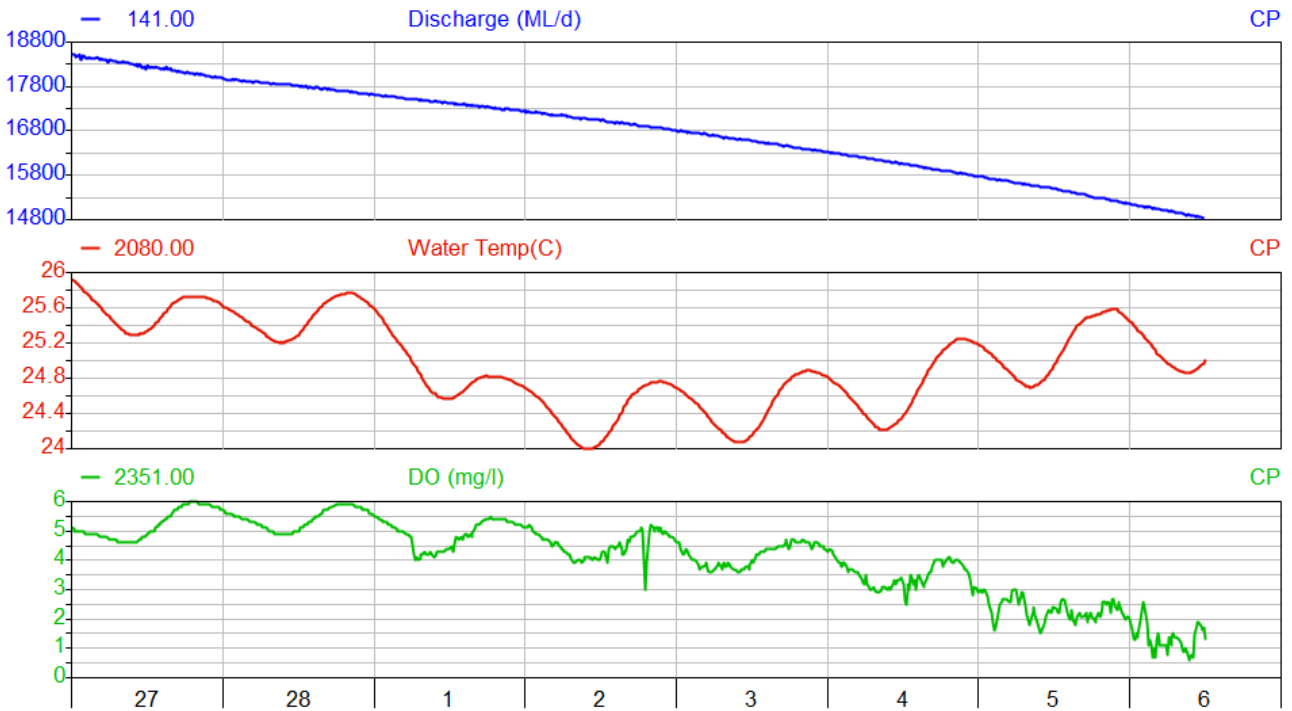


Figure 451: Continuous discharge (ML/day), dissolved oxygen (mg/L), water temperature (°C) in the Darling River at Burtundy

A series of satellite-derived Sentinel colour infrared images (Figure 452) from 22 February (left), 27 February (middle) and 4 March (right) highlights the draining of floodwater off the Darling River floodplain and into the main channel. The last of the floodwater is between Pooncarie and Burtundy (right). Dissolved oxygen monitoring results from the lower Darling River are listed in Table 2.



Figure 452: Satellite derived Sentinel colour infrared image of lower Darling River – Images 22 February (left), 27 February (middle), 4 March (right)

Table 44: Dissolved oxygen (mg/L) data from the lower Darling River

Site	23 February 2023	1 March 2023
Darling River at Pooncarie	3.1	2.16
Darling River at Burtundy	3.76	5.07
Darling River at Ellerslie	3.46	4.34
Darling River at Tapio	3.67	4.16

Discharge in Murray River at Colignan (upstream of Red Cliffs) is 10,201 ML/day. Dissolved oxygen in Murray River at Wentworth is 6.1 mg/L (6/03/2023 10:00).



Figure 453: Satellite derived Sentinel colour infrared image of Murray - Darling River junction – Image 4 March

Weather Outlook

The Bureau of Meteorology 8-day total rain forecast (6 to 13 March) indicates most of NSW will be dry with highest rainfall totals on the far north coast (Figure 454). Forecast is for maximum air temperatures at Menindee (Figure 455) in the high 20's to low 30's this week. Air temperatures in Mildura will be slightly lower than at Menindee (Figure 456). Overnight temperatures dropping to mid to low teens. There are no heatwave conditions forecast for southwest NSW this week.

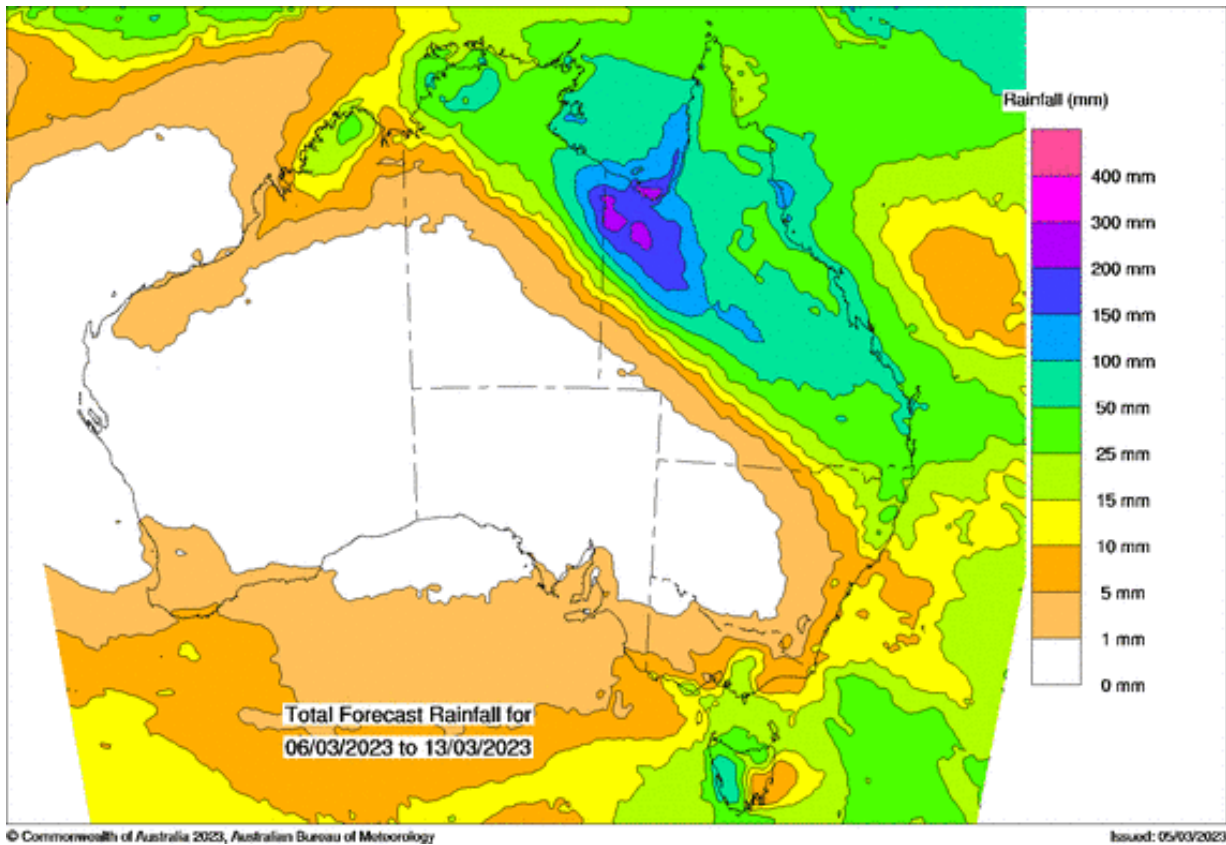


Figure 454: Bureau of Meteorology 8-day total rain forecast (6 to 13 March)

	MON Mar 6	TUE Mar 7	WED Mar 8	THU Mar 9	FRI Mar 10	SAT Mar 11	SUN Mar 12
Summary	Sunny	Sunny	Mostly sunny	Sunny	Sunny	Mostly sunny	Mostly sunny
Maximum	31°C	28°C	26°C	25°C	29°C	31°C	31°C
Minimum	15°C	13°C	11°C	10°C	11°C	14°C	17°C
Chance Of Rain	5%	5%	20%	5%	5%	5%	20%
Rain Amount	< 1mm	< 1mm	< 1mm	< 1mm	< 1mm	< 1mm	< 1mm

Figure 455: Forecast air temperatures for Menindee – 6 to 12 March








	MON Mar 6	TUE Mar 7	WED Mar 8	THU Mar 9	FRI Mar 10	SAT Mar 11	SUN Mar 12
Summary	 Mostly sunny	 Sunny	 Mostly sunny	 Mostly sunny	 Sunny	 Sunny	 Sunny
Maximum	28°C	26°C	23°C	24°C	28°C	30°C	31°C
Minimum	13°C	13°C	12°C	9°C	10°C	12°C	12°C
Chance Of Rain	5%	5%	5%	5%	5%	5%	10%
Rain Amount	< 1mm	< 1mm	< 1mm	< 1mm	< 1mm	< 1mm	< 1mm

Figure 456: Forecast air temperatures for Mildura – 6 to 12 March

Water quality update Meeting No. 20 – 14 March 2023

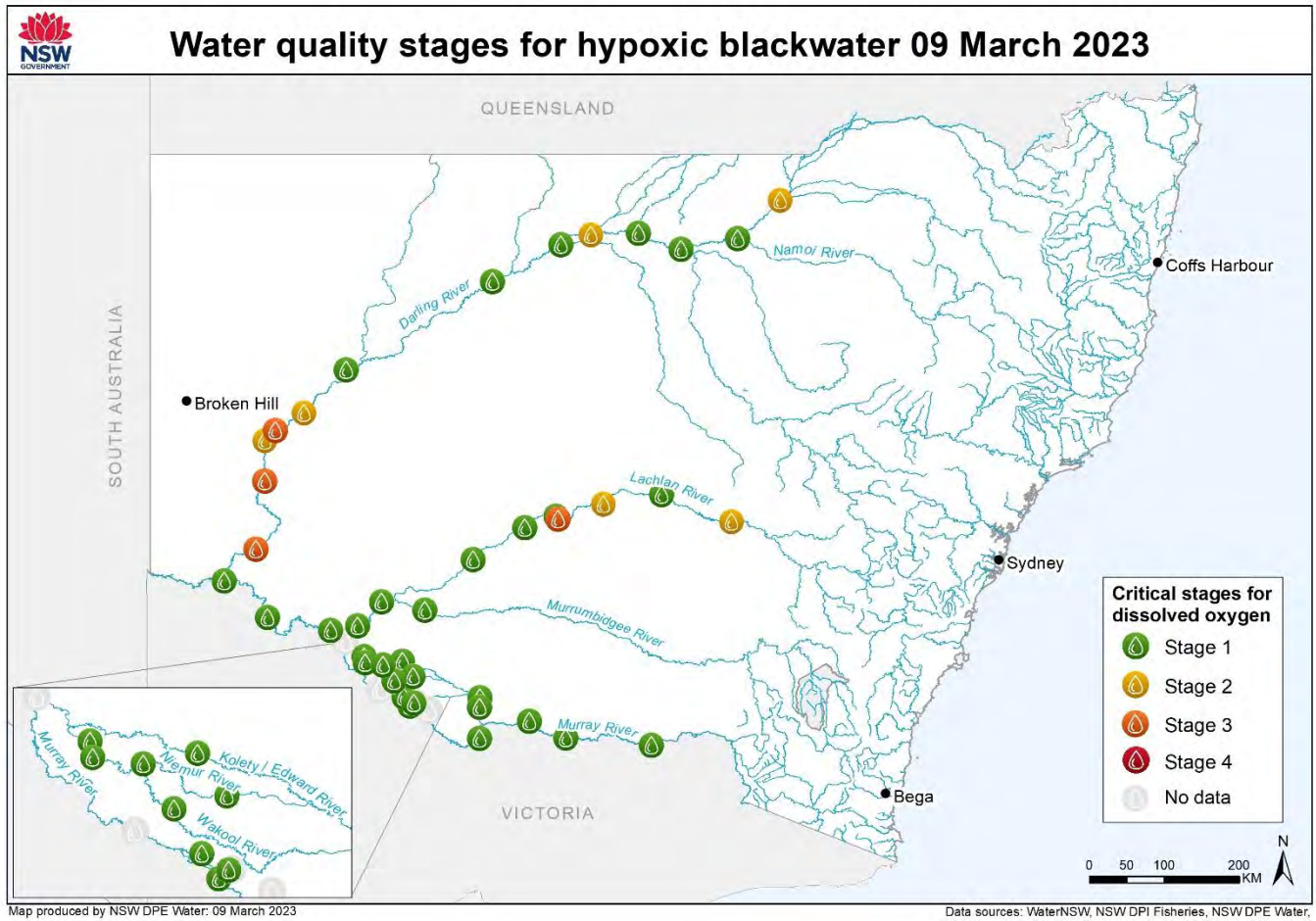


Figure 457: NSW water quality stages for hypoxic blackwater – 9 March 2023

Darling River and Menindee Lakes

Discharge in the Darling River and Tallyawalka Creek at Wilcannia is 1,500 and 1,285 ML/day respectively. Discharge in the Darling River at Pooncarie has declined to 8,889 ML/day and 9,800 ML/day at Burtundy.

Dissolved oxygen levels at both Wilcannia and Nelia Gaari are dropping to low levels overnight and then recovering during the day (Figure 458 and Figure 459). The high dissolved oxygen readings during the day at Nelia Gaari could be due to high algal growth at the site.

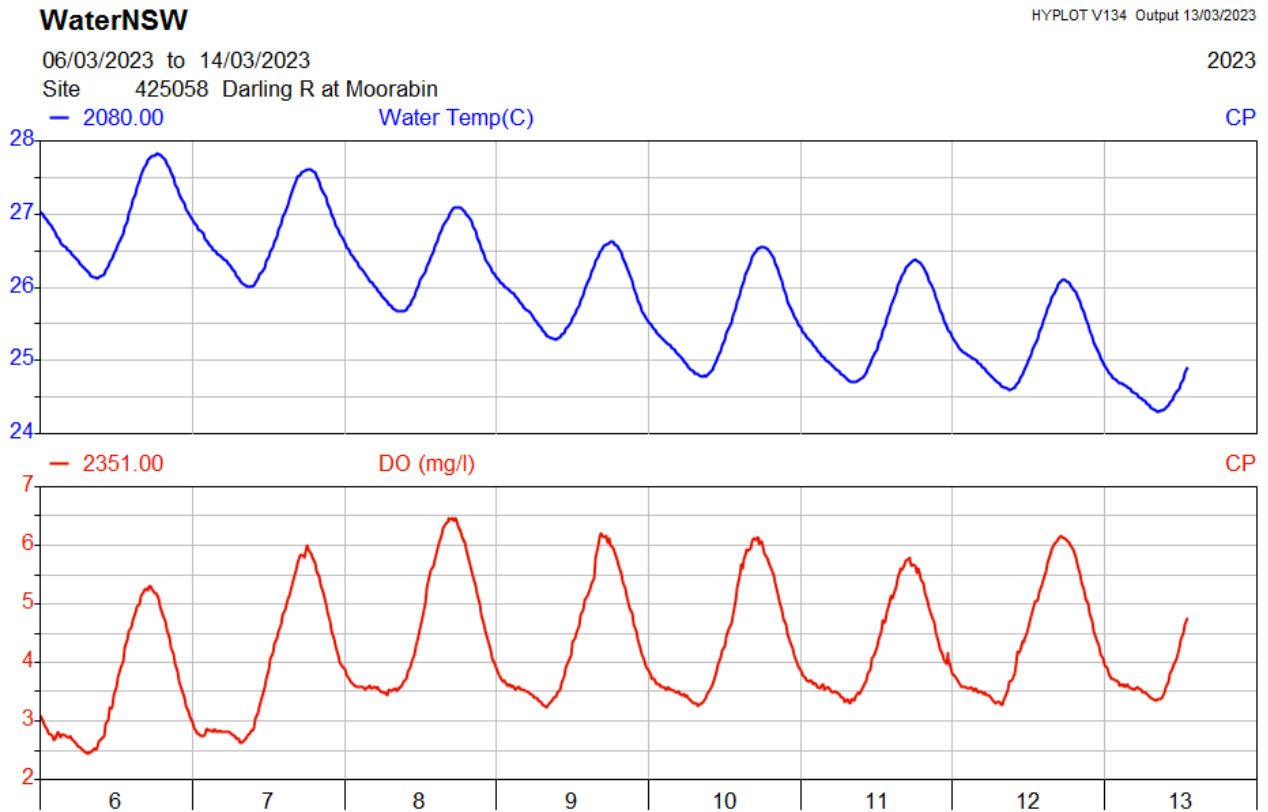


Figure 458: Continuous dissolved oxygen (mg/L) and water temperature (°C) in the Darling River at Wilcannia (Moorabin)

06/03/2023 to 14/03/2023

2023

Site 425060 DARLING RIVER @ NELIA GAARI

— 2080.00 Water Temp(C)

CP

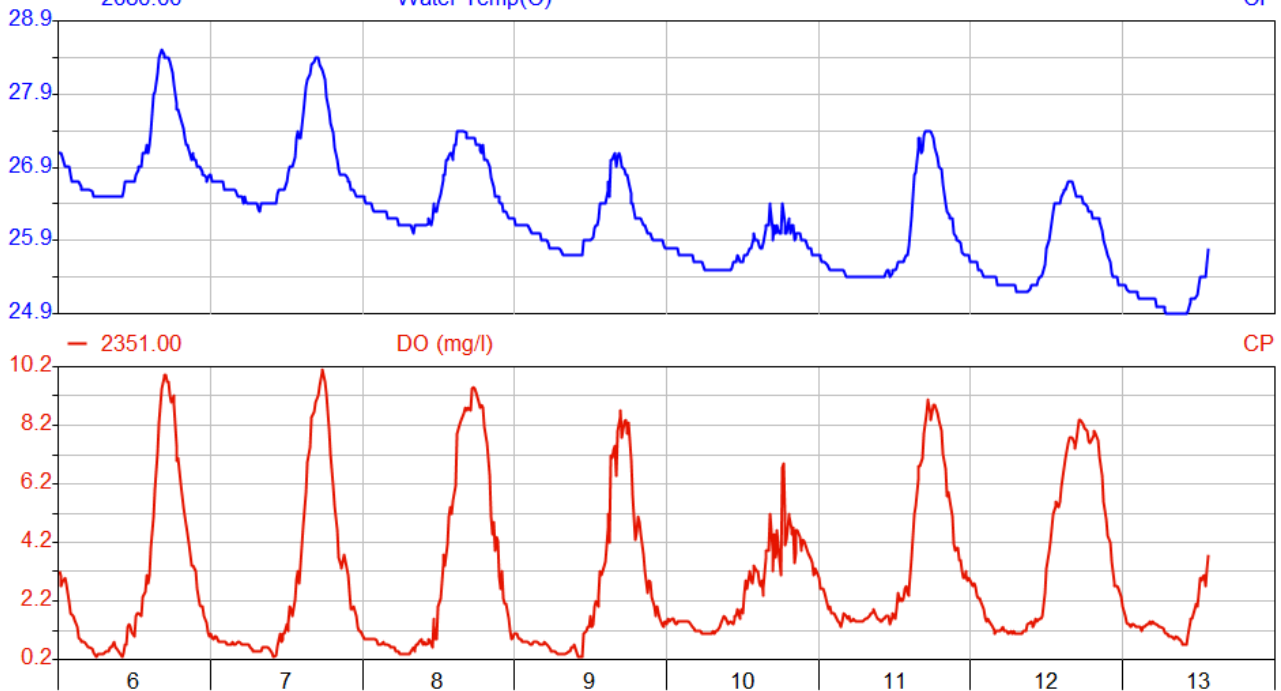


Figure 459: Continuous dissolved oxygen (mg/L) and water temperature (°C) in the Darling River at Nelia Gaari

Figure 460 is a satellite-derived Sentinel image showing the Darling River and Menindee Lakes at Menindee on 4 March. Dissolved oxygen monitoring results (mg/L) collected on 8 March.

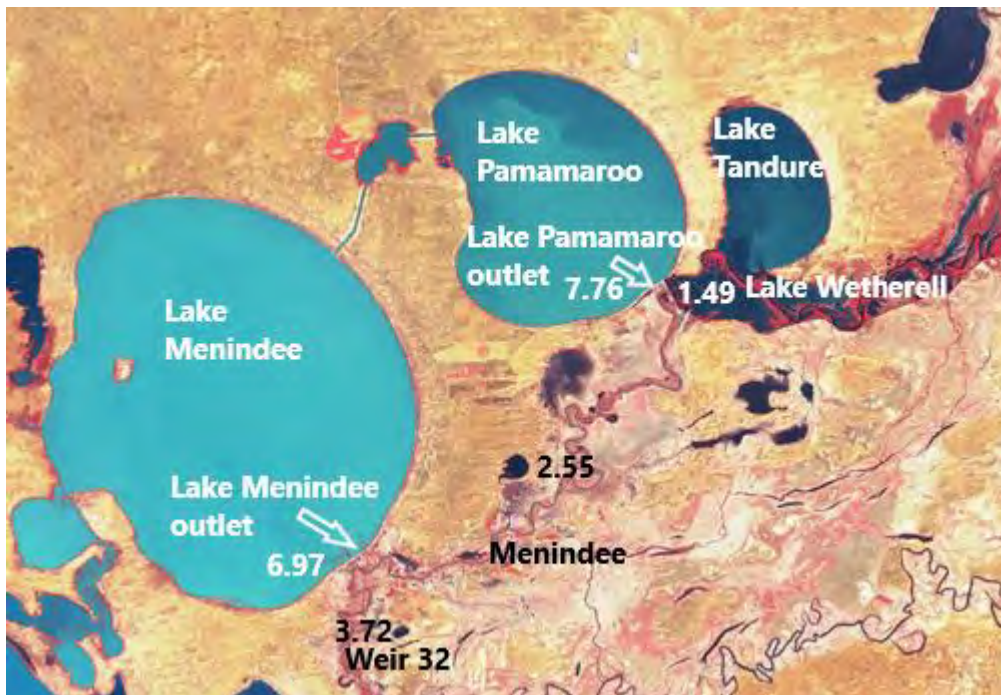


Figure 460: Satellite derived Sentinel colour infrared image – Image 4 March. Data collected 8 March (mg/L)

WaterNSW

HYPLOT V134 Output 13/03/2023

06/03/2023 to 14/03/2023

2023

Site 425012 DARLING RIVER AT MENINDEE UPSTREAM WEIR 32

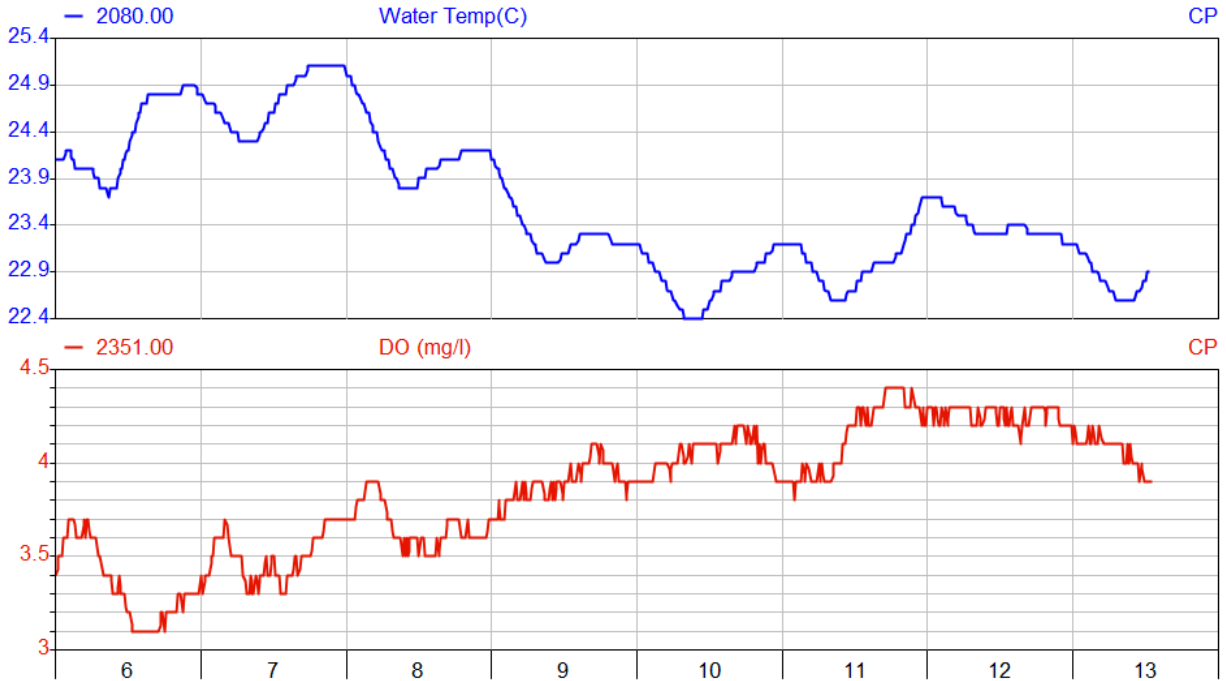


Figure 461: Continuous dissolved oxygen (mg/L) and water temperature (°C) in the Darling River at Weir 32

WaterNSW

HYPLOT V134 Output 13/03/2023

06/03/2023 to 14/03/2023

2023

Site 425007 DARLING RIVER AT BURTUNDY

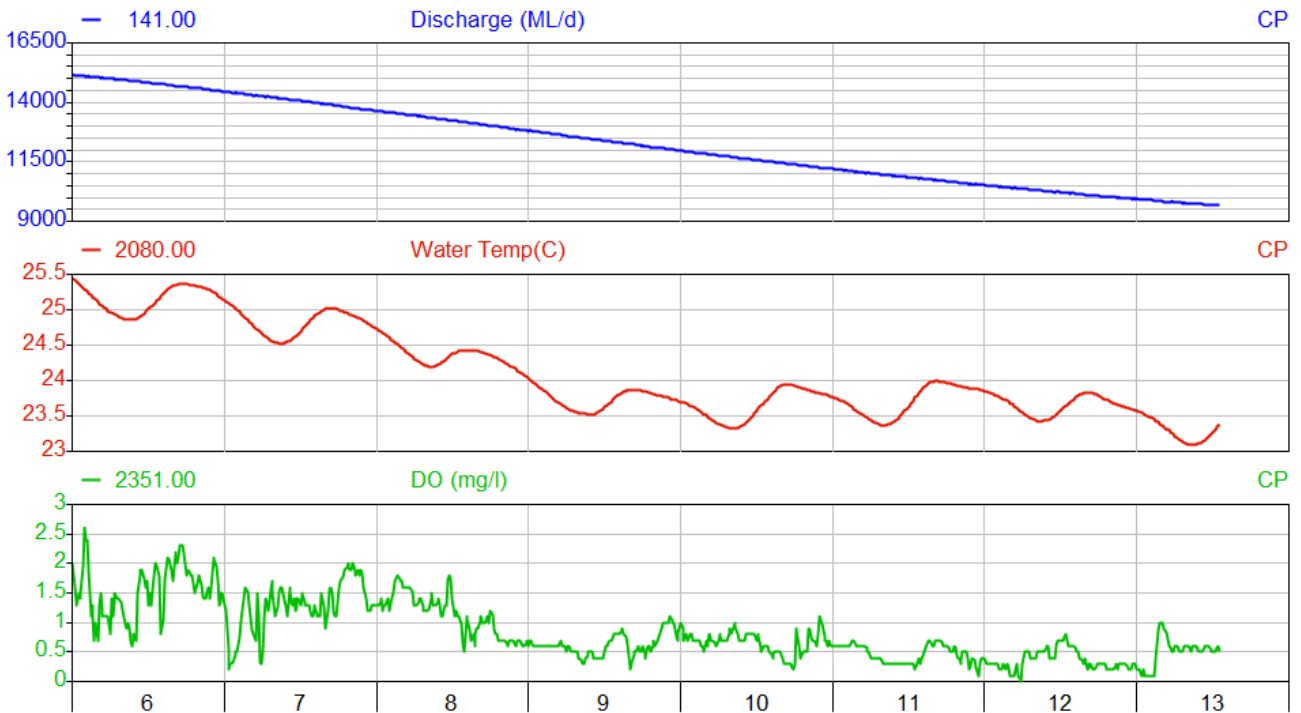


Figure 462: Continuous discharge (ML/day), dissolved oxygen (mg/L), water temperature (°C) in the Darling River at Burtundy

Dissolved oxygen monitoring results from the lower Darling and Murray rivers are listed in Table 45.

Table 45: Dissolved oxygen and water temperature data from lower Darling and Murray Rivers, 6-7 March

Station Name	Sample Time	Dissolved Oxygen (mg/L)	Temperature(°C)
Darling River at Pooncarie	6/03/2023 15:21	2.30	25.0
Darling River at Burtundy	6/03/2023 10:22	3.31	24.8
Darling River at Ellerslie	6/03/2023 9:51	3.95	24.5
Darling River at Tapio	6/03/2023 9:18	4.28	24.0
Anabranh at Silver City Hwy	6/03/2023 13:16	7.69	24.6
Murray River at Mt Dispersion	7/03/2023 10:05	7.95	23.3
Murray River at Merbein	6/03/2023 15:10	8.77	25.8
Murray River at Buronga	7/03/2023 11:13	7.61	24.6
Murray River at Curlwaa	6/03/2023 14:41	8.76	25.6
Murray River at Fort Courage	7/03/2023 12:19	5.94	24.0
Lake Victoria at the outlet regulator	7/03/2023 13:07	8.51	20.8

Discharge in Murray River at Colignan (upstream of Red Cliffs) is 8,869 ML/day, Lock 10 discharge is 21,721 ML/day. Dissolved oxygen in Murray River at Wentworth is 7.8 mg/L (13/03/2023 14:00).

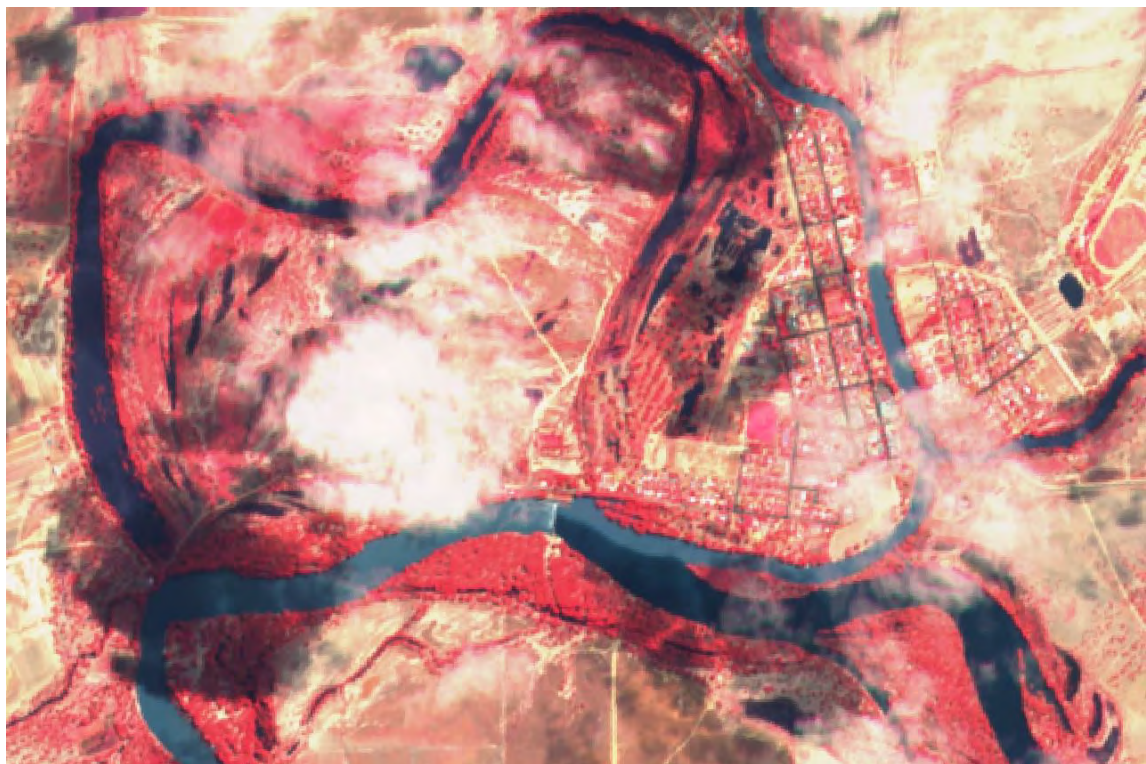


Figure 463: Satellite derived Sentinel colour infrared image of Murray - Darling River junction – Image 9 March

Weather Outlook

The Bureau of Meteorology 8-day total rain forecast (13 to 20 March) indicates western NSW will remain dry (Figure 464). Forecast is for maximum air temperatures at Menindee to increase up to 40°C on Saturday (Figure 465) and to 36°C at Mildura (Figure 466). Low intensity heatwave conditions are forecast for Friday to Saturday (17 to 19 March) (Figure 467).

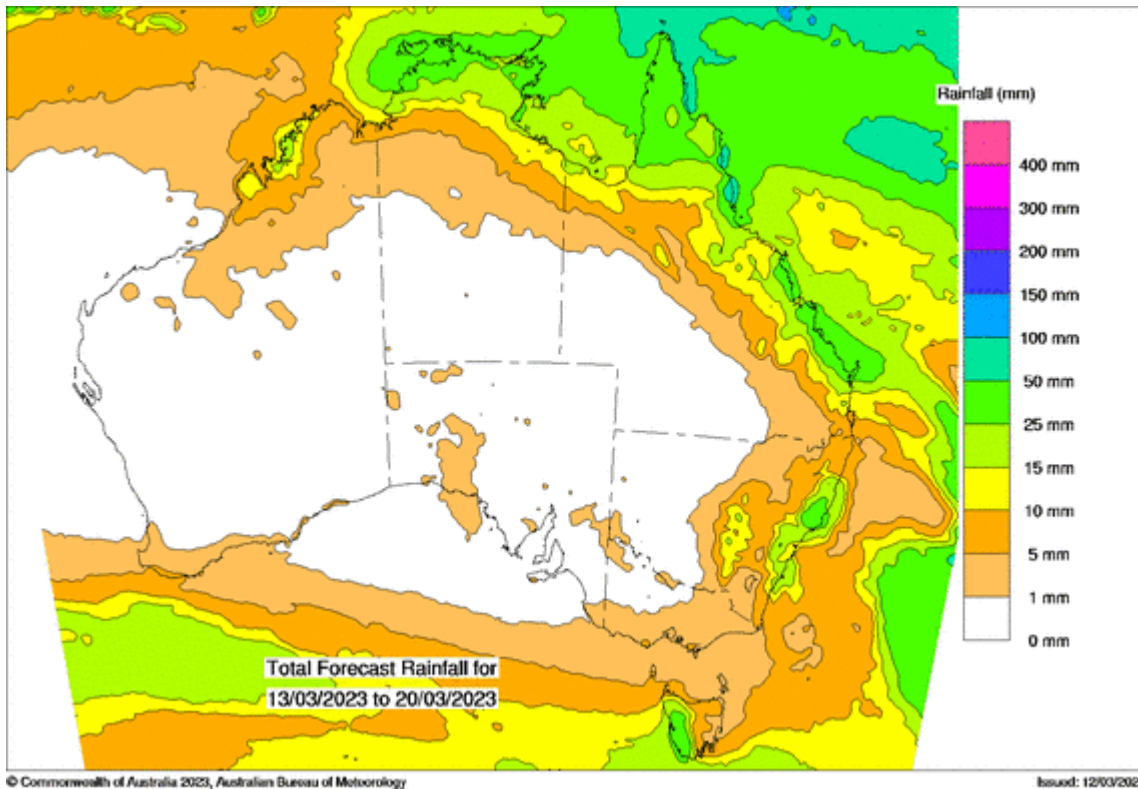


Figure 464: Bureau of Meteorology 8-day total rain forecast (13 to 20 March)








	MON Mar 13	TUE Mar 14	WED Mar 15	THU Mar 16	FRI Mar 17	SAT Mar 18	SUN Mar 19
Summary	 Sunny	 Mostly sunny	 Mostly sunny	 Sunny	 Sunny	 Mostly sunny	 Mostly sunny
Maximum	29°C	33°C	36°C	36°C	38°C	40°C	39°C
Minimum	12°C	15°C	17°C	20°C	17°C	22°C	21°C
Chance Of Rain	5%	5%	5%	5%	5%	5%	20%
Rain Amount	< 1mm	< 1mm	< 1mm	< 1mm	< 1mm	< 1mm	< 1mm

Figure 465: Forecast air temperatures for Menindee – 13 to 19 March








	MON Mar 13	TUE Mar 14	WED Mar 15	THU Mar 16	FRI Mar 17	SAT Mar 18	SUN Mar 19
Summary	 Sunny	 Mostly sunny	 Sunny	 Sunny	 Sunny	 Sunny	 Mostly sunny
Maximum	29°C	33°C	35°C	36°C	35°C	36°C	33°C
Minimum	12°C	15°C	13°C	17°C	16°C	17°C	15°C
Chance Of Rain	5%	5%	5%	5%	5%	5%	40%
Rain Amount	< 1mm	< 1mm	< 1mm	< 1mm	< 1mm	< 1mm	1-5mm

Figure 466: Forecast air temperatures for Mildura – 13 to 19 March

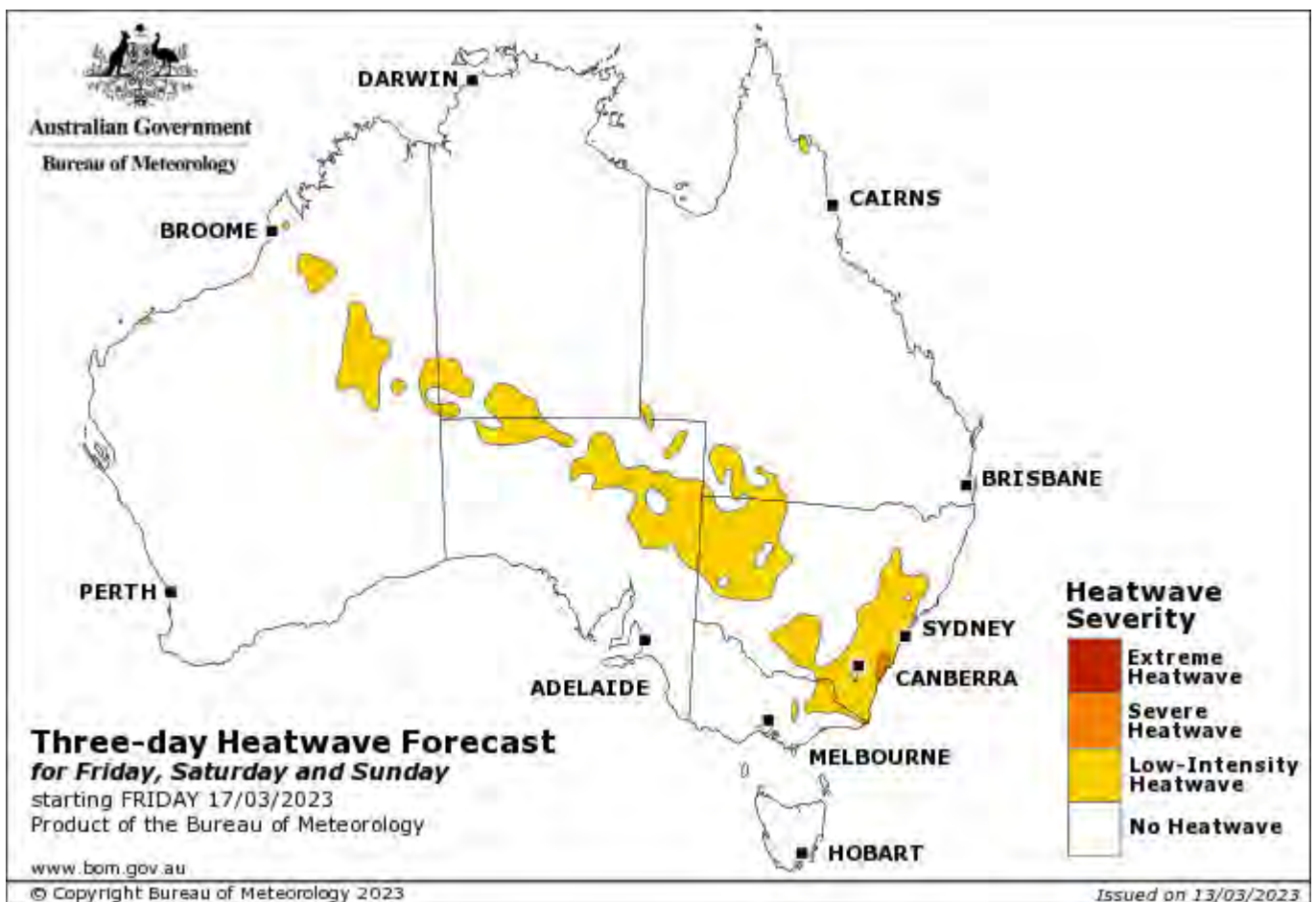


Figure 467: Three-day heatwave forecast for 17 to 19 March

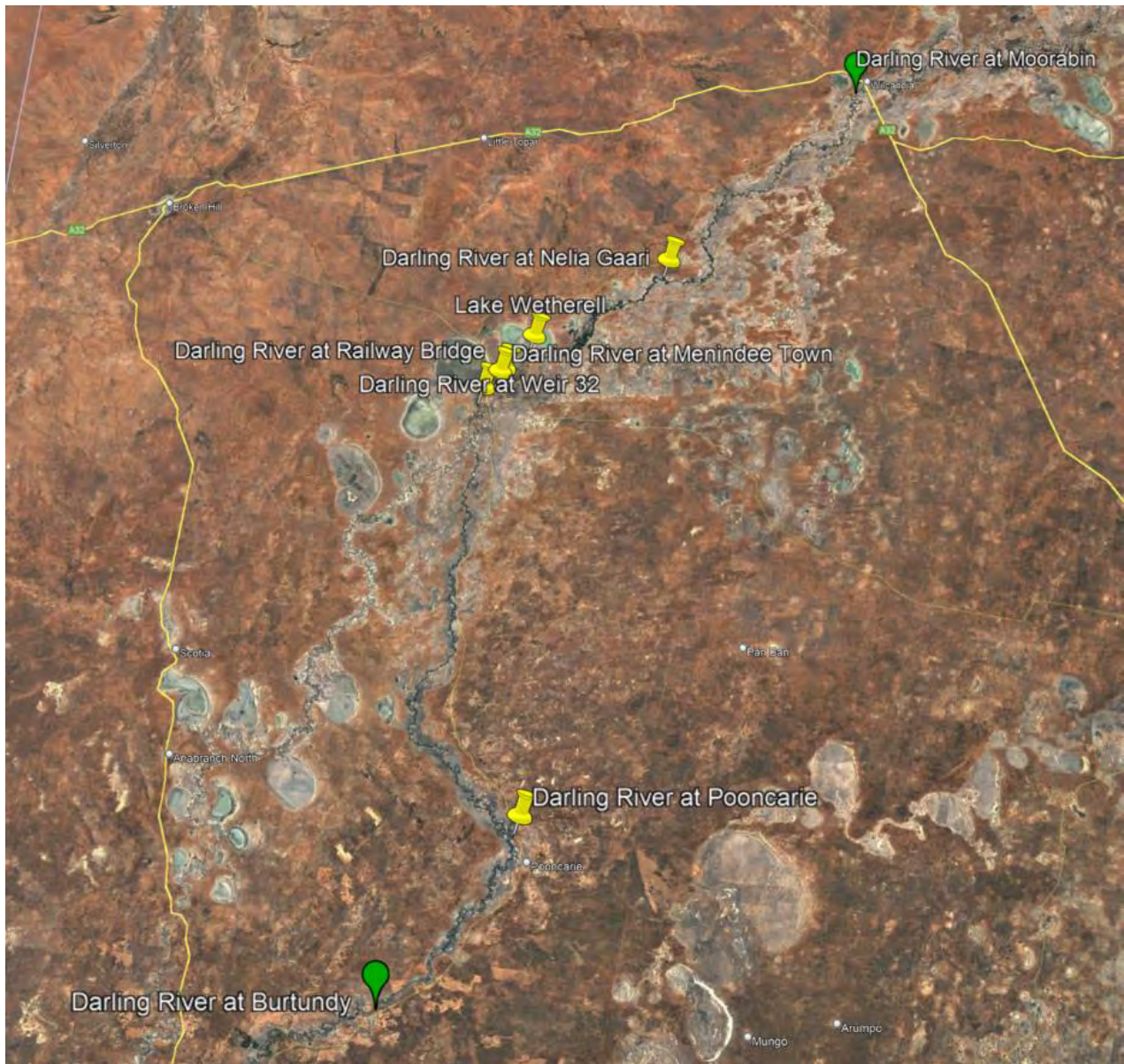


Figure 468: Proposed location of additional continuous dissolved oxygen monitoring sites

Water quality update Meeting No. 21 – 20 March 2023

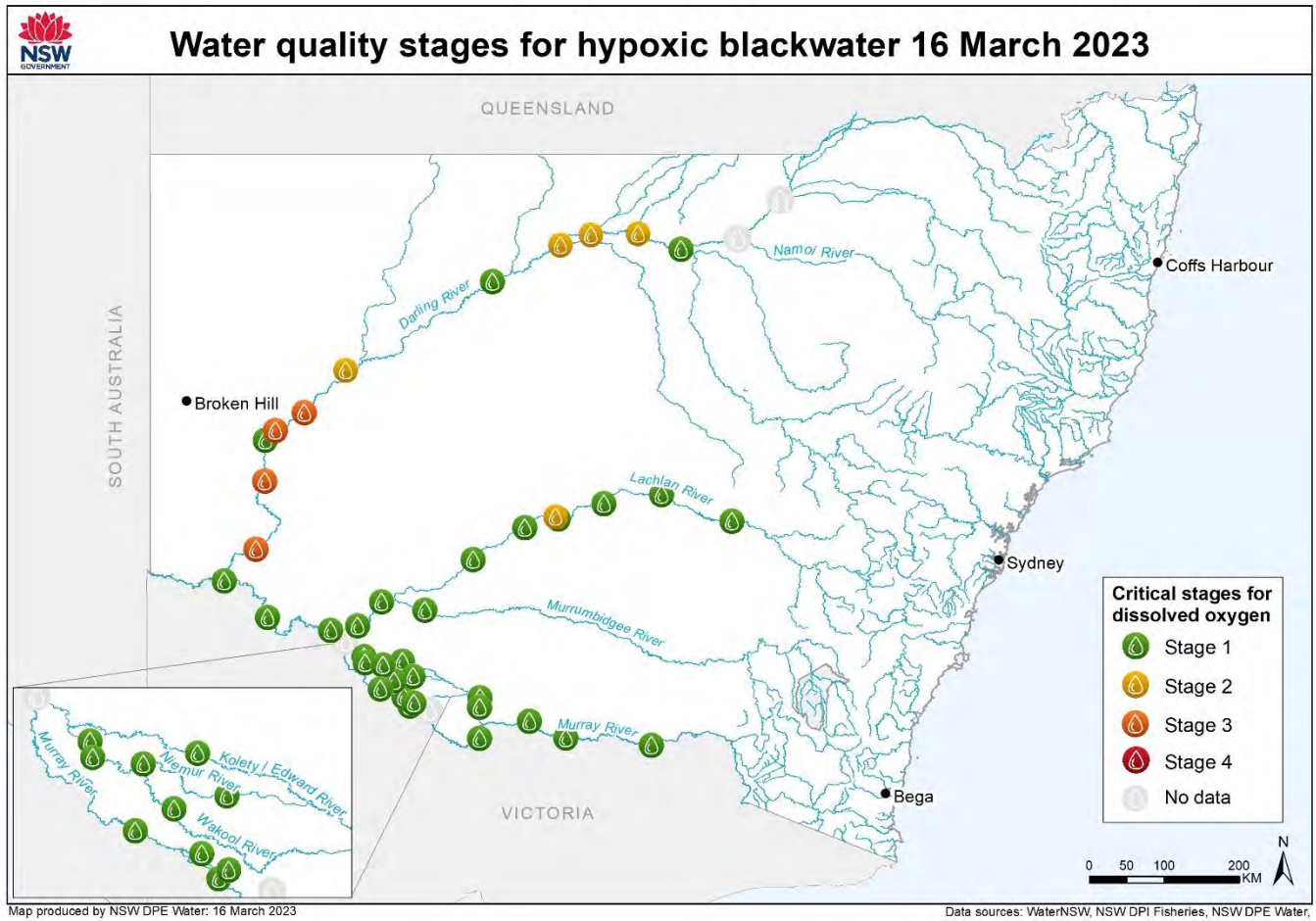


Figure 469: NSW water quality stages for hypoxic blackwater – 16 March 2023

Darling River and Menindee Lakes

Discharge in the Darling River and Tallyawalka Creek at Wilcannia is 1,360 and 1,044 ML/day respectively. Discharge in the Darling River at Pooncarie has declined to 6,700 ML/day and 7,105 ML/day at Burtundy.

Dissolved oxygen levels at both Wilcannia and Nelia Gaari are dropping to low levels overnight and then recovering during the day (Figure 470 and Figure 471).

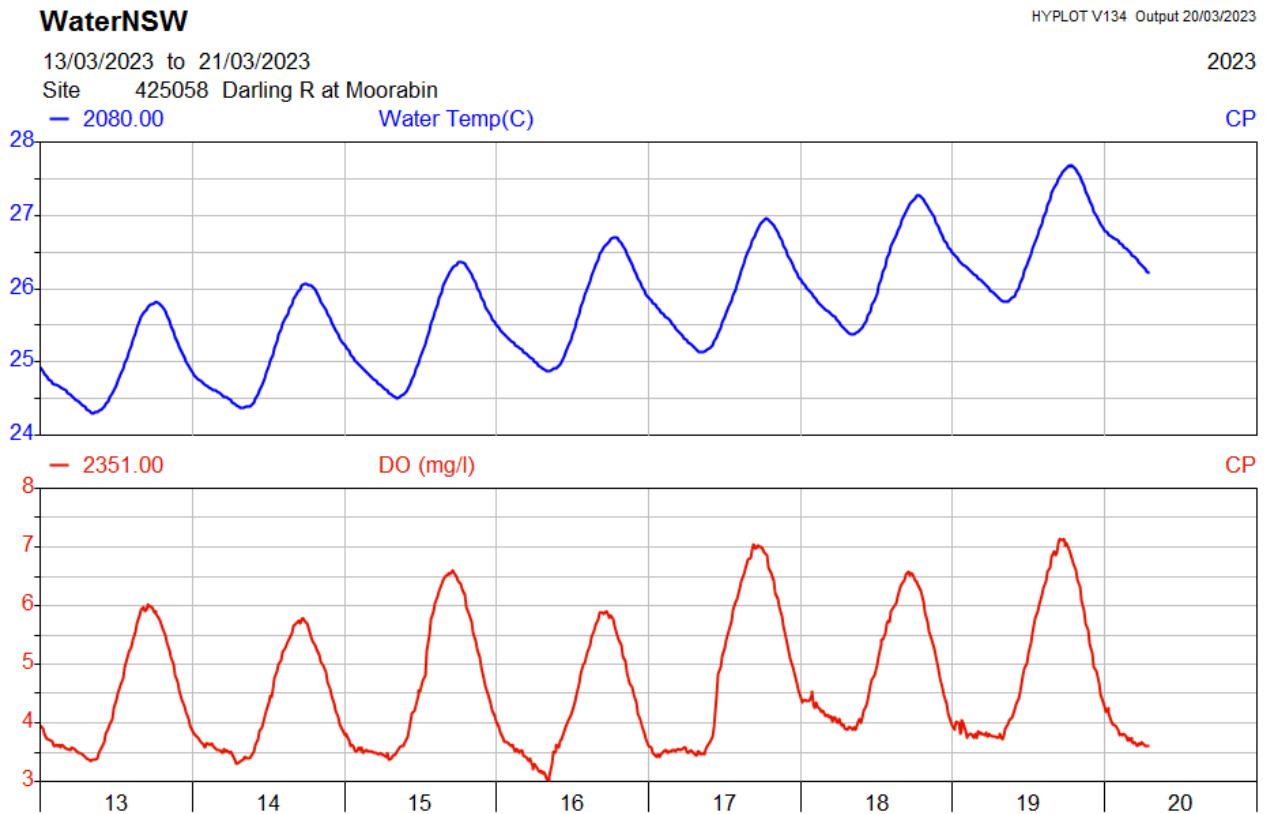


Figure 470: Continuous dissolved oxygen (mg/L) and water temperature (°C) in the Darling River at Wilcannia (Moorabin)

13/03/2023 to 21/03/2023

2023

Site 425060 DARLING RIVER @ NELIA GAARI

— 2080.00

Water Temp(C)

CP

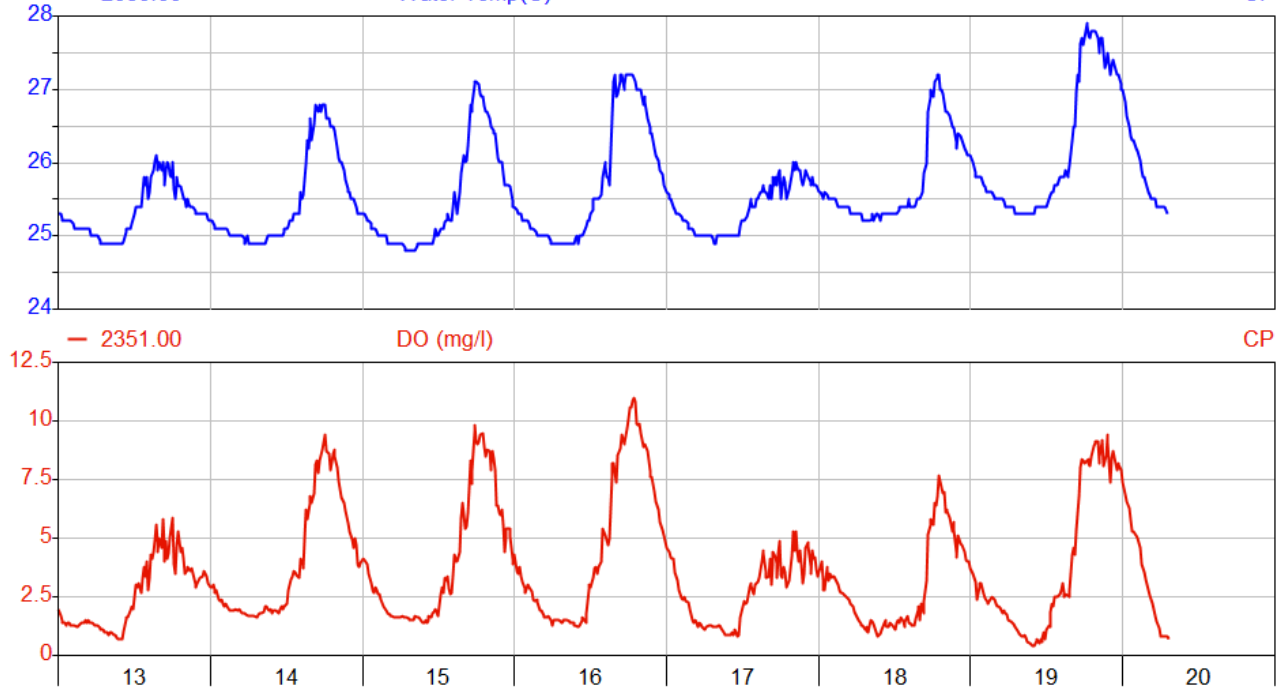


Figure 471: Continuous dissolved oxygen (mg/L) and water temperature (°C) in the Darling River at Nelia Gaari

Table 46: Dissolved oxygen and water temperature data from Darling River at Menindee, 17 and 20 March

Site	Sample time	Dissolved oxygen (mg/L)	Water temp (°C)
Darling River downstream of Main Weir	17/03/2023 13:50	4.44	24.1
Darling River near Railway line	17/03/2023 14:10	2.64	25.2
Darling River at Menindee town	17/03/2023 14:18	3.41	25.1
Darling River downstream of Main Weir	20/03/2023 10:24	2.0	24.6
Darling River near Railway line	20/03/2023 10:50	0.51	24.7
Darling River at Menindee town	20/03/2023 10:59	0.73	25.0

Figure 472 and Figure 473 are satellite-derived Sentinel images showing the Darling River and Menindee Lakes at Menindee on 19 March. Dissolved oxygen monitoring results (mg/L) collected on 17 and 20 March.



Figure 472: Satellite derived Sentinel image – Image 19 March. Data collected 17 March (mg/L)



Figure 473: Satellite derived Sentinel image – Image 19 March. Data collected 20 March (mg/L)

13/03/2023 to 21/03/2023

2023

Site 425012 DARLING RIVER AT MENINDEE UPSTREAM WEIR 32

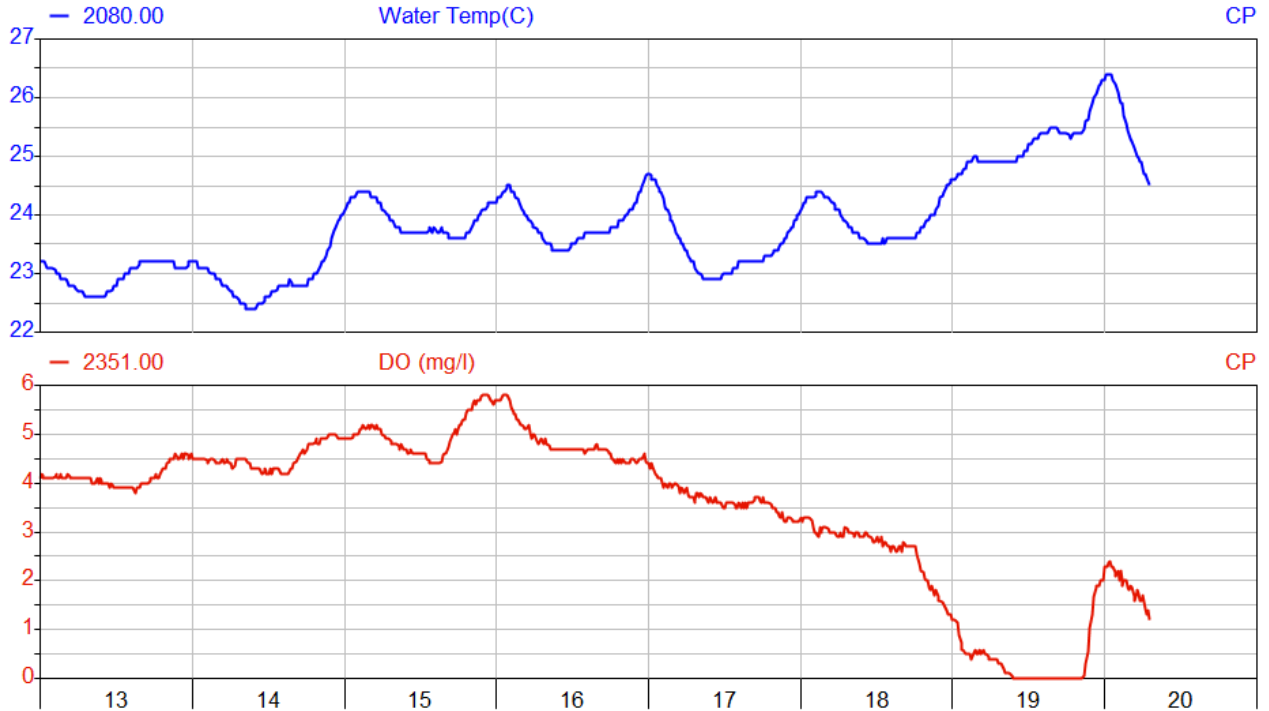


Figure 474: Continuous dissolved oxygen (mg/L) and water temperature (°C) in the Darling River at Weir 32

13/03/2023 to 21/03/2023

2023

Site 425007 DARLING RIVER AT BURTUNDY

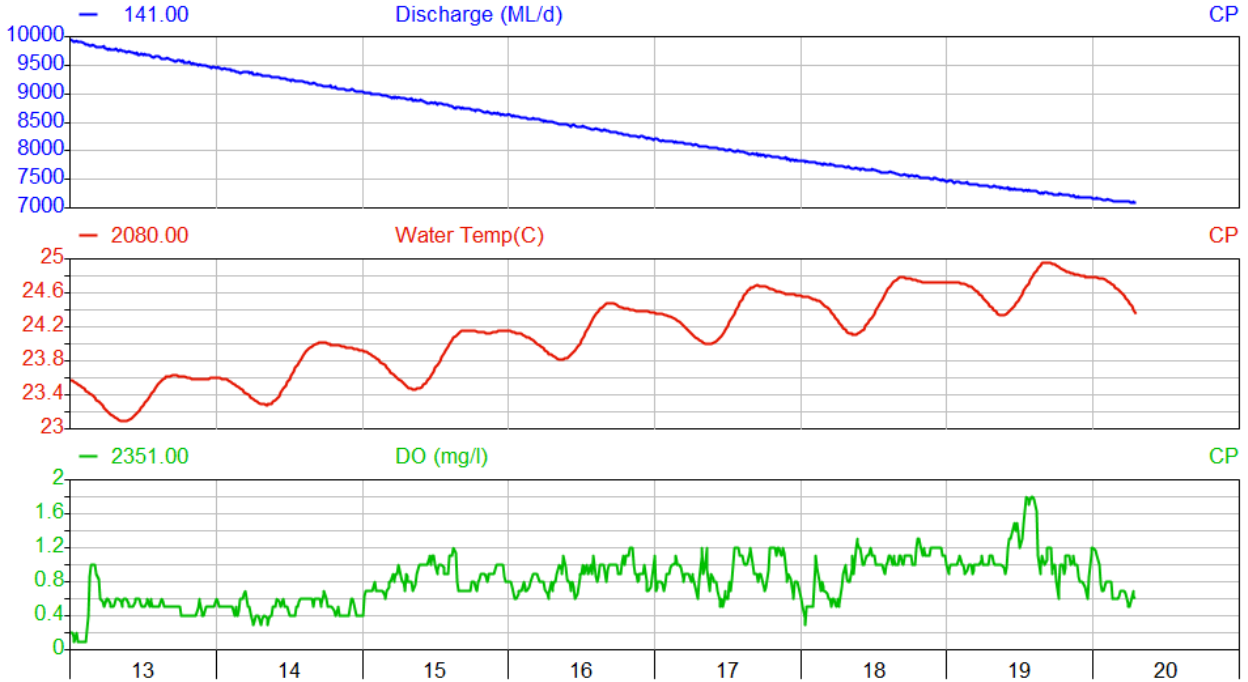


Figure 475: Continuous discharge (ML/day), dissolved oxygen (mg/L), water temperature (°C) in the Darling River at Burtundy

Dissolved oxygen monitoring results from the lower Darling and Murray rivers are listed in Table 47.

Table 47: Dissolved oxygen and water temperature data from lower Darling and Murray Rivers, 14 March

Station Name	Sample Time	Dissolved Oxygen (mg/L)	Temperature(°C)
Darling River at Weir 32	14/03/2023 11:42	4.51	22.5
Darling River at Tolarno	14/03/2023 12:43	2.9	23.5
Darling River at Pooncarie	14/03/2023 13:54	2.55	24.2
Darling River at Burtundy	14/03/2023 10:05	3.14	23.3
Darling River at Ellerslie	14/03/2023 9:34	3.2	23.2
Darling River at Tapio	14/03/2023 9:17	3.74	23.2
Anabranche at Silver City Hwy	14/03/2023 12:22	7.95	23.0
Murray River at Merbein	14/03/2023 14:07	9.05	25.2

Discharge in Murray River at Colignan (upstream of Red Cliffs) is 8,430 ML/day, Lock 10 discharge is 23,209 ML/day. Dissolved oxygen in Murray River at Wentworth is 7.8 mg/L (20/03/2023 9:00).



Figure 476: Satellite derived Sentinel image of Murray - Darling River junction – Image 17 March

Weather Outlook

The Bureau of Meteorology 8-day total rain forecast (20 to 27 March) indicates very light rainfall in western NSW with higher falls along the coast (Figure 477). Forecast is for maximum air temperatures at Menindee to remain in the low-mid 30's and high 20's this week (Figure 478) and

high 20's to low 30's in Mildura (Figure 479). The low intensity heatwave conditions have largely dissipated (20 to 22 March) (Figure 480).

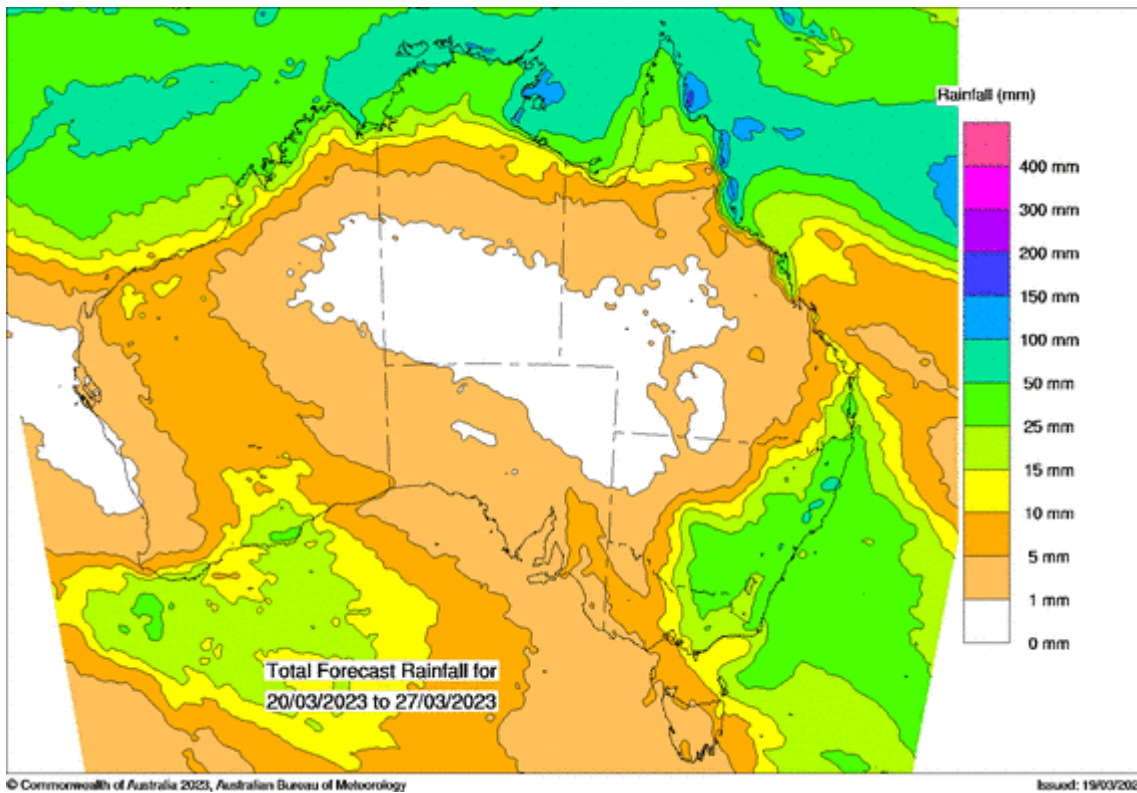


Figure 477: Bureau of Meteorology 8-day total rain forecast (20 to 27 March)

	MON Mar 20	TUE Mar 21	WED Mar 22	THU Mar 23	FRI Mar 24	SAT Mar 25	SUN Mar 26
Summary	Mostly cloudy	Possible shower	Mostly sunny	Mostly sunny	Mostly sunny	Mostly sunny	Mostly sunny
Maximum	30°C	30°C	34°C	34°C	29°C	28°C	28°C
Minimum	18°C	17°C	18°C	19°C	13°C	12°C	13°C
Chance Of Rain	40%	60%	10%	5%	5%	5%	30%
Rain Amount	< 1mm	1-5mm	< 1mm	< 1mm	< 1mm	< 1mm	< 1mm

Figure 478: Forecast air temperatures for Menindee – 20 to 26 March








	MON Mar 20	TUE Mar 21	WED Mar 22	THU Mar 23	FRI Mar 24	SAT Mar 25	SUN Mar 26
Summary	 Mostly sunny	 Possible shower	 Increasing sunshine	 Mostly sunny	 Mostly sunny	 Sunny	 Mostly sunny
Maximum	28°C	28°C	31°C	31°C	29°C	28°C	26°C
Minimum	15°C	16°C	16°C	18°C	14°C	13°C	13°C
Chance Of Rain	60%	50%	40%	5%	5%	10%	10%
Rain Amount	< 1mm	< 1mm	< 1mm	< 1mm	< 1mm	< 1mm	< 1mm

Figure 479: Forecast air temperatures for Mildura – 20 to 26 March

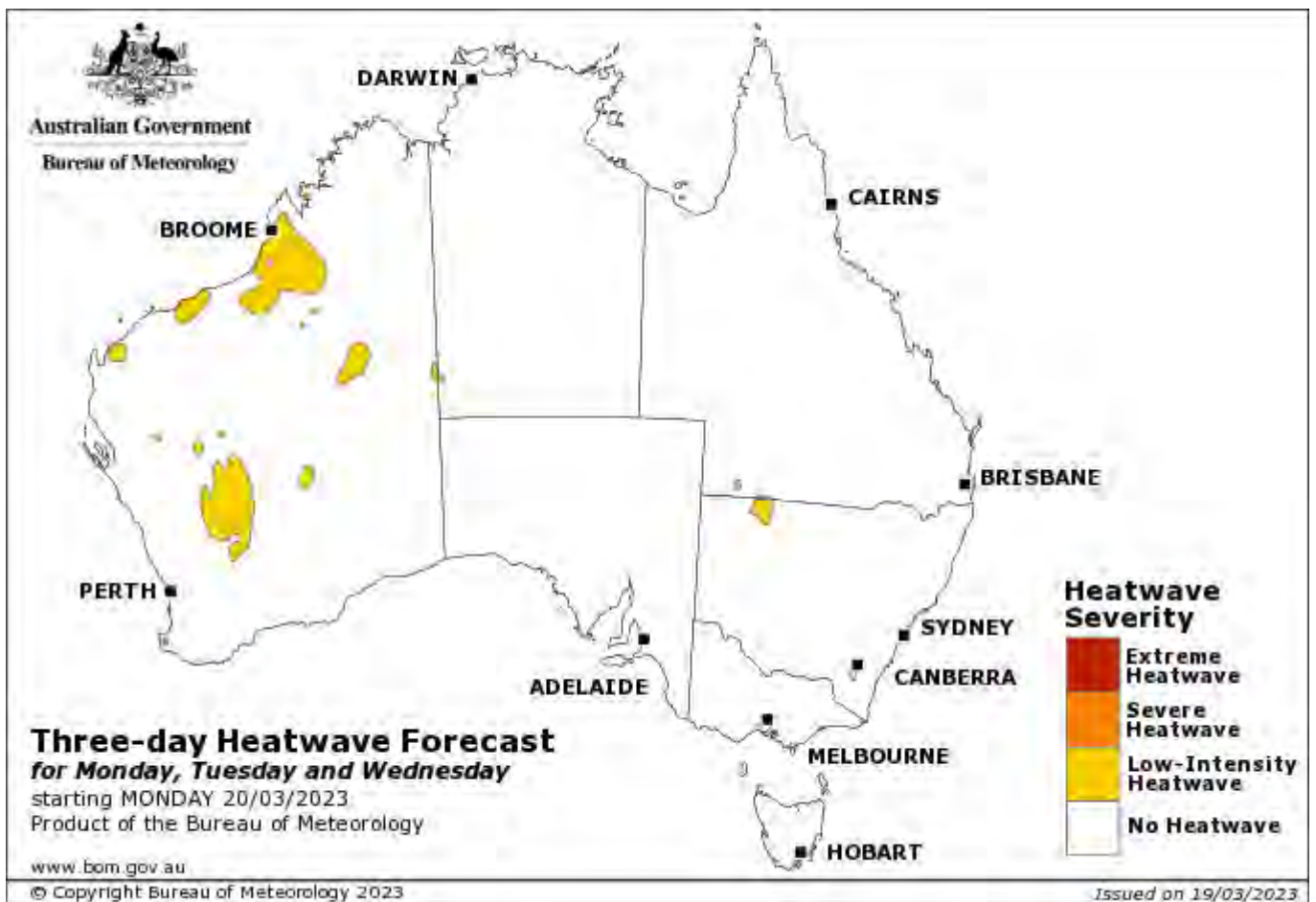


Figure 480: Three-day heatwave forecast for 20 to 22 March

Water quality update for Menindee Incident Management Team – 21 March 2023

Darling River and Menindee Lakes

Discharge in the Darling River and Tallyawalka Creek at Wilcannia is 1,333 and 1,030 ML/day respectively. Dissolved oxygen levels at Wilcannia are dropping below the 4 mg/L safe threshold for fish health over night but improving above 6 mg/L during the day (Figure 481). As a general guide, native fish and other large aquatic organisms require at least 2 mg/L of dissolved oxygen to survive but may begin to suffer if levels are below 4 to 5 mg/L for prolonged periods.

Dissolved oxygen levels drop overnight when respiration (microbes and animals breathing oxygen) outpaces oxygen replenishment (photosynthesis from aquatic plants and algae) that occurs during the day.

Water temperature increased in response to the heatwave conditions experienced from Friday 17 March through to Sunday 19 March but has started to decrease. The amount of dissolved oxygen water can hold decreases with increasing water temperature which can add additional stress to fish that may already be struggling.

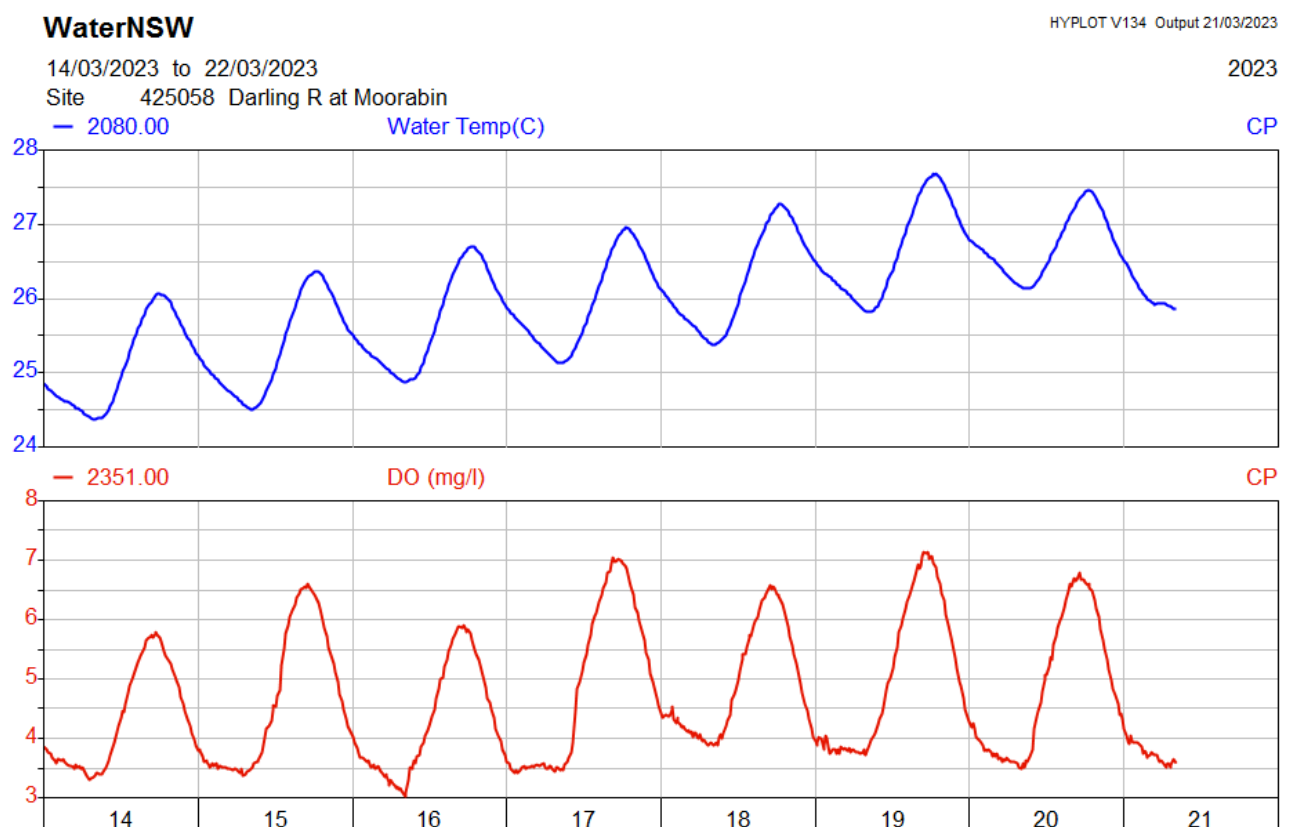


Figure 481: Continuous dissolved oxygen (mg/L) and water temperature (°C) in the Darling River at Wilcannia (Moorabin)

The continuous dissolved oxygen monitoring site in the upper reaches of Lake Wetherell at Nelia Gaari is also showing oxygen is dropping to critical levels overnight and then recovering during the day (Figure 482).

14/03/2023 to 22/03/2023

2023

Site 425060 DARLING RIVER @ NELIA GAARI

— 2080.00

Water Temp(C)

CP

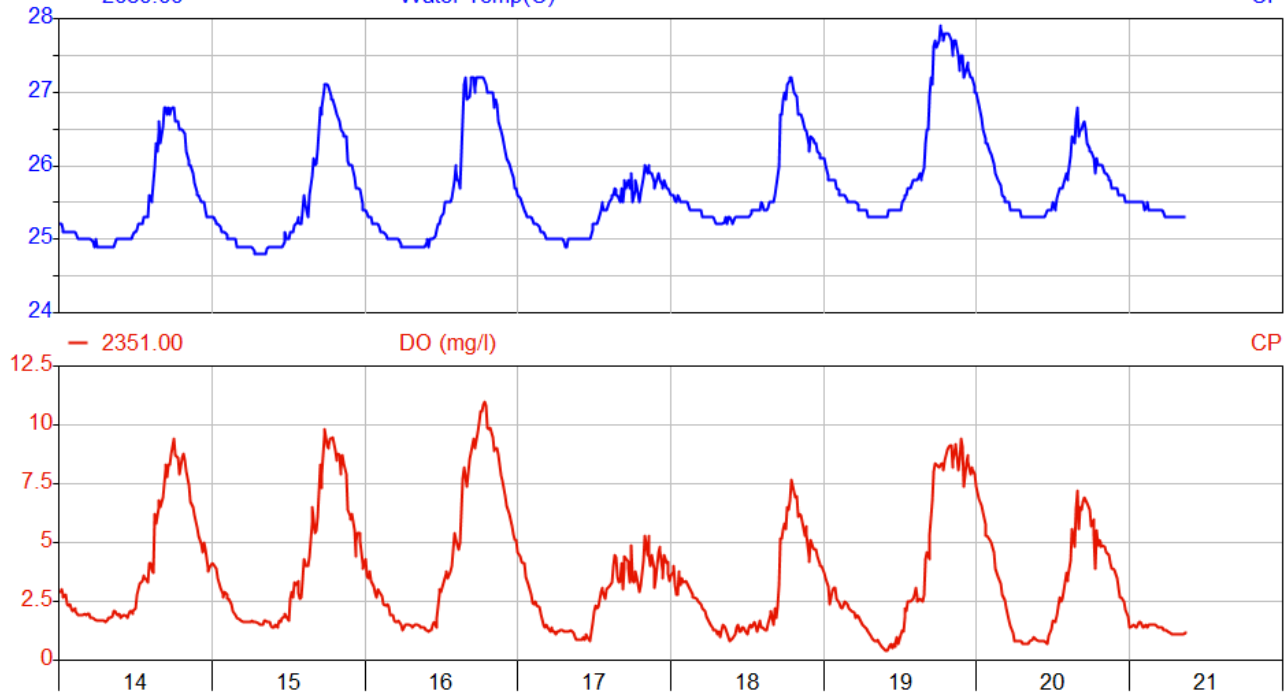


Figure 482: Continuous dissolved oxygen (mg/L) and water temperature (°C) in the Darling River at Nelia Gaari

Planet satellite imagery taken on 17 March (Figure 483) shows dead fish accumulating along the banks of the Darling River through Menindee town. Imagery from 19 March shows there is not the same extent of dead fish along the banks but there is an accumulation of dead fish at the junction of the Darling River and Menindee Creek.



Figure 483: Planet satellite image from 17 March 2023 showing dead fish accumulating along the banks of the Darling River at Menindee



Figure 484: Planet satellite image from 19 March 2023 showing an accumulation of dead fish at the junction of the Darling River and Menindee Creek

Figure 485 is a satellite-derived Sentinel image showing the Darling River and Menindee Lakes at Menindee on 19 March. Dissolved oxygen monitoring results (mg/L) collected by WaterNSW and NSW Fisheries on 21 March are shown on Figure 485 with all water quality parameters included in Table 48.

Dissolved oxygen in the water being released from lakes Pamamaroo and Menindee is above the safe threshold for fish health. The lowest readings are in the Darling River from downstream of Main Weir (1.19 mg/L) through to Menindee town (0.17 mg/L). Dissolved oxygen levels improve downstream of the inflow of more oxygenated water from Lake Menindee via Menindee Creek. The dissolved oxygen result from Weir 32 is higher than the readings from the continuous sensor at the gauging station (Figure 486). The sensor at Weir 32 is set at affixed depth lower in the profile. Oxygen levels can be higher near the water surface than closer to the bottom of pools.



Figure 485: Satellite derived Sentinel image – Image 19 March. Data collected 21 March (mg/L)

Table 48: Dissolved oxygen and water temperature data from Darling River at Menindee, 21 March (WaterNSW and NSW Fisheries)

Site	Sample time	Dissolved oxygen (mg/L)	Water temperature (°C)	pH	Electrical conductivity (µS/cm)
Lake Wetherell outlet regulator	21/03/2023 7:57	3.20	24.1	7.6	429
Lake Pamamaroo inlet regulator	21/03/2023 8:04	5.87	23.5	8.0	414
Lake Pamamaroo outlet regulator	21/03/2023 8:11	5.50	22.9	7.9	398
Darling River downstream of Main Weir	21/03/2023 7:50	1.19	22.8	7.4	419
Darling River near Railway line	21/03/2023 10:50	0.53	24.5	7.5	401
Darling River at Menindee town	21/03/2023 7:45	0.17	24.5		
Darling River upstream of Menindee Creek junction	21/03/2023 8:30	0.22			
Lake Menindee outlet regulator	21/03/2023 8:57	6.98	22.2	8.2	324
Darling River at Menindee Creek junction	21/03/2023	2.82			
Darling River downstream of Menindee Creek junction	21/03/2023 9:40	4.12	22.9	7.8	344
Darling River upstream of Weir 32	21/03/2023 9:30	3.62			
Darling River downstream of Weir 32	21/03/2023 10:23	3.47	23.1	7.8	347

WaterNSW

HYPLOT V134 Output 21/03/2023

14/03/2023 to 22/03/2023

2023

Site 425012 DARLING RIVER AT MENINDEE UPSTREAM WEIR 32

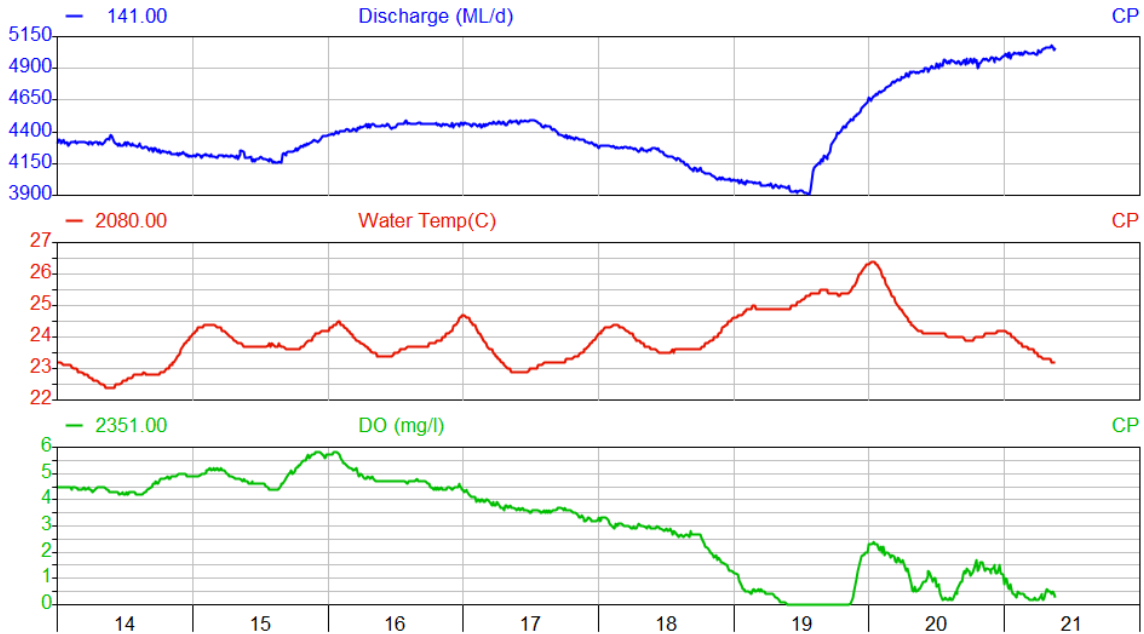


Figure 486: Continuous discharge (ML/day), dissolved oxygen (mg/L) and water temperature (°C) in the Darling River at Weir 32

Discharge in the Darling River at Pooncarie has declined to 6,500 ML/day and 6,886 ML/day at Burtundy. Results from the continuous sensor located toward the bottom of the pool at Burtundy are remaining low (Figure 487), while recent monitoring has shown more oxygenated water closer to the water surface.

WaterNSW

HYPLOT V134 Output 21/03/2023

14/03/2023 to 22/03/2023

2023

Site 425007 DARLING RIVER AT BURTUNDY

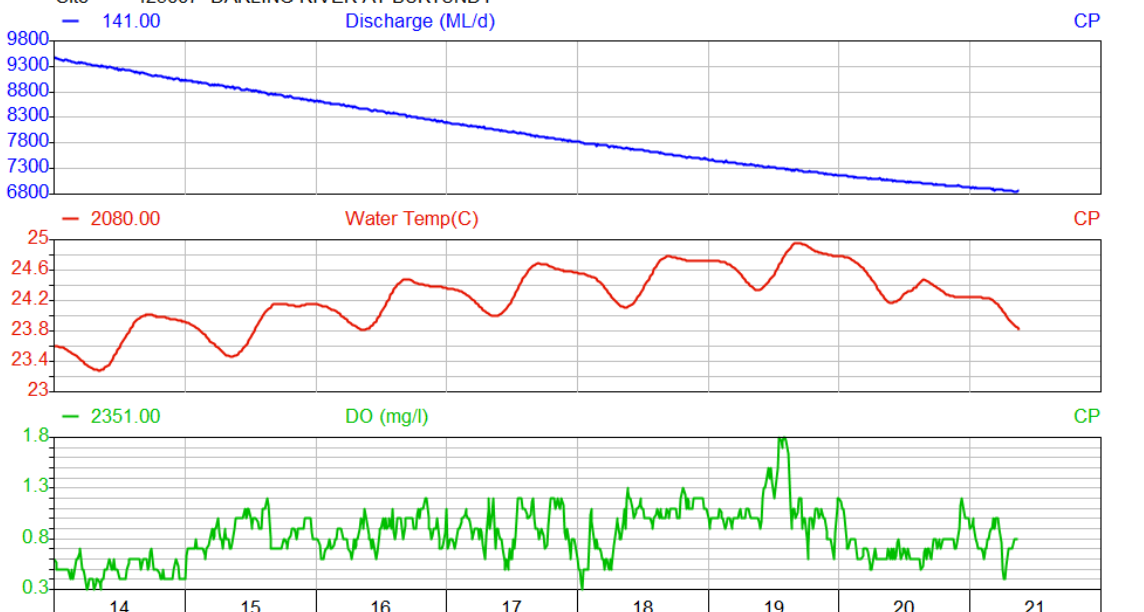


Figure 487: Continuous discharge (ML/day), dissolved oxygen (mg/L), water temperature (°C) in the Darling River at Burtundy

Weather Outlook

The Bureau of Meteorology 8-day total rain forecast (21 to 28 March) indicates very light rainfall in western NSW with higher falls along the coast (Figure 488). Forecast is for maximum air temperatures at Menindee to remain in the low-mid 30's and high 20's this week (Figure 489). There are no heatwave conditions forecast by the Bureau of Meteorology for this week.

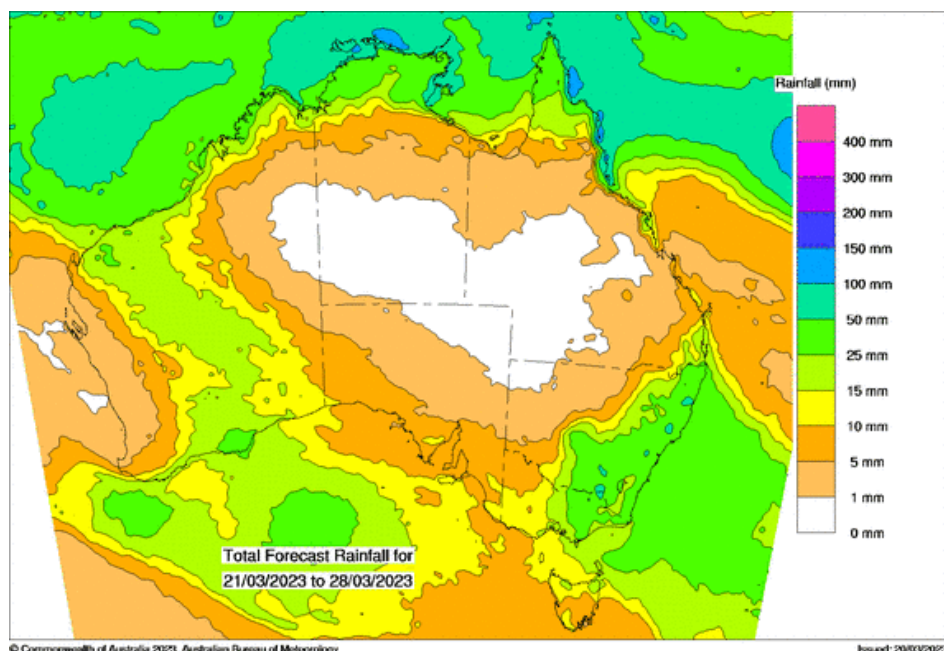


Figure 488: Bureau of Meteorology 8-day total rain forecast (21 to 28 March)

	TUE Mar 21	WED Mar 22	THU Mar 23	FRI Mar 24	SAT Mar 25	SUN Mar 26	MON Mar 27
Summary	Possible shower	Mostly sunny	Mostly sunny	Mostly sunny	Mostly cloudy	Mostly cloudy	Cloudy
Maximum	31°C	34°C	34°C	31°C	29°C	29°C	30°C
Minimum	18°C	18°C	18°C	14°C	14°C	15°C	17°C
Chance Of Rain	50%	10%	10%	5%	20%	5%	50%
Rain Amount	< 1mm	< 1mm	< 1mm	< 1mm	< 1mm	< 1mm	< 1mm

Figure 489: Forecast air temperatures for Menindee – 21 to 27 March

Water quality update for Menindee Incident Management Team – 23 March 2023

Darling River and Menindee Lakes

Discharge in the Darling River and Tallyawalka Creek at Wilcannia is 1,316 and 962 ML/day respectively. Dissolved oxygen levels at Wilcannia are dropping below the 4 mg/L safe threshold for fish health over night but improving above 6 mg/L during the day (Figure 490). As a general guide, native fish and other large aquatic organisms require at least 2 mg/L of dissolved oxygen to survive but may begin to suffer if levels are below 4 to 5 mg/L for prolonged periods.

Dissolved oxygen levels drop overnight when respiration (microbes and animals breathing oxygen) outpaces oxygen replenishment (photosynthesis from aquatic plants and algae) that occurs during the day.

Water temperature at Wilcannia has stabilised at around 27°C. The amount of dissolved oxygen water can hold decreases with increasing water temperature which can add additional stress to fish that may already be struggling.

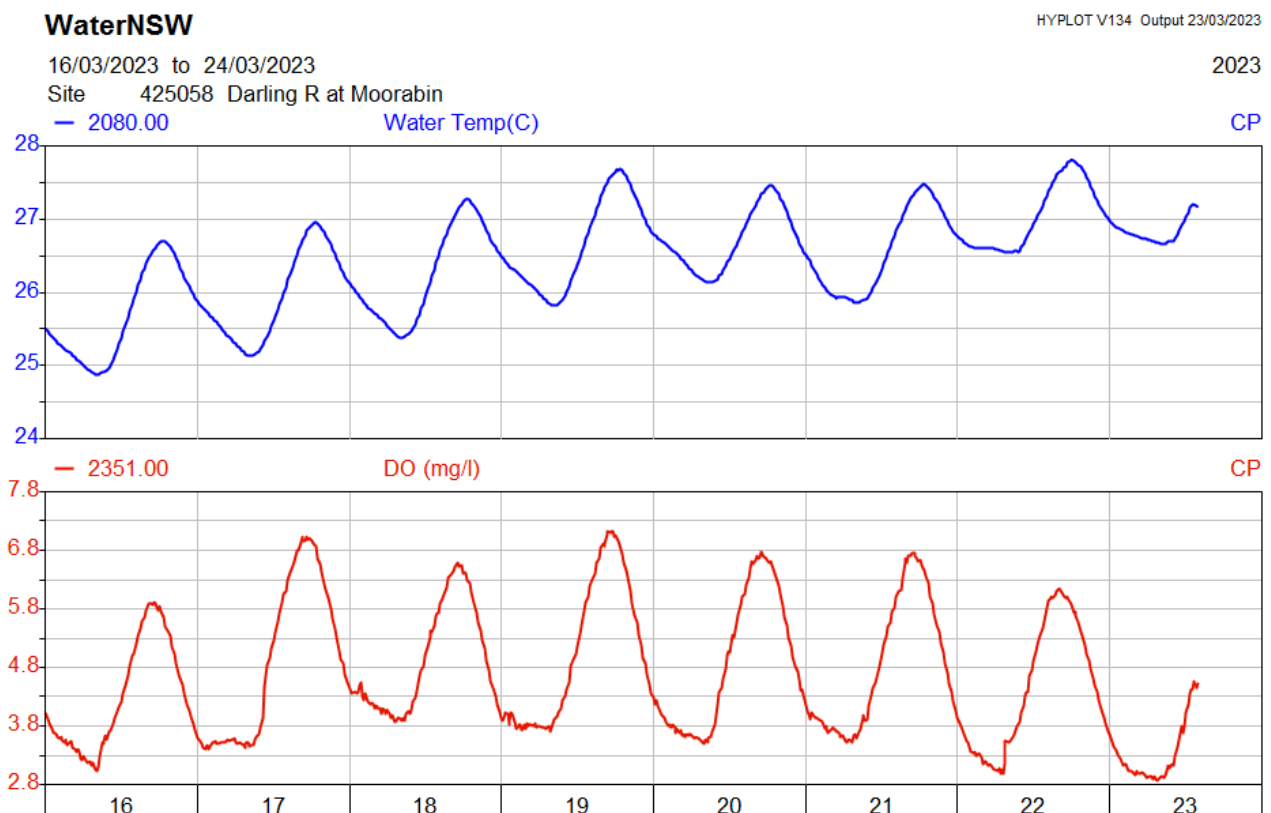


Figure 490: Continuous dissolved oxygen (mg/L) and water temperature (°C) in the Darling River at Wilcannia (Moorabin) The continuous dissolved oxygen monitoring site in the upper reaches of Lake Wetherell at Nelia Gaari is also showing oxygen is dropping to critical levels overnight and then recovering during the day (Figure 491).

16/03/2023 to 24/03/2023

2023

Site 425060 DARLING RIVER @ NELIA GAARI

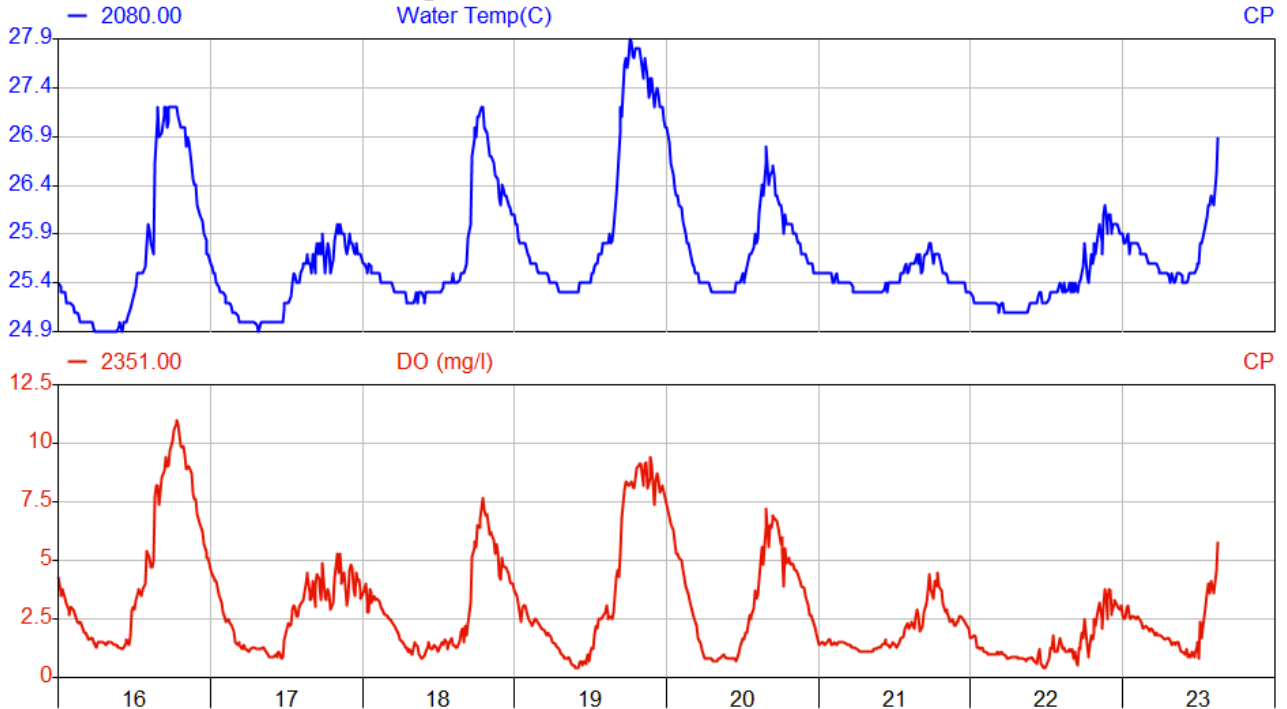


Figure 491: Continuous dissolved oxygen (mg/L) and water temperature (°C) in the Darling River at Nelia Gaari

Planet satellite imagery taken on 19 March showed an accumulation of dead fish upstream of the junction of the Darling River and Menindee Creek. Figure 492 is an image taken on 21 March which shows the accumulation of dead fish has dispersed. There still appears to be dead fish concentrating along the banks in some areas.



Figure 492: Planet satellite image from 21 March 2023 showing the accumulation of dead fish that was at the junction of the Darling River and Menindee Creek has been dispersed

Figure 493 is a Planet satellite image showing the Darling River and Menindee Lakes at Menindee on 22 March. Dissolved oxygen monitoring results (mg/L) collected near the water surface by WaterNSW 22 March are shown on Figure 493. Figure 494 shows the dissolved oxygen data collected at the same sites on 23 March.

Dissolved oxygen in the water being released from lakes Pamamaroo and Menindee is above the safe threshold for fish health (4 mg/L).

The lowest readings are in the Darling River from the railway bridge down to the junction of the Darling River and Menindee Creek. These low dissolved oxygen results indicate that there is still a risk of further fish deaths in this area and downstream. The readings taken near the surface indicate there is some oxygen replenishment from the atmosphere. However, readings taken deeper in the water column show oxygen levels quickly drop below 2 mg/L at around 50 cm (Table 49).

The Pamamaroo inlet regulator has been opened to allow the water levels between lakes Wetherell and Pamamaroo to even out. The green coloured water in the imagery can be seen pushing out into the turbid water of Lake Pamamaroo. Ongoing monitoring will identify if this low oxygen water is once again being drawn into the Pamamaroo outlet.

Monitoring is showing that releases from Lake Menindee are diluting the low oxygen water coming down the Darling River through Menindee town. It is also showing that turbulence from the high flow velocity is mixing oxygen through the whole water column (Table 49). The dissolved oxygen results from upstream of Weir 32 are higher than the readings from the continuous sensor at the gauging station (Figure 495). The sensor at Weir 32 is set at a fixed depth near the bottom of the weir pool. Oxygen levels can be higher near the water surface than at the very bottom of pools.

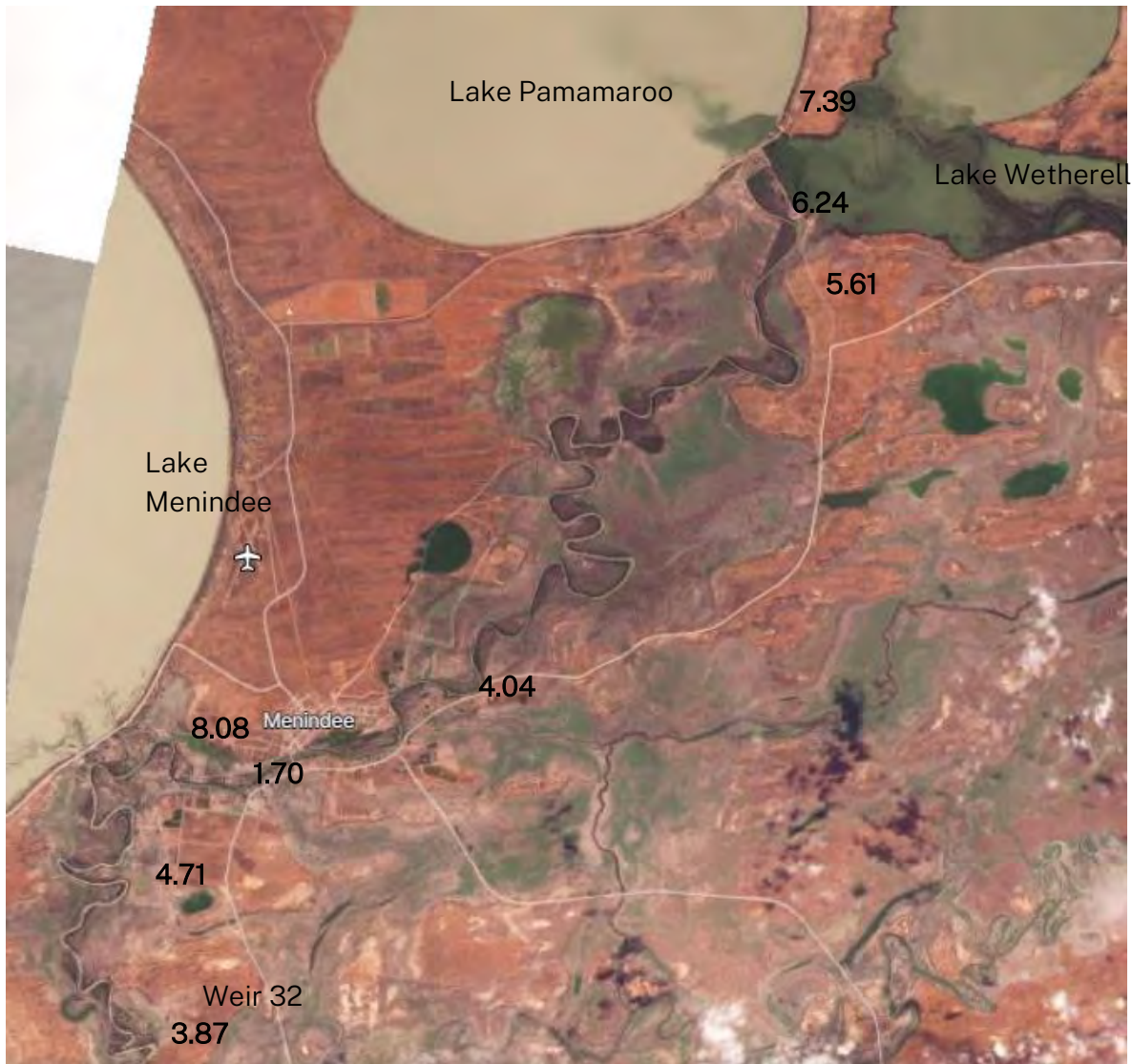


Figure 493: Planet satellite image – Image 21 March. Dissolved oxygen data collected 22 March (mg/L)

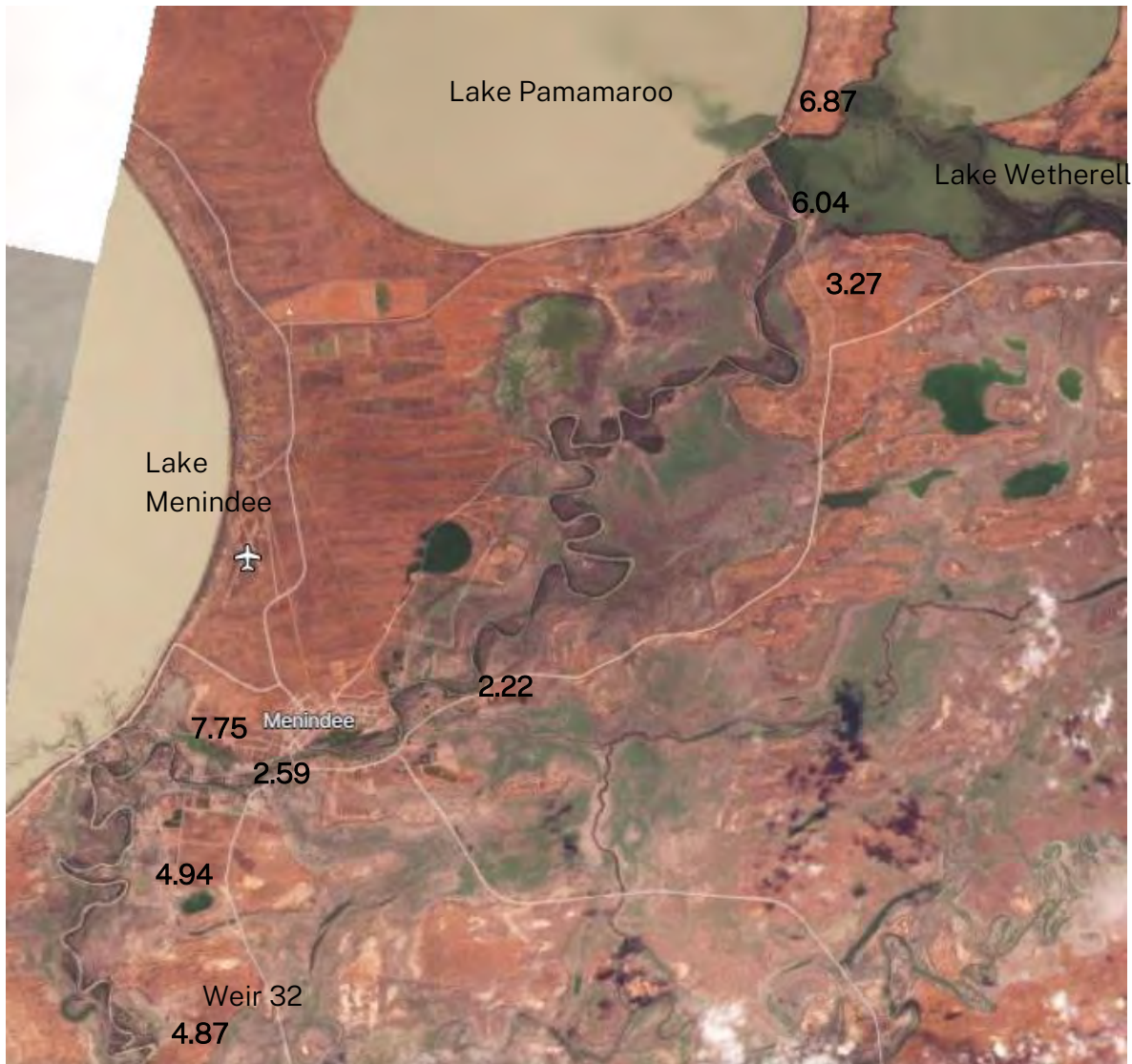


Figure 494: Planet satellite image – Image 21 March. Dissolved oxygen data collected 23 March (mg/L)

Table 49: Dissolved oxygen (mg/L) profile data from Darling River at Menindee, 23 March

Depth (m)	Downstream Main Weir	Menindee Rail Bridge	Upstream Menindee Ck	Downstream Menindee Ck	Downstream Weir 32
0.5	3.99	1.05	2.35	4.78	4.87
1.0	3.87	0.49	0.92	4.75	4.68
2.0	3.81	0.37	0.42	4.69	4.38
3.0	3.75	0.27	0.24	5.19	4.27
4.0	3.37	0.16	0.16	4.8	4.2
5.0		0.12	0.14	4.65	4.17

One sample returned an elevated pH reading near the water surface at the Railway Bridge near the town water offtake (Table 50). The high pH is only at the water surface (0.3 metres). If pH stays high, as the dead fish decompose, they will be giving off ammonia as one of the degradation products. Essential Water has been notified.

Table 50: Water quality results from Darling River at Menindee railway bridge/town water offtake, 23 March

Depth (m)	pH	Dissolved oxygen (mg/L)	Water temperature (°C)	Electrical conductivity (µS/cm)
0.3	9.27	2.22	24.6	466
0.5	8.53	1.05	24.3	463
1.0	8.34	0.49	24.1	460
2.0	8.19	0.33	24.1	460

The data from the temporary dissolved oxygen sensor installed at the Menindee pump station is now available on the WaterNSW real time data web page (Figure 495).

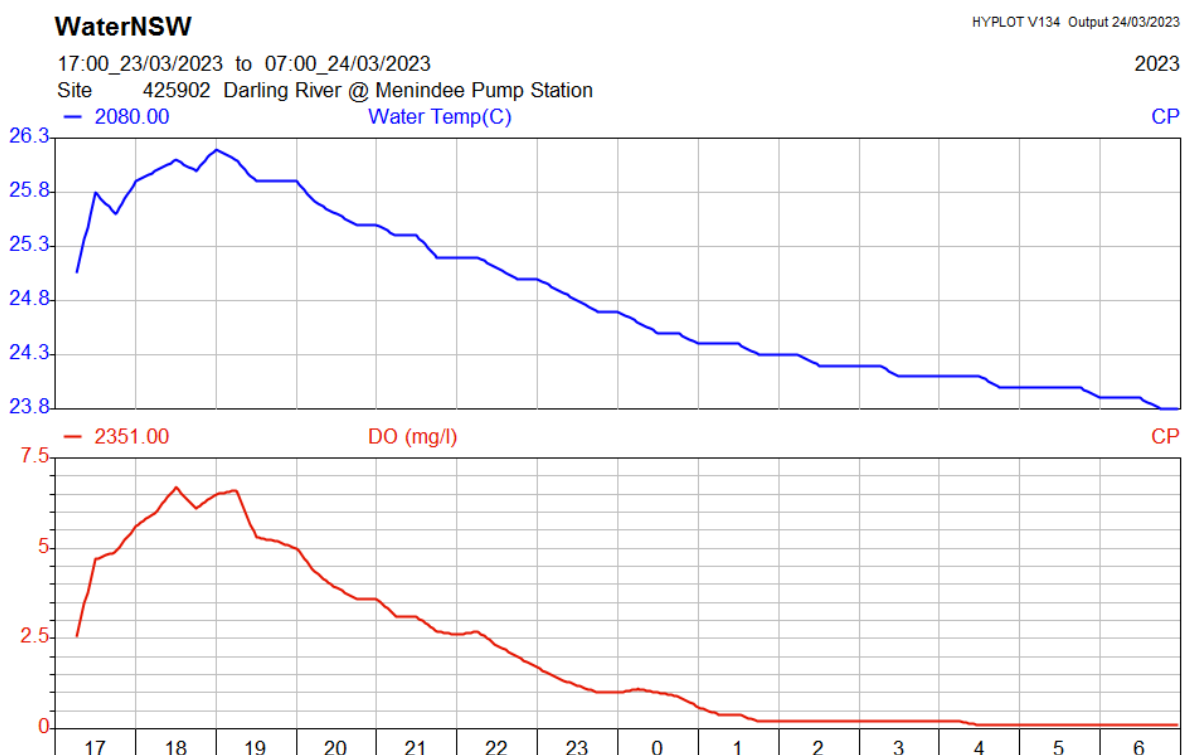


Figure 495: Continuous discharge (ML/day), dissolved oxygen (mg/L) and water temperature (°C) in the Darling River at Menindee pump station

16/03/2023 to 24/03/2023

2023

Site 425012 DARLING RIVER AT MENINDEE UPSTREAM WEIR 32

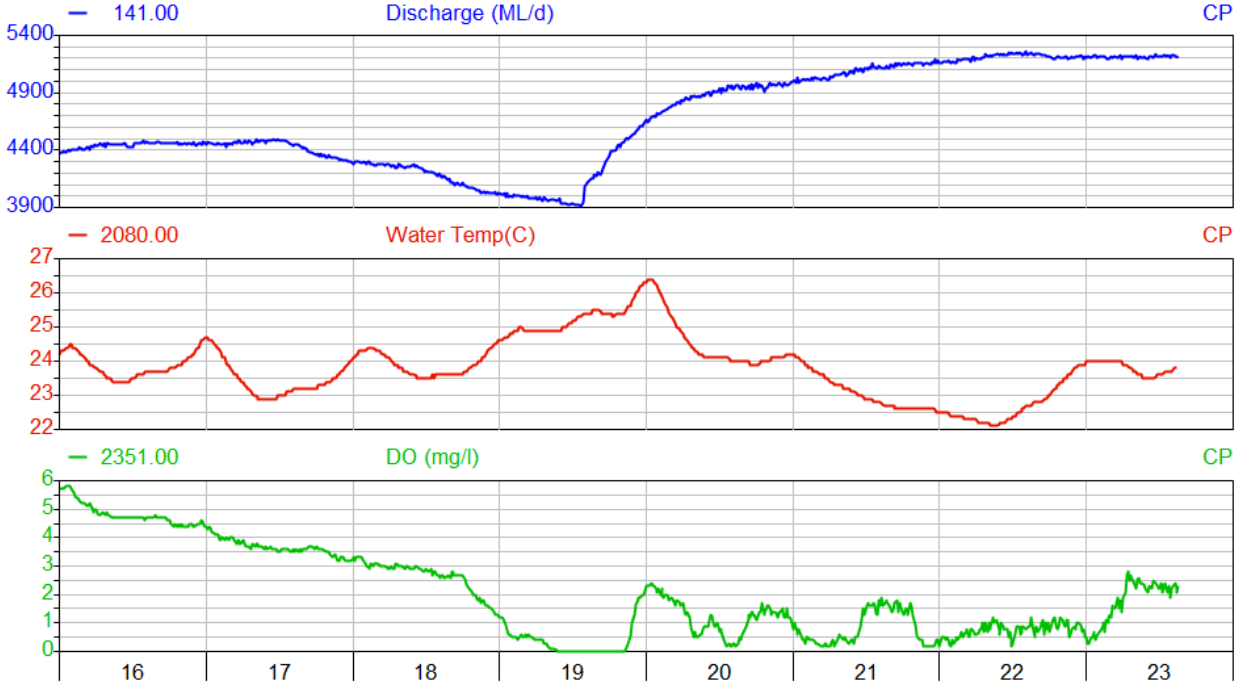


Figure 496: Continuous discharge (ML/day), dissolved oxygen (mg/L) and water temperature (°C) in the Darling River at Weir 32

Discharge in the Darling River at Pooncarie has declined to 6,354 ML/day and 6,548 ML/day at Burtundy. Data collected by NSW Fisheries on 21 March indicates low dissolved oxygen levels persist in the lower Darling River between Weir 32 and Pooncarie as low oxygen water makes its way downstream.

Results from the continuous dissolved oxygen sensor at Burtundy had been low. Routine maintenance resulted in dissolved oxygen readings jumping up to around 3.5 mg/L (Figure 496). These readings are more in line with data collected near the water surface with hand held meters. Results through this stretch of the lower Darling River are still below the safer level for fish health of 4 mg/L.

WaterNSW

HYPLOT V134 Output 23/03/2023

16/03/2023 to 24/03/2023

2023

Site 425007 DARLING RIVER AT BURTUNDY

— 141.00

Discharge (ML/d)

CP

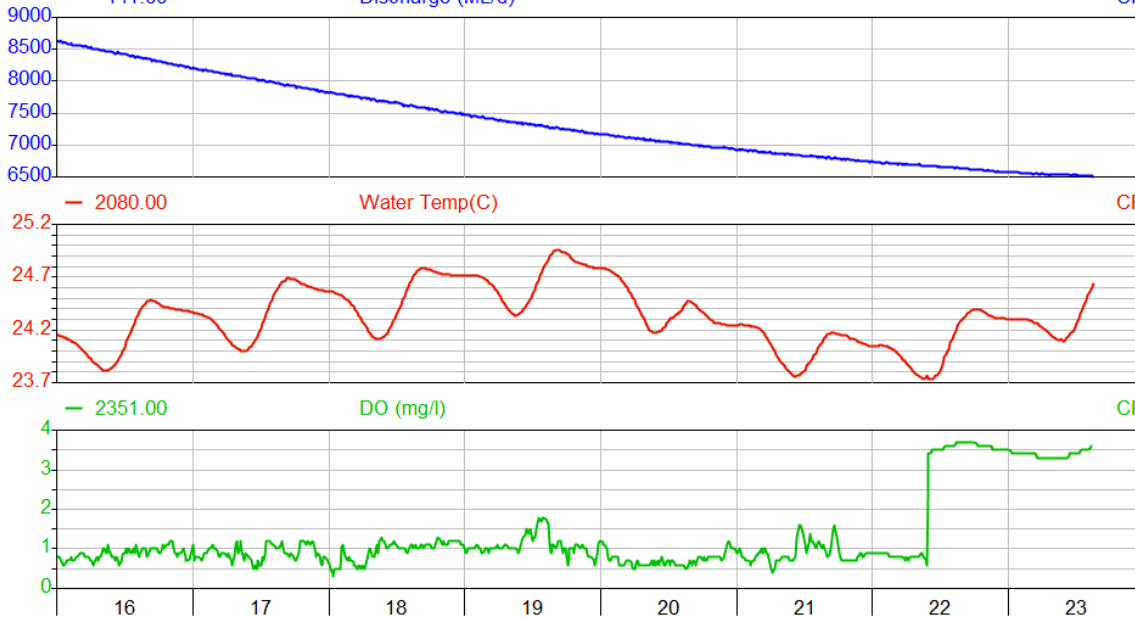


Figure 497: Continuous discharge (ML/day), dissolved oxygen (mg/L), water temperature (°C) in the Darling River at Burtundy

The data from the temporary dissolved oxygen sensor installed in the Murray River downstream of Lock 10 is now available on the WaterNSW real time data web page (Figure 498).

WaterNSW

HYPLOT V134 Output 24/03/2023

17:00_23/03/2023 to 07:00_24/03/2023

2023

Site 425901 MURRAY RIVER @ WENTWORTH WQ

— 2080.00

Water Temp(C)

CP

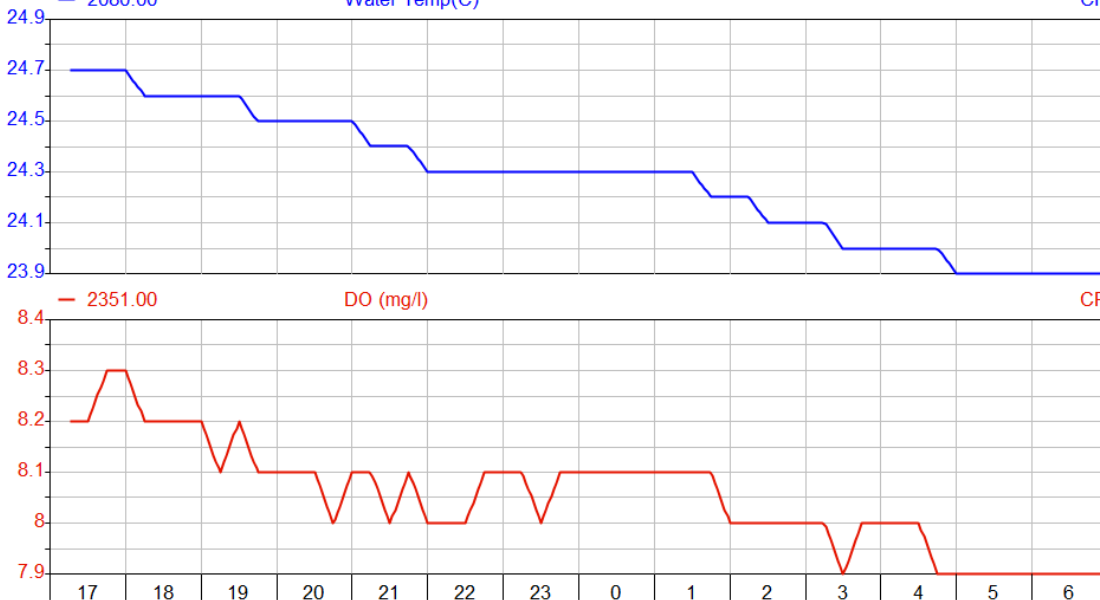


Figure 498: Continuous discharge (ML/day), dissolved oxygen (mg/L), water temperature (°C) in the Murray River at Wentworth

Weather Outlook

The Bureau of Meteorology 8-day total rain forecast (23 to 30 March) indicates very light rainfall in western NSW with higher falls along the coast (Figure 499). Forecast is for maximum air temperatures at Menindee to remain around 30°C over the weekend and decrease to the low 20's early next (Figure 500). There are no heatwave conditions forecast by the Bureau of Meteorology.

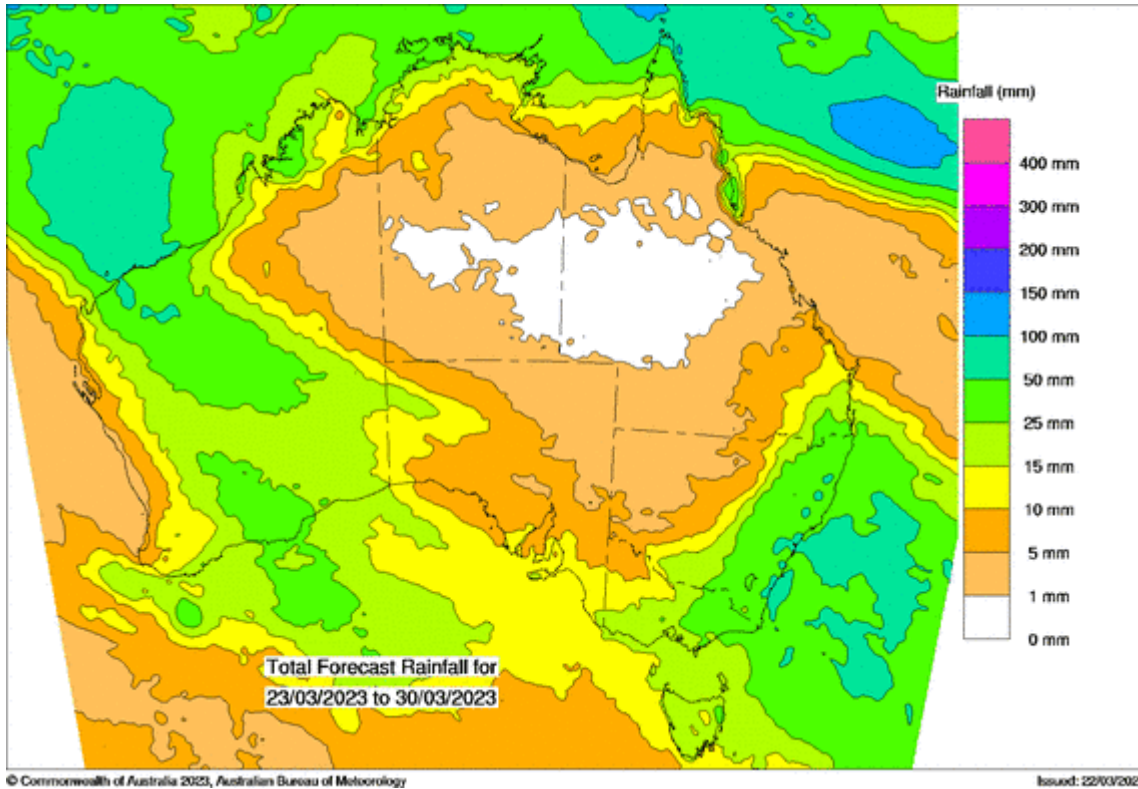


Figure 499: Bureau of Meteorology 8-day total rain forecast (23 to 30 March)

	THU Mar 23	FRI Mar 24	SAT Mar 25	SUN Mar 26	MON Mar 27	TUE Mar 28	WED Mar 29
Summary	Sunny	Mostly sunny	Mostly sunny	Mostly cloudy	Late shower	Mostly cloudy	Clearing shower
Maximum	34°C	30°C	29°C	31°C	29°C	25°C	23°C
Minimum	19°C	15°C	14°C	13°C	20°C	16°C	11°C
Chance Of Rain	5%	5%	5%	20%	40%	30%	40%
Rain Amount	< 1mm	< 1mm	< 1mm	< 1mm	1-5mm	1-5mm	< 1mm

Figure 500: Forecast air temperatures for Menindee – 23 to 29 March

Water quality update for Menindee Incident Management Team – 26 March 2023

Darling River and Menindee Lakes

Discharge in the Darling River and Tallyawalka Creek at Wilcannia is 1,280 and 863 ML/day respectively. Dissolved oxygen levels at Wilcannia are dropping below the 4 mg/L safe threshold for fish health over night but improving during the day (Figure 501). As a general guide, native fish and other large aquatic organisms require at least 2 mg/L of dissolved oxygen to survive but may begin to suffer if levels are below 4 to 5 mg/L for prolonged periods.

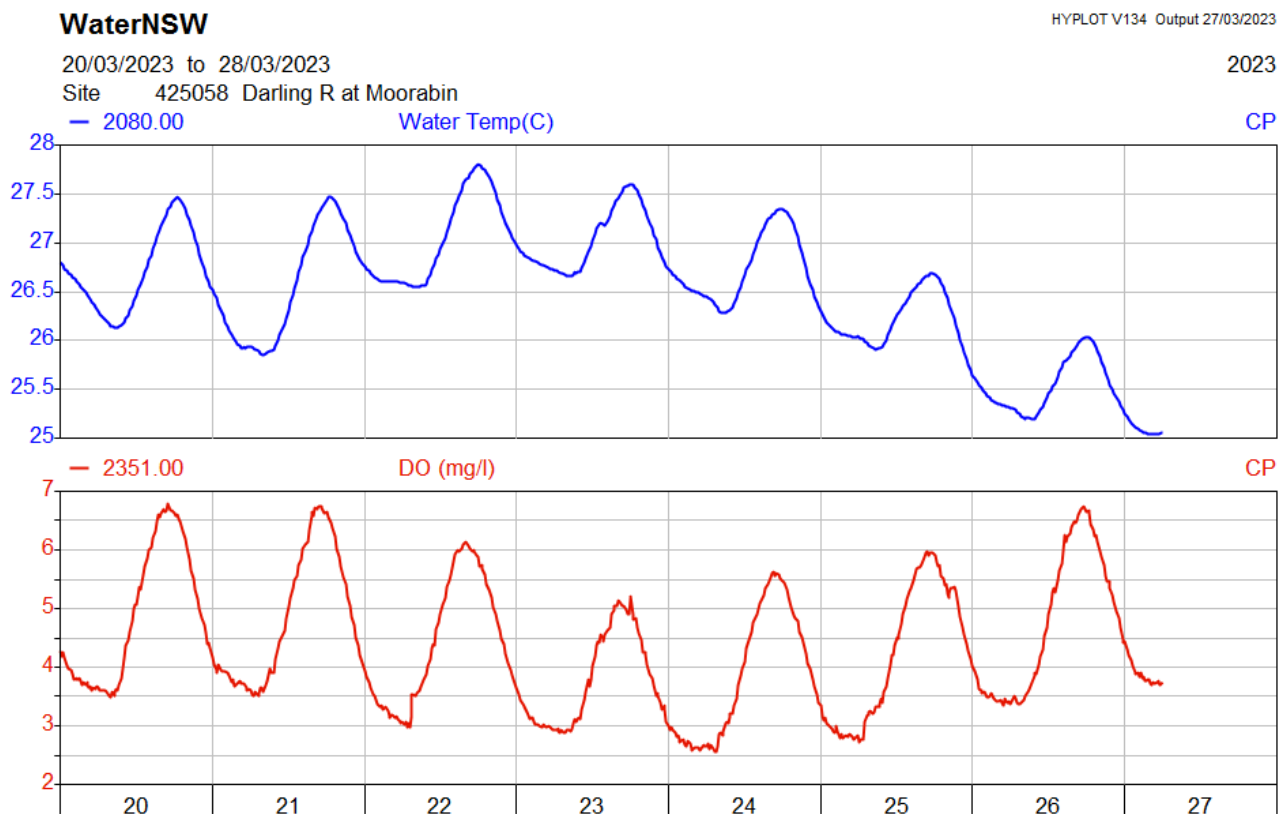


Figure 501: Continuous dissolved oxygen (mg/L) and water temperature (°C) in the Darling River at Wilcannia (Moorabin). The continuous dissolved oxygen monitoring site in the upper reaches of Lake Wetherell at Nelia Gaari is also showing oxygen is dropping to critical levels overnight and then recovering during the day (Figure 502).

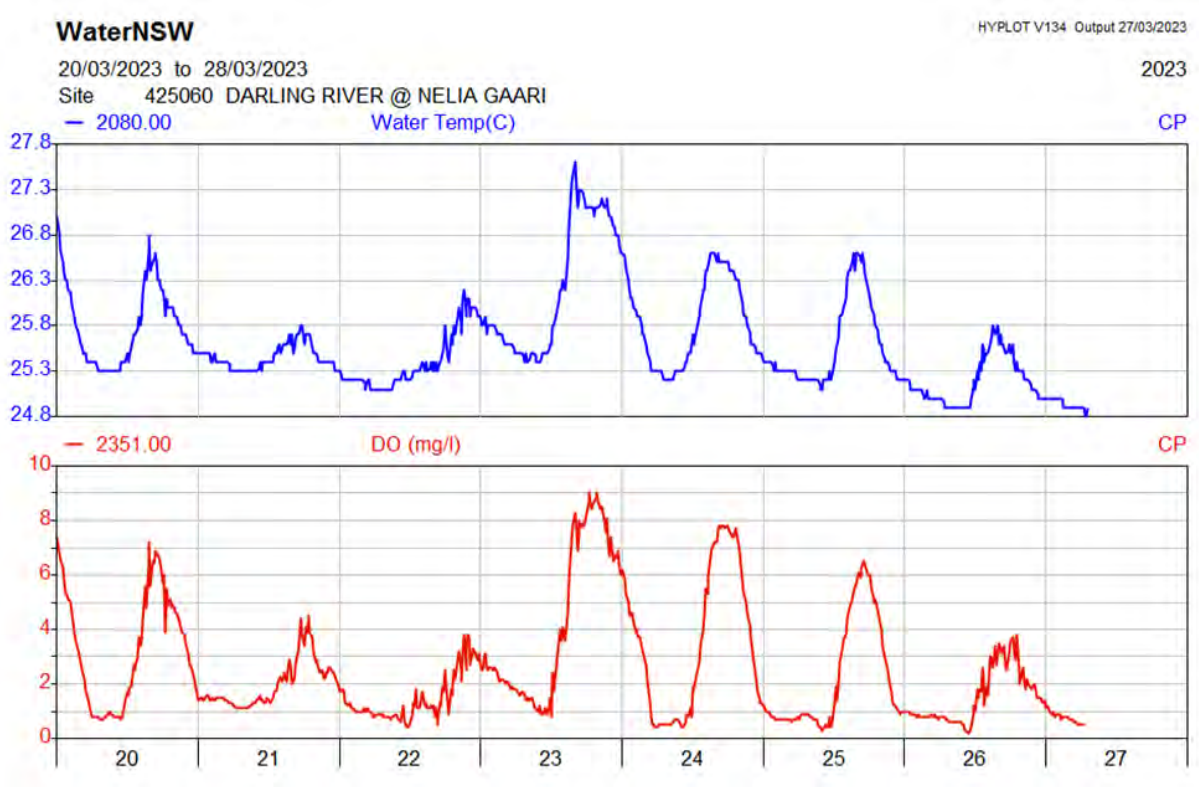


Figure 502: Continuous dissolved oxygen (mg/L) and water temperature (°C) in the Darling River at Nelia Gaari

Figure 503 is a Google Earth image showing the location and results from a survey of dissolved oxygen levels down the Darling River on 25 March. There is a drop in oxygen levels from 6.34 mg/L near the Pamamaroo outlet to 4.67 mg/L just downstream of Main Weir.



Figure 503: Google Earth image showing dissolved oxygen results from the Lake Pamamaroo outlet to downstream of Main Weir - 25 March

The results from Main Weir down to Menindee (Figure 504) show there is a gradual decrease in oxygen levels with distance down the Darling River. Most of this reach of river has dissolved oxygen levels below the critical threshold for fish health of 2 mg/L.

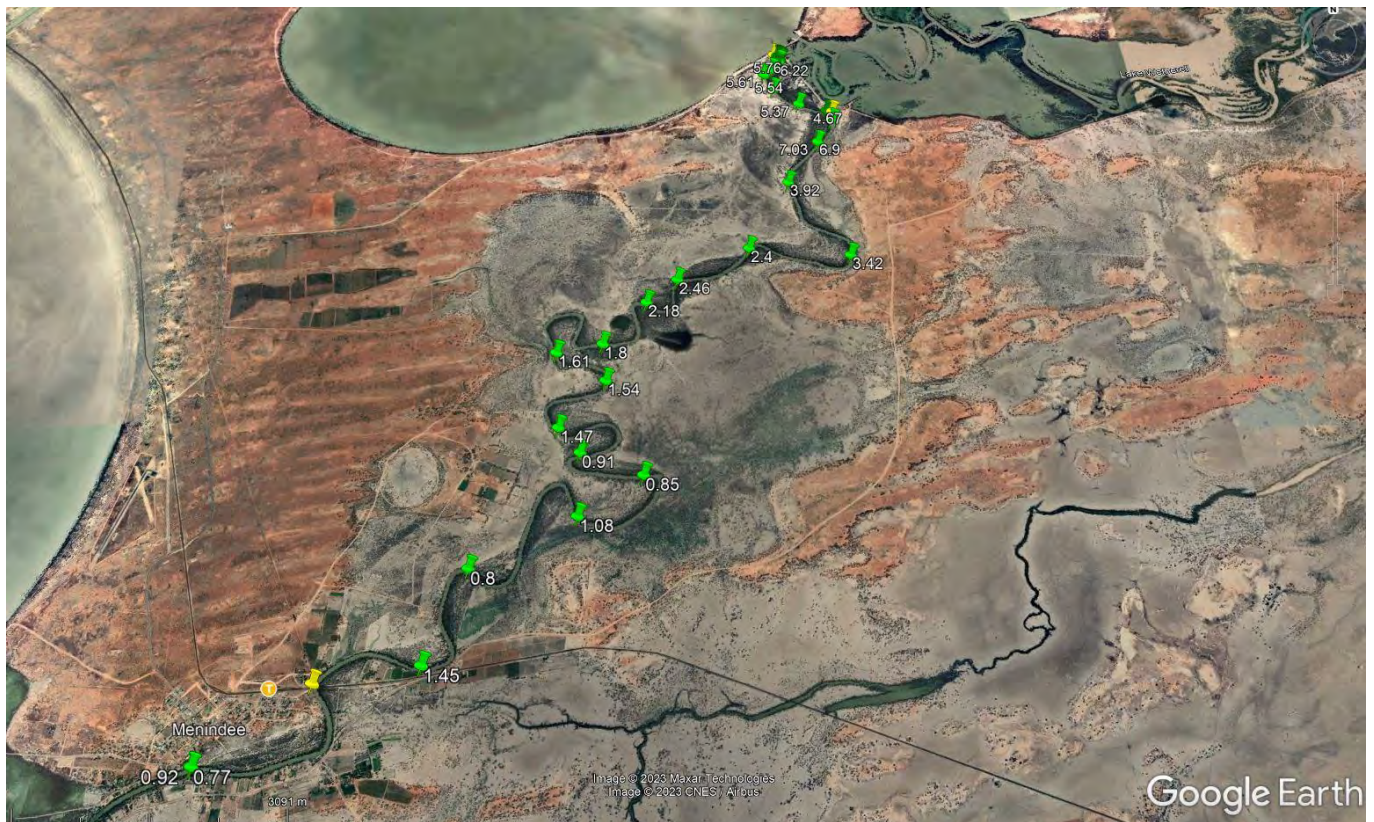


Figure 504: Google Earth image showing dissolved oxygen results from the Lake Pamamaroo outlet to Menindee town - 25 March

Figure 505 is a Planet satellite image showing the Darling River and Menindee Lakes at Menindee on 25 March. Dissolved oxygen monitoring results (mg/L) collected near the water surface by WaterNSW on 26 March are shown on Figure 505. The depth profile dissolved oxygen readings are shown in Table 51 and Figure 506.

The image shows the green water from Lake Wetherell is mixing with the water in Lake Pamamaroo. Some of this water is being drawn into the Pamamaroo outlet. This does not appear to be impacting the dissolved oxygen levels in the Darling River.

The data collected on 26 March is showing the same pattern as previous days with the dissolved oxygen levels decreasing between Lake Pamamaroo and downstream of the Main Weir and dropping to critical levels by the Railway Bridge. These low dissolved oxygen results indicate that there is still a risk of further fish deaths in this area and downstream to the junction of the Darling River and Menindee Creek (Table 51).

Profile readings collected upstream and downstream of the junction of the Darling River with Menindee Creek show that releases from Lake Menindee are continuing to dilute and mix the low oxygen water coming down the Darling River from Menindee town.

All pH readings collected on 26 March were less than 8.2.



Figure 505: Planet satellite image – Image 25 March. Dissolved oxygen data collected 26 March (mg/L)

Table 51: Dissolved oxygen (mg/L) profile data from Darling River at Menindee, 26 March

Depth (m)	Downstream Main Weir	Menindee Rail Bridge	Upstream Menindee Ck	Downstream Menindee Ck	Downstream Weir 32
0.5	5.79	0.98	1.20	6.02	6.21
1.0	5.56	0.54	0.37	5.86	6.06
2.0	5.53	0.43	0.22	5.82	5.78
3.0	5.49	0.40	0.23	5.78	5.69
4.0		0.39	0.20	5.75	5.61
5.0		0.38	0.19	5.73	5.57

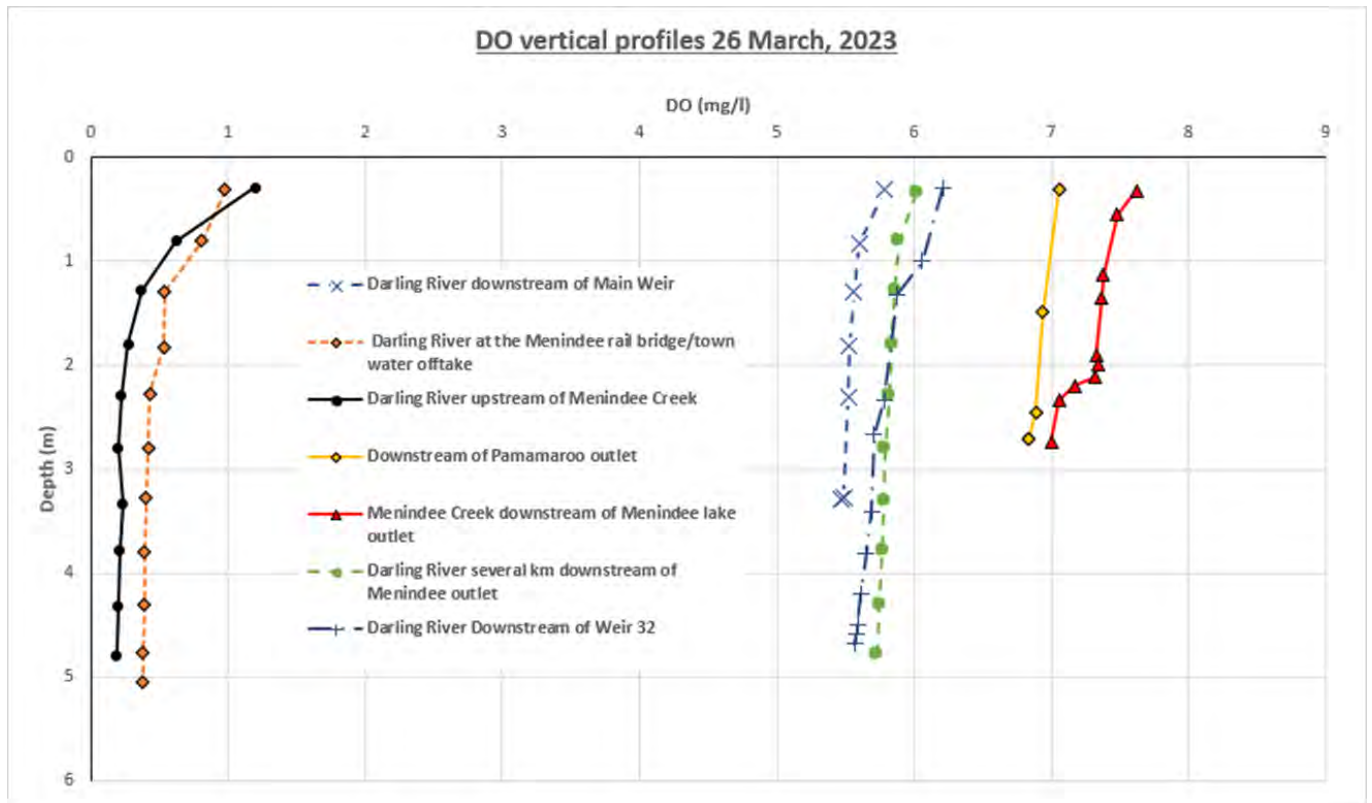


Figure 506: Dissolved oxygen vertical profiles in Darling River at Menindee 25 March.

The data from the temporary dissolved oxygen sensor installed at the Menindee pump station (at a depth of about 1 m from the water surface) is showing a diurnal fluctuation in dissolved oxygen with replenishment during the day but dropping to critical levels for fish health overnight (Figure 507). A second dissolved oxygen sensor at the Menindee Town gauging station is showing low dissolved oxygen levels near the riverbed (Figure 508). The two sites are approximately 2 km apart by river.

WaterNSW

HYPLOT V134 Output 27/03/2023

23/03/2023 to 28/03/2023

2023

Site 425902 Darling River @ Menindee Pump Station

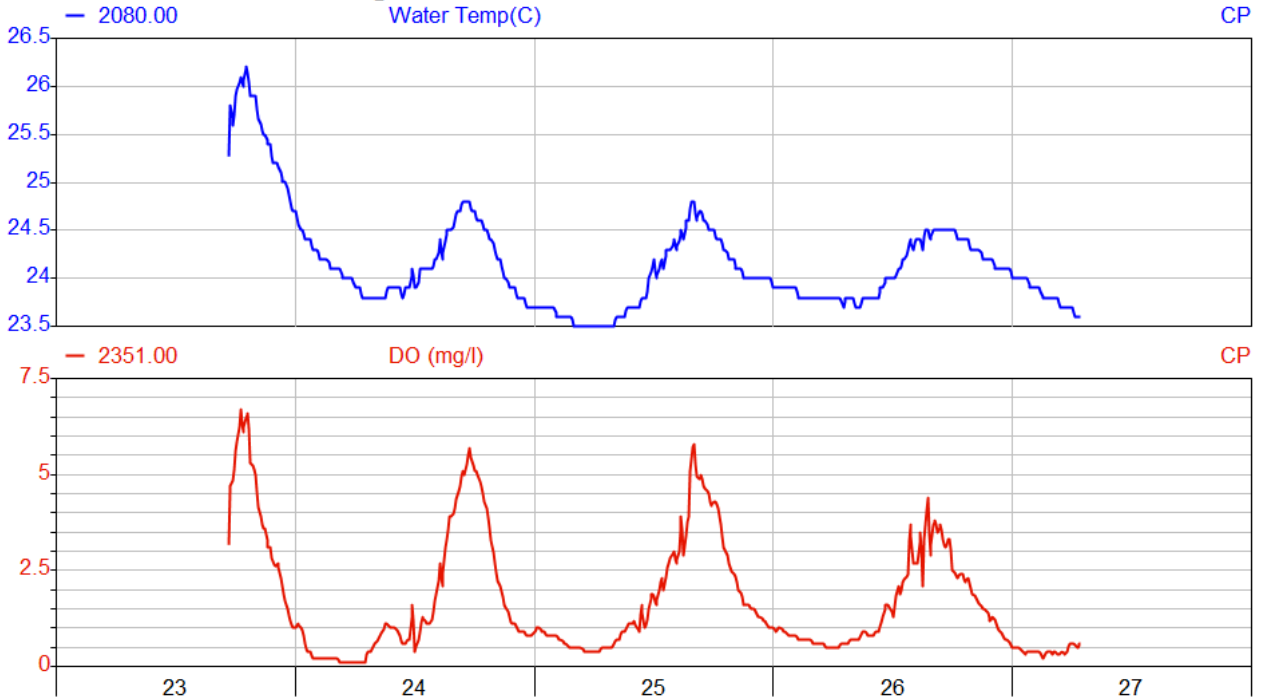


Figure 507: Continuous discharge (ML/day), dissolved oxygen (mg/L) and water temperature (°C) in the Darling River at Menindee pump station

WaterNSW

HYPLOT V134 Output 27/03/2023

23/03/2023 to 28/03/2023

2023

Site 425001 DARLING RIVER AT MENINDEE TOWN

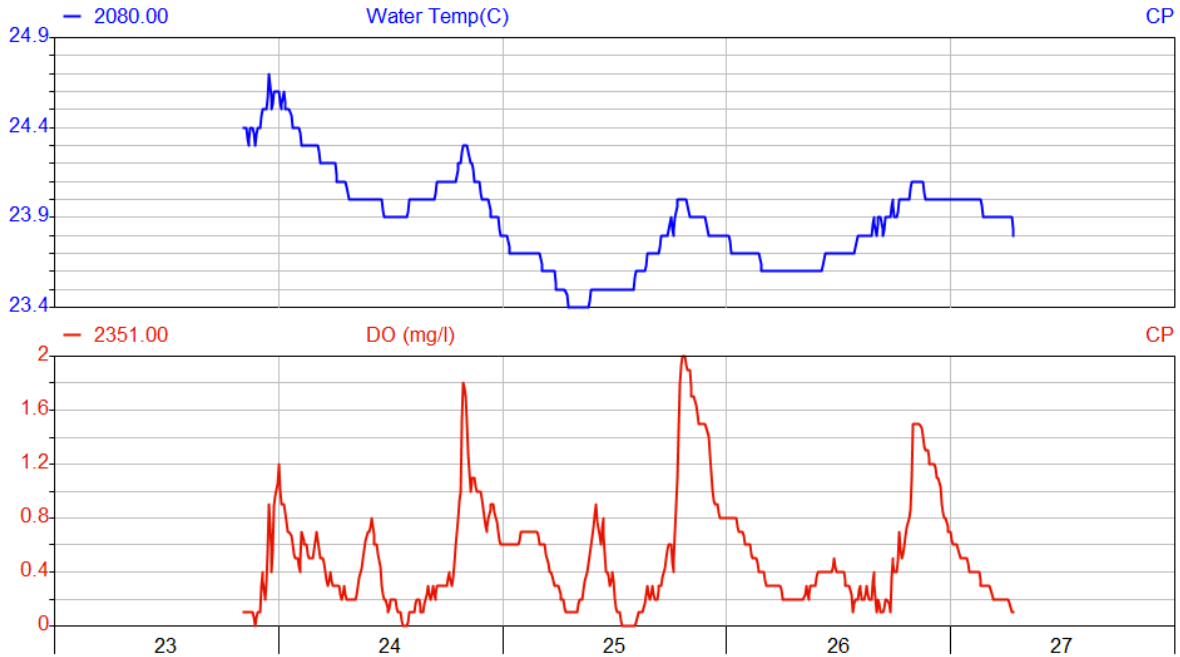


Figure 508: Continuous discharge (ML/day), dissolved oxygen (mg/L) and water temperature (°C) in the Darling River at Menindee town

Dissolved oxygen at Weir 32 has been stable at around 5 to 6 mg/L since 24 March (Figure 509).

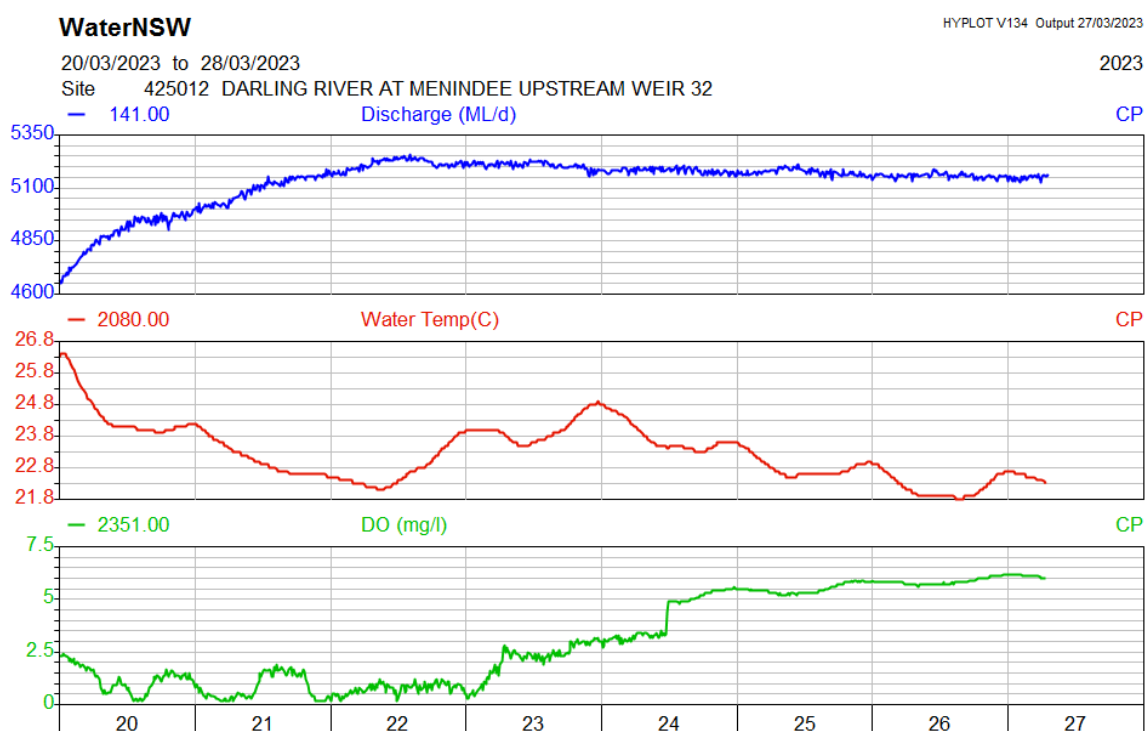


Figure 509: Continuous discharge (ML/day), dissolved oxygen (mg/L) and water temperature (°C) in the Darling River at Weir 32

The Darling River between Weir 32 and Pooncarie is an area of concern as the low oxygen water and impacts from decomposing fish make their way downstream. A report has been received of fish struggling and dying (all species) at Pooncarie on the morning of 26 March. This is expected as data collected at Karoola (halfway between Weir 32 and Pooncarie), Moorara (25 km by road upstream of Pooncarie) and Pooncarie town indicates low dissolved oxygen water is continuing to move down the system (Table 52).

Discharge in the Darling River at Pooncarie has increased slightly to 6,568 ML/day as the earlier increased release measures from Menindee Lakes to mitigate low dissolved oxygen levels arrive. Discharge at Burtundy has also increased slightly to 6,496 ML/day.

Table 52: Dissolved oxygen (mg/L) readings in the Darling River between Weir 32 and Pooncarie

Monitoring site	23/3/2023	24/3/2023	25/3/2023	26/3/2023
Darling River at Karoola	1.93	0.82	2.77	
Darling River at Moorara	1.71	0.51	0.63	0.67
Darling River at Pooncarie	2.27	2.87	2.23	1.13
Darling River at Lethero			3.47	3.34
Darling River at Ellerslie			3.84	3.94

Dissolved oxygen readings at Burtundy are stable at around 3.5 mg/L (Figure 510). Dissolved oxygen results through this stretch of the lower Darling River and the Darling River arm of the Lock 10 weir pool are still below the safe level for fish health of 4 mg/L.

Figure 511 highlights dissolved oxygen levels in the Murray River downstream of Wentworth (Lock 10) are at safe levels for fish health.

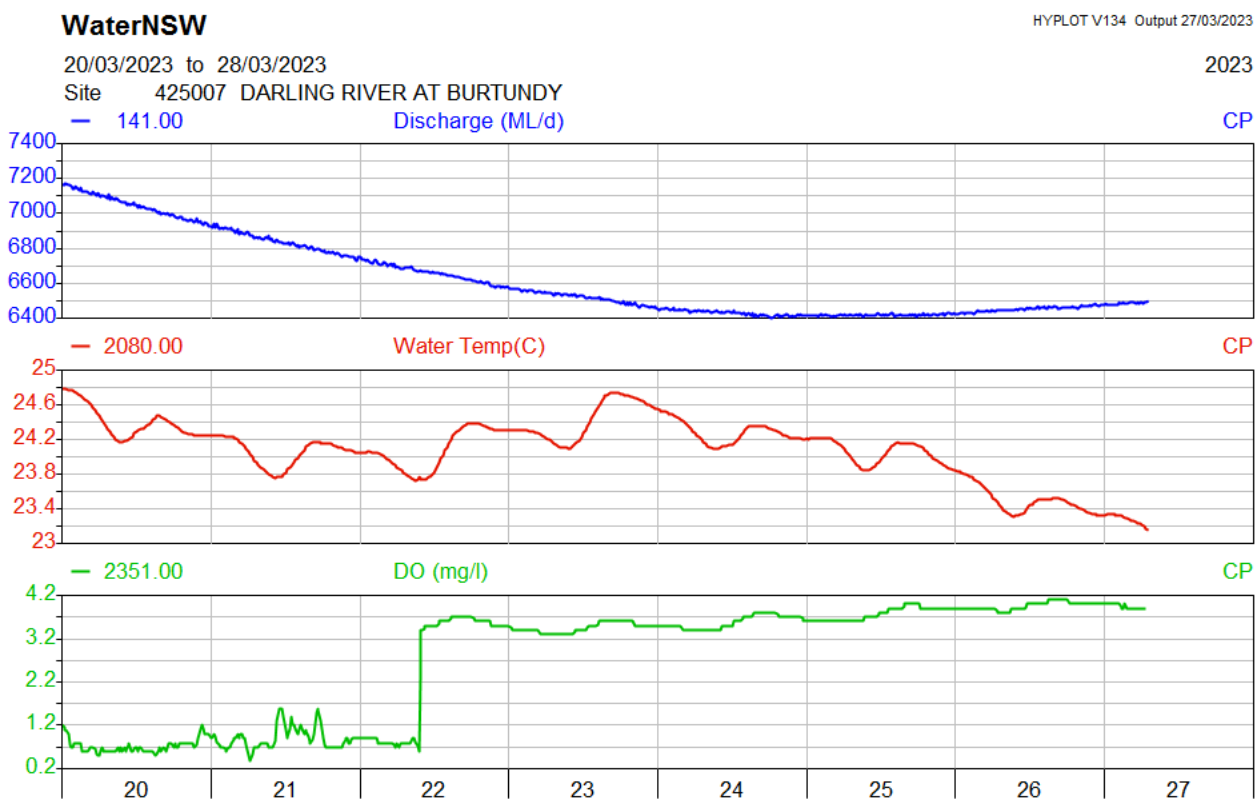


Figure 510: Continuous discharge (ML/day), dissolved oxygen (mg/L), water temperature (°C) in the Darling River at Burtundy

24/03/2023 to 28/03/2023

2023

Site 425901 MURRAY RIVER @ WENTWORTH WQ

— 2080.00 Water Temp(C)

CP

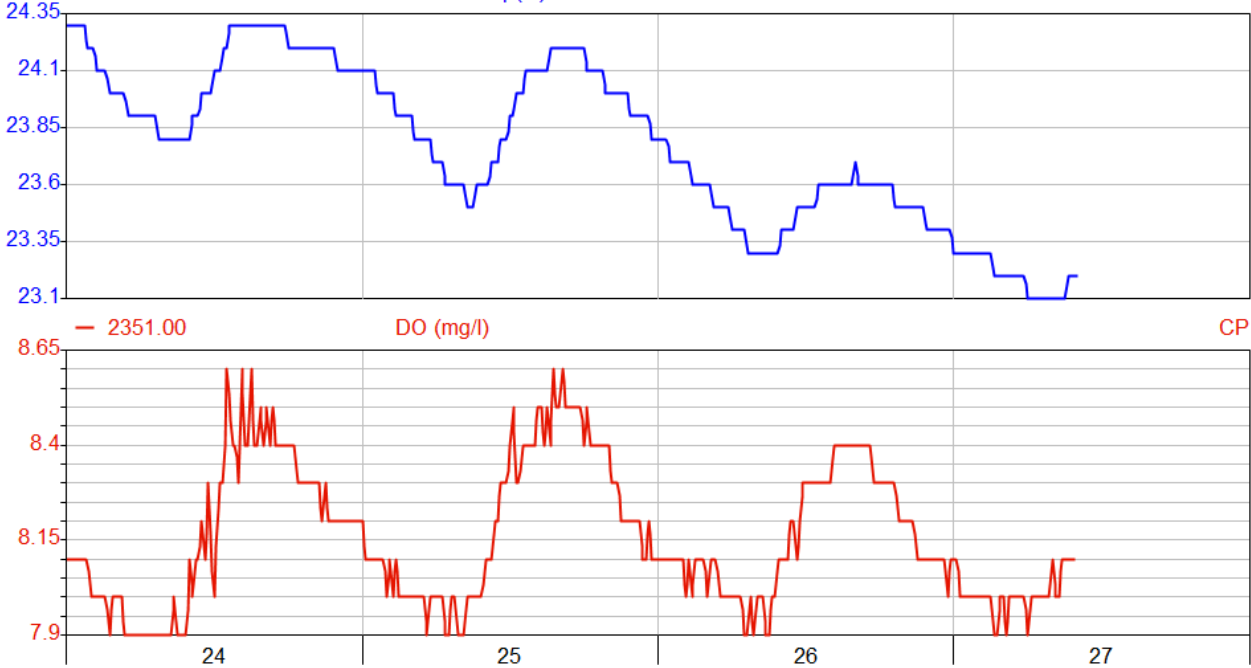


Figure 511: Continuous dissolved oxygen (mg/L), water temperature (°C) in the Murray River at Wentworth

Weather Outlook

The Bureau of Meteorology 8-day total rain forecast (27 March to 3 April) indicates very light rainfall in western NSW with higher falls along the coast (Figure 512). Forecast is for maximum air temperatures at Menindee to remain around 30°C until Monday 27 March and then decrease to the mid-low 20's during the week (Figure 513). Overnight minimums are forecast to drop to less than 10°C on Sunday 2 April. There are no heatwave conditions forecast by the Bureau of Meteorology.

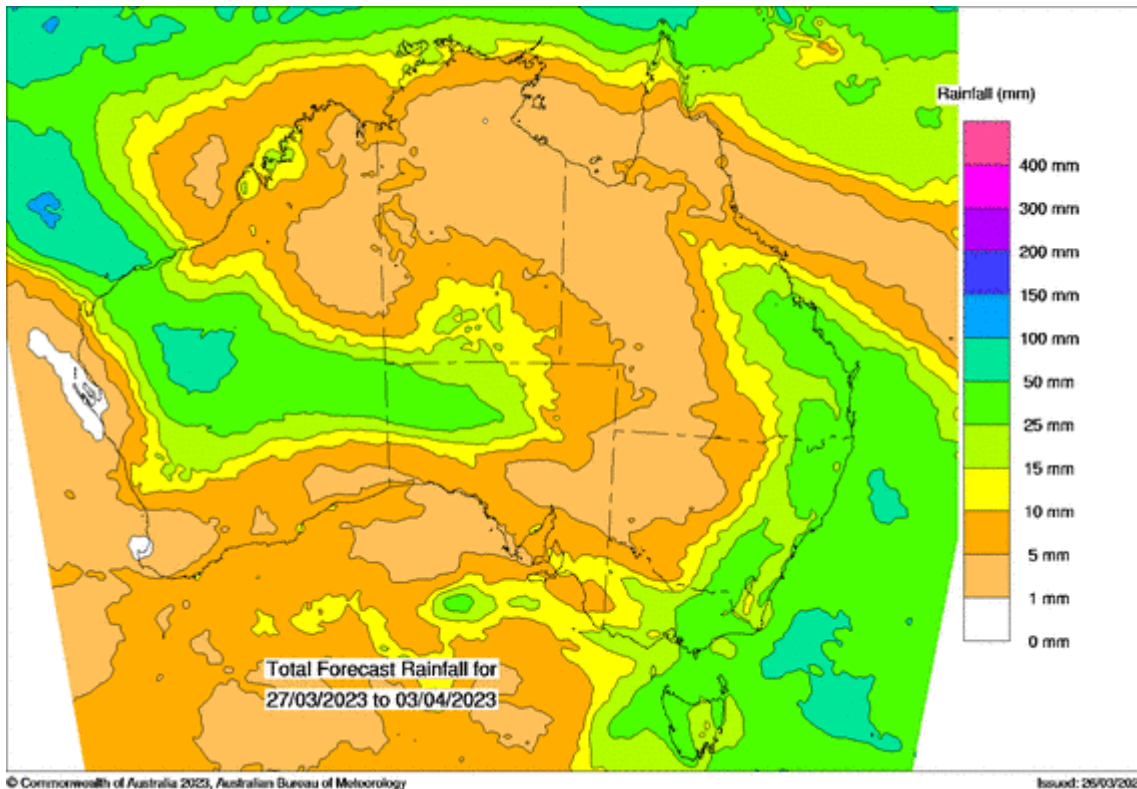


Figure 512: Bureau of Meteorology 8-day total rain forecast (27 March to 3 April)

	MON Mar 27	TUE Mar 28	WED Mar 29	THU Mar 30	FRI Mar 31	SAT Apr 1	SUN Apr 2
Summary	Mostly cloudy	Possible shower	Mostly sunny	Mostly sunny	Mostly cloudy	Mostly cloudy	Mostly sunny
Maximum	32°C	29°C	25°C	23°C	24°C	23°C	21°C
Minimum	20°C	17°C	14°C	10°C	12°C	10°C	7°C
Chance Of Rain	50%	80%	20%	5%	5%	5%	5%
Rain Amount	1-5mm	1-5mm	< 1mm	< 1mm	< 1mm	< 1mm	< 1mm

Figure 513: Forecast air temperatures for Menindee – 27 March to 2 April

Water quality update for Menindee Incident Management Team – 29 March 2023

Darling River and Menindee Lakes

Discharge in the Darling River and Tallyawalka Creek at Wilcannia is 1,247 and 810 ML/day respectively. Dissolved oxygen levels at Wilcannia are dropping below the 4 mg/L safe threshold for fish health over night but improving during the day (Figure 514). As a general guide, native fish and other large aquatic organisms require at least 2 mg/L of dissolved oxygen to survive but may begin to suffer if levels are below 4 to 5 mg/L for prolonged periods. Water temperatures are continuing to fall.

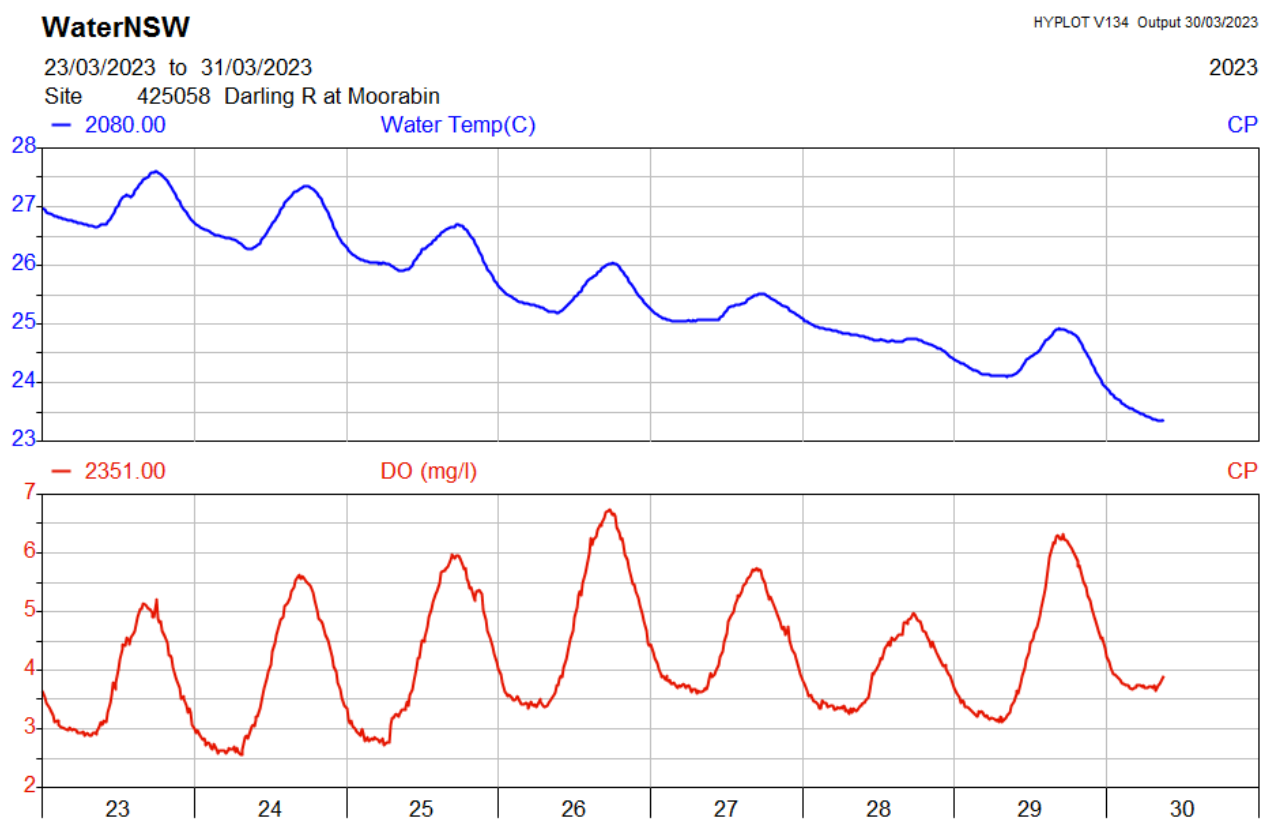


Figure 514: Continuous dissolved oxygen (mg/L) and water temperature (°C) in the Darling River at Wilcannia (Moorabin)

The continuous dissolved oxygen monitoring site in the upper reaches of Lake Wetherell at Nelia Gaari is showing oxygen is dropping to critical levels overnight and then recovering during the day (Figure 515). Despite the more oxygenated water coming from upstream, there has been little improvement at the Nelia Gaari site.

23/03/2023 to 31/03/2023

2023

Site 425060 DARLING RIVER @ NELIA GAARI

— 2080.00 Water Temp(C)

CP

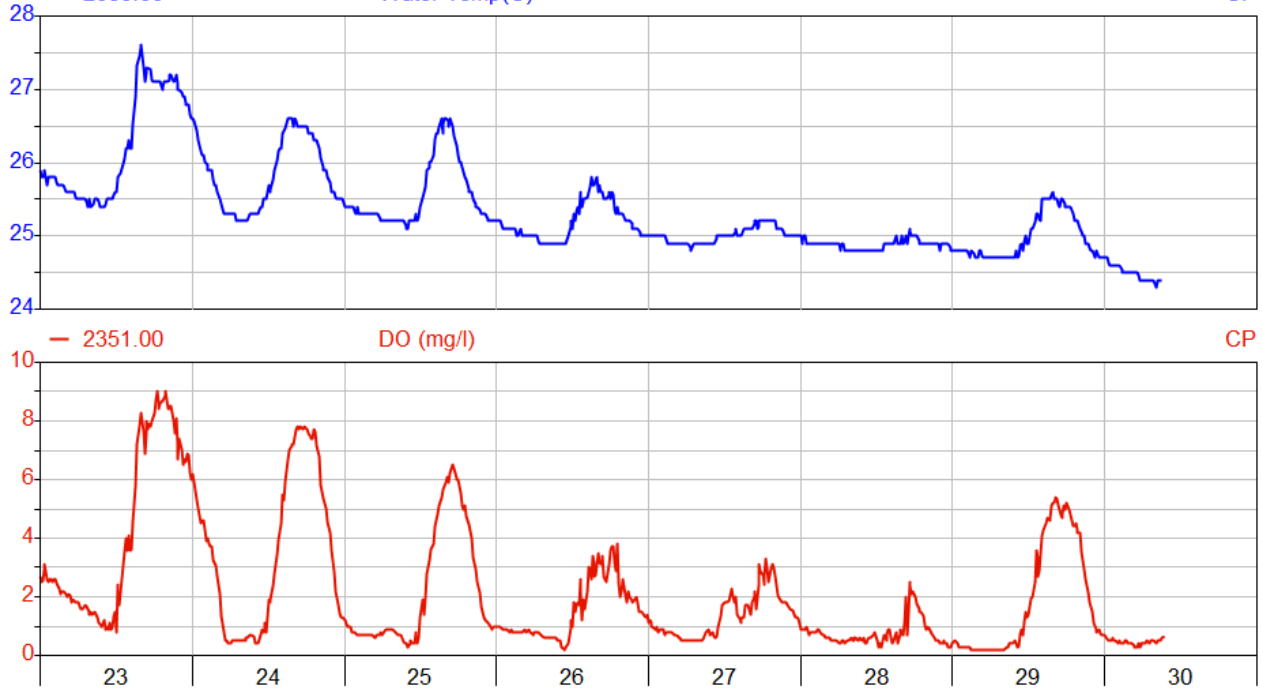


Figure 515: Continuous dissolved oxygen (mg/L) and water temperature (°C) in the Darling River at Nelia Gaari

Routine water quality monitoring in Menindee Lakes was conducted on 27 and 28 March. Table 53 lists the dissolved oxygen profile data collected in Lake Wetherell and Lake Pamamaroo. Dissolved oxygen levels in the upper reaches of Lake Wetherell at Sites 2 and 3 are still low through the full water profile. There is improvement in oxygen levels closer to the water surface at Site 4 which is near the Lake Wetherell outlet. The water in Lake Pamamaroo is oxygenated and well mixed.

Table 53: Dissolved oxygen (mg/L) profile data from lakes Wetherell and Pamamaroo, 27 March

Sample depth (m)	Lake Wetherell Site 2 (upstream)	Lake Wetherell Site 3 (mid lake)	Lake Wetherell Site 4 (near outlet)	Lake Pamamaroo (centre)
0.25	1.58	2.11	6.32	8.77
0.5	1.40	1.95	5.24	8.26
1.0	1.32	1.74	4.44	8.03
2.0	1.36	1.51	2.6	8.01
3.0	1.27	1.38	2.23	7.95
4.0	1.20	1.15	2.18	7.58
5.0	1.19	1.02	2.24	
6.0	1.19	0.38	1.88	
7.0	1.19	0.33		
8.0	1.19	0.27		
9.0	1.12	0.25		
10.0	1.11			

Figure 516 is a Planet satellite image showing the Darling River and Menindee Lakes at Menindee on 25 March. Dissolved oxygen monitoring results (mg/L) collected near the water surface by WaterNSW on 28 March are shown on Figure 516. The depth profile dissolved oxygen readings are shown in Table 54.

The data collected on 28 March highlighted a similar pattern to previous days. Oxygenated water is being released into the Darling River from Lake Pamamaroo. Dissolved oxygen levels are decreasing slightly between Lake Pamamaroo and downstream of the Main Weir and then decreasing to critical levels for fish health by the Railway Bridge and upstream of the Darling River and Menindee Creek Junction (Table 54).

Profile readings collected upstream and downstream of the junction of the Darling River with Menindee Creek show that releases from Lake Menindee are continuing to dilute and mix the low oxygen water coming down the Darling River from Menindee town.

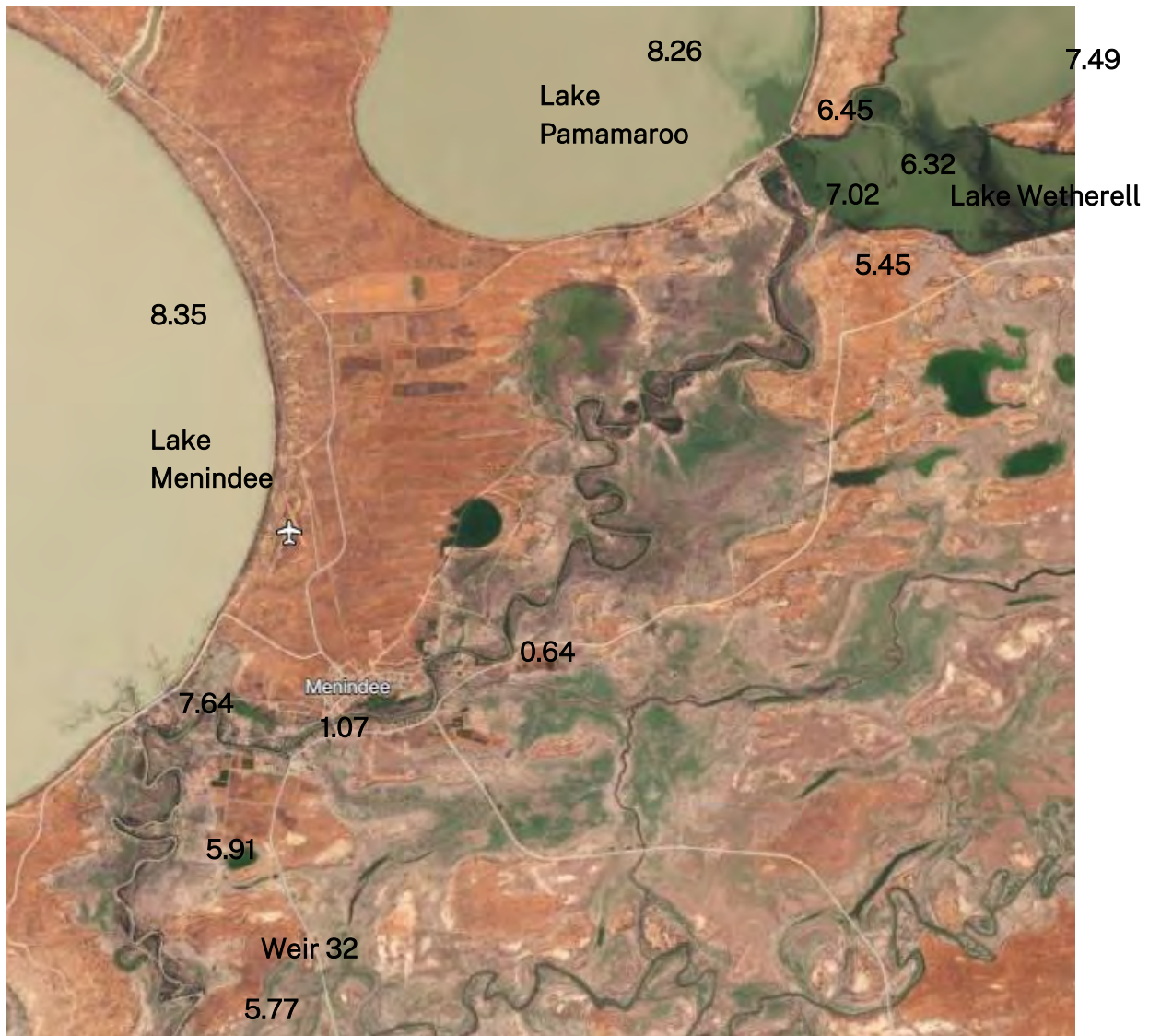


Figure 516: Planet satellite image – Image 25 March. Dissolved oxygen data collected 28 March (mg/L)

Table 54: Dissolved oxygen (mg/L) profile data from Darling River at Menindee, 28 March

Sample depth (m)	Downstream Main Weir	Menindee Rail Bridge	Upstream Menindee Ck	Downstream Menindee Ck	Downstream Weir 32
0.5	5.21	0.47	0.90	5.78	5.68
1.0	5.07	0.47	0.47	5.73	5.60
2.0	4.98	0.42	0.38	5.70	5.56
3.0	4.95	0.35	0.30	5.68	5.53
4.0	4.89	0.37	0.30	5.66	5.50
5.0				5.65	5.48

Figure 517 is a Google Earth image showing the location and results from a survey of dissolved oxygen levels down the Darling River from the Lake Pamamaroo outlet to the Rail Bridge at Menindee on 29 March. There is a steady drop in oxygen levels from 6.17 mg/L near the Pamamaroo outlet down to 1.07 mg/L at the Rail Bridge just upstream of Menindee.

Figure 518 is a graph showing the dissolved oxygen results from the two longitudinal surveys undertaken on 25 and 29 March. The graph highlights that there has been some improvement in dissolved oxygen in the upper section but is remaining low down toward the Railway Bridge.



Figure 517: Google Earth image showing dissolved oxygen results from the Lake Pamamaroo outlet to the Rail Bridge upstream of Menindee - 29 March 2023

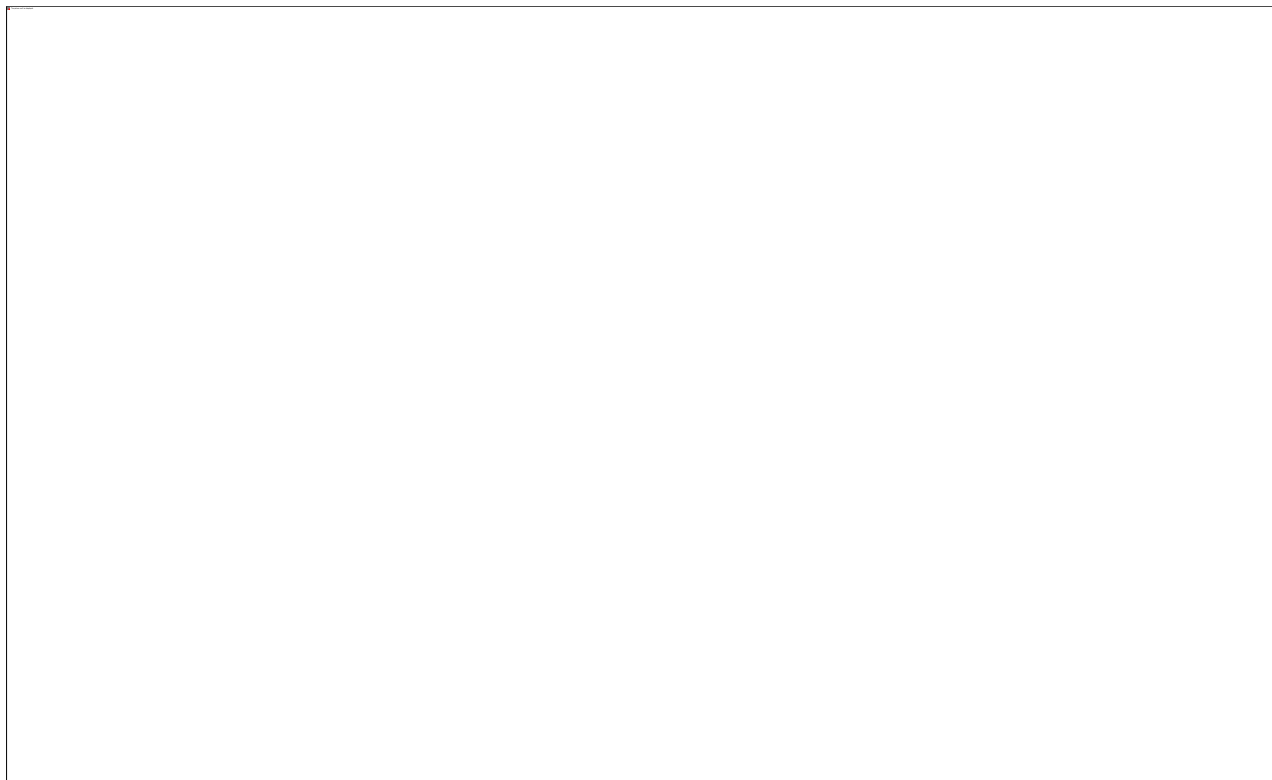


Figure 518: Graph of dissolved oxygen results from the two longitudinal profiles collected on 25 and 29 March

In addition to the longitudinal survey, WaterNSW undertook profile monitoring at key locations down the Darling River between Main Weir and Menindee. These results (Table 55) highlight that oxygen levels are still very low through the full water column at the Rail Bridge and upstream of the Darling River and Menindee Creek junction. Results less than the 2 mg/L critical threshold for fish health have been highlighted in red. These low dissolved oxygen results indicate that there is still a risk of further fish deaths in this area.

Table 55: Dissolved oxygen (mg/L) profile data from Darling River at Menindee, 29 March

Sample depth (m)	Darling River at Menindee Rail Bridge	Darling River upstream Menindee Creek	Darling River downstream Menindee Creek
0.5	1.13	0.54	5.95
1.0	1.10	0.44	5.93
2.0	0.65	0.39	5.90
3.0	0.62	0.36	5.88
4.0	0.59	0.32	5.87
5.0	0.58		5.87

The data from the temporary dissolved oxygen sensor installed at the Menindee pump station (at a depth of about 1 m from the water surface) is showing a diurnal fluctuation in dissolved oxygen with replenishment during the day but dropping to critical levels for fish health overnight (Figure 519). A second dissolved oxygen sensor at the Menindee Town gauging station is showing low dissolved oxygen levels near the riverbed (Figure 520). The two sites are approximately 2 km apart by river.

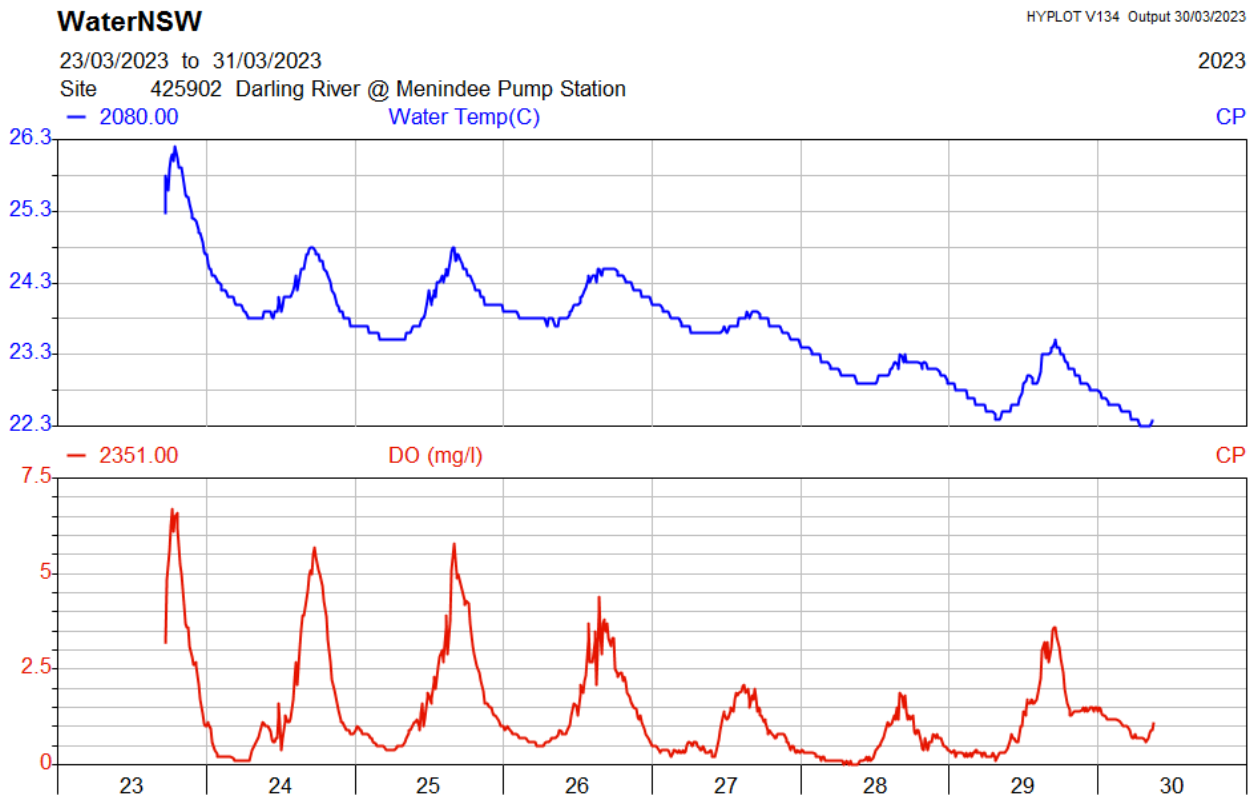


Figure 519: Continuous dissolved oxygen (mg/L) and water temperature (°C) in the Darling River at Menindee pump station

WaterNSW

HYPLOT V134 Output 30/03/2023

23/03/2023 to 31/03/2023

2023

Site 425001 DARLING RIVER AT MENINDEE TOWN

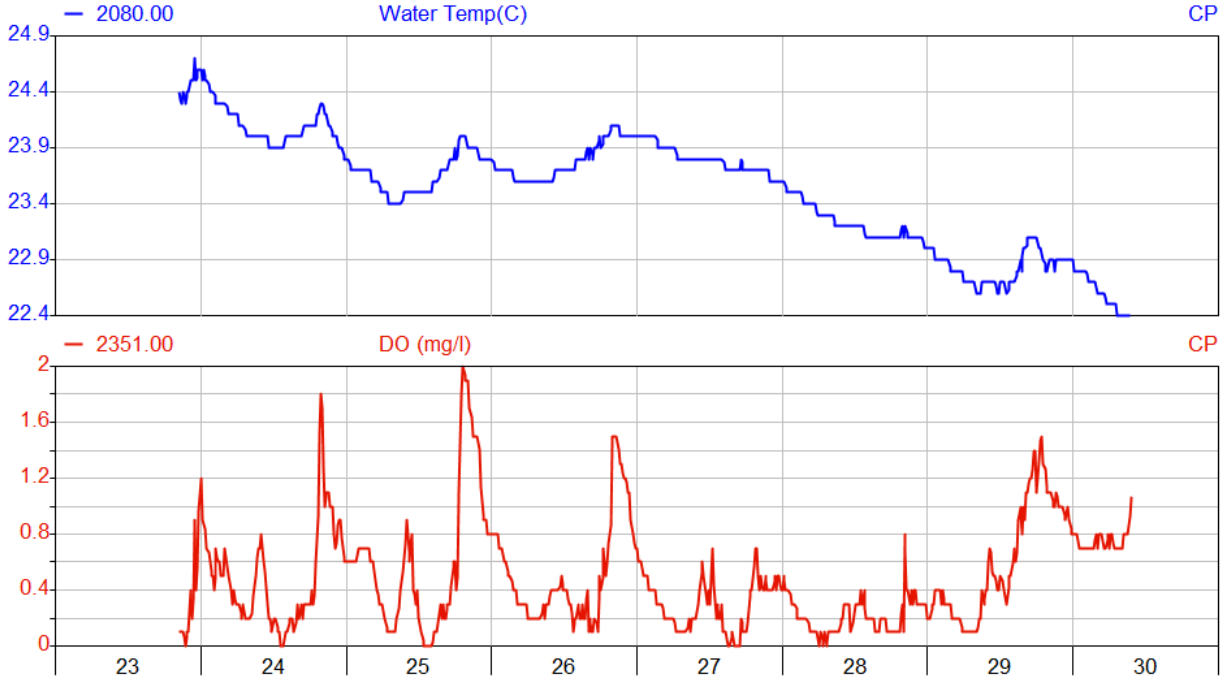


Figure 520: Continuous dissolved oxygen (mg/L) and water temperature (°C) in the Darling River at Menindee town. Dissolved oxygen at Weir 32 has been stable before a slight dip yesterday (Figure 521).

WaterNSW

HYPLOT V134 Output 30/03/2023

23/03/2023 to 31/03/2023

2023

Site 425012 DARLING RIVER AT MENINDEE UPSTREAM WEIR 32

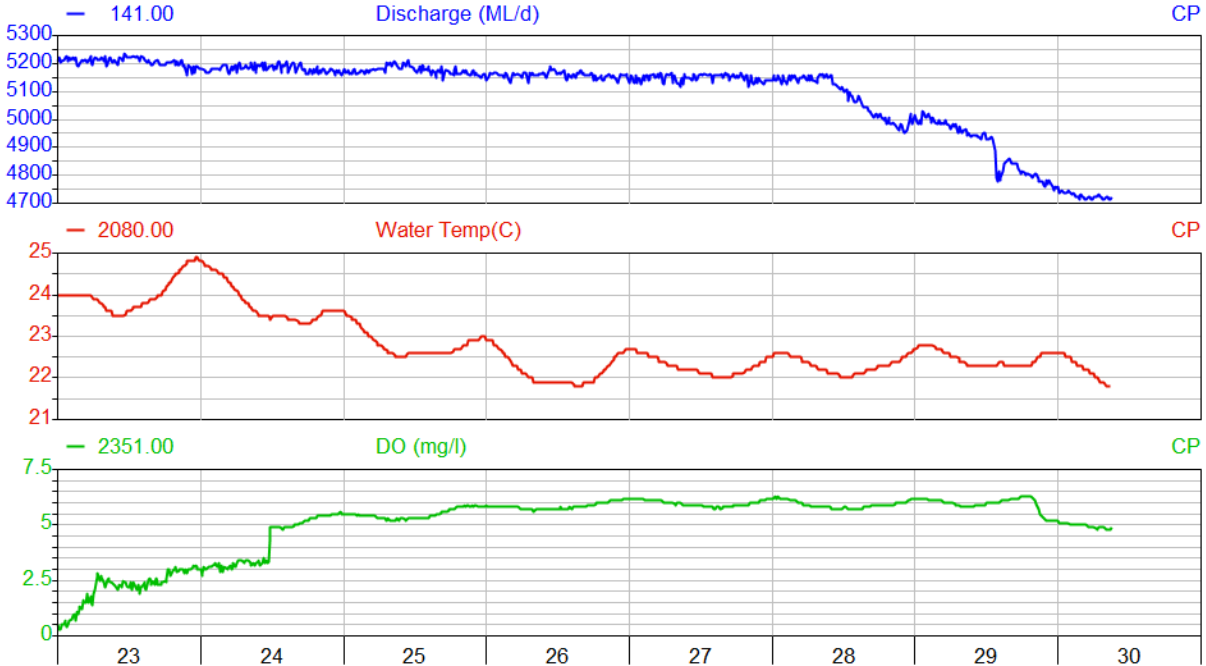


Figure 521: Continuous discharge (ML/day), dissolved oxygen (mg/L) and water temperature (°C) in the Darling River at Weir 32

The Darling River at Pooncarie is an area of concern as the low oxygen water and impacts from decomposing fish make their way downstream. Reports have been received of fish struggling and dying at Pooncarie. Monitoring is showing the low dissolved oxygen water has been progressing downstream over the past week (Table 56). On 27 March the low oxygen water had progressed downstream to the property Lethero and arrived at the Burtundy gauging station on 28 March, causing dissolved oxygen to drop to 2.2 mg/L (Figure 522). Road closures due to rain restricted access to some sites on 29 March.

Discharge in the Darling River at Pooncarie is steady at 6,607 ML/day, while discharge at Burtundy has increased slightly to 6,592 ML/day (Figure 522).

Table 56: Dissolved oxygen (mg/L) readings in the Darling River between Weir 32 and Wentworth

Monitoring site	24/03/2023	25/03/2023	26/03/2023	27/03/2023	28/03/2023	29/03/2023
Darling River at Karoola	0.82	2.77		2.67	2.64	
Darling River at Moorara	0.51	0.63	0.67	0.54	0.99	
Darling River at Pooncarie	2.87	2.23	1.13	0.76	0.76	1.03
Darling River at Lethero		3.47	3.34	1.36		
Darling River at Ellerslie		3.84	3.94	3.63		3.73

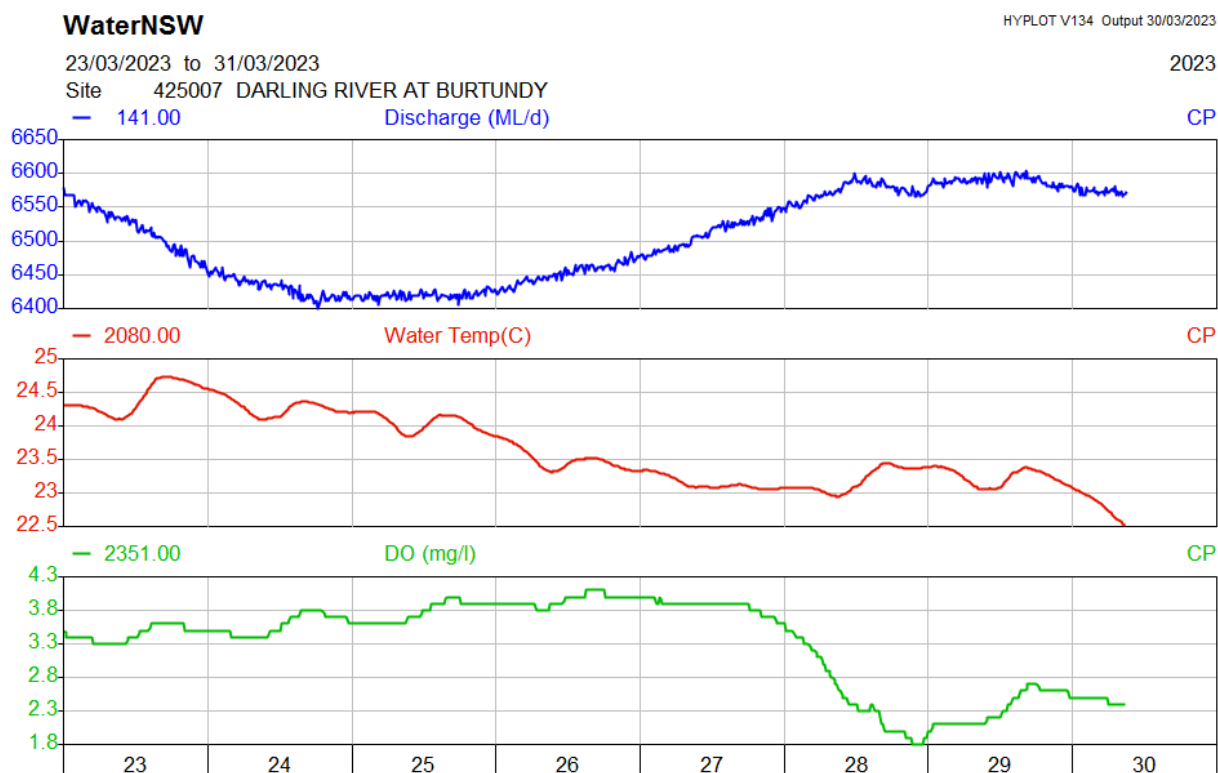


Figure 522: Continuous discharge (ML/day), dissolved oxygen (mg/L), water temperature (°C) in the Darling River at Burtundy

Dissolved oxygen levels in the Murray River at Wentworth downstream of the Darling and Murray River junction is remaining at safe levels for fish health (Figure 523).

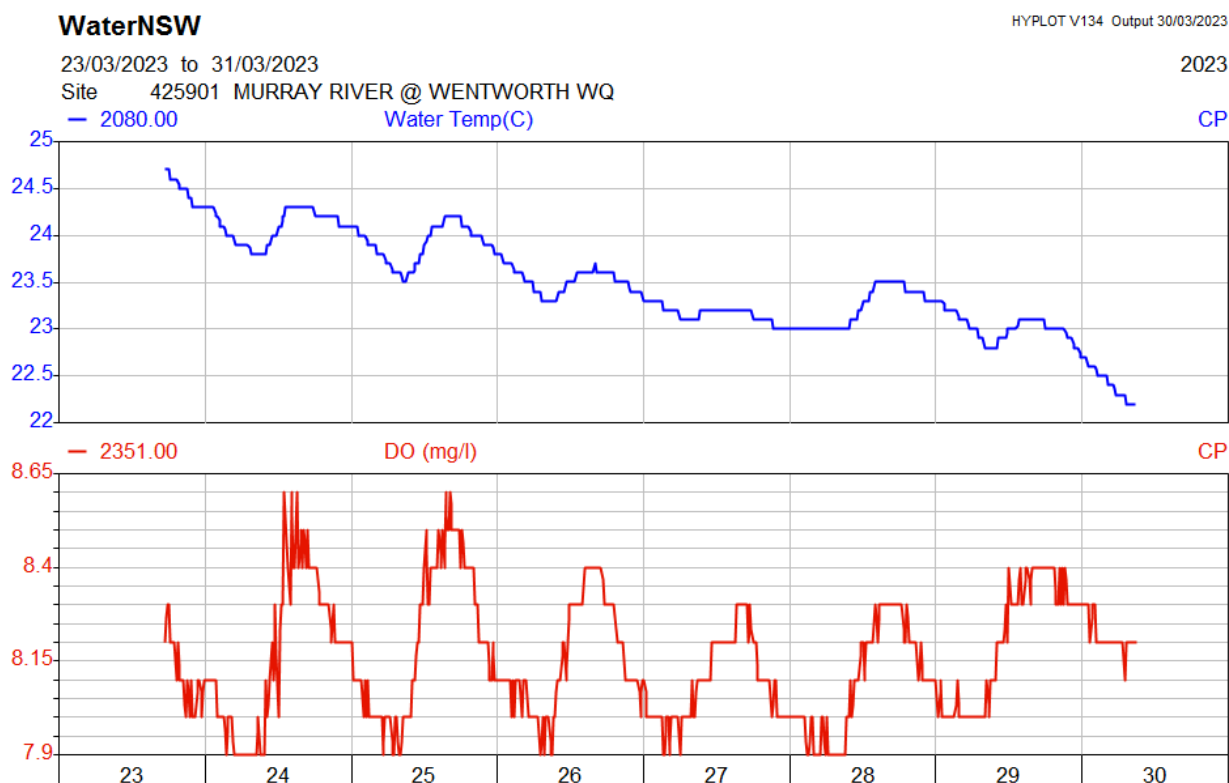


Figure 523: Continuous dissolved oxygen (mg/L), water temperature (°C) in the Murray River at Wentworth

Weather Outlook

The Bureau of Meteorology 8-day total rain forecast (30 March to 6 April) indicates light rainfall in western NSW with higher falls along the coast (Figure 524). Forecast is for maximum air temperatures at Menindee to remain in the mid-low 20's until next Tuesday 4 April (Figure 525). Overnight minimums are forecast to drop to 7°C on Sunday 2 April. There are no heatwave conditions forecast by the Bureau of Meteorology.

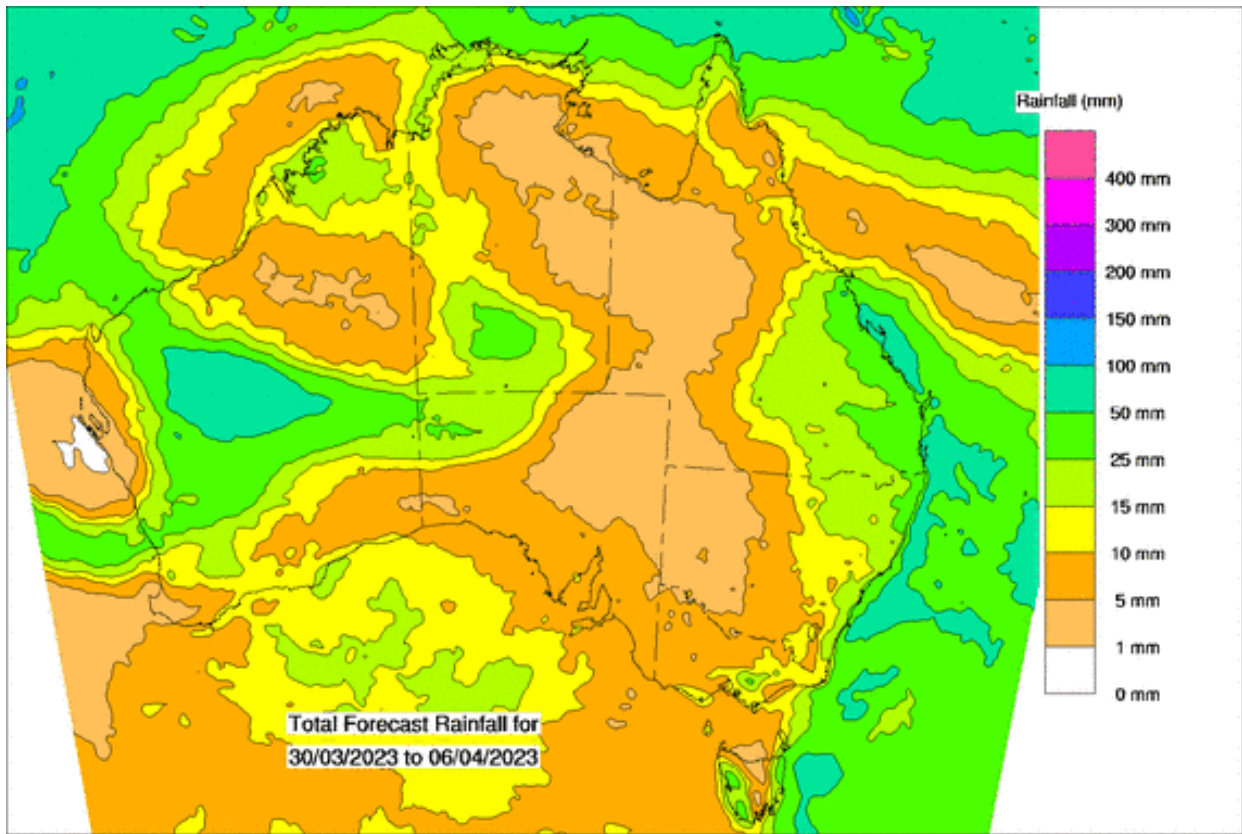


Figure 524: Bureau of Meteorology 8-day total rain forecast (3 March to 6 April)

	THU Mar 30	FRI Mar 31	SAT Apr 1	SUN Apr 2	MON Apr 3	TUE Apr 4	WED Apr 5
Summary	Mostly sunny	Mostly cloudy	Mostly sunny	Mostly sunny	Mostly sunny	Mostly sunny	Mostly cloudy
Maximum	22°C	22°C	21°C	21°C	24°C	27°C	27°C
Minimum	9°C	11°C	10°C	7°C	8°C	11°C	13°C
Chance Of Rain	5%	5%	5%	5%	10%	10%	50%
Rain Amount	< 1mm	< 1mm	< 1mm	< 1mm	< 1mm	< 1mm	1-5mm

Figure 525: Forecast air temperatures for Menindee – 30 March to 5 April

Water quality update for Menindee & Wentworth Incident Management Team – 2 April 2023

Darling River and Menindee Lakes

Discharge in the Darling River main channel and Tallyawalka Creek at Wilcannia is 1,200 and 750 ML/day respectively. Dissolved oxygen levels at Wilcannia are improving. On April 2, overnight readings remained above 4 mg/L (the safe threshold for fish health) and reached above 6 mg/L during the day (Figure 526). As a general guide, native fish and other large aquatic organisms require at least 2 mg/L of dissolved oxygen to survive but may begin to suffer if levels are below 4 to 5 mg/L for prolonged periods. Water temperatures are continuing to fall.

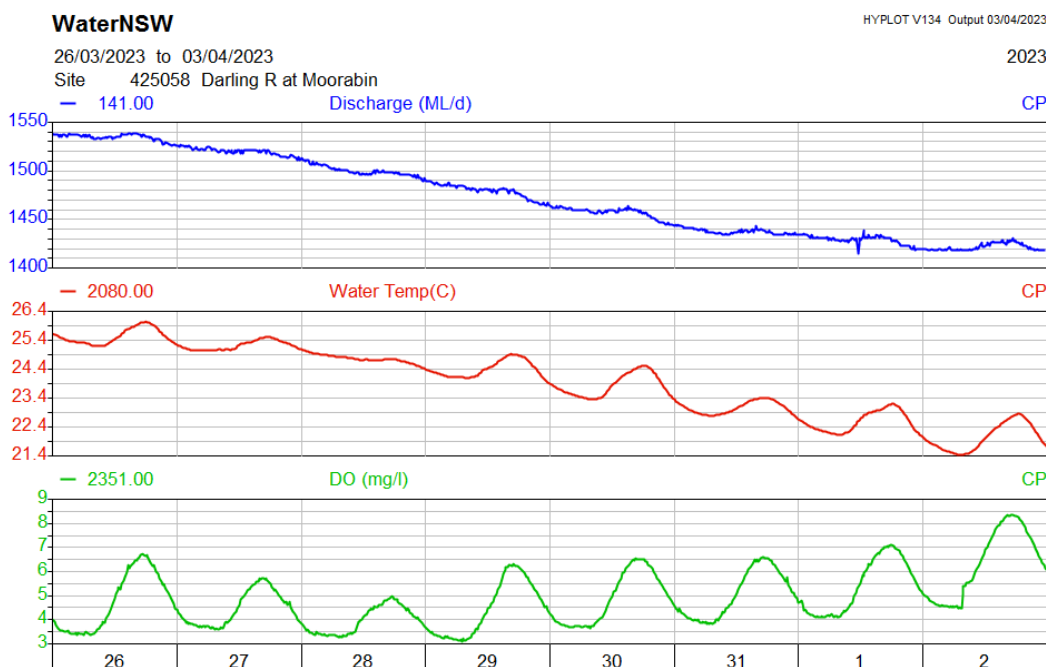


Figure 526: Discharge (ML/d), continuous dissolved oxygen (mg/L) and water temperature (°C) in the Darling River at Wilcannia (Moorabin)

The continuous dissolved oxygen monitoring site in the upper reaches of Lake Wetherell at Nelia Gaari is showing oxygen is dropping to critical levels overnight and then recovering during the day (Figure 527).

26/03/2023 to 03/04/2023

2023

Site 425060 DARLING RIVER @ NELIA GAARI

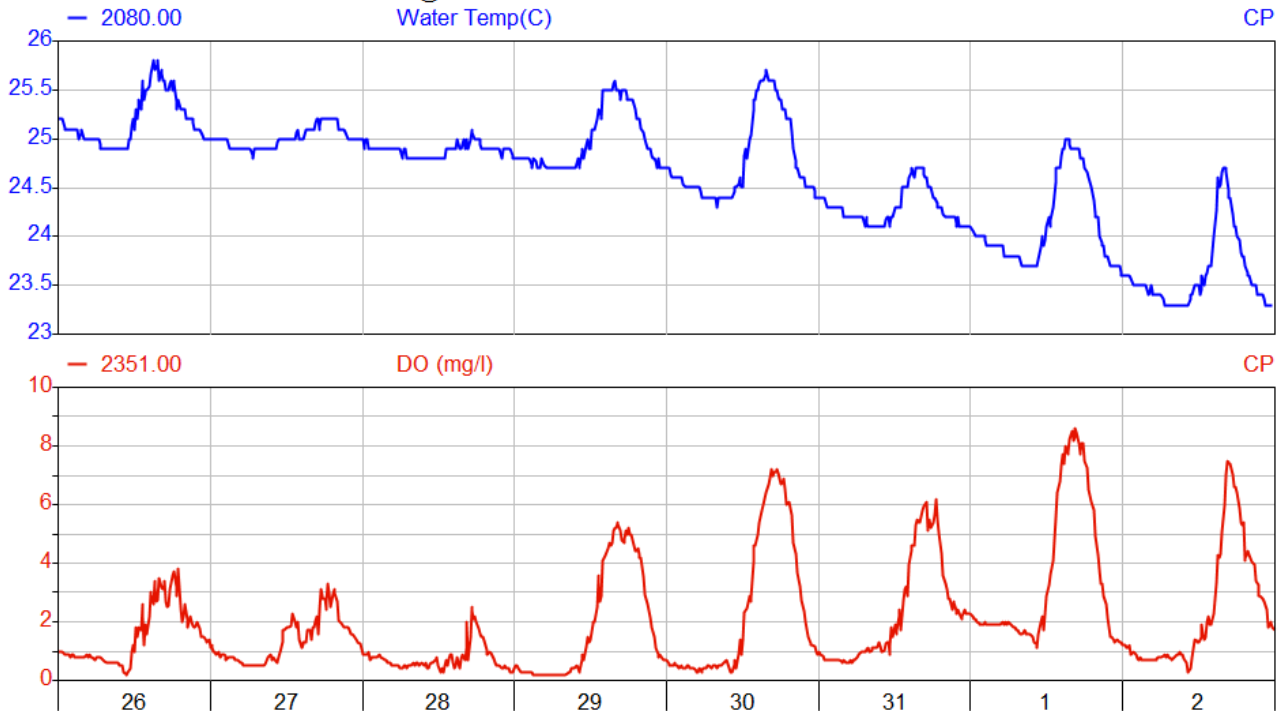


Figure 527: Continuous dissolved oxygen (mg/L) and water temperature (°C) in the Darling River at Nelia Gaari

Menindee Depth Profile Sampling

Figure 528 is a Google Earth image showing the depth profile sampling locations at Menindee.

Currently oxygenated water is being released into the Darling River from Lake Pamamaroo. Dissolved oxygen levels are decreasing to critical levels for fish health between the Main Weir and the Railway Bridge and upstream of the Darling River and Menindee Creek Junction.

Profile readings collected 2 April upstream and downstream of the junction of the Darling River with Menindee Creek show that releases from Lake Menindee are continuing to dilute and mix the low oxygen water coming down the Darling River from Menindee town (Figure 529). Low dissolved oxygen is still critical upstream of Menindee Creek but is showing improvement above 2 mg/L near the surface.



Figure 528: Menindee depth profile sampling locations

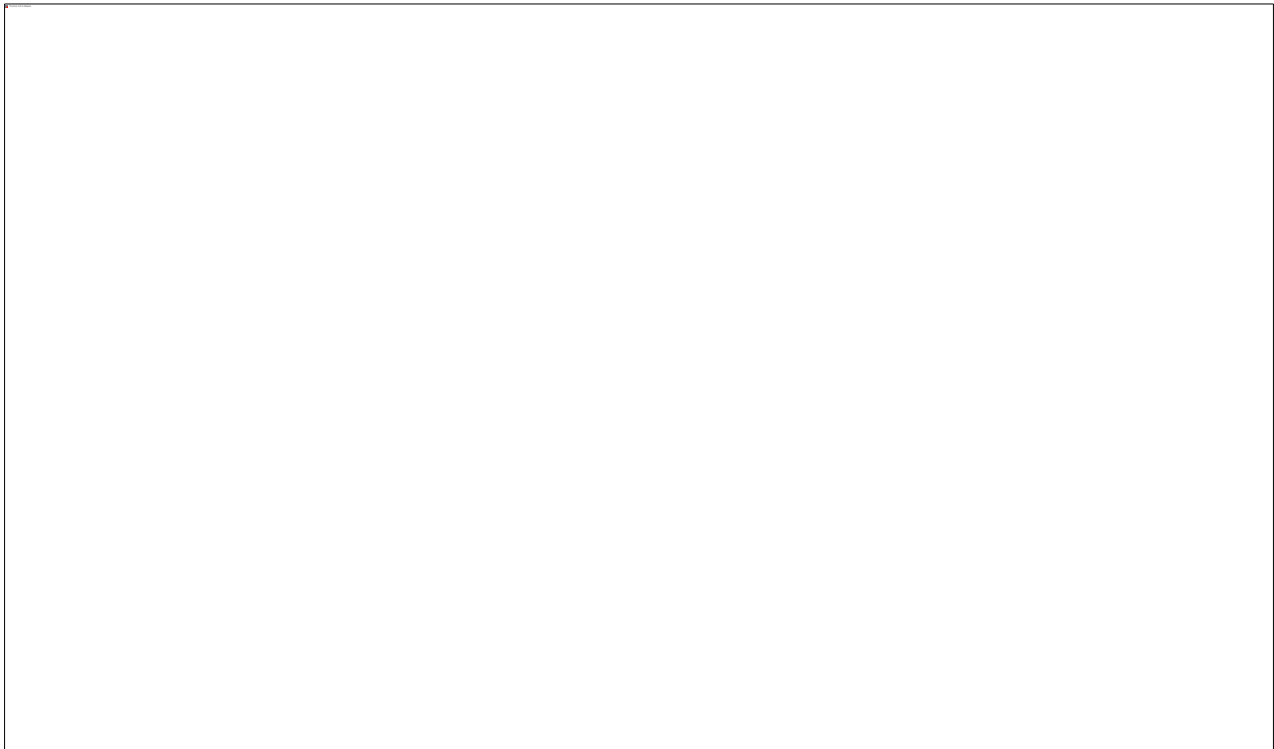


Figure 529: Menindee depth profiles

Longitudinal Survey

Figure 530 is a Google Earth image showing the location and results from a longitudinal survey of dissolved oxygen levels down the Darling River from the Lake Pamamaroo outlet to the Rail Bridge at Menindee on 1 April. Extra readings were also taken on 1 April at Lake Pamamaroo before the outlet. Mean values collected here were 6.97 mg/L. Dissolved oxygen levels remain above critical thresholds for fish at 6.57 mg/L just after the Pamamaroo outlet. Levels slowly decline and begin to drop below 4 mg/L approximately 8 kms upstream of Menindee (highlighted in red). The final reading is 1.78 mg/L at the Rail Bridge just upstream of Menindee.

Figure 531 is a graph showing the dissolved oxygen results from 3 longitudinal surveys undertaken on 25, 29 March and 1 April. The graph highlights that there has been great improvement in dissolved oxygen in the upper section. Although dissolved oxygen is remaining low down toward the Railway Bridge, only one site in the sampling run is below 2 mg/L.

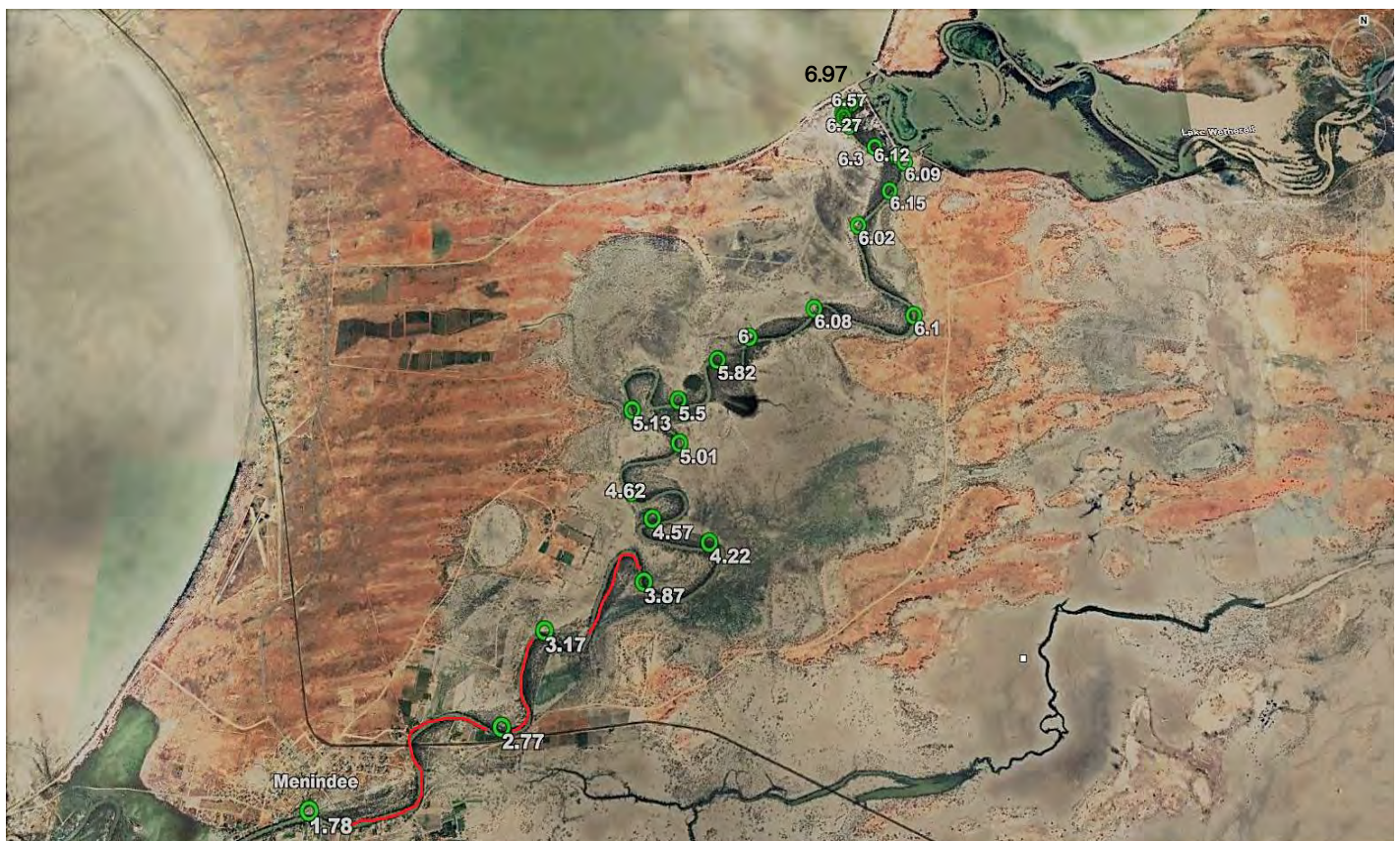


Figure 530: Google Earth image showing dissolved oxygen results from the Lake Pamamaroo outlet to the Rail Bridge upstream of Menindee – 1 April 2023



Figure 531: Graph of dissolved oxygen results from the two longitudinal profiles collected 25, 29 March and 1 April

The data from the temporary dissolved oxygen sensor installed at the Menindee pump station (at a depth of about 1 m from the water surface) is showing a diurnal fluctuation in dissolved oxygen with replenishment during the day but dropping to critical levels for fish health overnight (Figure 532). A second dissolved oxygen sensor at the Menindee Town gauging station is showing low dissolved oxygen levels near the riverbed. There have been slight overnight improvements with cooler water temperatures (Figure 533). The two sites are approximately 2 km apart by river.

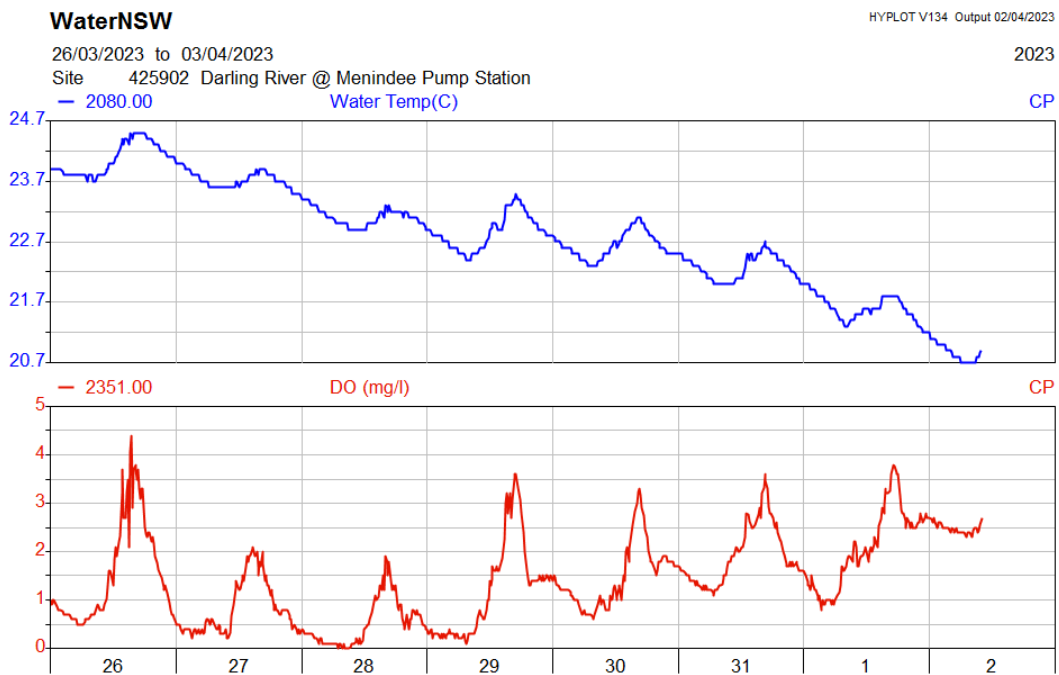


Figure 532: Continuous dissolved oxygen (mg/L) and water temperature (°C) in the Darling River at Menindee pump station

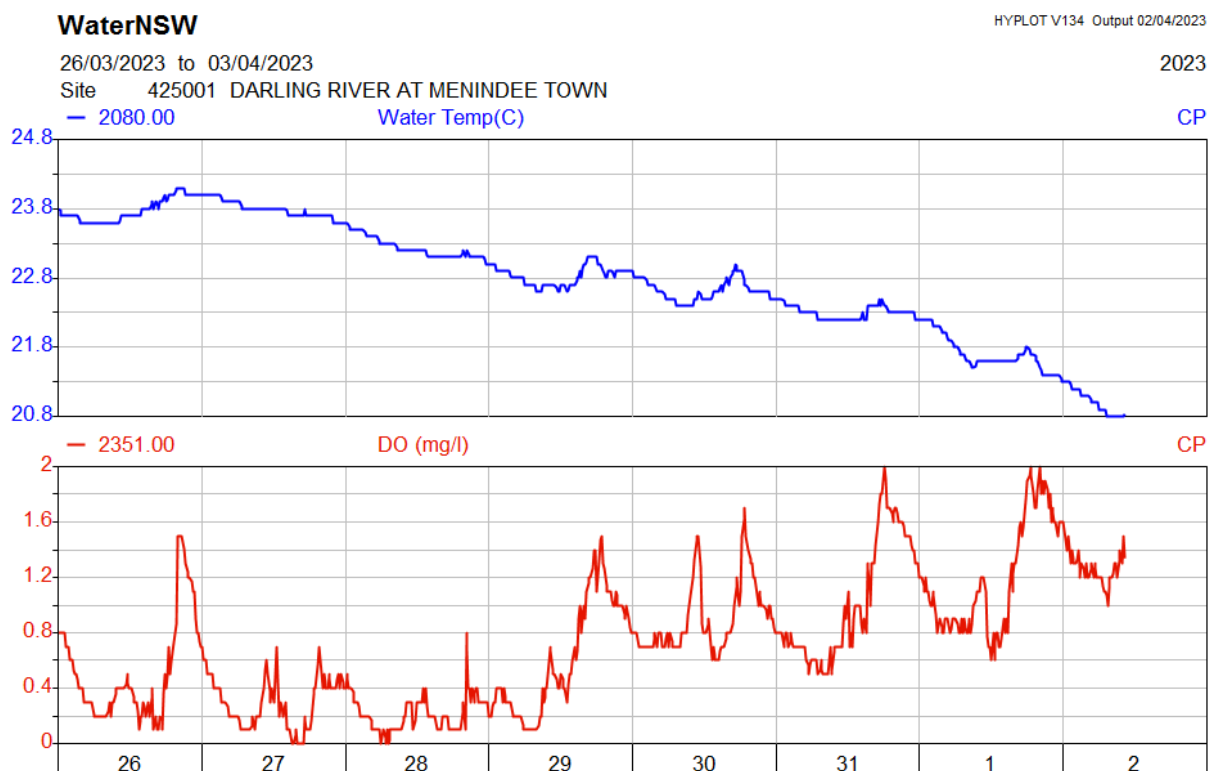


Figure 533: Continuous dissolved oxygen (mg/L) and water temperature (°C) in the Darling River at Menindee town

Dissolved oxygen at Weir 32 had been stable before a slight dip on 30 March (Figure 534). Mean dissolved oxygen levels remain above 5 mg/L.

26/03/2023 to 03/04/2023

2023

Site 425012 DARLING RIVER AT MENINDEE UPSTREAM WEIR 32

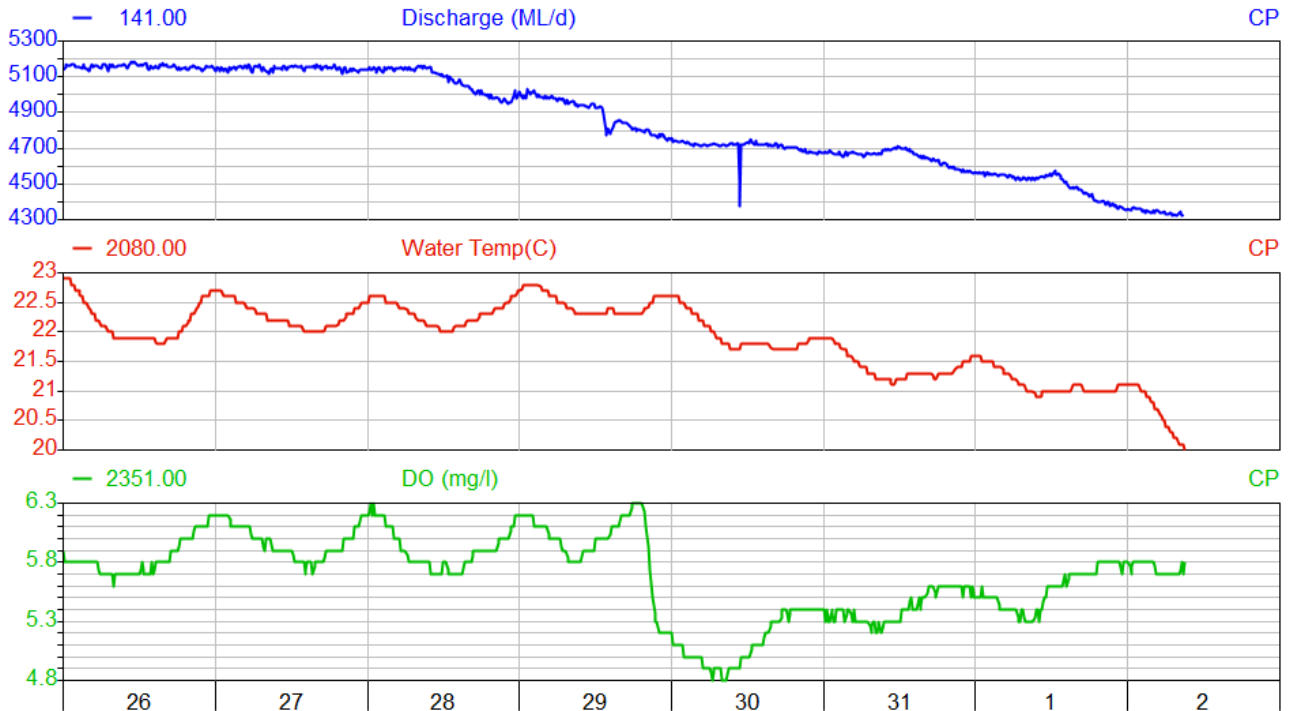


Figure 534: Continuous discharge (ML/day), dissolved oxygen (mg/L) and water temperature (°C) in the Darling River at Weir 32

Lower Darling

The Darling River at Pooncarie is an area of concern as the low oxygen water and impacts from decomposing fish make their way downstream. Monitoring is showing the low dissolved oxygen water has been progressing downstream over the past week (Table 57).

As of Friday 31 March, there were reports of struggling fish at Pooncarie and some dead carp at Lethero. There were no observed dead fish at Ellerslie or Tapio.

Further sampling was conducted on 2 April. The results in Table 57 show the low dissolved oxygen levels in this reach towards Wentworth have improved slightly but remains stressful for fish.

The next WaterNSW routine sampling from Weir 32 to Wentworth will occur next week. The fisheries research team will continue monitoring water quality over the next few days. Figure 535: Lower Darling River sampling locations shows sampling locations.

Table 57: Dissolved oxygen (mg/L) readings in the Darling River between Weir 32 and Wentworth

Monitoring site	26/03/2023	27/03/2023	28/03/2023	29/3/2023	30/3/2023	31/3/2023	01/4/2023	02/04/2023
Darling River at Weir 32			5.85					
Darling River at Karoola		2.67	2.64	1.80				
Darling River at Moorara	0.67	0.54	0.99			1.33	1.38	1.71
Darling River at Pooncarie	1.13	0.76		1.03	1.66	1.75	1.77	2.18
Darling River at Pooncarie bridge	1.27	0.98	1.15	1.27	1.76	2.01	1.85	2.31
Darling River at Lethero	3.34	1.36			1.82	2.07	1.95	2.14
Darling River at Burtundy		4.12					2.52	2.93
Darling River at Ellerslie	3.94	4.34		3.73	2.75	3.08	3.15	3.42
Darling River at Tapio		3.63		3.88	4.04	3.48	3.7	4.27
Wentworth							3.37	

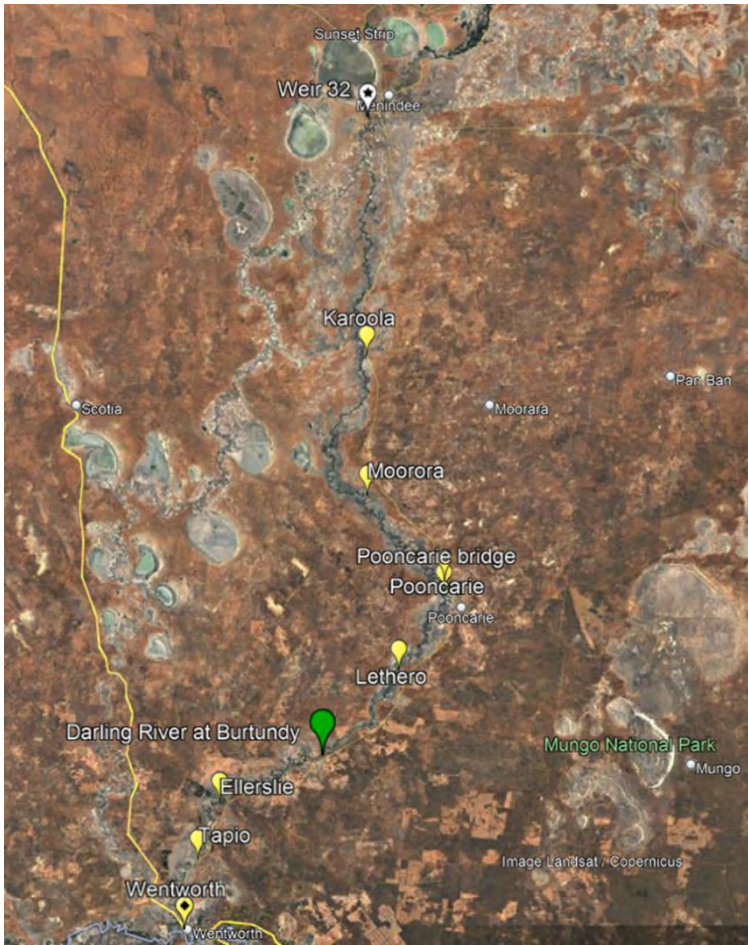


Figure 535: Lower Darling River sampling locations

Discharge in the Darling River at Pooncarie and Burtundy is steady at around 6,600 ML/day at both sites (Figure 536 and Figure 537).

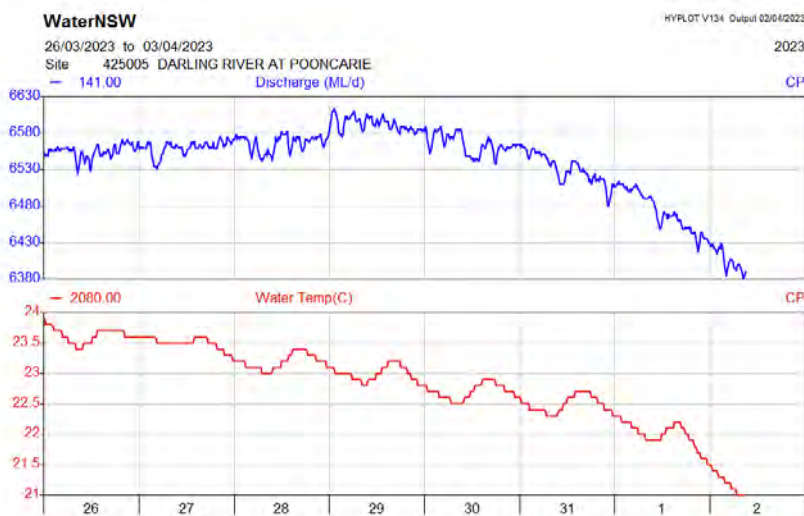


Figure 536: Continuous discharge (ML/day) and water temperature (°C) in the Darling River at Pooncarie

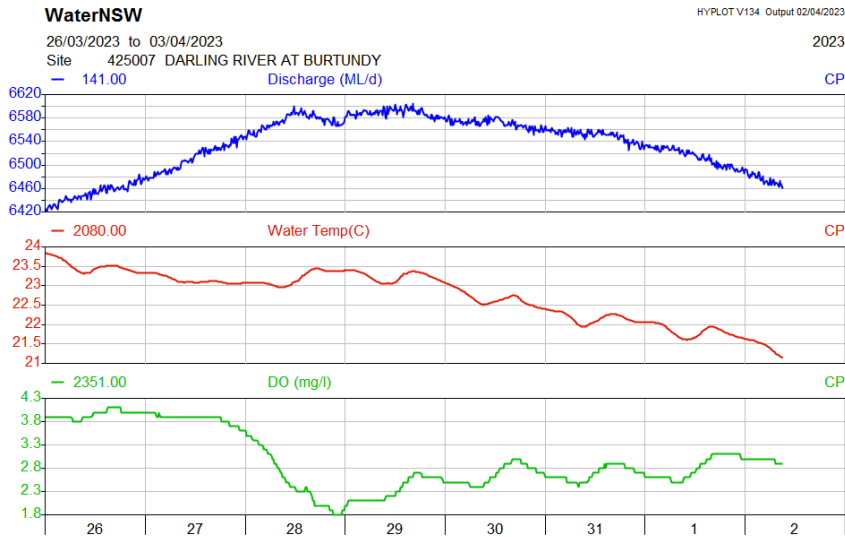


Figure 537: Continuous discharge (ML/day), dissolved oxygen (mg/L), water temperature (°C) in the Darling River at Burtundy

Murray River

Weekly routine hand-held readings in the Murray collected on 27 March, show dissolved oxygen levels above the critical threshold for fish at Merbein and Fort Courage (Table 58).

Table 58: Hand-held dissolved oxygen (mg/L) readings in the Murray River

Location	Date	Time	Dissolved Oxygen (mg/L)
Murray River at Merbein	27/3/2023	2:46 PM	8.29
Murray River at Fort Courage	27/3/2023	2:00 PM	6.46

Continuous dissolved oxygen readings in the Murray River at Wentworth have remained above 8 mg/L in the last 4 days, with water temperatures decreasing (Figure 538).



Figure 538: Continuous discharge (ML/day) and water temperature (°C) in the Murray River at Wentworth

Weather Outlook

The Bureau of Meteorology 8-day total rain forecast (1 April to 8 April) indicates light rainfall in western NSW with higher falls along the coast (Figure 539). Forecast is for maximum air temperatures at Menindee and Wentworth to reach 31 °C Wednesday 5 April, followed by possible rain (Figure 540 and Figure 541). There are no heatwave conditions forecast by the Bureau of Meteorology.

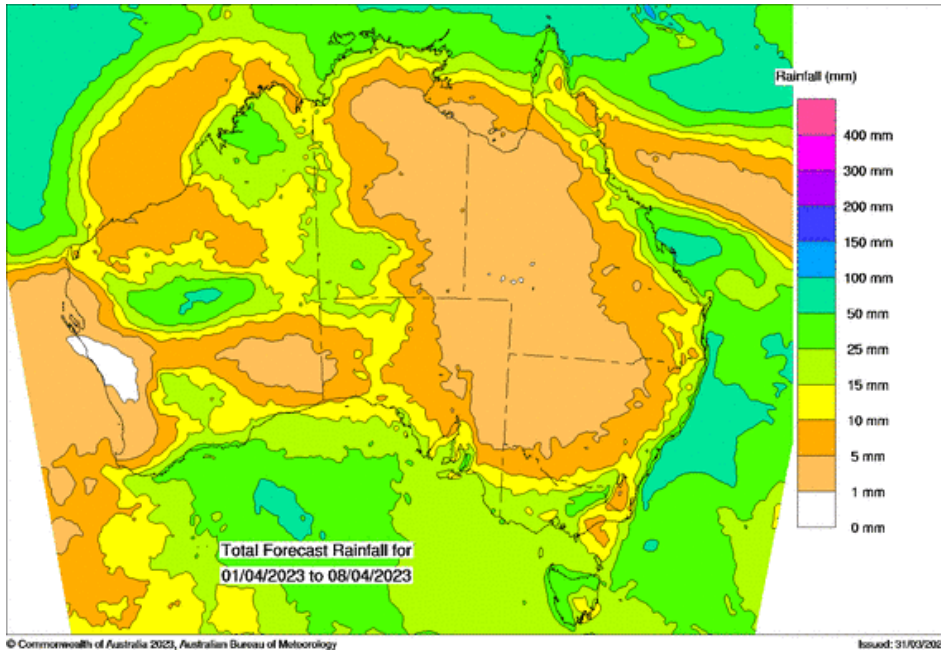


Figure 539: Bureau of Meteorology 8-day total rain forecast

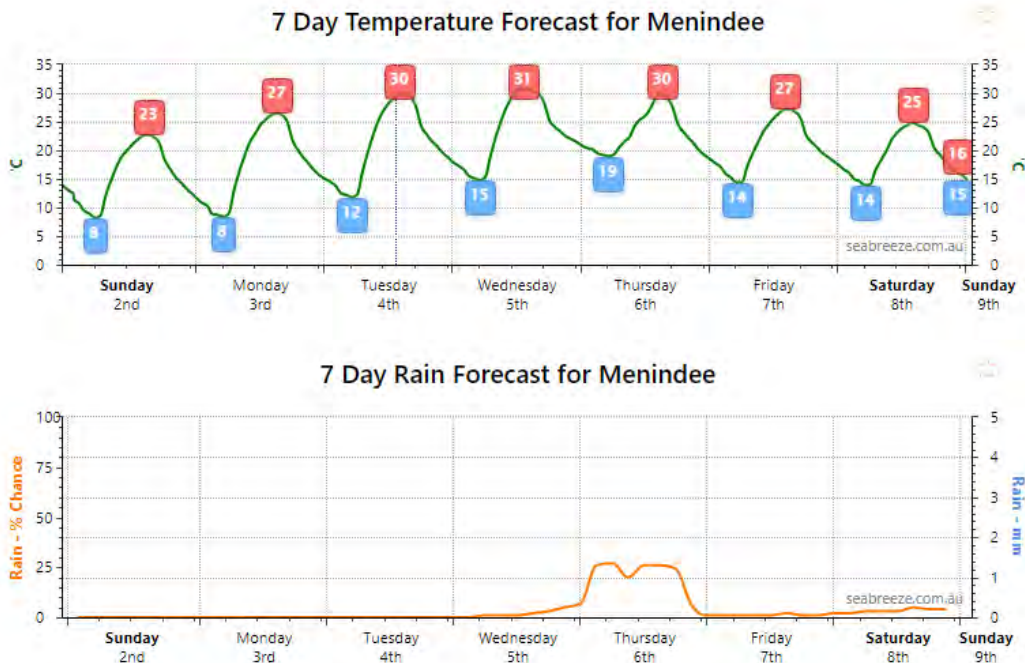


Figure 540: Forecast air temperatures and rainfall for Menindee

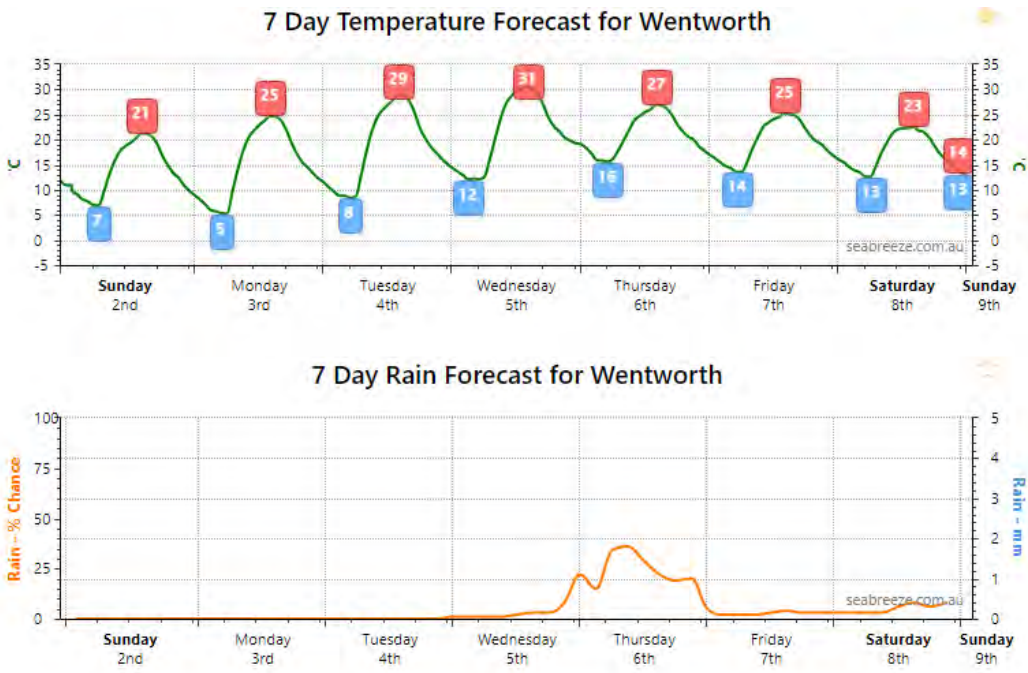


Figure 541: Forecast air temperatures and rainfall for Wentworth

Water quality update for Menindee & Wentworth Incident Management Team – 5 April 2023

Darling River and Menindee Lakes

Discharge in the Darling River main channel and Tallyawalka Creek at Wilcannia is 1,200 and 670 ML/day respectively. Dissolved oxygen levels at Wilcannia are improving. On April 5, readings are above 6 mg/L (the safe threshold for fish health) even with a slight increase in water temperature (Figure 542). As a general guide, native fish and other large aquatic organisms require at least 2 mg/L of dissolved oxygen to survive but may begin to suffer if levels are below 4 to 5 mg/L for prolonged periods.

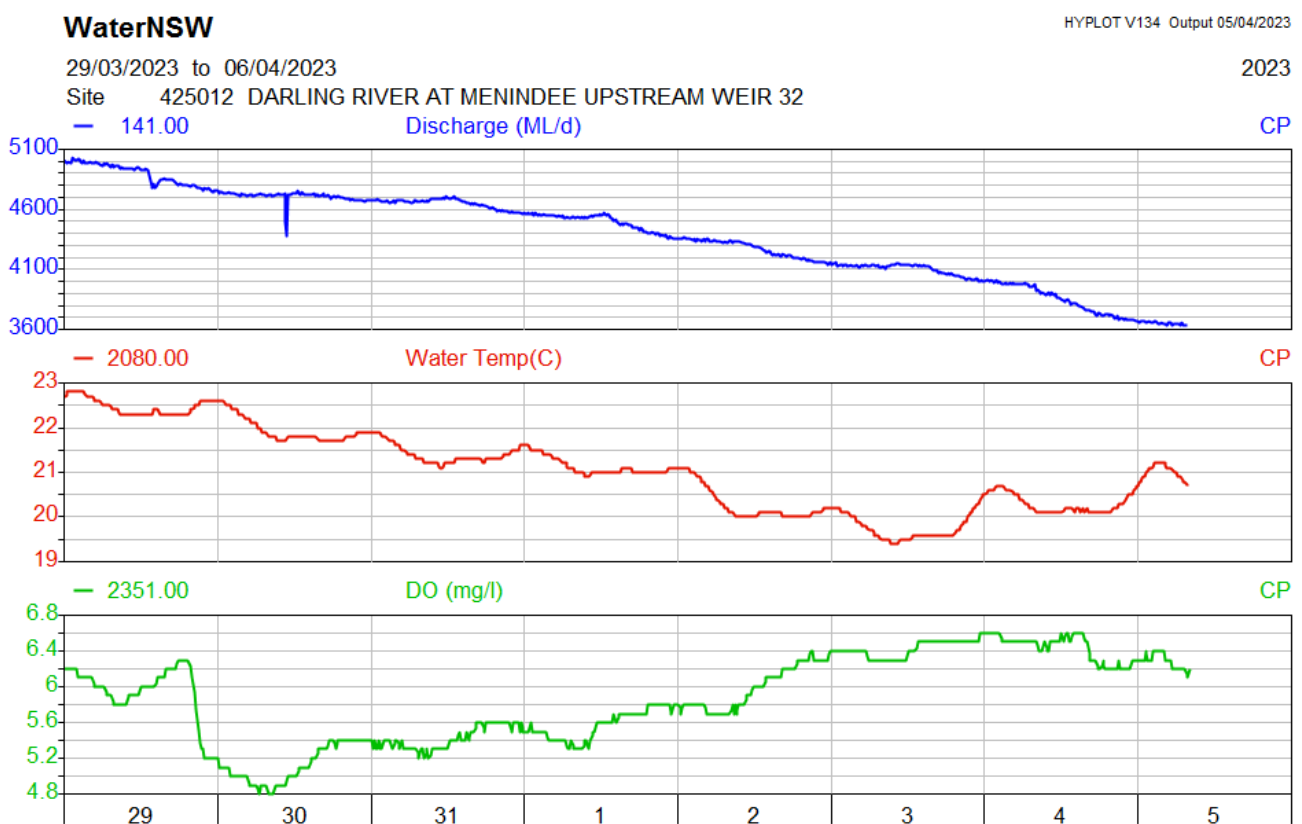


Figure 542: Discharge (ML/d), continuous dissolved oxygen (mg/L) and water temperature (°C) in the Darling River at Wilcannia (Moorabin)

The continuous dissolved oxygen monitoring site in the upper reaches of Lake Wetherell at Nelia Gaari is showing oxygen is dropping to critical levels overnight and then recovering during the day (Figure 543). The increase in dissolved oxygen levels above 10 mg/L on 3 April may be due to algal activity. Areas in the Darling and Menindee Lakes are currently under amber algal alerts (Figure 555).

29/03/2023 to 06/04/2023

2023

Site 425060 DARLING RIVER @ NELIA GAARI

— 2080.00

Water Temp(C)

CP

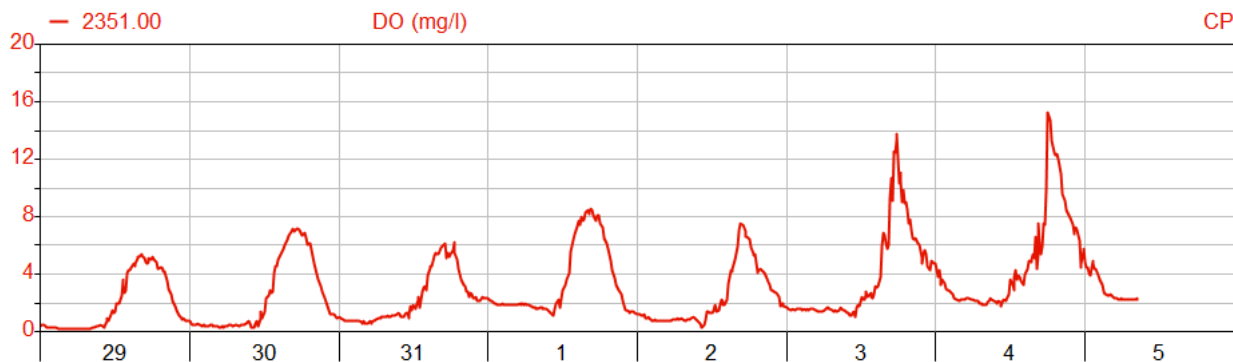
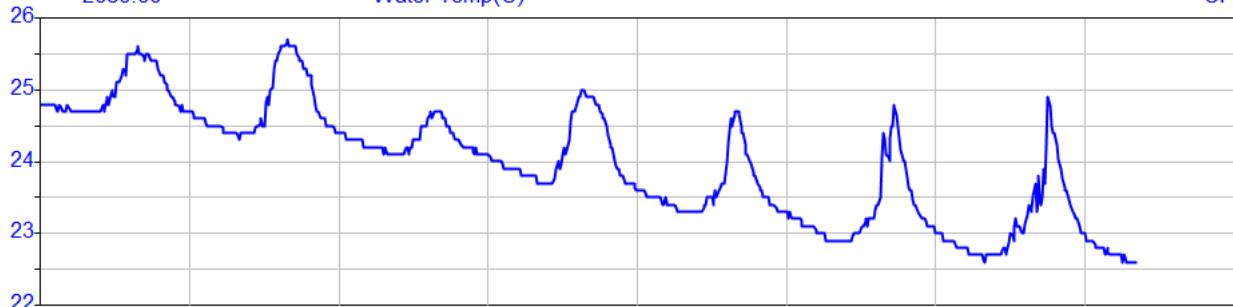


Figure 543: Continuous dissolved oxygen (mg/L) and water temperature (°C) in the Darling River at Nelia Gaari

Menindee Depth Profile Sampling

Figure 544 is a Google Earth image showing the depth profile sampling locations in the Darling River at Menindee.

Currently oxygenated water is being released into the Darling River from Lake Pamamaroo. Dissolved oxygen levels are decreasing to critical levels for fish health between the Main Weir and the Railway Bridge and upstream of the Darling River and Menindee Creek Junction.

Profile readings collected on 5 April upstream and downstream of the junction of the Darling River with Menindee Creek show that releases from Lake Menindee are continuing to dilute and mix the low-oxygen water coming down the Darling River from Menindee town (Figure 545). Dissolved oxygen at the surface upstream of Menindee Creek is above 2 mg/L and Railway Bridge has improved above 4 mg/L. Low dissolved oxygen is still critical for these sites at the lower depths.



Figure 544: Darling River at Menindee depth profile sampling locations

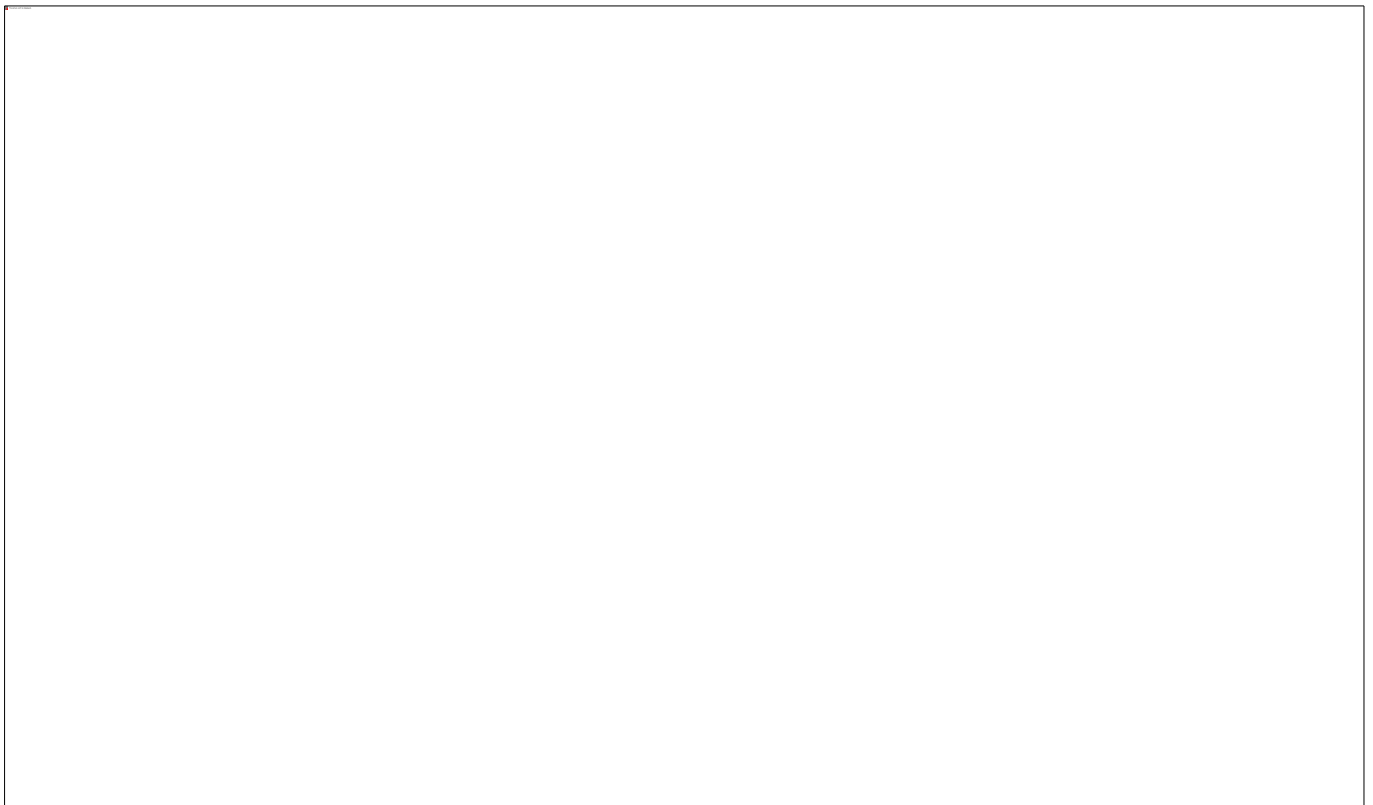


Figure 545: Darling River at Menindee depth profiles

Longitudinal Survey

Figure 546 is a Google Earth image showing the location and results from a longitudinal survey of dissolved oxygen levels down the Darling River from the Lake Pamamaroo outlet to the Rail Bridge at Menindee on 5 April. Dissolved oxygen levels remain above critical thresholds for fish at 7.38 mg/L just after the Pamamaroo outlet. Levels slowly decline and begin to drop below 4 mg/L approximately 5 kms upstream of Menindee (highlighted in red). The final reading is 2.4 mg/L at the Rail Bridge just upstream of Menindee.

Figure 547 is a graph showing the dissolved oxygen results from 4 longitudinal surveys undertaken on 25, 29 March and 1, 5 April. The graph highlights that there has been further improvement in dissolved oxygen at the sites downstream. Although dissolved oxygen is remaining low down toward the Railway Bridge, only one site in the sampling run is below 3 mg/L.

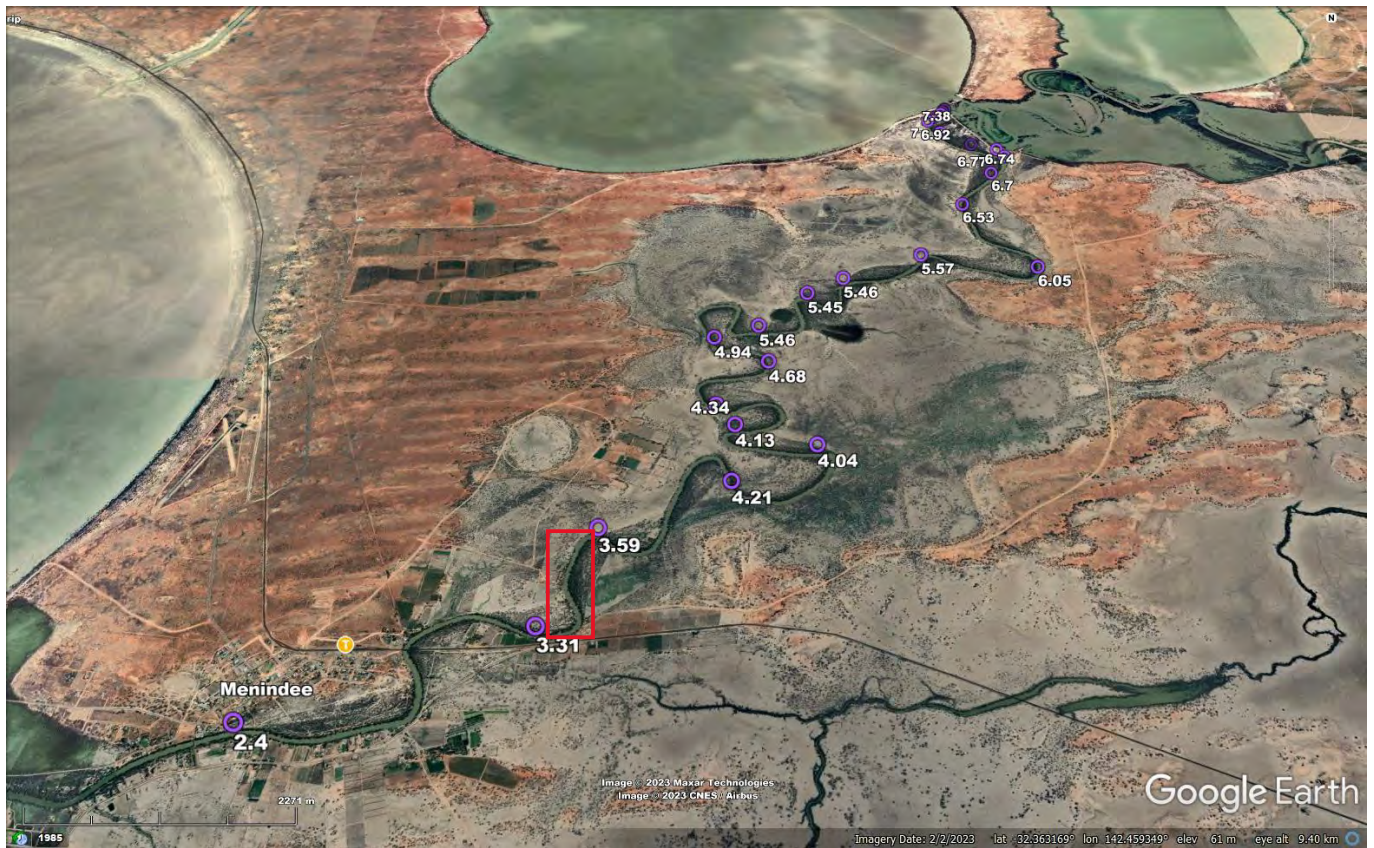


Figure 546: Google Earth image showing dissolved oxygen results from the Lake Pamamaroo outlet to the Rail Bridge upstream of Menindee – 5 April 2023



Figure 547: Graph of dissolved oxygen results from longitudinal profiles collected 25, 29 March, 1, 5 April

The data from the temporary dissolved oxygen sensor installed at the Menindee pump station (at a depth of about 1 m from the water surface) is showing a diurnal fluctuation in dissolved oxygen with replenishment during the day but dropping to critical levels for fish health overnight (Figure 548). A second dissolved oxygen sensor at the Menindee Town gauging station is showing low dissolved oxygen levels near the riverbed. The dissolved oxygen levels here remain critical but stable (Figure 549). The two sites are approximately 2 km apart by river.

WaterNSW

HYPLOT V134 Output 05/04/2023

29/03/2023 to 06/04/2023

2023

Site 425902 Darling River @ Menindee Pump Station

— 2080.00 Water Temp(C)

CP

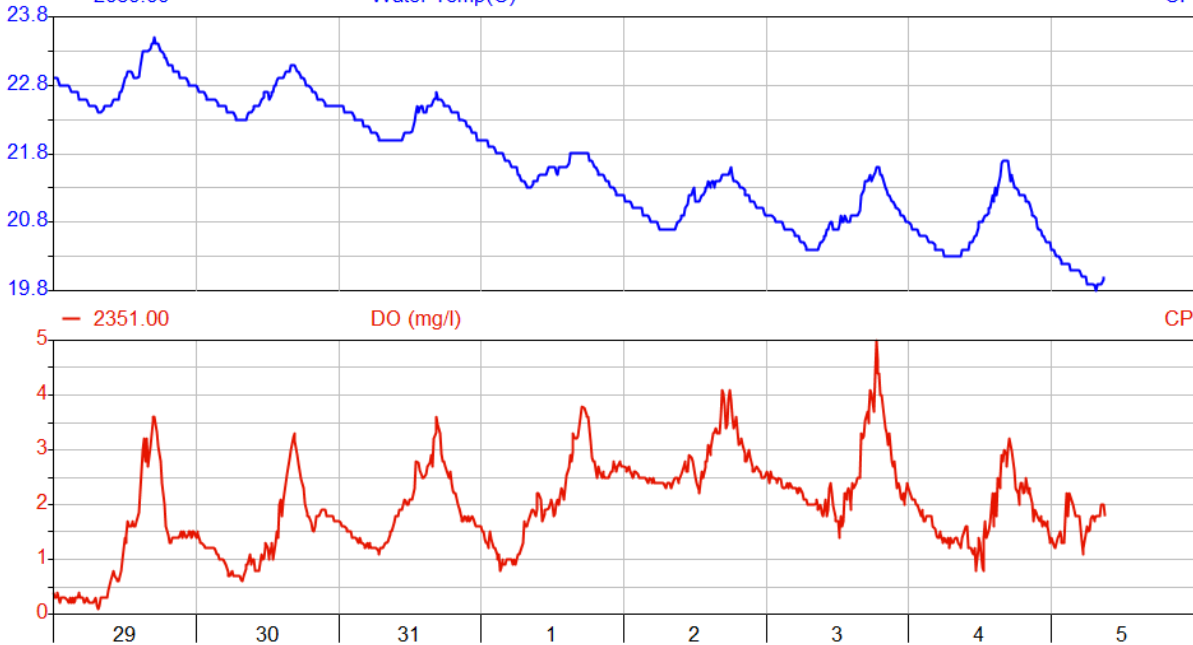


Figure 548: Continuous dissolved oxygen (mg/L) and water temperature (°C) in the Darling River at Menindee pump station

WaterNSW

HYPLOT V134 Output 05/04/2023

29/03/2023 to 06/04/2023

2023

Site 425001 DARLING RIVER AT MENINDEE TOWN

— 2080.00 Water Temp(C)

CP

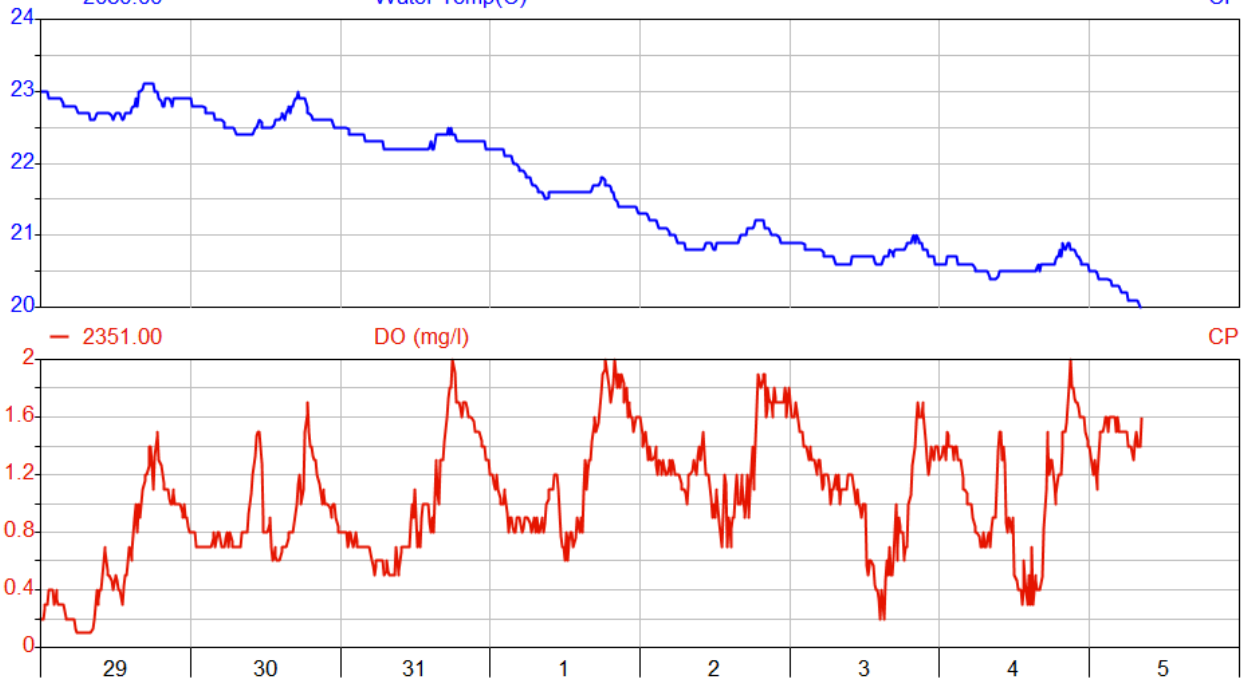


Figure 549: Continuous dissolved oxygen (mg/L) and water temperature (°C) in the Darling River at Menindee town

Dissolved oxygen at Weir 32 has improved since 30 March (Figure 550). Dissolved oxygen levels have increased above 6 mg/L with decreasing water temperatures.

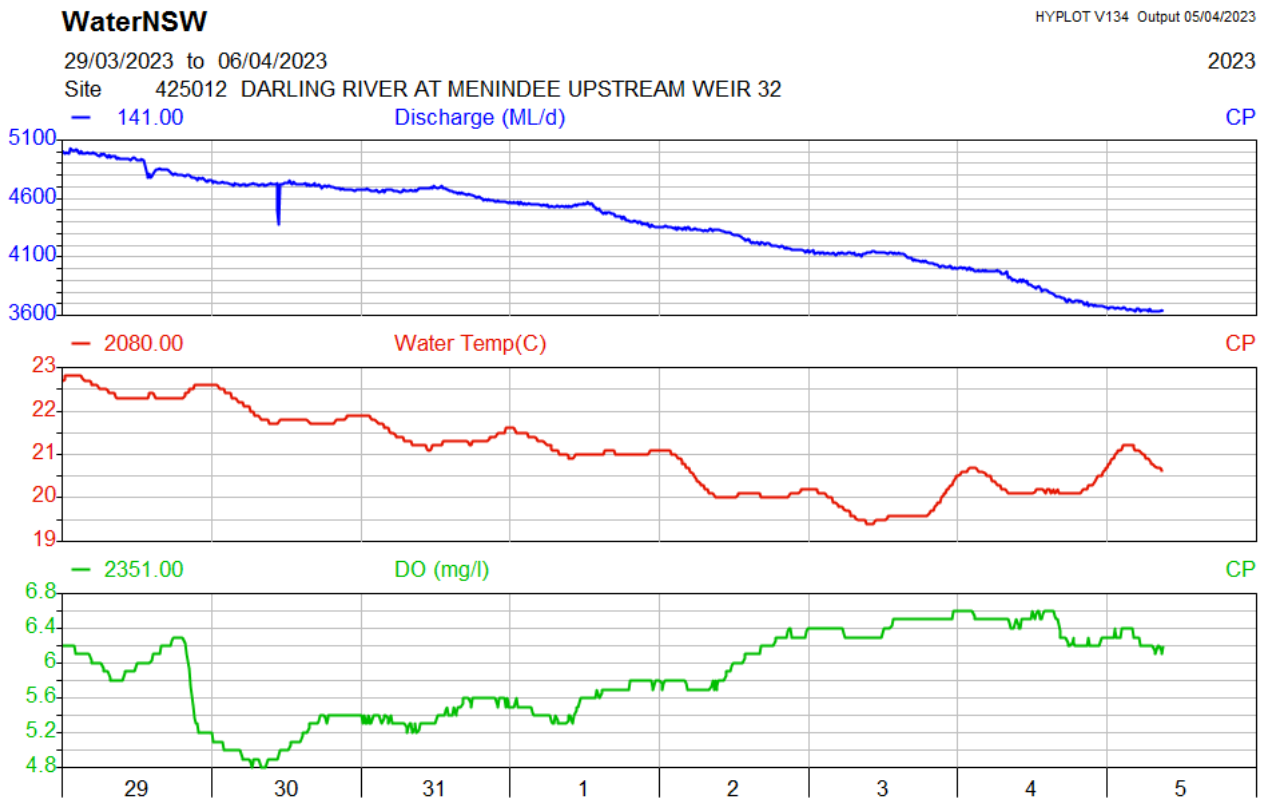


Figure 550: Continuous discharge (ML/day), dissolved oxygen (mg/L) and water temperature (°C) in the Darling River at Weir 32

Lower Darling

The Darling River at Pooncarie is an area of concern as the low oxygen water and impacts from decomposing fish make their way downstream. Monitoring is showing the low dissolved oxygen water has been progressing downstream over the past week (Table 59).

Further sampling was conducted at Tolarno, Pooncarie and Lethero on 3 April. The results in Table 59 show the low dissolved oxygen levels in this reach towards Wentworth have improved slightly but remains stressful for fish.

As of 3 April, there were reports of hundreds of dead carp and a few Murray cod at Lethero. Dead fish have also been observed floating downstream at Burtundy including Bony Herring and Murray Cod.

The next WaterNSW routine sampling from Weir 32 to Wentworth will occur next week. The fisheries research team will continue monitoring water quality over the next few days. Figure 551 shows sampling locations.

Table 59: Hand-held dissolved oxygen (mg/L) readings in the Darling River between Weir 32 and Wentworth

Monitoring site	27/03/2023	28/03/2023	29/03/2023	30/03/2023	31/03/2023	01/4/2023	02/4/2023	03/4/2023
Darling River at Weir 32		5.85						6.39
Darling River at Tolarno								4.09
Darling River at Karoola	2.67	2.64	1.80					
Darling River at Moorara	0.54	0.99			1.33	1.38	1.71	
Darling River at Pooncarie	0.76		1.03	1.66	1.75	1.77	2.18	2.56
Darling River at Pooncarie bridge	0.98	1.15	1.27	1.76	2.01	1.85	2.31	
Darling River at Lethero	1.36			1.82	2.07	1.95	2.14	2.53
Darling River at Burtundy	4.12					2.52	2.93	
Darling River at Ellerslie	4.34		3.73	2.75	3.08	3.15	3.42	
Darling River at Tapio	3.63		3.88	4.04	3.48	3.7	4.27	
Wentworth						3.37		

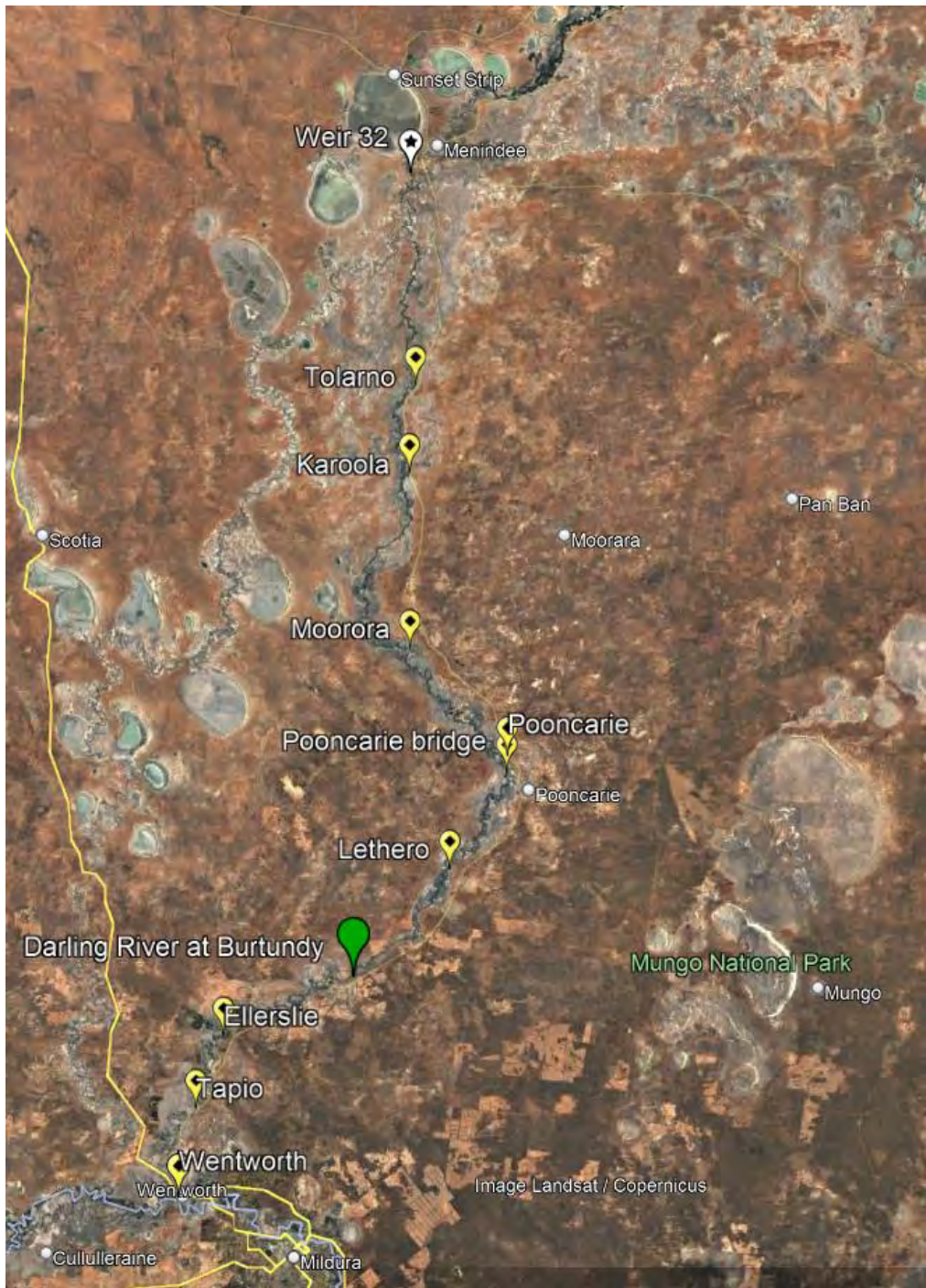


Figure 551: Lower Darling River sampling locations

Discharge in the Darling River at Pooncarie and Burtundy is steady at around 6,000 ML/day at both sites (Figure 552 and Figure 553). The continuous dissolved oxygen levels at Burtundy (Figure 553) have remained around 3 mg/L in the past 4 days. This is consistent with the hand-held readings collected on 2 April (Table 59).

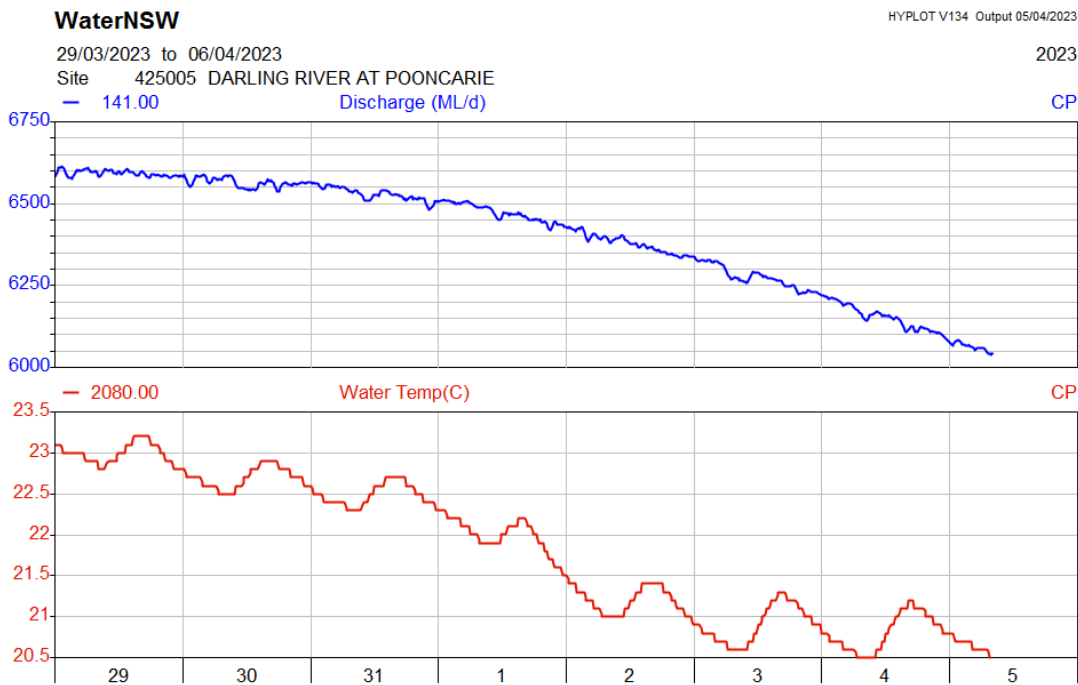


Figure 552: Continuous discharge (ML/day) and water temperature (°C) in the Darling River at Pooncarie

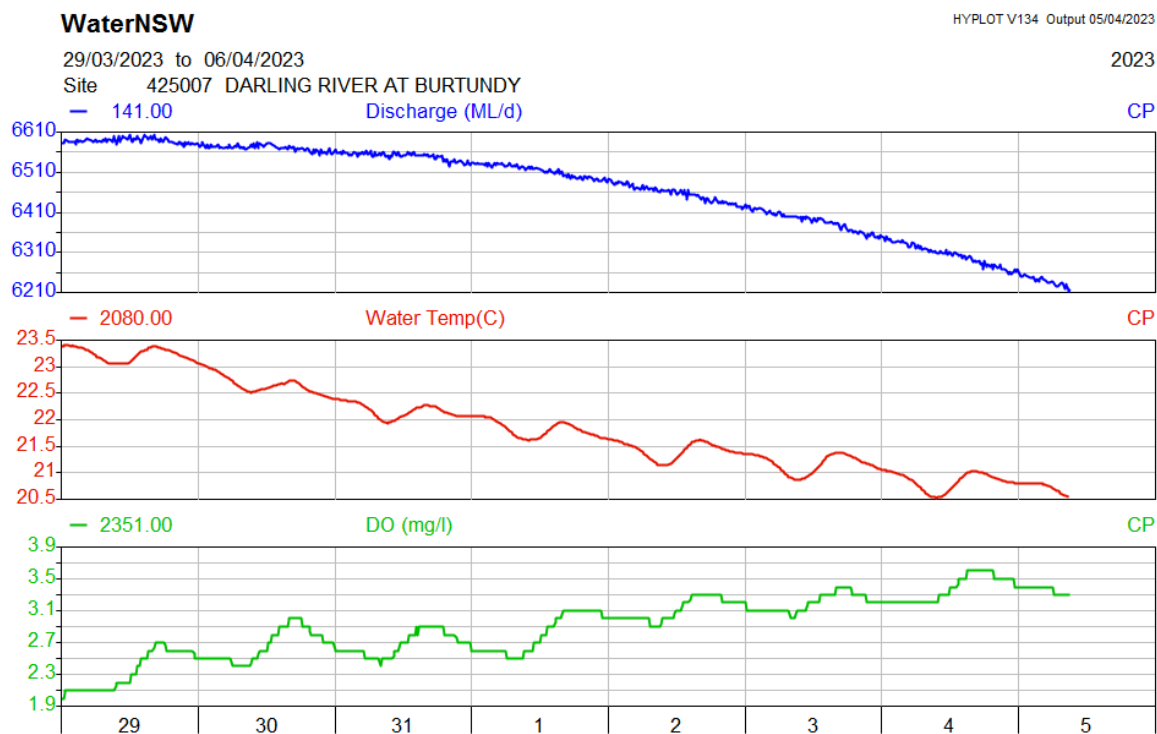


Figure 553: Continuous discharge (ML/day), dissolved oxygen (mg/L), water temperature (°C) in the Darling River at Burtundy

Murray River

Weekly routine hand-held readings in the Murray collected on 27 March, show dissolved oxygen levels above the critical threshold for fish at Merbein and Fort Courage (Table 60). Merbein is currently on amber alert and Fort Courage is on red alert for blue-green algae (Figure 555). Discharge in the Murray River at Colignan is 10,032 ML/day.

Table 60: Weekly hand-held dissolved oxygen (mg/L) readings in the Murray River

Location	Date	Time	Dissolved Oxygen (mg/L)
Murray River at Merbein	27/3/2023	2:46 PM	8.29
Murray River at Fort Courage	27/3/2023	2:00 PM	6.46

Continuous dissolved oxygen readings in the Murray River at Wentworth have remained above 8 mg/L with water temperatures decreasing (Figure 554). Discharge in the Murray River at Lock 10 is 14,218 ML/day

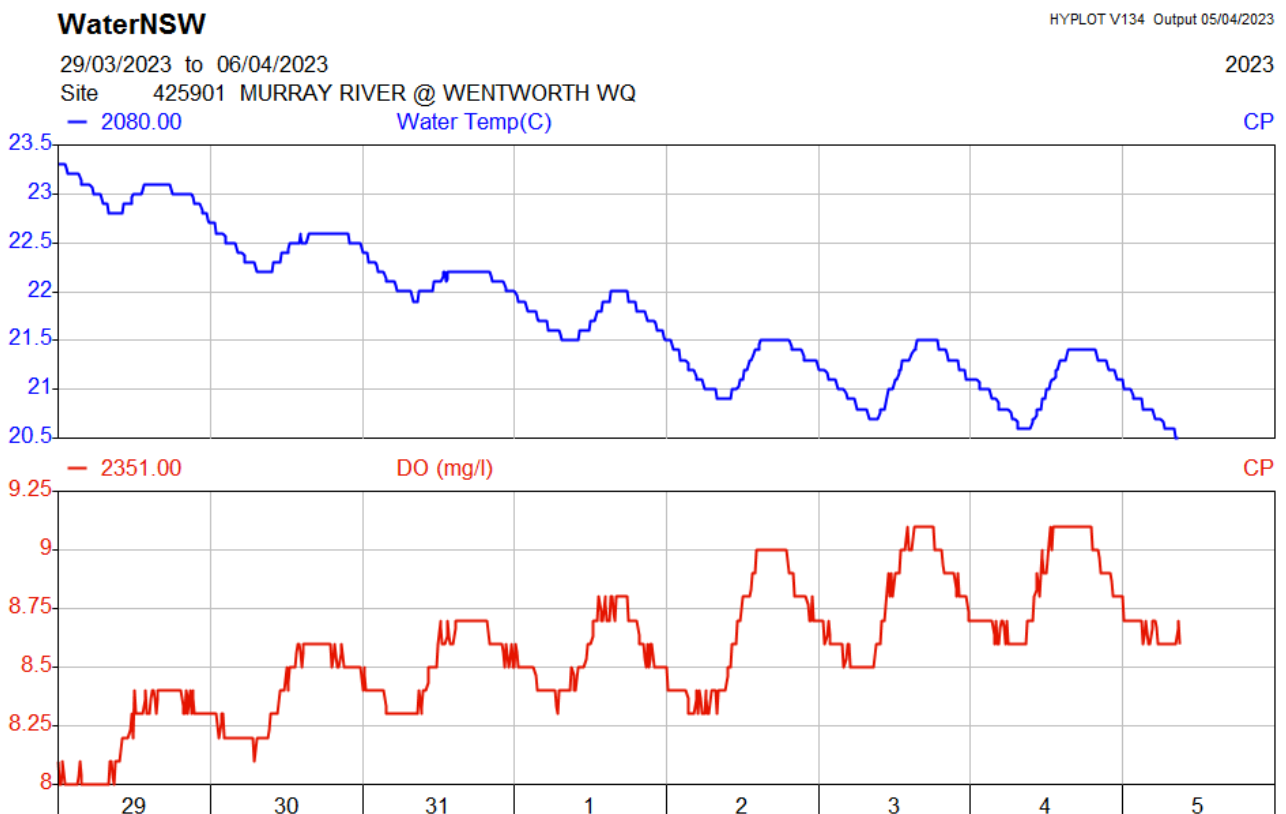


Figure 554: Continuous discharge (ML/day) and water temperature (°C) in the Murray River at Wentworth

Algal Alerts

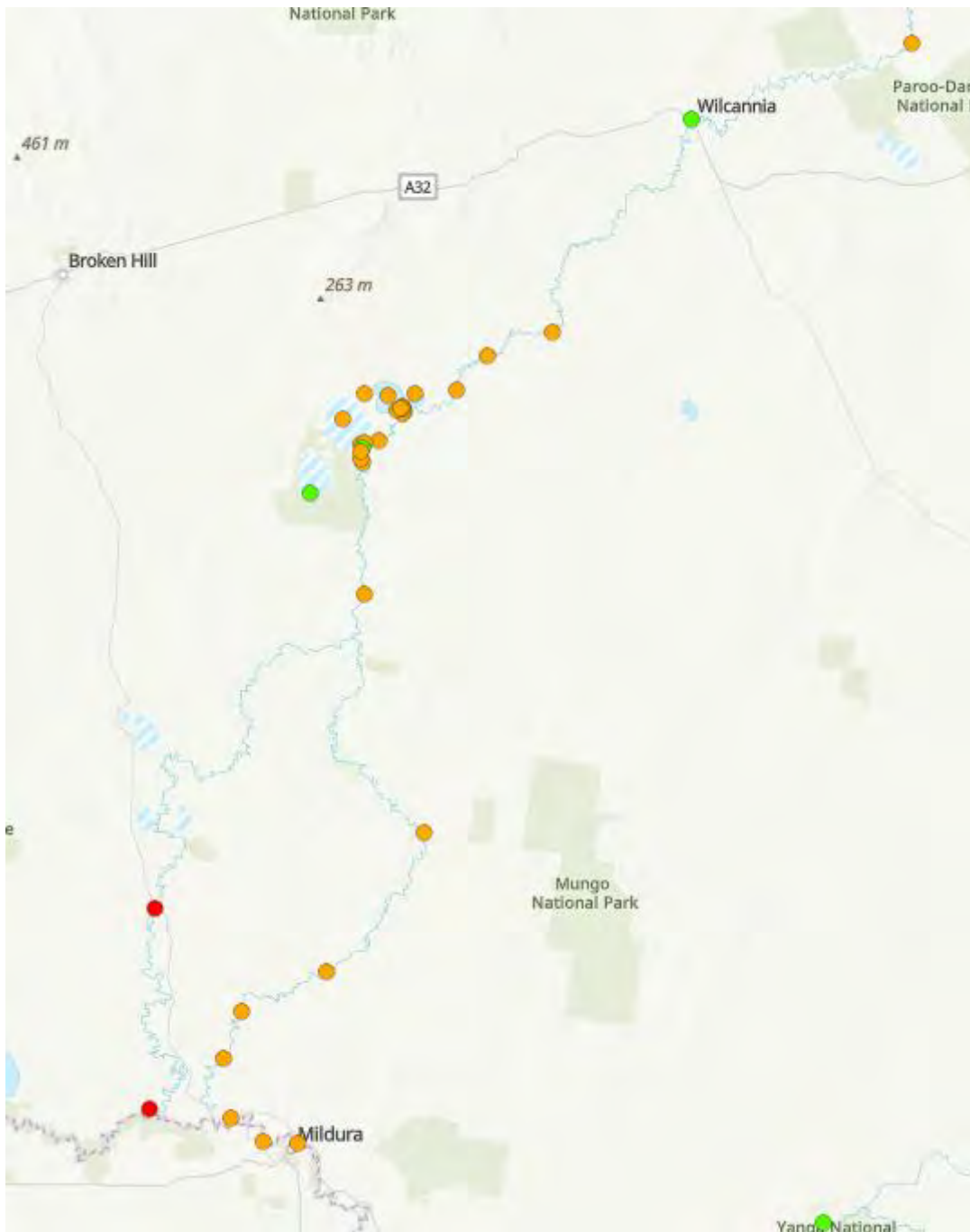


Figure 555: Latest algal alerts for the Darling, Menindee Lakes and Lower Murray.

The latest algal sampling results show sites along the Darling, Menindee Lakes and Lower Murray are on amber alert for blue-green algae. The Anabranch and Fort Courage both have a red alert (Figure 555). Visit [WaterNSW algal alerts](#) for the most up to date information and warnings.

Weather Outlook

The Bureau of Meteorology 8-day total rain forecast (4 April to 11 April) indicates zero to light rainfall in western NSW with higher falls along the coast (Figure 556). Forecast is for maximum air temperatures at Menindee and Wentworth to reach the low 30's Wednesday 5 April, followed by possible rain (Figure 346 and Figure 558). There are no heatwave conditions forecast by the Bureau of Meteorology.

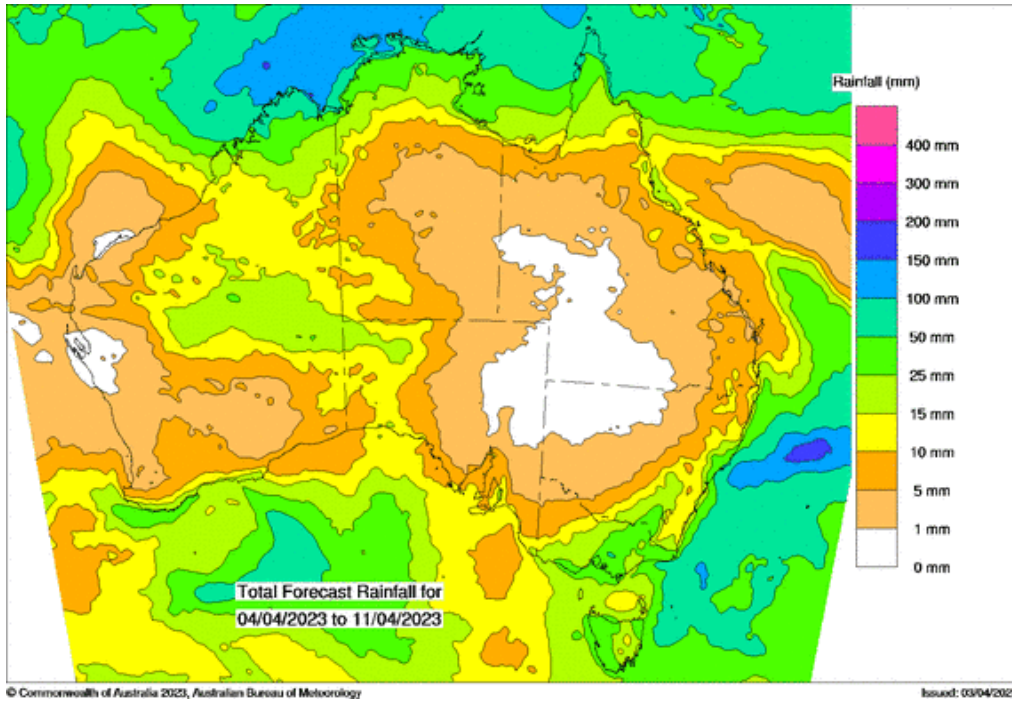


Figure 556: Bureau of Meteorology 8-day total rain forecast

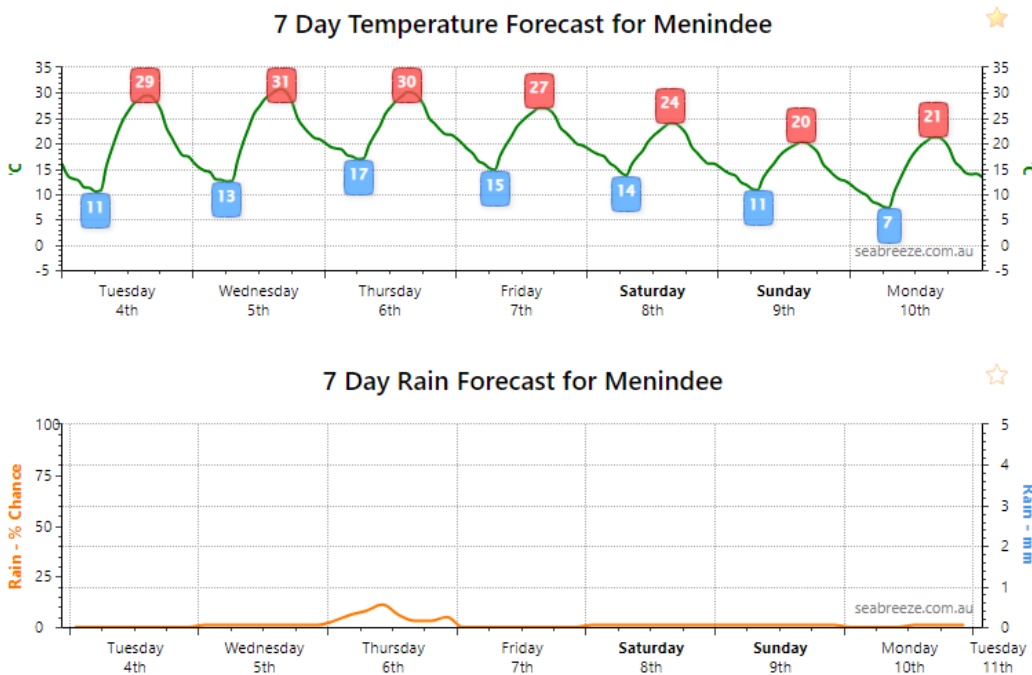


Figure 557: Forecast air temperatures and rainfall for Menindee

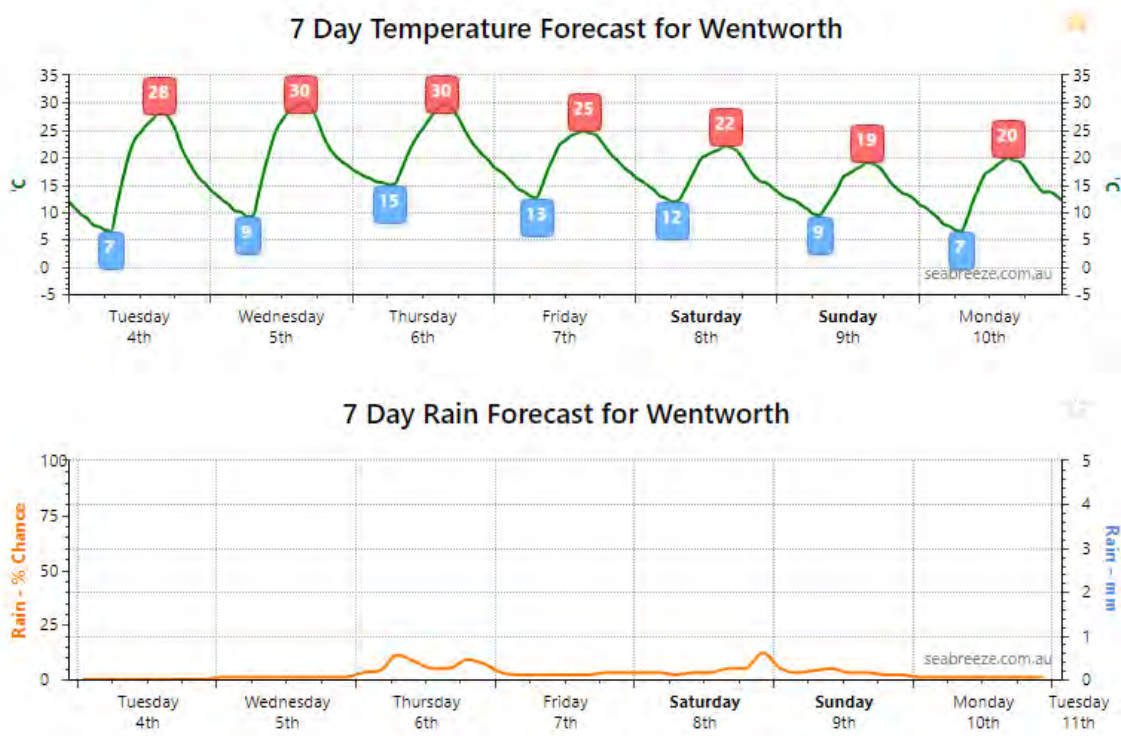


Figure 558: Forecast air temperatures and rainfall for Wentworth

Water quality update for Menindee and Lower Darling – 11 April 2023

Darling River and Menindee Lakes

Dissolved oxygen levels at Wilcannia are remaining above 6 mg/L during the day (Figure 559). As a general guide, native fish and other large aquatic organisms require at least 2 mg/L of dissolved oxygen to survive but may begin to suffer if levels are below 4 to 5 mg/L for prolonged periods.

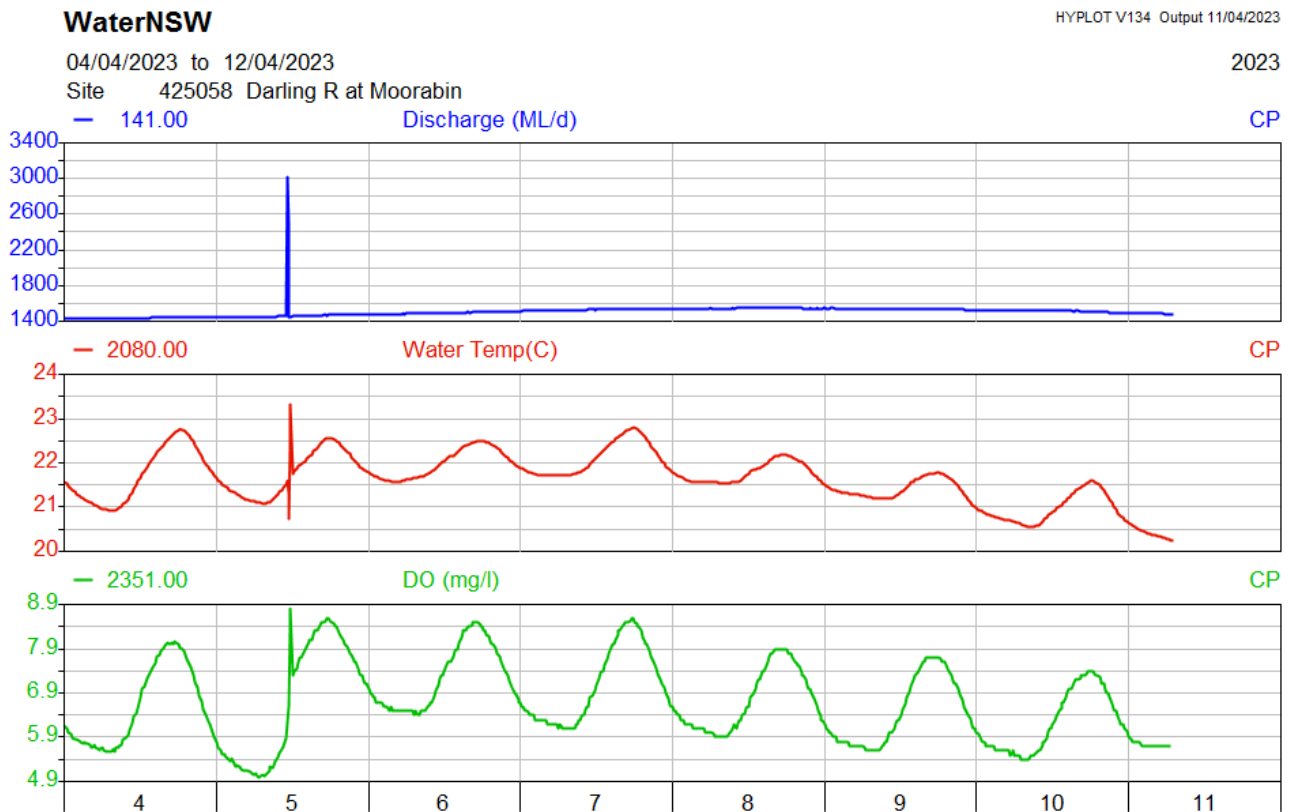


Figure 559: Discharge (ML/d), continuous dissolved oxygen (mg/L) and water temperature (°C) in the Darling River at Wilcannia (Moorabin)

The continuous dissolved oxygen monitoring site in the upper reaches of Lake Wetherell at Nelia Gaari is showing oxygen is dropping to critical levels overnight and then recovering during the day (Figure 560).

04/04/2023 to 12/04/2023

2023

Site 425060 DARLING RIVER @ NELIA GAARI

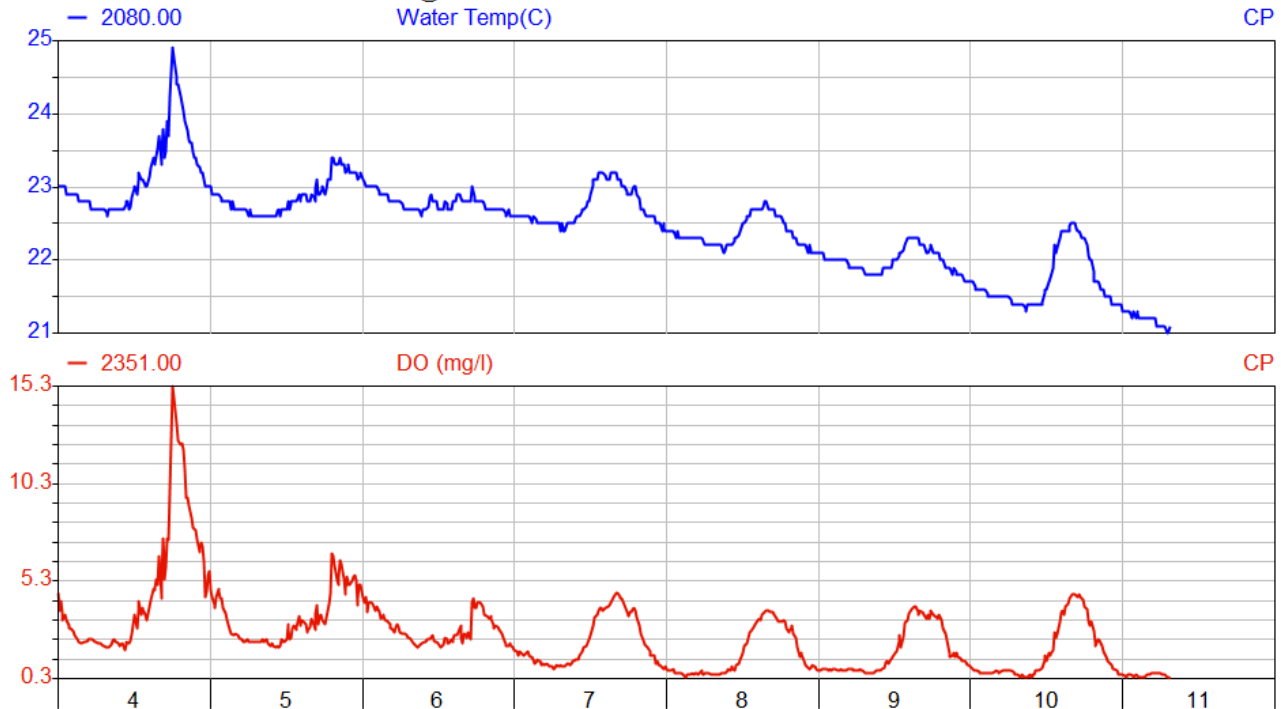


Figure 560: Continuous dissolved oxygen (mg/L) and water temperature (°C) in the Darling River at Nelia Gaari

Menindee Depth Profile Sampling

Figure 561 is a Google Earth image showing the depth profile sampling locations in the Darling River at Menindee.

Dissolved oxygen levels near the water surface are now increasing upstream of Menindee Creek but are at critical levels for fish health at lower depths.

Profile readings collected downstream of the junction of the Darling River with Menindee Creek show that releases from Lake Menindee are continuing to dilute and mix the low-oxygen water coming down the Darling River from Menindee town (Figure 562).



Figure 561: Darling River at Menindee depth profile sampling locations

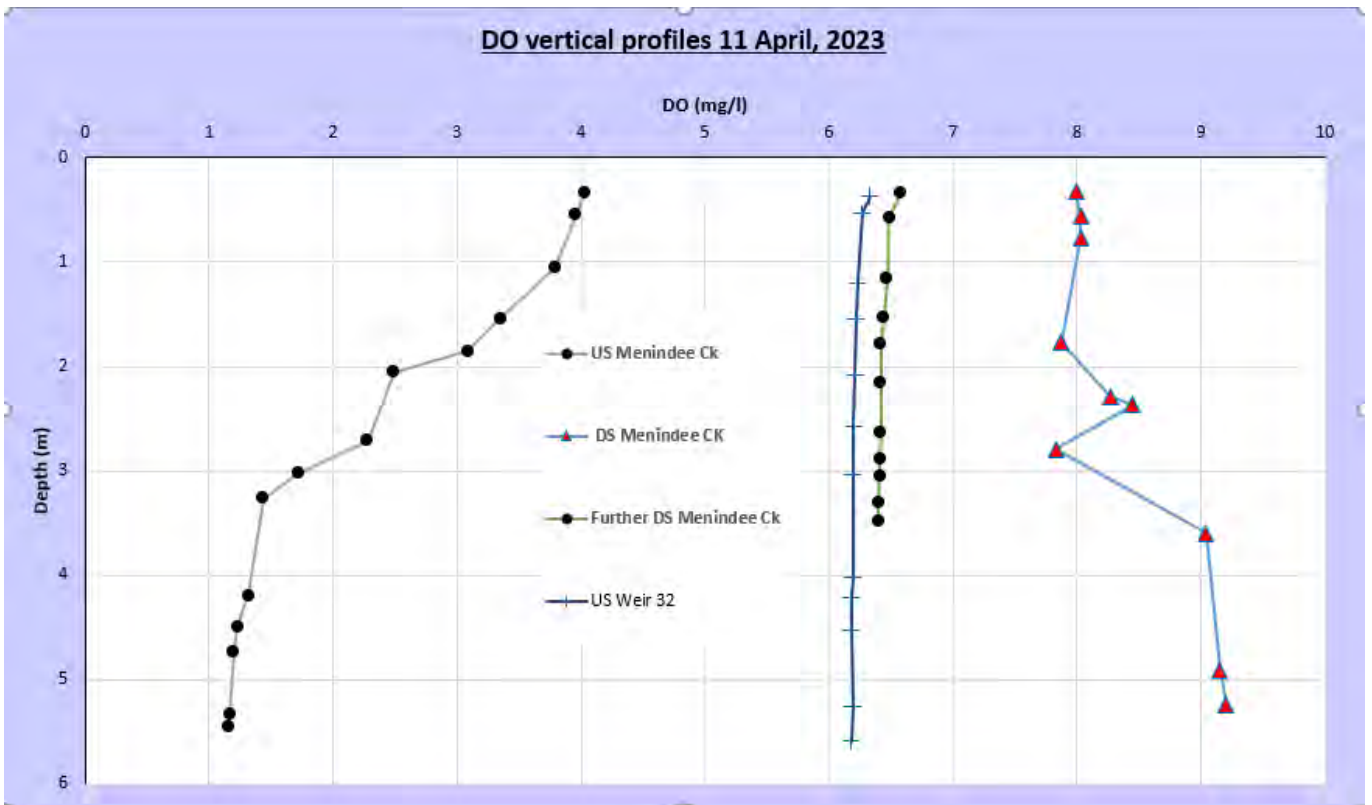


Figure 562: Darling River at Menindee depth profiles

Longitudinal Survey

Figure 563 is a Google Earth image showing the location and results from a longitudinal survey of dissolved oxygen levels down the Darling River from the Lake Pamamaroo outlet to the Rail Bridge at Menindee on 11 April. Dissolved oxygen levels are above 4 mg/L at all sites between Lake Pamamaroo and Menindee.

Figure 564 is a graph showing the dissolved oxygen results from 4 longitudinal surveys undertaken on 25, 29 March and 1, 5 and 11 April. The graph highlights that there has been further improvement in dissolved oxygen at the sites downstream.



Figure 563: Google Earth image showing dissolved oxygen results from the Lake Pamamaroo outlet to the Rail Bridge upstream of Menindee – 11 April 2023

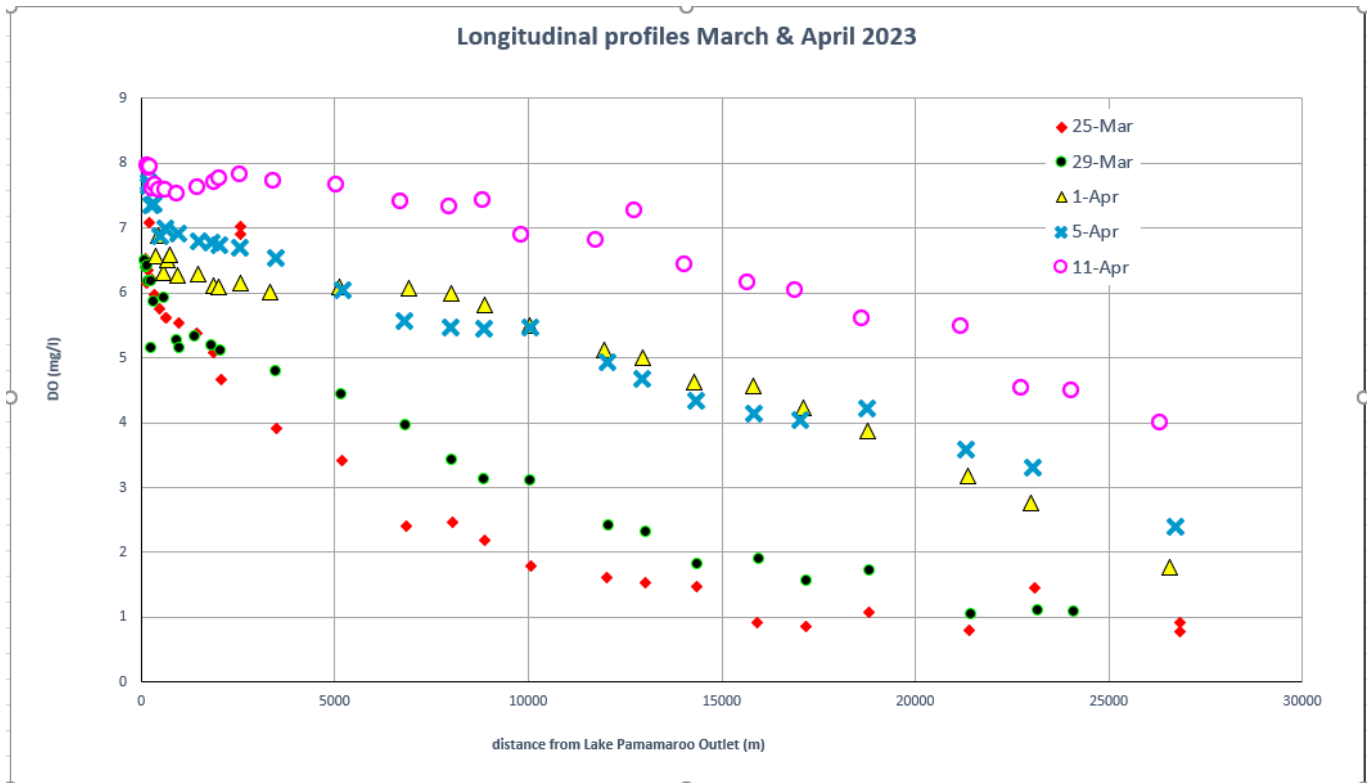


Figure 564: Graph of dissolved oxygen results from longitudinal profiles collected 25, 29 March, 1, 5 and 11 April

The data from the temporary dissolved oxygen sensor installed at the Menindee pump station (at a depth of about 1 m from the water surface) is showing a diurnal fluctuation in dissolved oxygen with replenishment during the day but dropping to critical levels for fish health overnight (Figure 565). A second dissolved oxygen sensor at the Menindee Town gauging station is showing low dissolved oxygen levels near the riverbed. The dissolved oxygen levels here remain critical but stable (Figure 566). The two sites are approximately 2 km apart by river.

WaterNSW

HYPLOT V134 Output 11/04/2023

04/04/2023 to 12/04/2023

2023

Site 425902 Darling River @ Menindee Pump Station

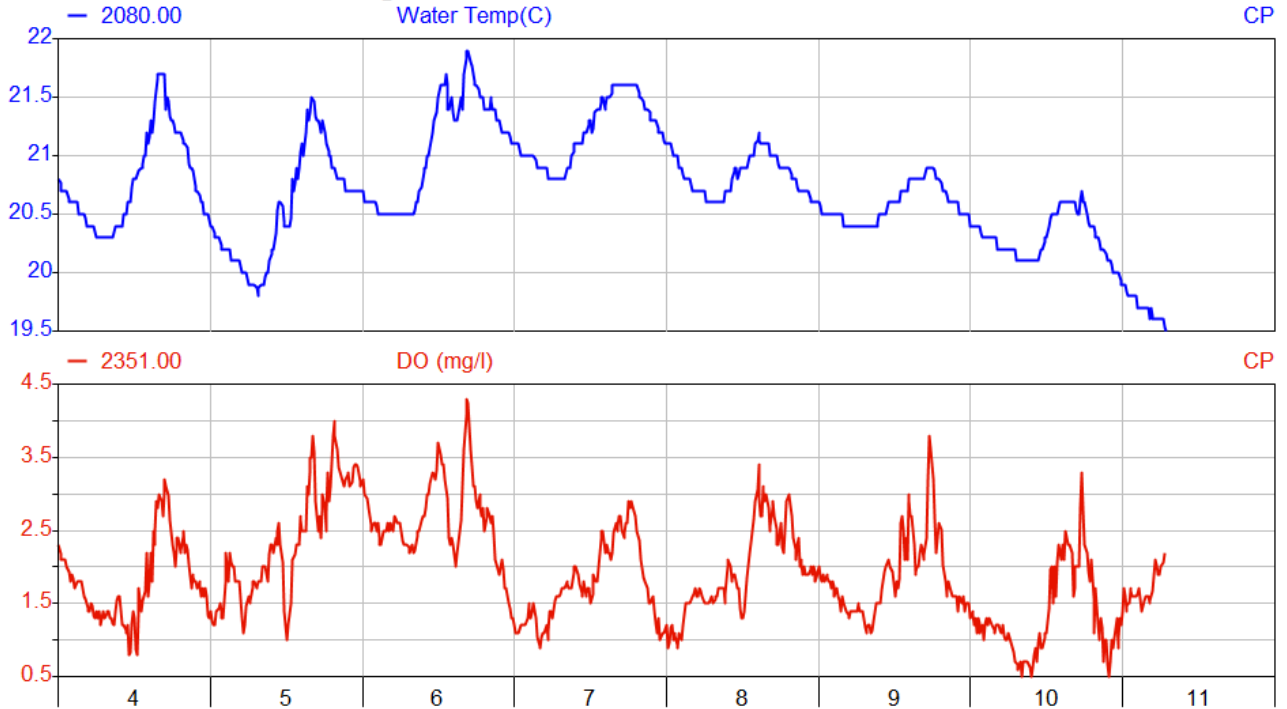


Figure 565: Continuous dissolved oxygen (mg/L) and water temperature (°C) in the Darling River at Menindee pump station

WaterNSW

HYPLOT V134 Output 11/04/2023

04/04/2023 to 12/04/2023

2023

Site 425001 DARLING RIVER AT MENINDEE TOWN

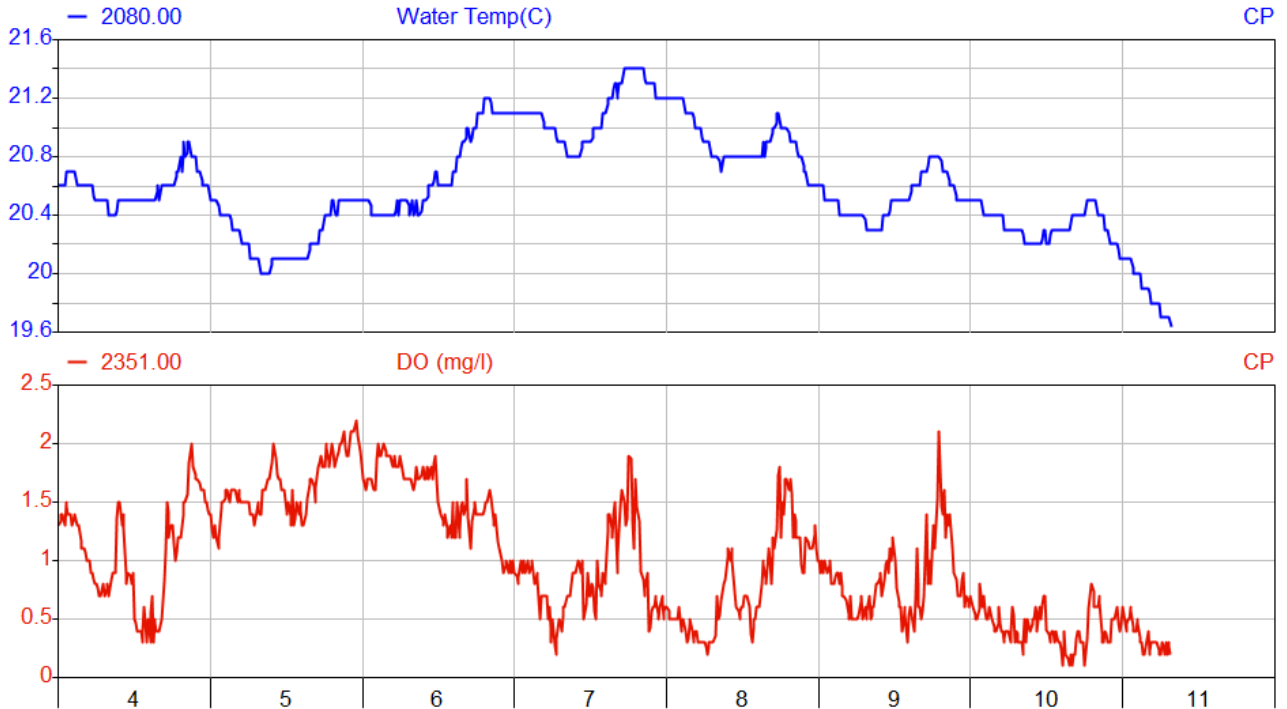


Figure 566: Continuous dissolved oxygen (mg/L) and water temperature (°C) in the Darling River at Menindee town

Dissolved oxygen at Weir 32 has remained steady (Figure 567).

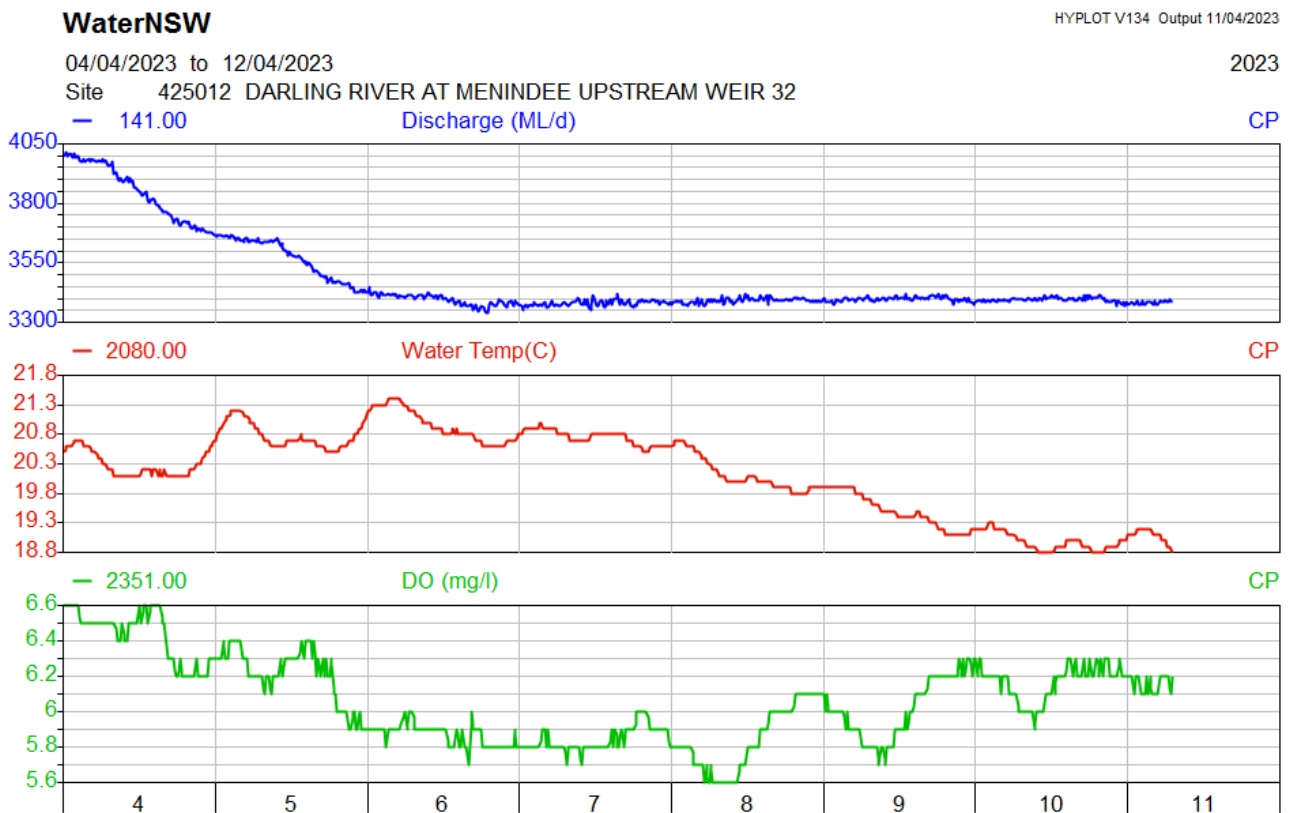


Figure 567: Continuous discharge (ML/day), dissolved oxygen (mg/L) and water temperature (°C) in the Darling River at Weir 32

Lower Darling

The Darling River at Pooncarie is an area of concern as the low oxygen water and impacts from decomposing fish make their way downstream. Monitoring is showing the low dissolved oxygen water has been progressing downstream over the past week (Table 61). Figure 568 shows sampling locations.

Table 61: Hand-held dissolved oxygen (mg/L) readings in the Darling River between Weir 32 and Wentworth

Monitoring site	27/03/23	28/03/23	29/03/23	30/03/23	31/03/23	01/04/23	02/04/23	03/04/23	04/04/23	06/04/23
Darling River at Weir 32		5.85						6.39		
Darling River at Tolarno								4.09		
Darling River at Karoola	2.67	2.64	1.80							
Darling River at Moorara	0.54	0.99			1.33	1.38	1.71			
Darling River at Pooncarie	0.76		1.03	1.66	1.75	1.77	2.18	2.56		2.72
Darling River at Pooncarie bridge	0.98	1.15	1.27	1.76	2.01	1.85	2.31			
Darling River at Lethero	1.36			1.82	2.07	1.95	2.14	2.53		
Darling River at Burtundy	4.12					2.52	2.93		4.18	
Darling River at Ellerslie	4.34		3.73	2.75	3.08	3.15	3.42		5.44	

Monitoring site	27/03/23	28/03/23	29/03/23	30/03/23	31/03/23	01/04/23	02/04/23	03/04/23	04/04/23	06/04/23
Darling River at Tapio	3.63		3.88	4.04	3.48	3.7	4.27		5.51	
Wentworth						3.37				

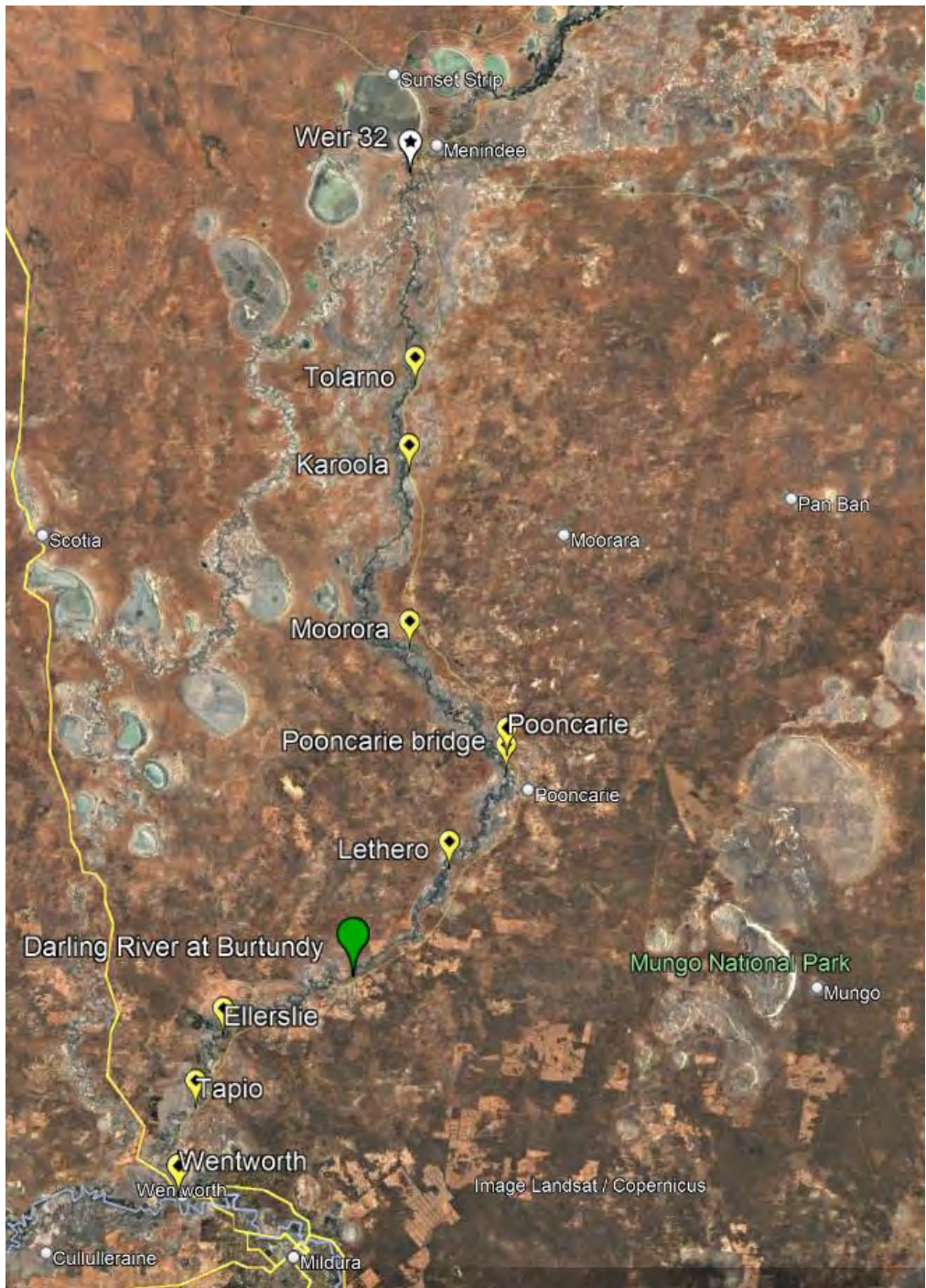


Figure 568: Lower Darling River sampling locations

Discharge in the Darling River at Pooncarie and Burtundy is around 5,000 ML/day at both sites (Figure 569 and Figure 570). The continuous dissolved oxygen levels at Burtundy (Figure 570) have gradually increased over the past 4 days.

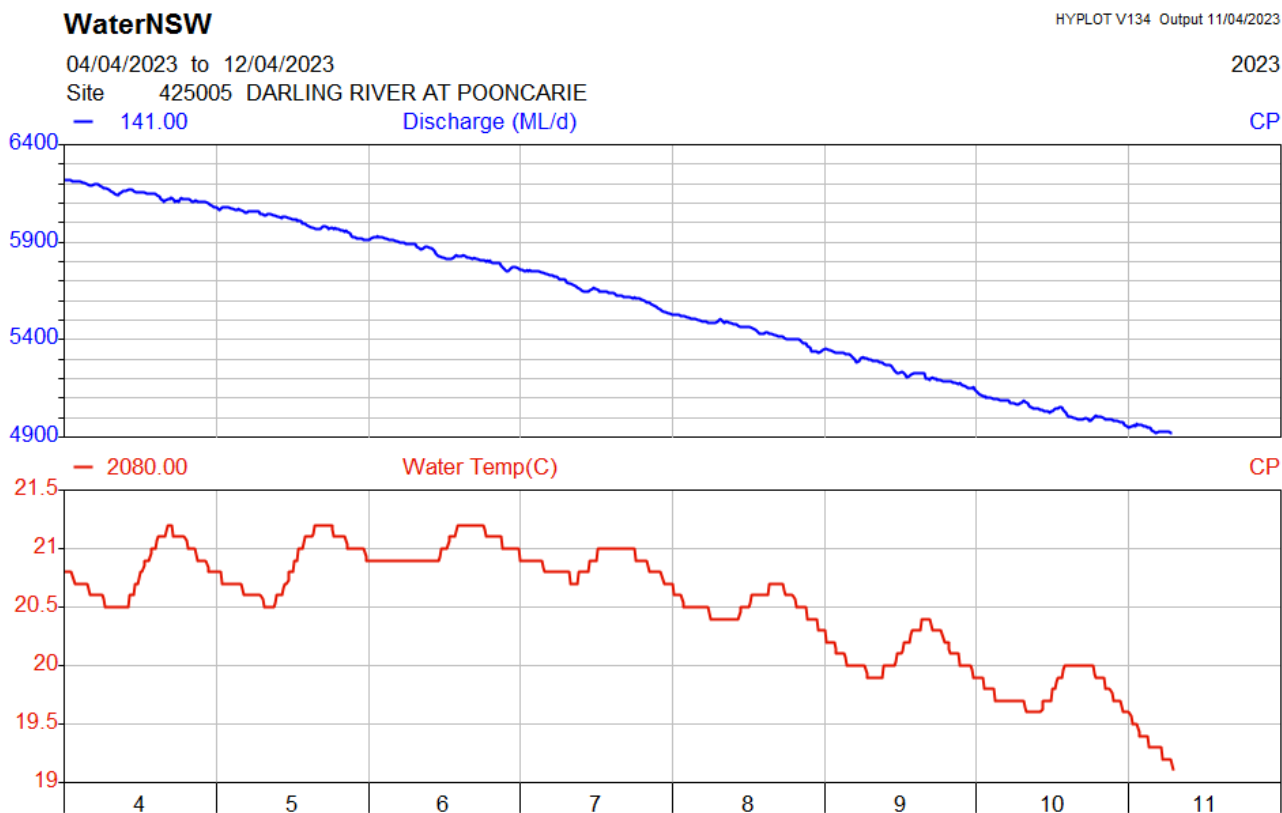


Figure 569: Continuous discharge (ML/day) and water temperature (°C) in the Darling River at Pooncarie

04/04/2023 to 12/04/2023

2023

Site 425007 DARLING RIVER AT BURTUNDY

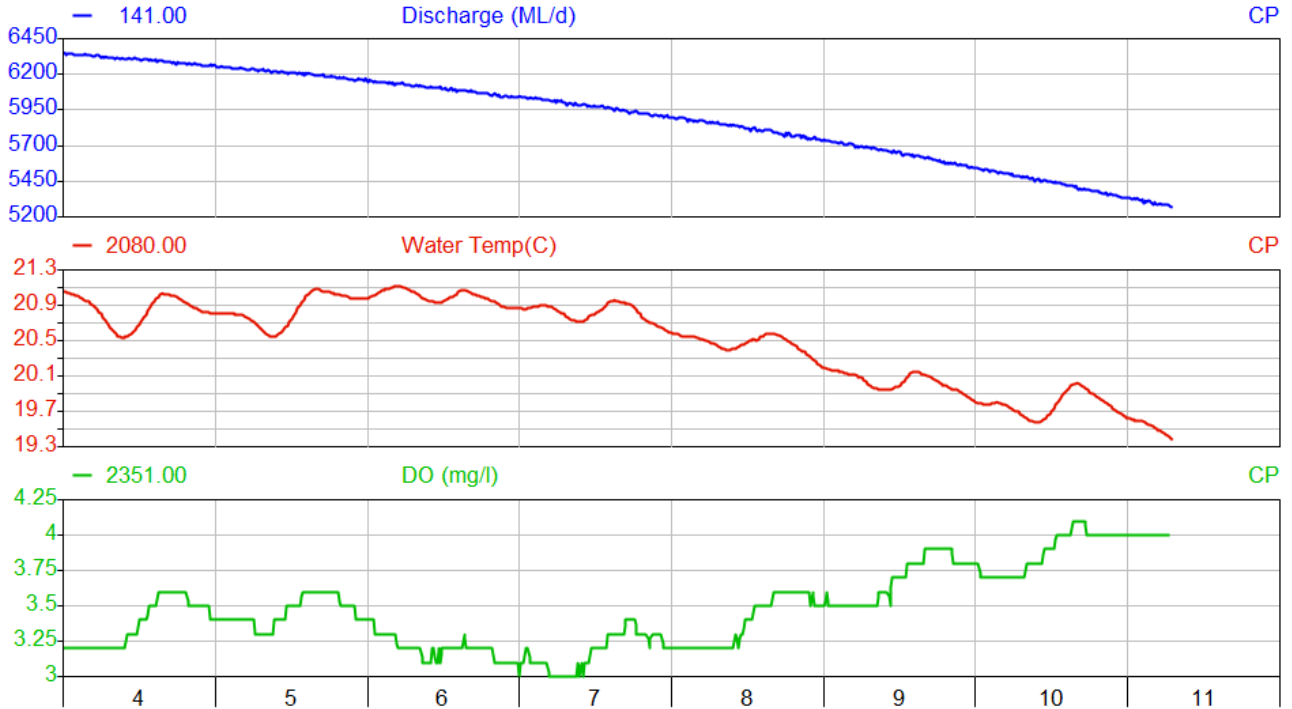


Figure 570: Continuous discharge (ML/day), dissolved oxygen (mg/L), water temperature (°C) in the Darling River at Burtundy

Murray River

Weekly routine hand-held readings in the Murray collected on 4 April, show dissolved oxygen levels above the critical threshold for fish at Merbein and Fort Courage (Table 62). Merbein is currently on amber alert and Fort Courage is on red alert for blue-green algae (Figure 572). Discharge in the Murray River at Colignan is 13230 ML/day.

Table 62: Weekly hand-held dissolved oxygen (mg/L) readings in the Murray River

Location	Date	Time	Dissolved Oxygen (mg/L)
Murray River at Merbein	4/4/2023	9:40 AM	8.95
Murray River at Fort Courage	4/4/2023	12:58 PM	8.36

Continuous dissolved oxygen readings in the Murray River at Wentworth have remained above 8 mg/L with water temperatures decreasing (Figure 571).

04/04/2023 to 12/04/2023

2023

Site 425901 MURRAY RIVER @ WENTWORTH WQ

— 2080.00 Water Temp(C)

CP

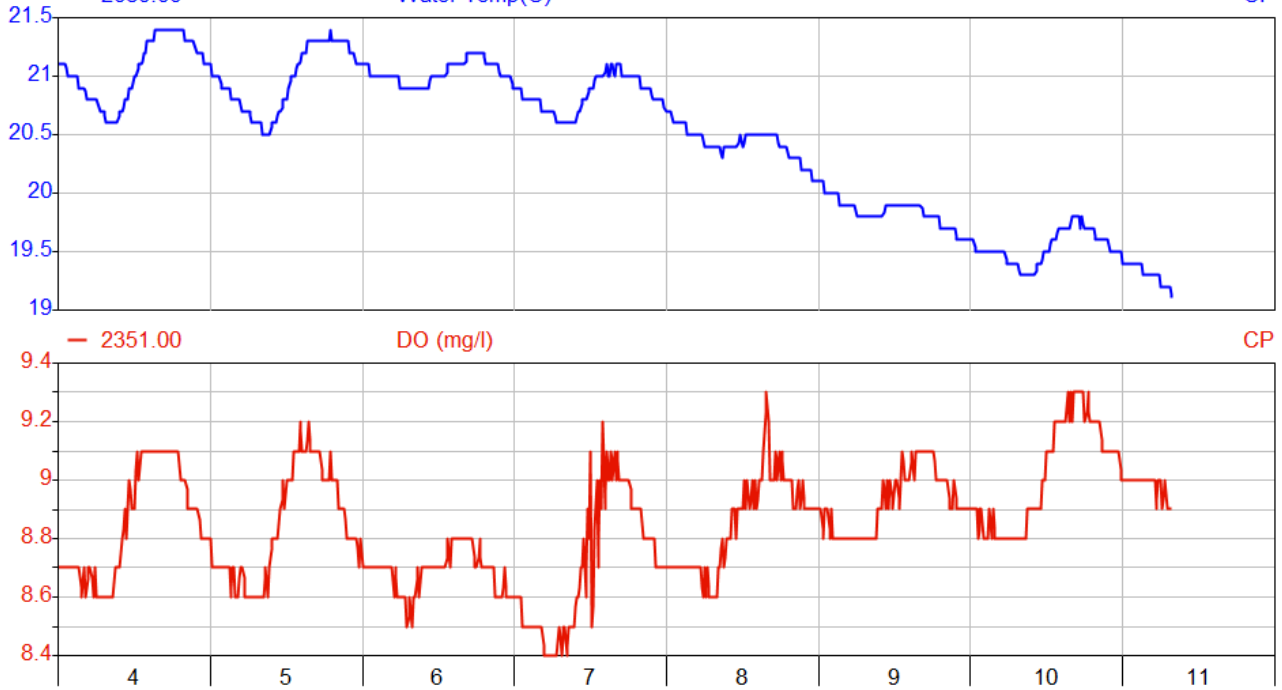


Figure 571: Continuous discharge (ML/day) and water temperature (°C) in the Murray River at Wentworth

Algal Alerts

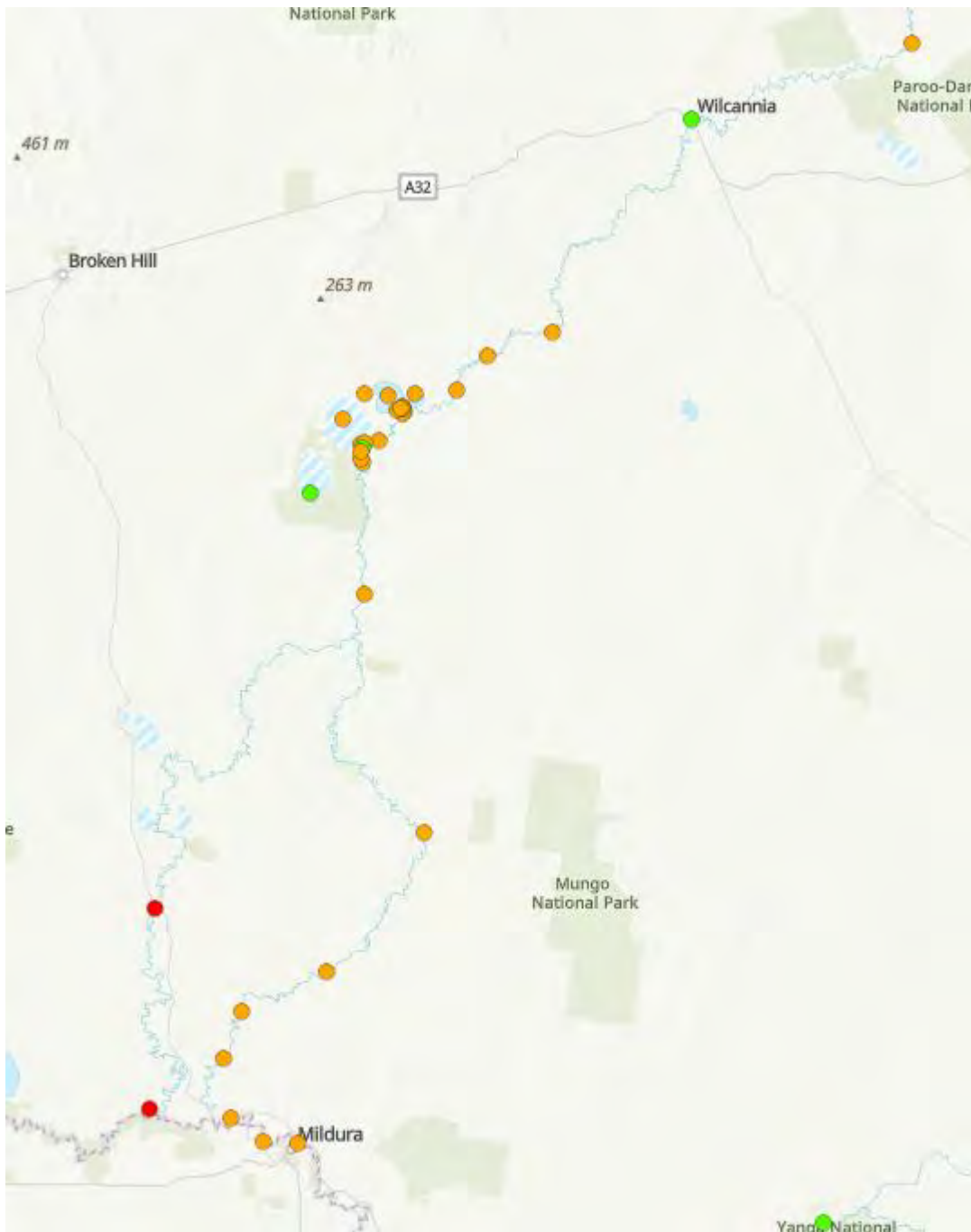


Figure 572: Latest algal alerts for the Darling, Menindee Lakes and Lower Murray.

The latest algal sampling results show sites along the Darling, Menindee Lakes and Lower Murray are on amber alert for blue-green algae. The Anabranch and Fort Courage both have a red alert (Figure 572). Visit [WaterNSW algal alerts](#) for the most up to date information and warnings.

Weather Outlook

The Bureau of Meteorology 8-day total rain forecast (11 April to 18 April) indicates 10-15 mm rainfall in western NSW (Figure 573). The forecast maximum air temperatures at Menindee and Wentworth are in the mid to high 20s with possible rain on Tuesday and the weekend. (Figure 574 Figure 346 and Figure 575). There are no heatwave conditions forecast by the Bureau of Meteorology.

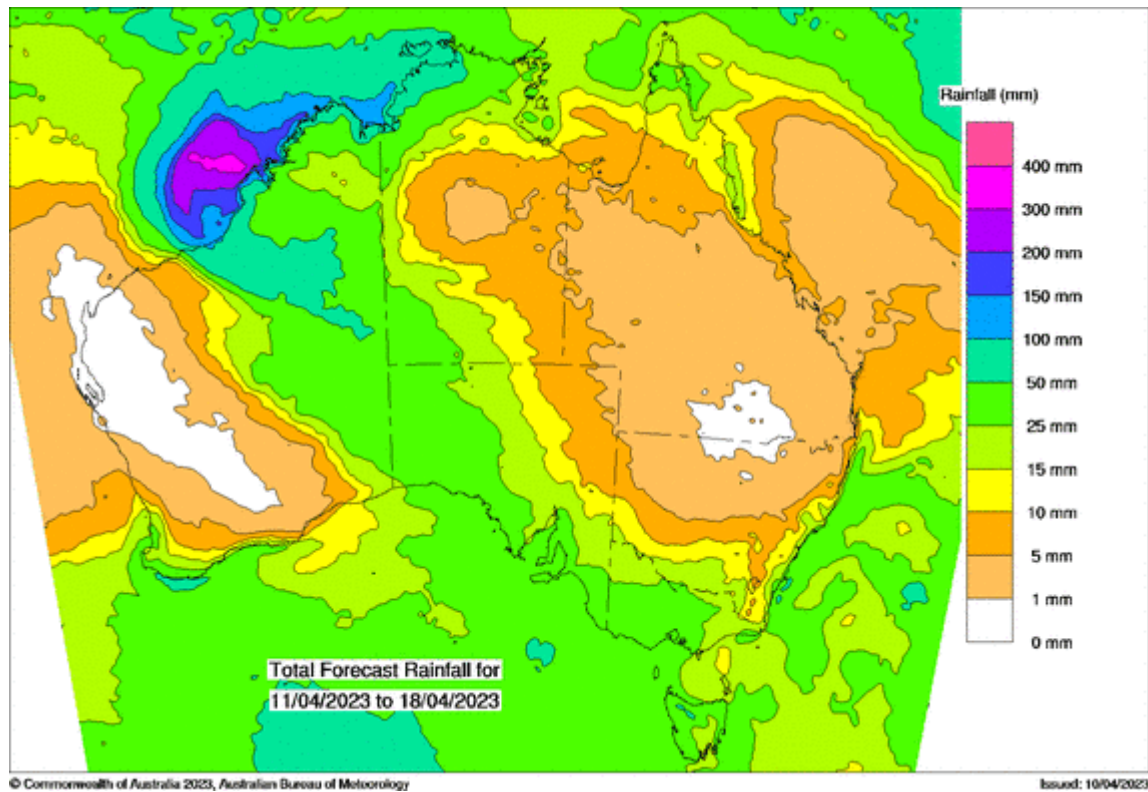
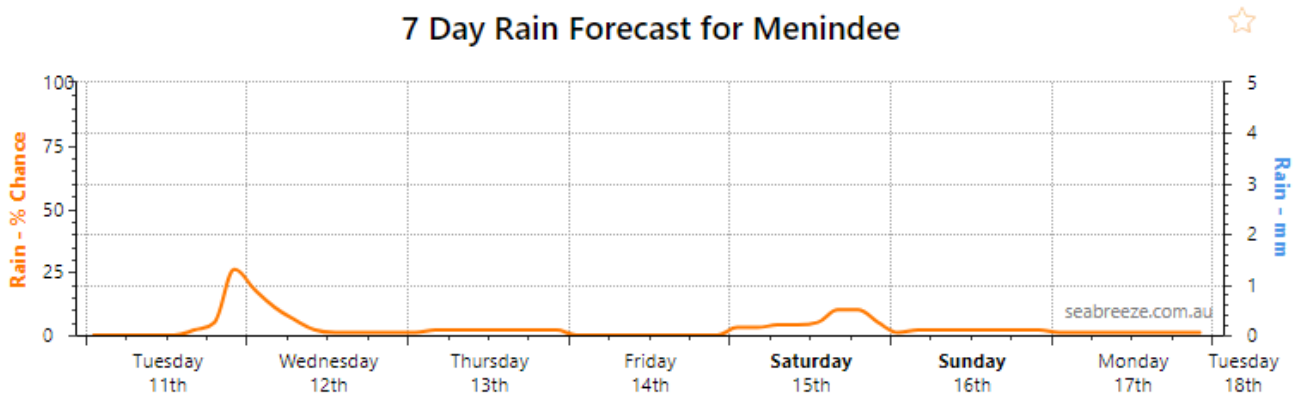
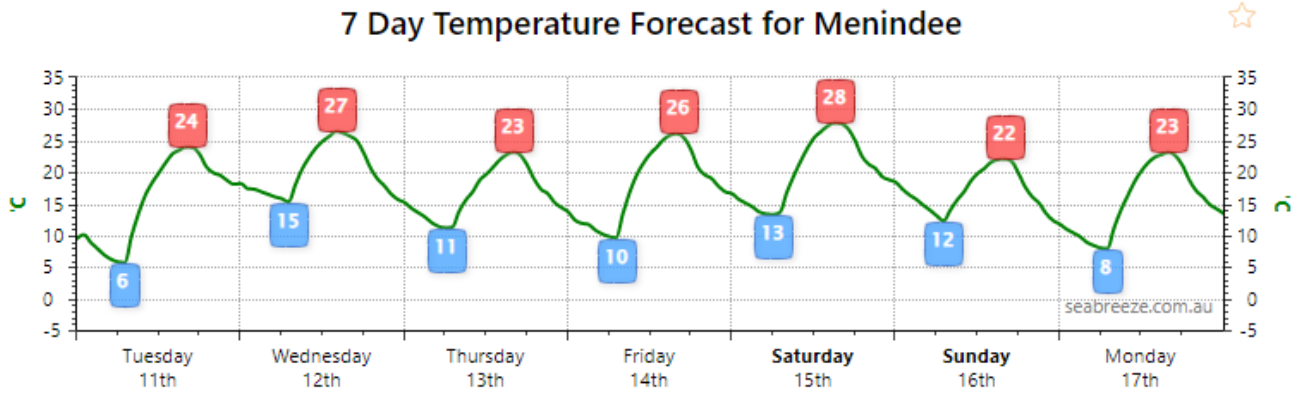
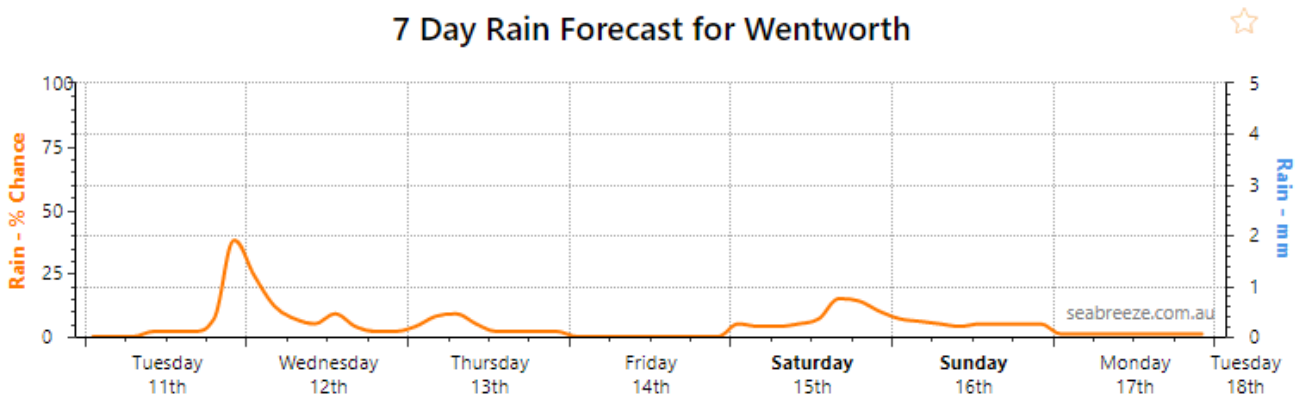
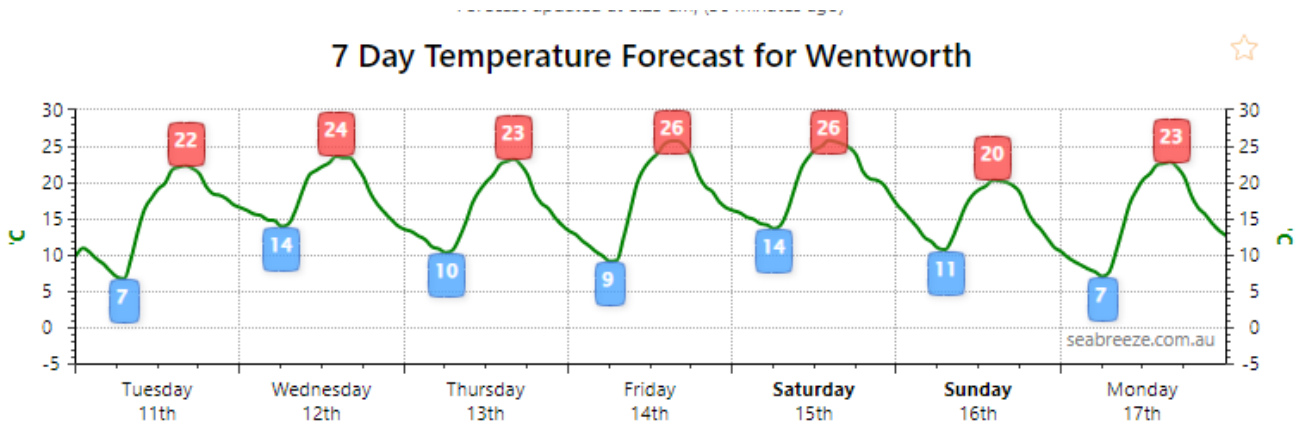


Figure 573: Bureau of Meteorology 8-day total rain forecast



Weather information based on data supplied by the Bureau of Meteorology and other sources.

Figure 574: Forecast air temperatures and rainfall for Menindee



Weather information based on data supplied by the Bureau of Meteorology and other sources.

Figure 575: Forecast air temperatures and rainfall for Wentworth

Water quality update for Menindee and Lower Darling – 13 April 2023

Darling River and Menindee Lakes

Dissolved oxygen levels at Wilcannia are remaining above 6 mg/L during the day and above 5 mg/L during the night (Figure 576). As a general guide, native fish and other large aquatic organisms require at least 2 mg/L of dissolved oxygen to survive but may begin to suffer if levels are below 4 to 5 mg/L for prolonged periods.

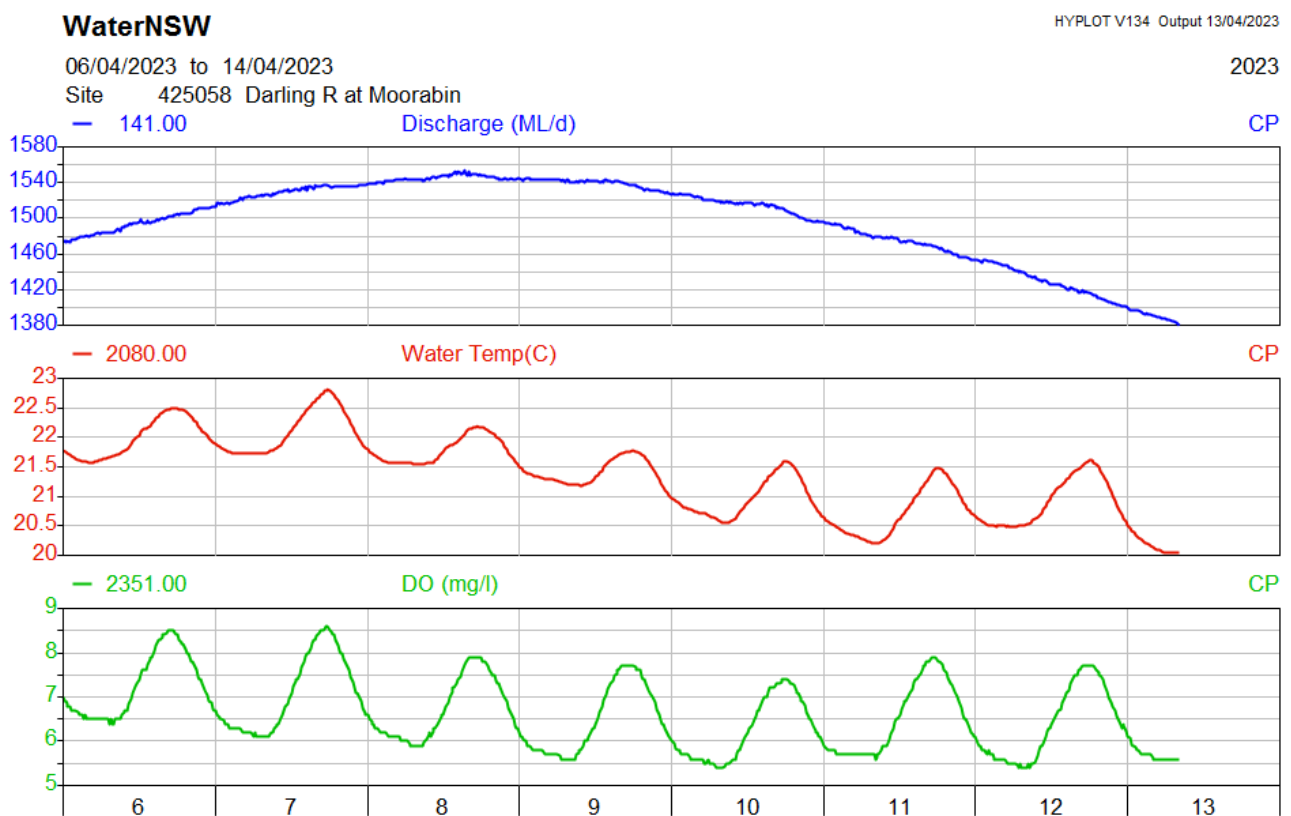


Figure 576: Discharge (ML/d), continuous dissolved oxygen (mg/L) and water temperature (°C) in the Darling River at Wilcannia (Moorabin)

The continuous dissolved oxygen monitoring site in the upper reaches of Lake Wetherell at Nelia Gaari is showing oxygen is dropping to critical levels overnight and then recovering during the day above 3 mg/L (Figure 577).

06/04/2023 to 14/04/2023

2023

Site 425060 DARLING RIVER @ NELIA GAARI

— 2080.00

Water Temp(C)

CP

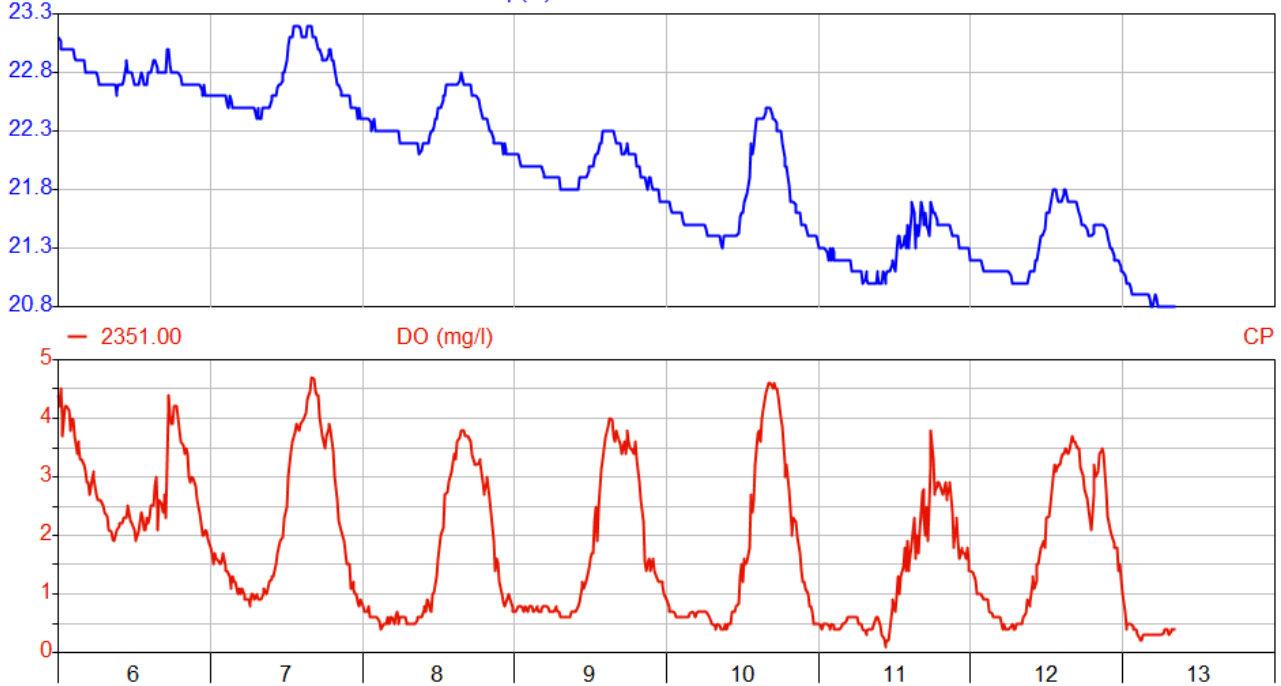


Figure 577: Continuous dissolved oxygen (mg/L) and water temperature (°C) in the Darling River at Nelia Gaari

Menindee Depth Profile Sampling

Figure 578 is a Google Earth image showing the depth profile sampling locations in the Darling River at Menindee.

Dissolved oxygen levels near the water surface are now increasing upstream of Menindee Creek but are at critical levels for fish health at lower depths.

Profile readings collected downstream of the junction of the Darling River with Menindee Creek show that releases from Lake Menindee are continuing to dilute and mix the low-oxygen water coming down the Darling River from Menindee town (Figure 579).



Figure 578: Darling River at Menindee depth profile sampling locations

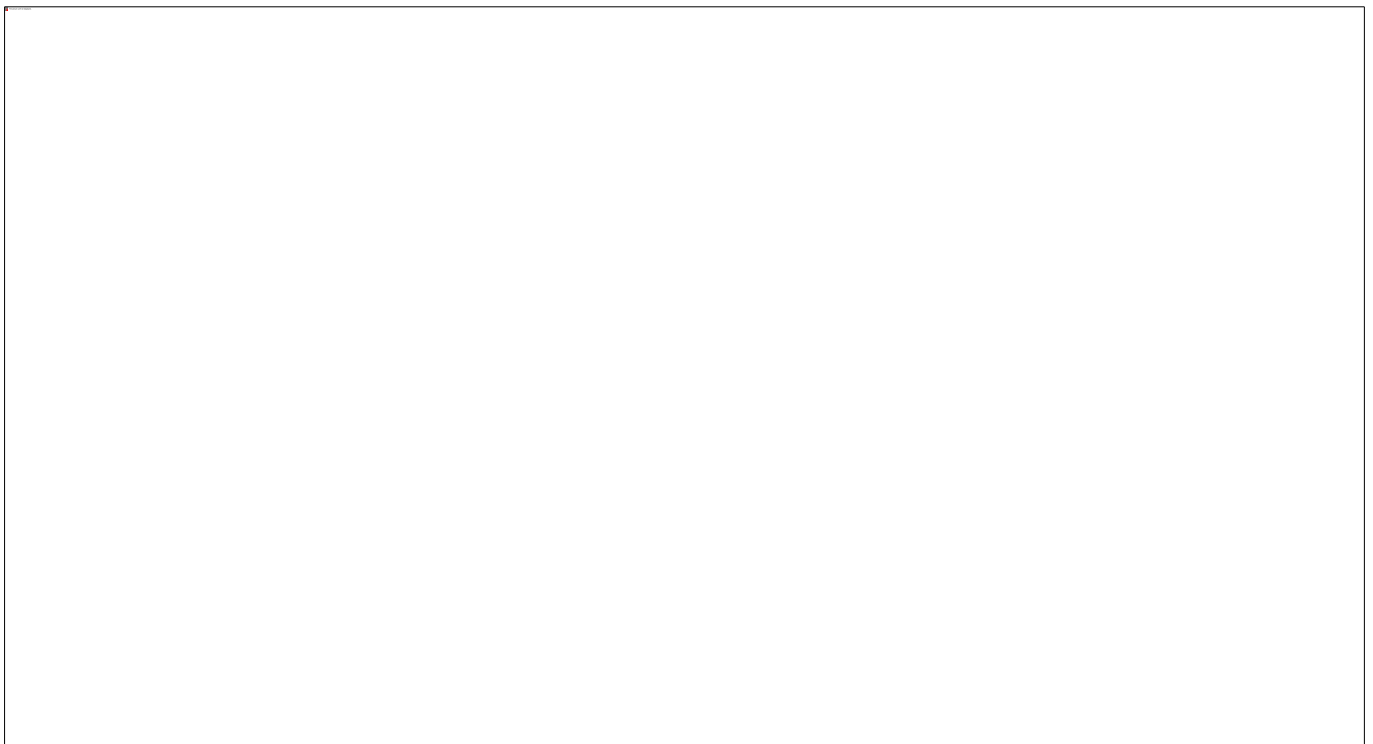


Figure 579: Darling River at Menindee depth profiles

Longitudinal Survey

Figure 580 is a Google Earth image showing the location and results from a longitudinal survey of dissolved oxygen levels down the Darling River from the Lake Pamamaroo outlet to the Rail Bridge at Menindee on 13 April. Dissolved oxygen levels are above 4 mg/L at most sites between Lake Pamamaroo and Menindee.

Figure 581 is a graph showing the dissolved oxygen results from 6 longitudinal surveys undertaken on 25, 29 March and 1, 5, 11 and 13 April. The graph highlights that there has been improvement in dissolved oxygen at the sites downstream.



Figure 580: Google Earth image showing dissolved oxygen results from the Lake Pamamaroo outlet to the Rail Bridge upstream of Menindee – 13 April 2023



Figure 581: Graph of dissolved oxygen results from longitudinal profiles collected 25, 29 March, 1, 5, 11 and 13 April

The data from the temporary dissolved oxygen sensor installed at the Menindee pump station (at a depth of about 1 m from the water surface) is showing a diurnal fluctuation in dissolved oxygen with replenishment during the day but dropping to critical levels for fish health overnight (Figure 582). A second dissolved oxygen sensor at the Menindee Town gauging station is showing low dissolved oxygen levels near the riverbed. The dissolved oxygen levels here remain critical but stable (Figure 583). The two sites are approximately 2 km apart by river.

WaterNSW

HYPLOT V134 Output 13/04/2023

06/04/2023 to 14/04/2023

2023

Site 425902 Darling River @ Menindee Pump Station

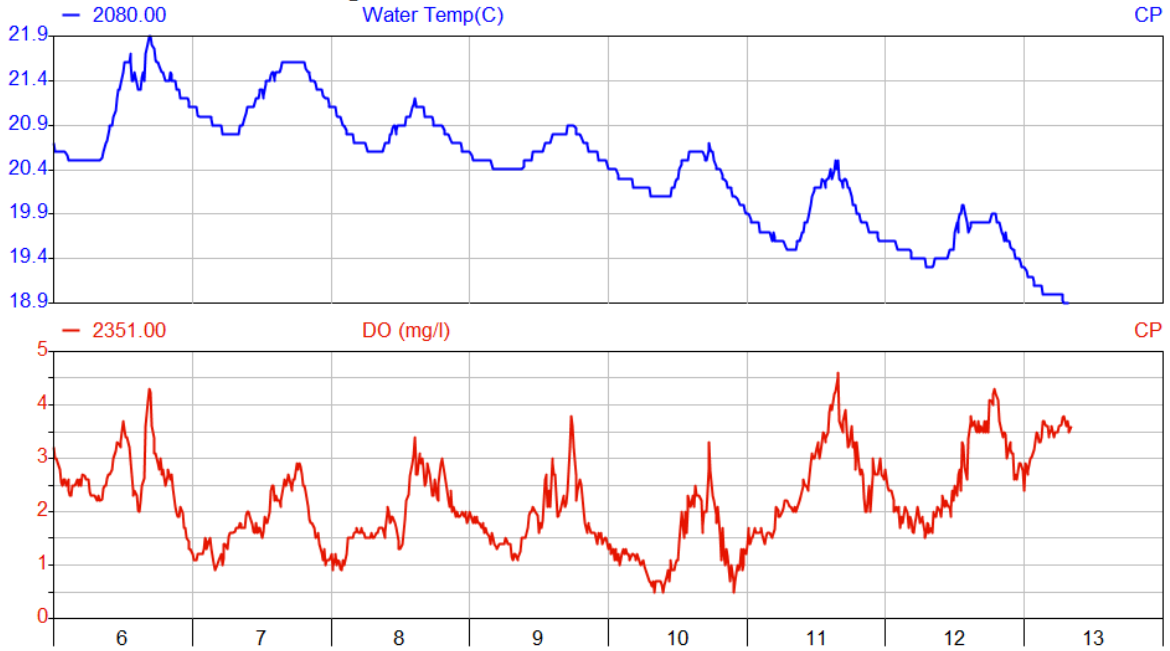


Figure 582: Continuous dissolved oxygen (mg/L) and water temperature (°C) in the Darling River at Menindee pump station

WaterNSW

HYPLOT V134 Output 13/04/2023

06/04/2023 to 14/04/2023

2023

Site 425001 DARLING RIVER AT MENINDEE TOWN

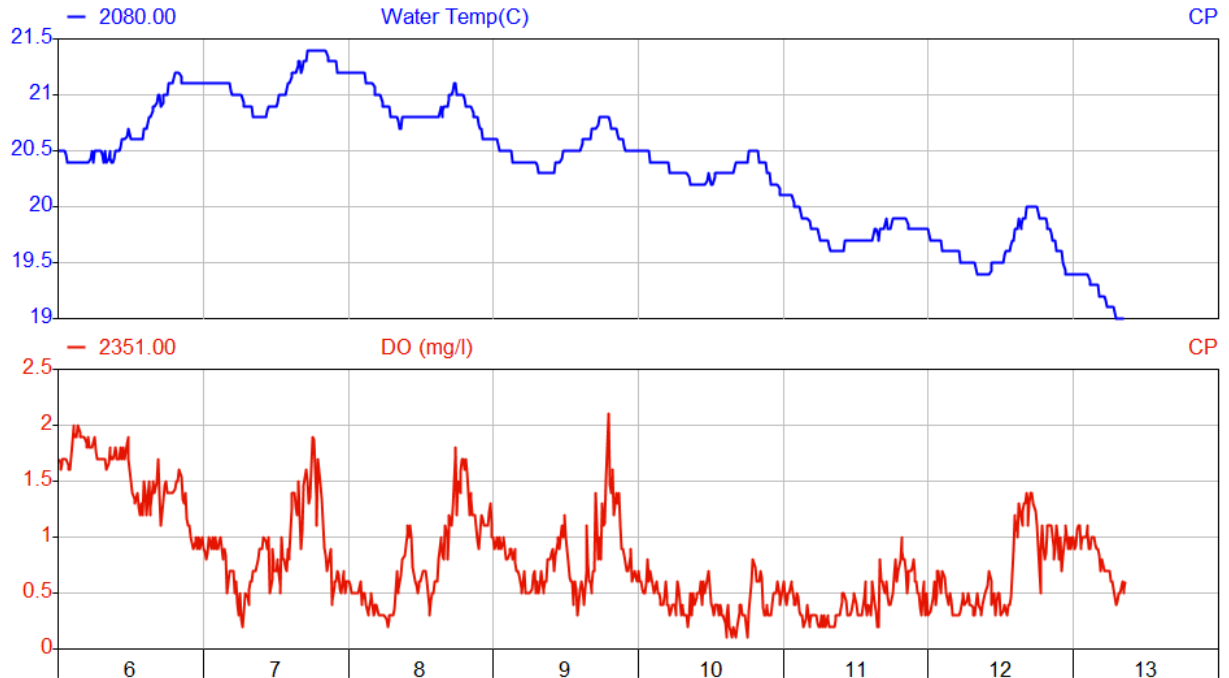


Figure 583: Continuous dissolved oxygen (mg/L) and water temperature (°C) in the Darling River at Menindee town

Dissolved oxygen at Weir 32 has remained steady above 5 mg/L (Figure 584).

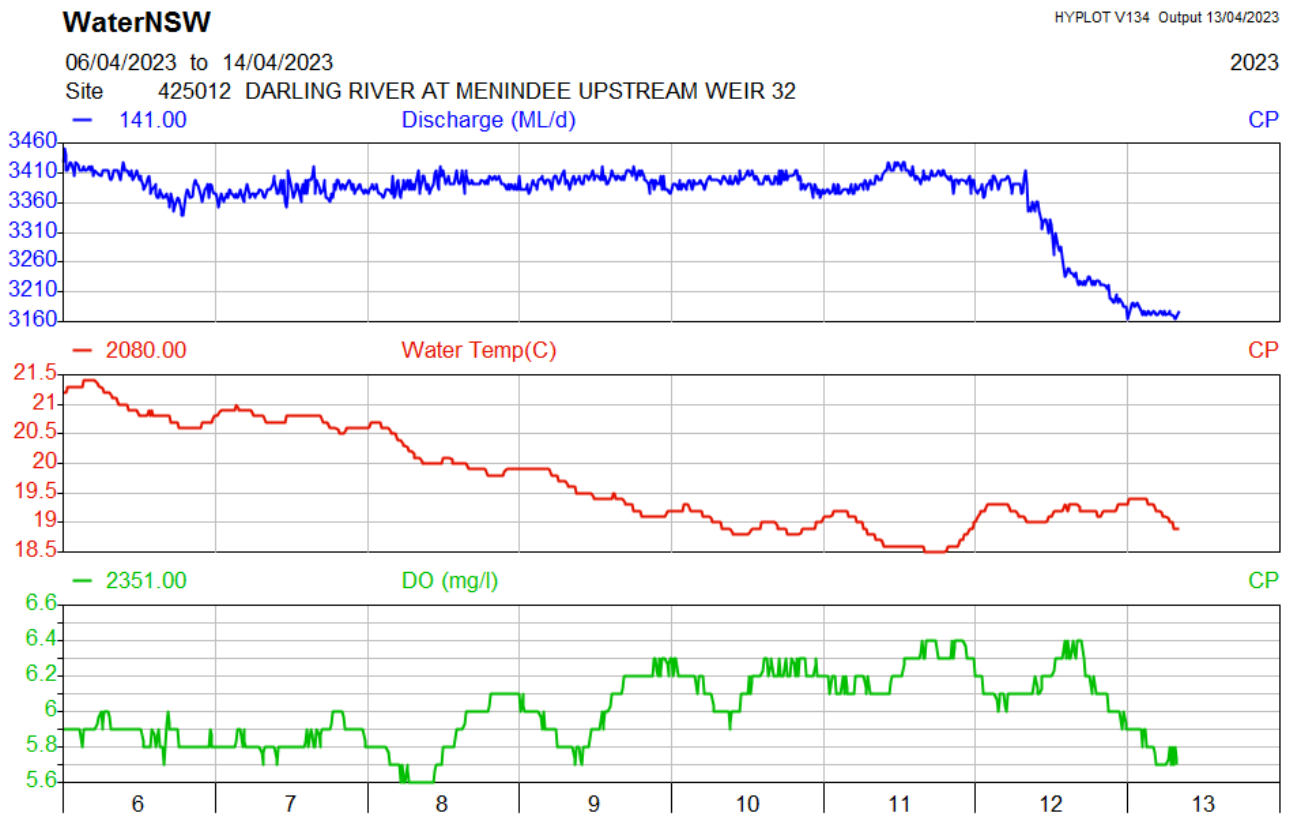


Figure 584: Continuous discharge (ML/day), dissolved oxygen (mg/L) and water temperature (°C) in the Darling River at Weir 32

Lower Darling

The Darling River at Pooncarie is an area of concern as the low oxygen water and impacts from decomposing fish make their way downstream. Monitoring is showing the low dissolved oxygen water has been progressing downstream over the past week (Table 63). Figure 585 shows sampling locations.

Table 63: Hand-held dissolved oxygen (mg/L) readings in the Darling River between Weir 32 and Wentworth

Monitoring site	28/03/23	29/3/23	30/3/23	31/3/23	01/4/23	02/4/23	03/4/23	4/4/23	6/4/23	13/4/23
Darling River at Weir 32	5.85						6.39			
Darling River at Tolarno							4.09			
Darling River at Karoola	2.64	1.80								
Darling River at Moorara	0.99			1.33	1.38	1.71				
Darling River at Pooncarie		1.03	1.66	1.75	1.77	2.18	2.56		2.72	
Darling River at Pooncarie bridge	1.15	1.27	1.76	2.01	1.85	2.31				
Darling River at Lethero			1.82	2.07	1.95	2.14	2.53			
Darling River at Burtundy					2.52	2.93		4.18		
Darling River at Ellerslie		3.73	2.75	3.08	3.15	3.42		5.44		
Darling River at Tapio		3.88	4.04	3.48	3.7	4.27		5.51		

Monitoring site	28/03/23	29/03/23	30/03/23	31/03/23	01/04/23	02/04/23	03/04/23	4/4/23	6/4/23	13/4/23
Wentworth					3.37					

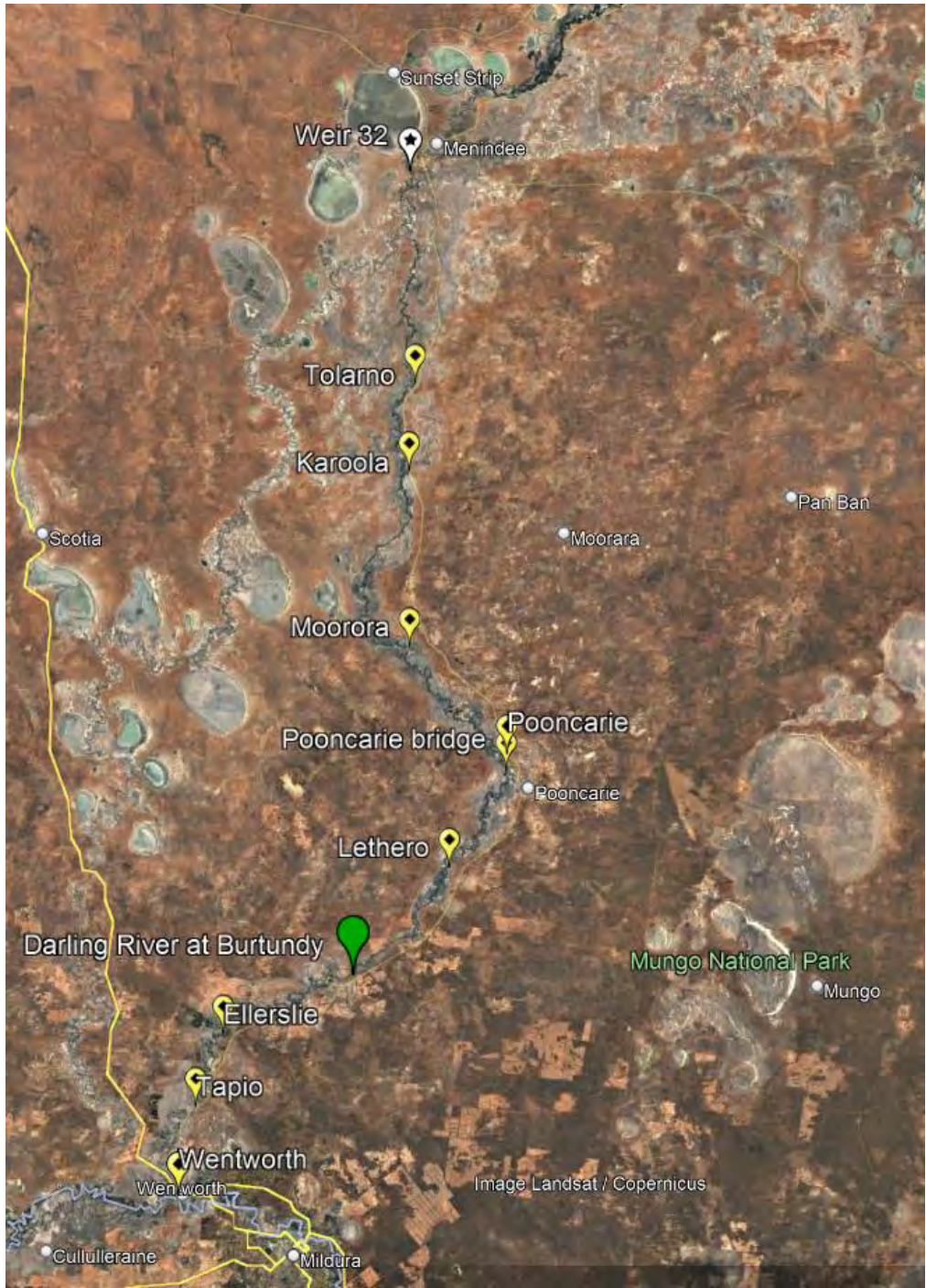


Figure 585: Lower Darling River sampling locations

Discharge in the Darling River at Pooncarie and Burtundy is just below 5,000 ML/day at both sites (Figure 586 and Figure 587). The continuous dissolved oxygen levels at Burtundy (Figure 587) have gradually increased over the past 4 days.

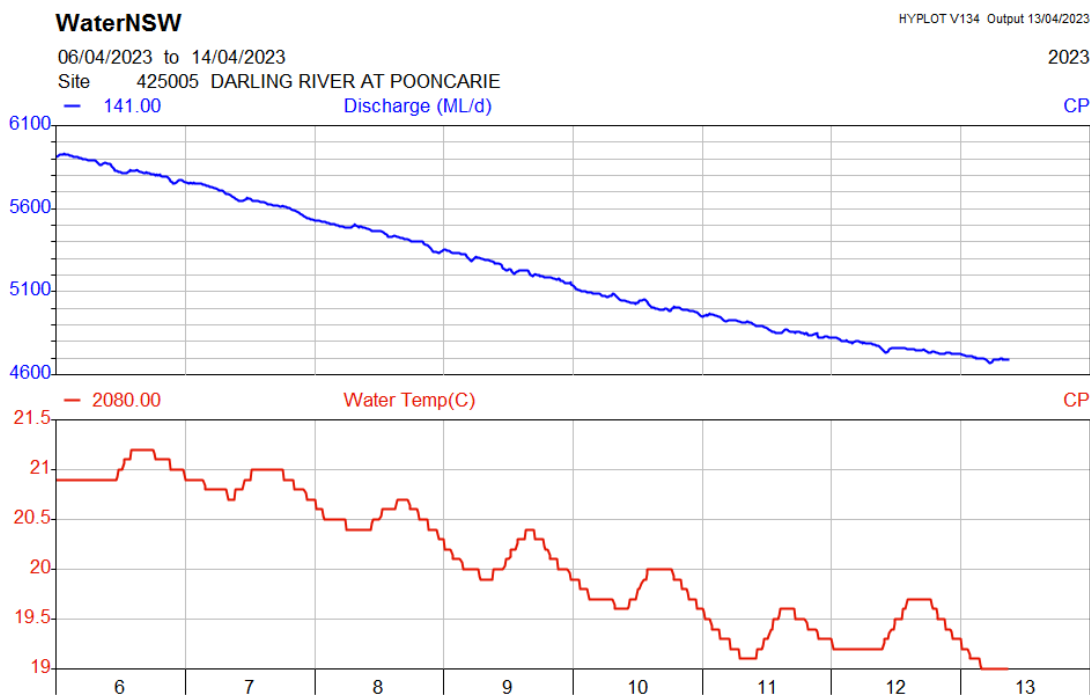


Figure 586: Continuous discharge (ML/day) and water temperature (°C) in the Darling River at Pooncarie

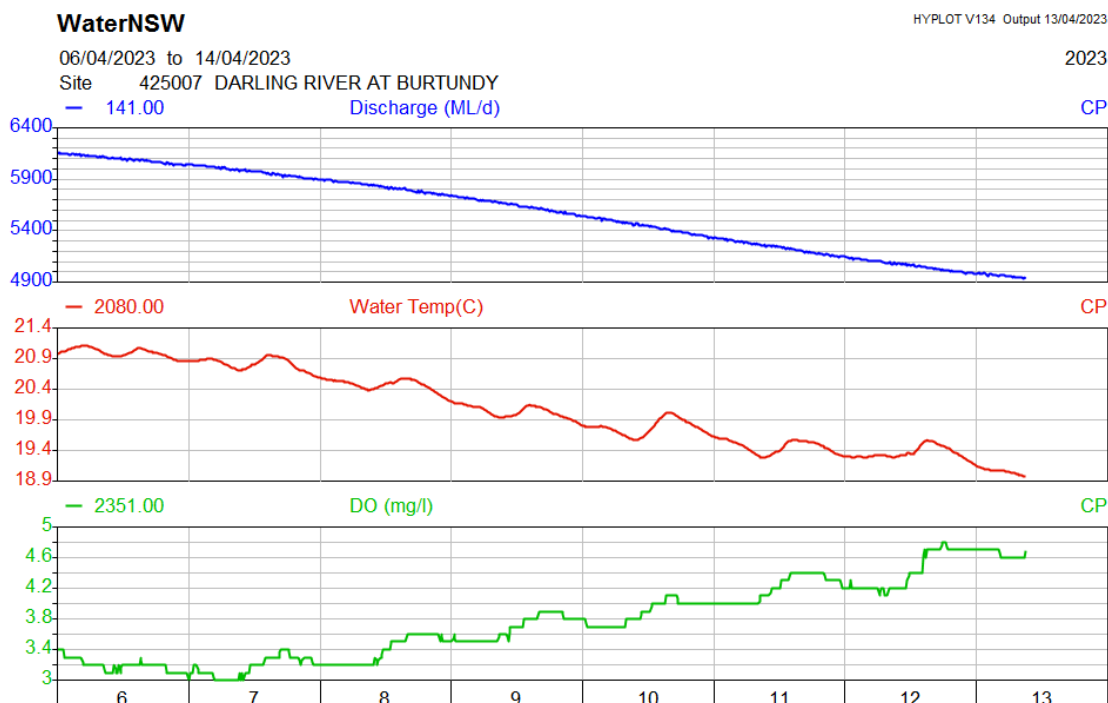


Figure 587: Continuous discharge (ML/day), dissolved oxygen (mg/L), water temperature (°C) in the Darling River at Burtundy

Murray River

Weekly routine hand-held readings in the Murray collected on 4 April, show dissolved oxygen levels above the critical threshold for fish at Merbein and Fort Courage (Table 64). Merbein is currently on amber alert and Fort Courage is on red alert for blue-green algae (Figure 589). Discharge in the Murray River at Colignan is 13600 ML/day.

Table 64: Weekly hand-held dissolved oxygen (mg/L) readings in the Murray River

Location	Date	Time	Dissolved Oxygen (mg/L)
Murray River at Merbein	4/4/2023	9:40 AM	8.95
Murray River at Fort Courage	4/4/2023	12:58 PM	8.36

Continuous dissolved oxygen readings in the Murray River at Wentworth have remained above 8 mg/L with water temperatures decreasing (Figure 588).



Figure 588: Continuous discharge (ML/day) and water temperature (°C) in the Murray River at Wentworth

Algal Alerts

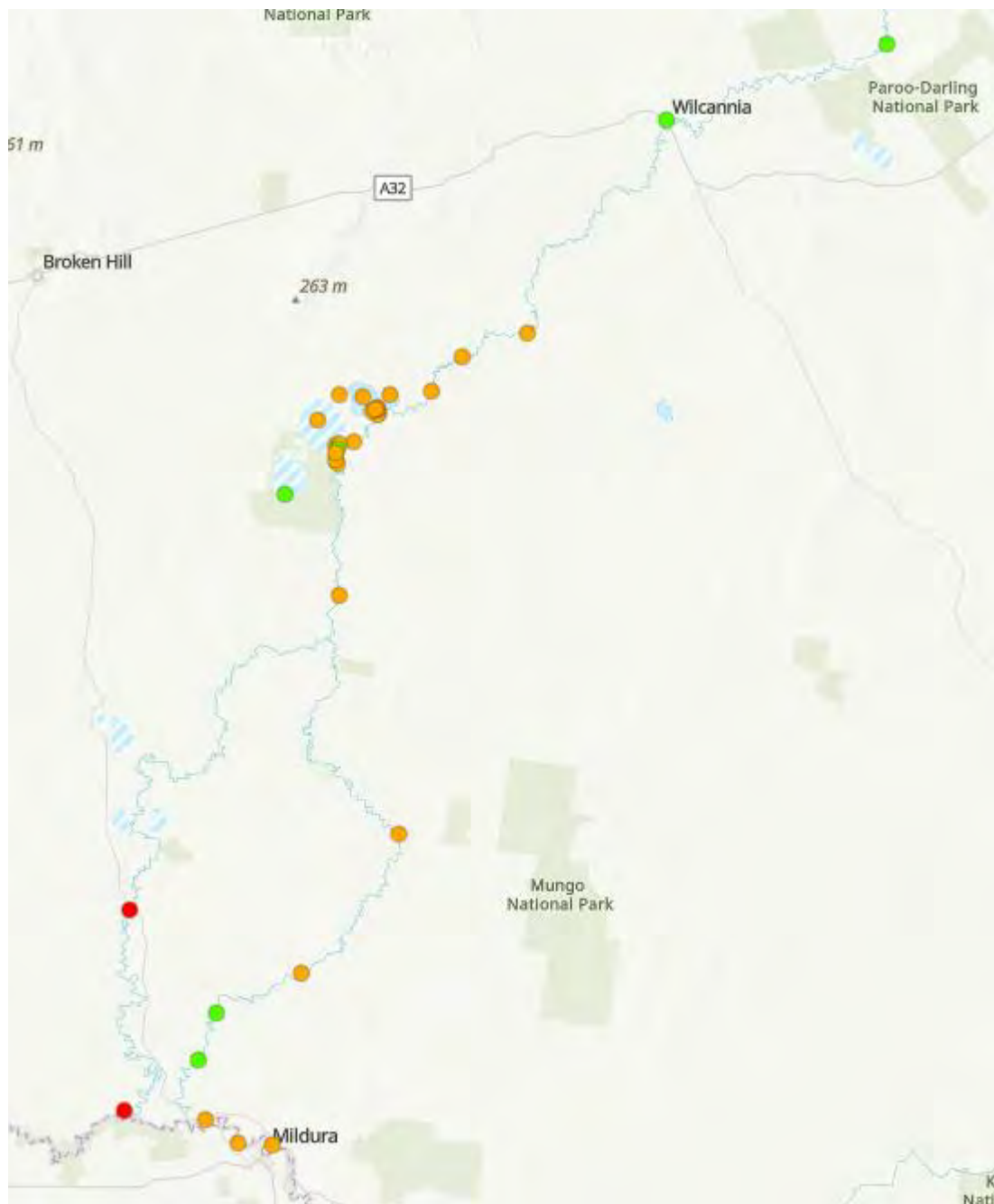


Figure 589: Latest algal alerts for the Darling, Menindee Lakes and Lower Murray.

The latest algal sampling results show most sites along the Darling, Menindee Lakes and Lower Murray are on amber alert for blue-green algae. The Anabranch and Fort Courage both have a red alert (Figure 589). Visit [WaterNSW algal alerts](#) for the most up-to-date information and warnings.

Weather Outlook

The Bureau of Meteorology 8-day total rain forecast (13 April to 20 April) indicates 10-15 mm rainfall in western NSW (Figure 590). The forecast maximum air temperatures at Menindee and Wentworth are in the mid 20s with possible rain on the weekend (Figure 591 and Figure 592). There are no heatwave conditions forecast by the Bureau of Meteorology.

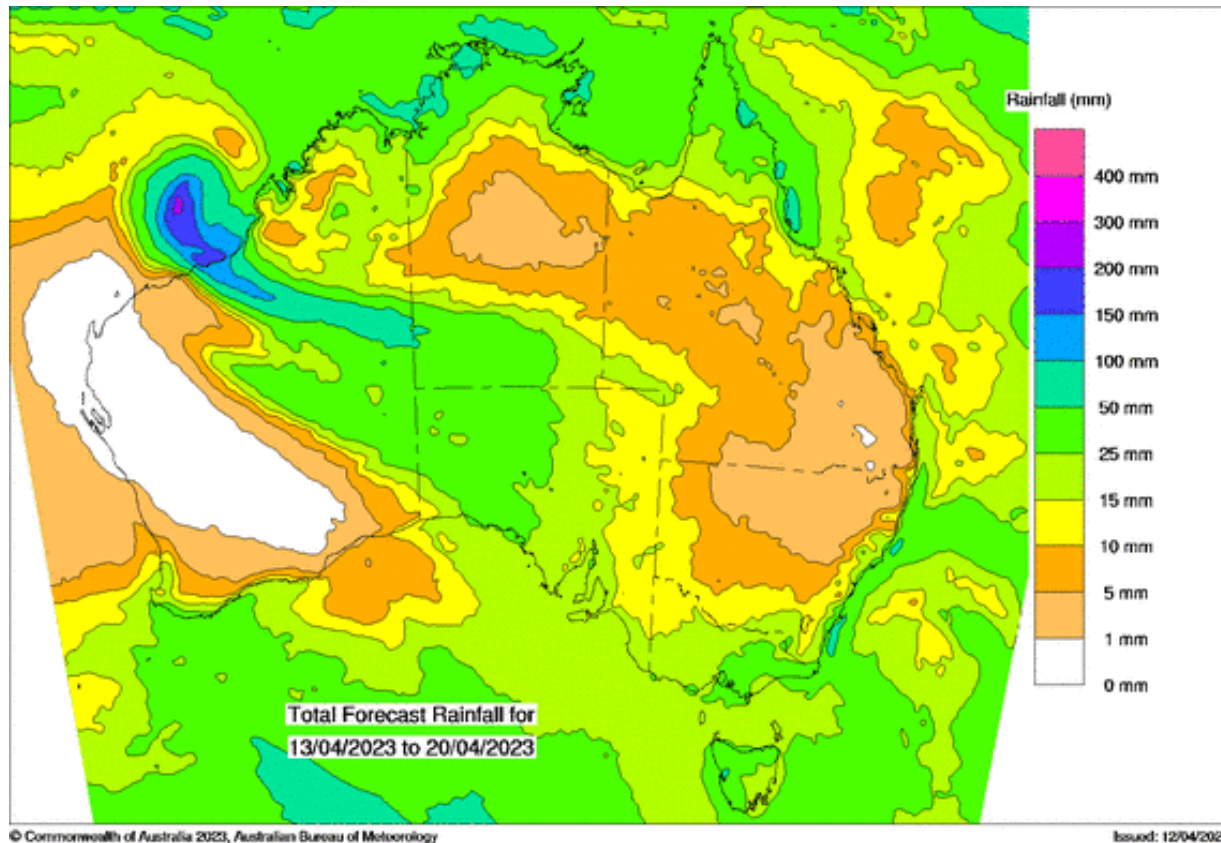


Figure 590: Bureau of Meteorology 8-day total rain forecast

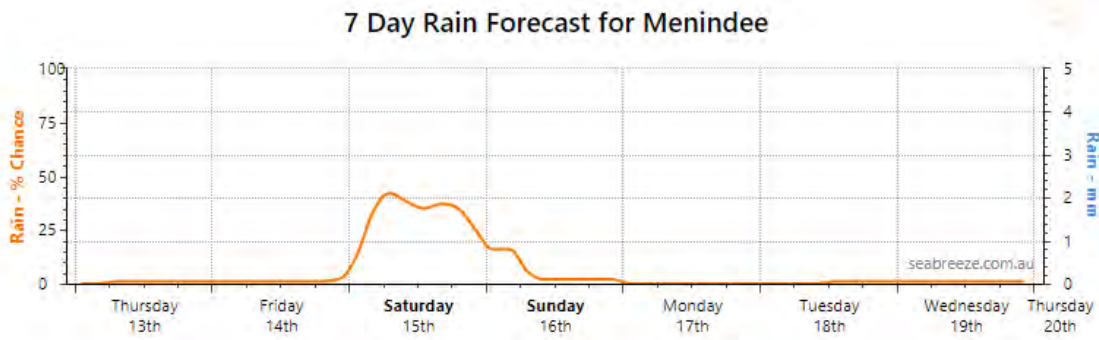
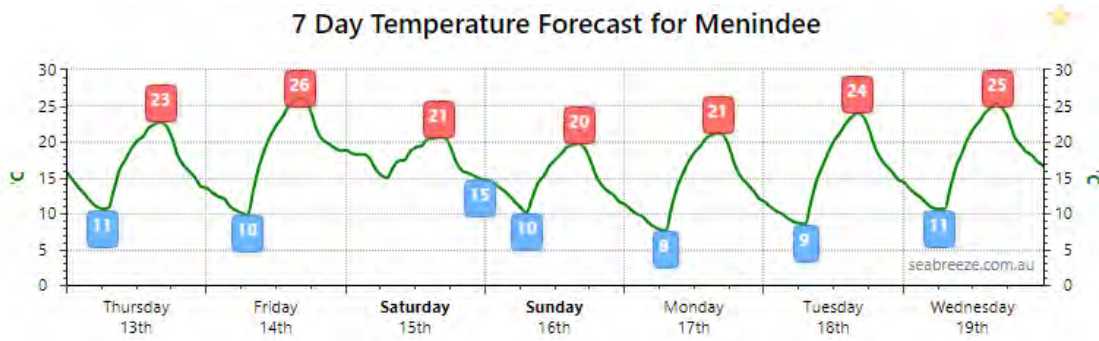


Figure 591: Forecast air temperatures and rainfall for Menindee

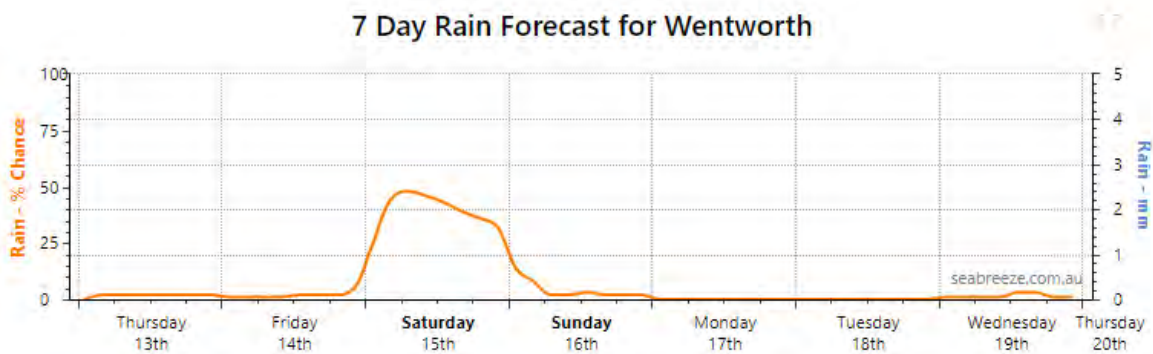
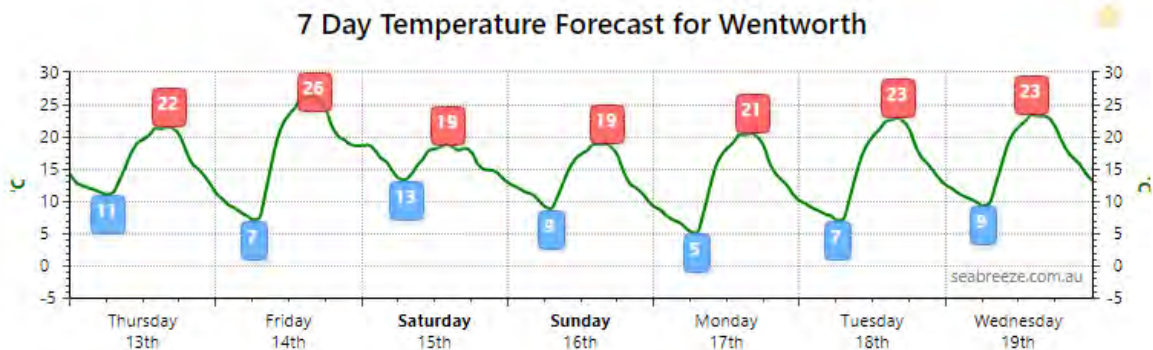


Figure 592: Forecast air temperatures and rainfall for Wentworth

Water quality update for Menindee and Lower Darling – 17 April 2023

Darling River and Menindee Lakes

Dissolved oxygen levels at Wilcannia are remaining above 6 mg/L during the day and above 5 mg/L during the night (Figure 593). As a general guide, native fish and other large aquatic organisms require at least 2 mg/L of dissolved oxygen to survive but may begin to suffer if levels are below 4 to 5 mg/L for prolonged periods.

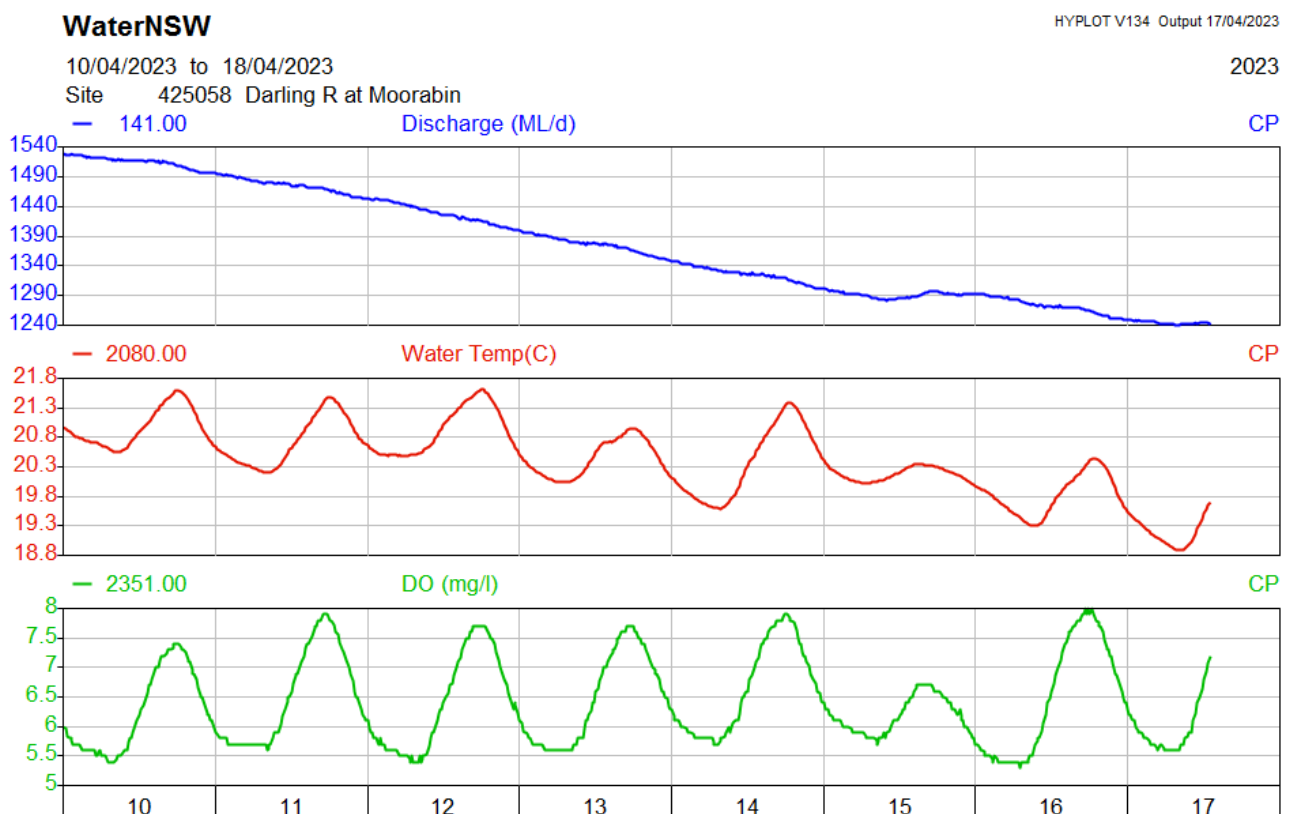


Figure 593: Discharge (ML/d), continuous dissolved oxygen (mg/L) and water temperature (°C) in the Darling River at Wilcannia (Moorabin)

The continuous dissolved oxygen monitoring site in the upper reaches of Lake Wetherell at Nelia Gaari is showing oxygen is dropping to critical levels overnight and then recovering during the day. For the past 2 days, readings have been above 4 mg/L (Figure 594).

10/04/2023 to 18/04/2023

2023

Site 425060 DARLING RIVER @ NELIA GAARI

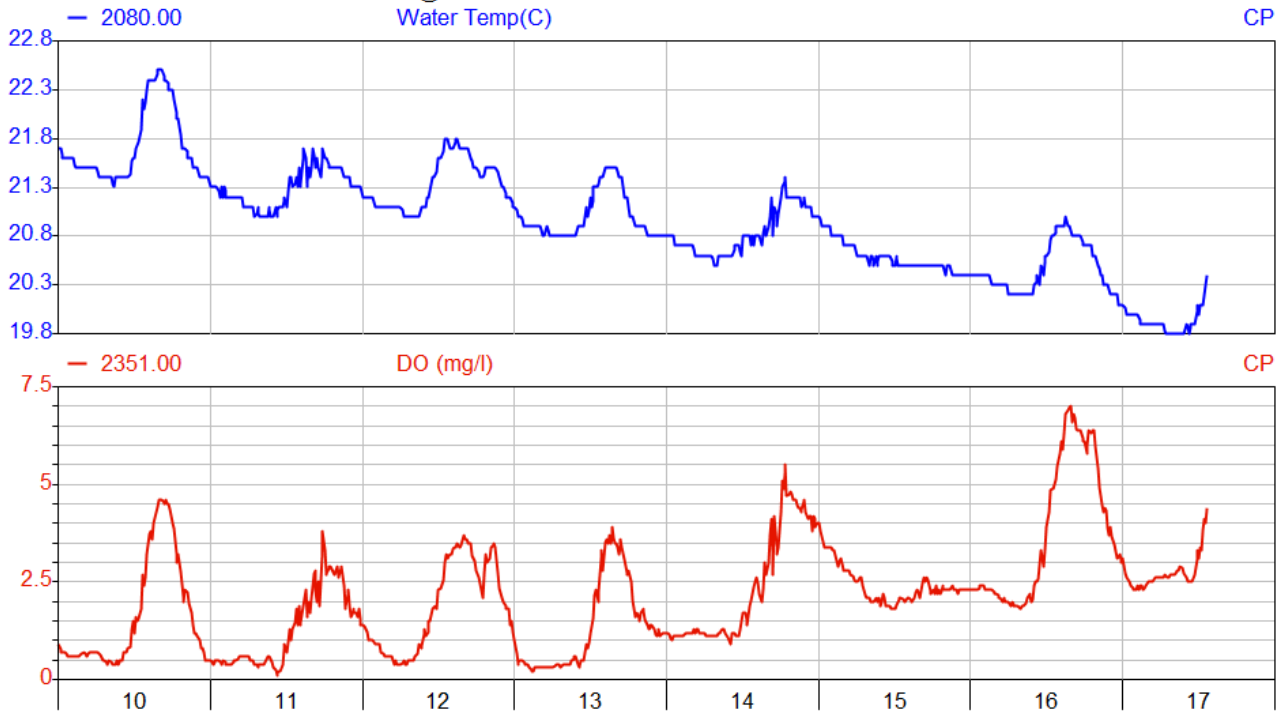


Figure 594: Continuous dissolved oxygen (mg/L) and water temperature (°C) in the Darling River at Nelia Gaari

Menindee Depth Profile Sampling

Figure 595 is a Google Earth image showing the depth profile sampling locations in the Darling River at Menindee.

Dissolved oxygen levels near the water surface are now increasing upstream of Menindee Creek but are at critical levels for fish health at lower depths.

Profile readings collected downstream of the junction of the Darling River with Menindee Creek show that releases from Lake Menindee are continuing to dilute and mix the low-oxygen water coming down the Darling River from Menindee town (Figure 596).



Figure 595: Darling River at Menindee depth profile sampling locations

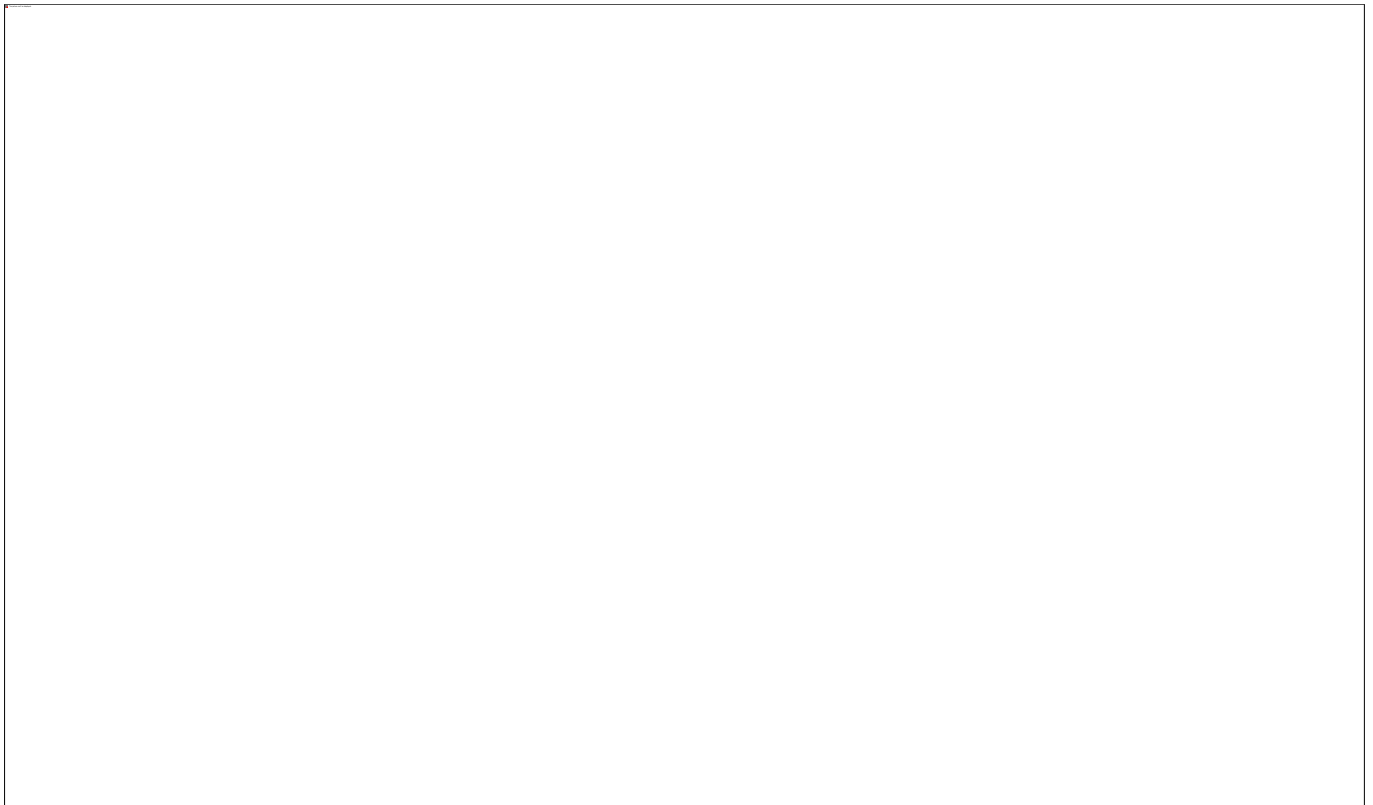


Figure 596: Darling River at Menindee depth profiles

Longitudinal Survey

Figure 597 is a Google Earth image showing the location and results from a longitudinal survey of dissolved oxygen levels down the Darling River from the Lake Pamamaroo outlet to the Rail Bridge at Menindee on 17 April. Dissolved oxygen levels are above 4 mg/L at most sites between Lake Pamamaroo and Menindee.

Figure 598 is a graph showing the dissolved oxygen results from 7 longitudinal surveys undertaken on 25, 29 March and 1, 5, 11,13 and 17 April.

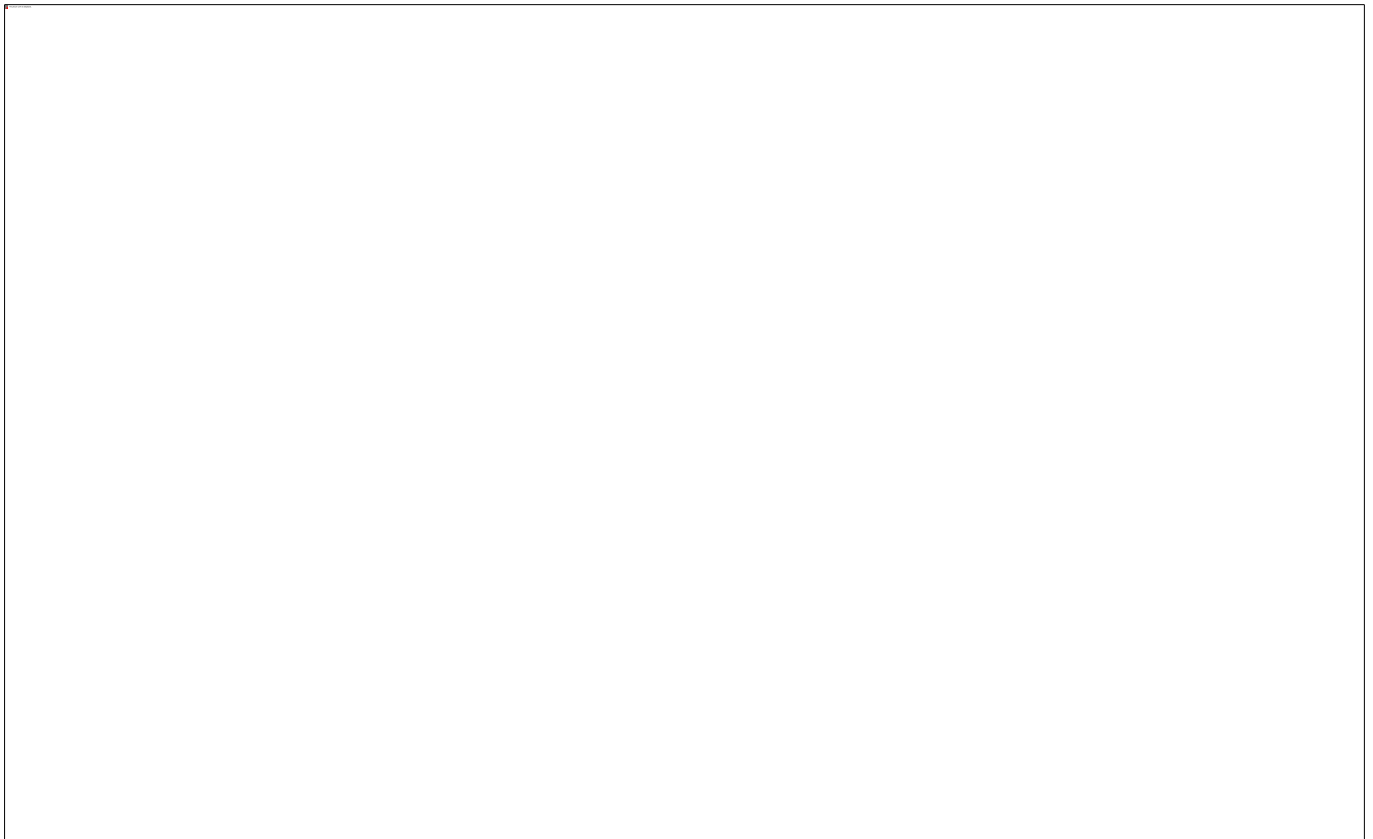


Figure 597: Google Earth image showing dissolved oxygen results from the Lake Pamamaroo outlet to the Rail Bridge upstream of Menindee – 17 April 2023



Figure 598: Graph of dissolved oxygen results from longitudinal profiles collected 25, 29 March, 1, 5, 11,13 and 17 April

The data from the temporary dissolved oxygen sensor installed at the Menindee pump station (at a depth of about 1 m from the water surface) is showing a diurnal fluctuation in dissolved oxygen with replenishment during the day but dropping to critical levels for fish health overnight (Figure 599). A second dissolved oxygen sensor at the Menindee Town gauging station is showing low dissolved oxygen levels near the riverbed. The dissolved oxygen levels here remain critical but have improved in the recent days (Figure 600). The two sites are approximately 2 km apart by river.

WaterNSW

HYPLOT V134 Output 17/04/2023

10/04/2023 to 18/04/2023

2023

Site 425902 Darling River @ Menindee Pump Station

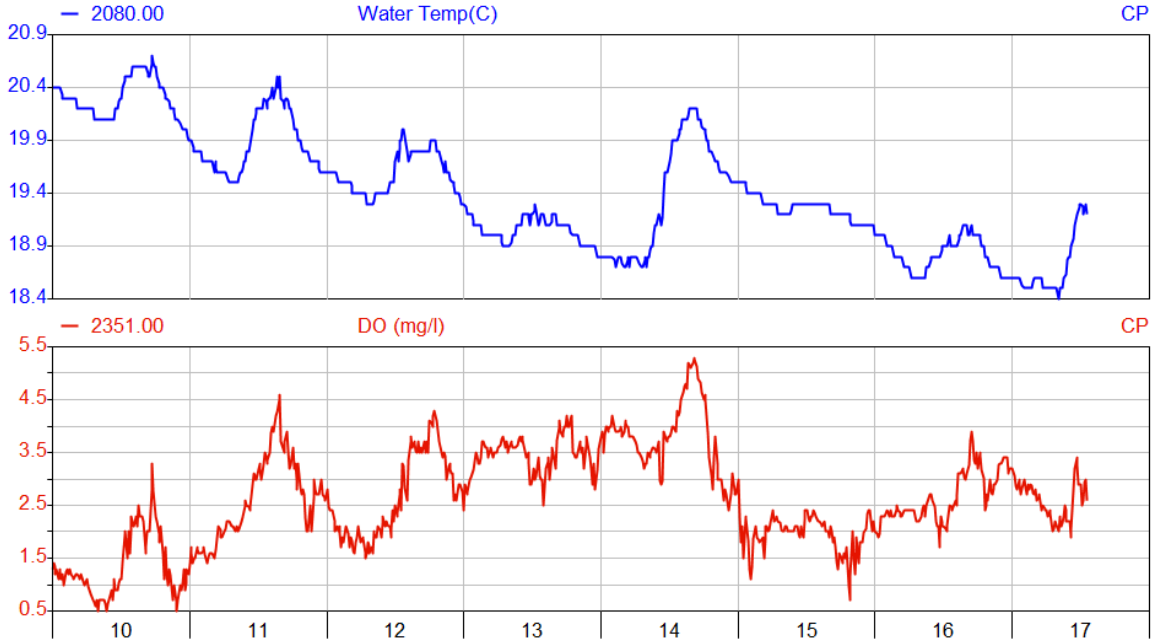


Figure 599: Continuous dissolved oxygen (mg/L) and water temperature (°C) in the Darling River at Menindee pump station

WaterNSW

HYPLOT V134 Output 17/04/2023

10/04/2023 to 18/04/2023

2023

Site 425001 DARLING RIVER AT MENINDEE TOWN

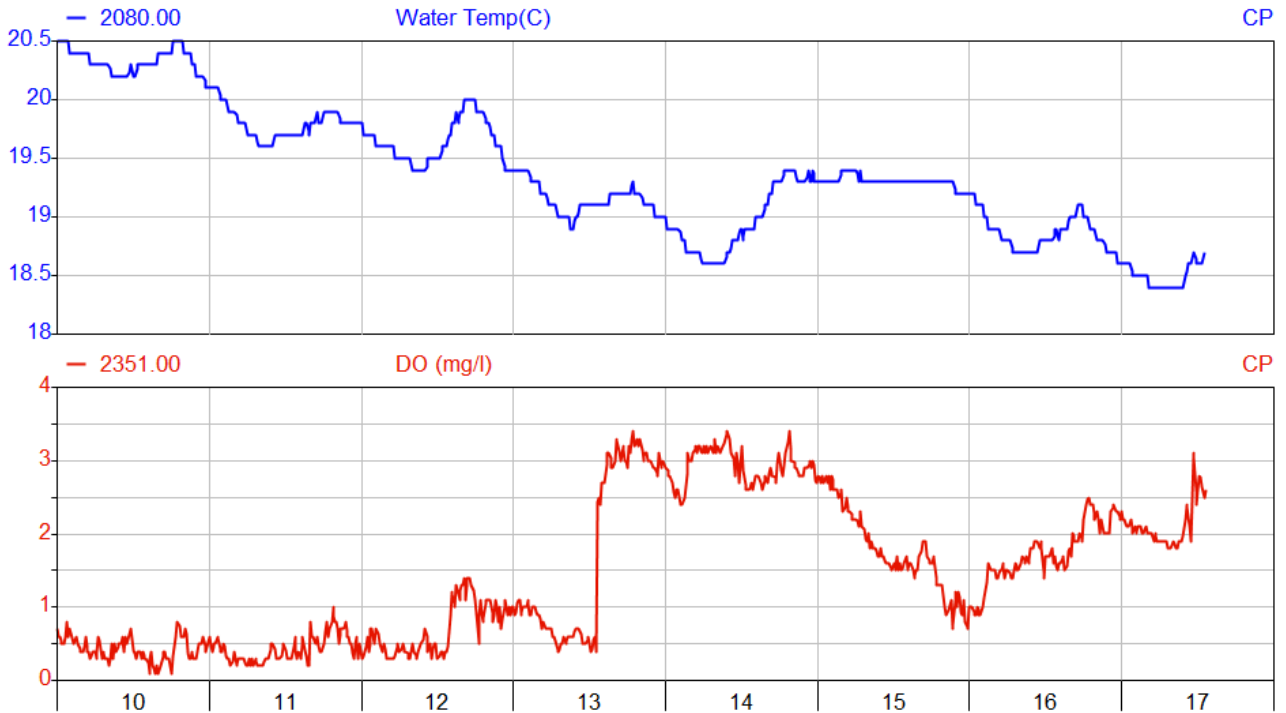


Figure 600: Continuous dissolved oxygen (mg/L) and water temperature (°C) in the Darling River at Menindee town

With a reduction in discharge, dissolved oxygen at Weir 32 has decreased slightly. Readings are still around 5 mg/L (Figure 601).

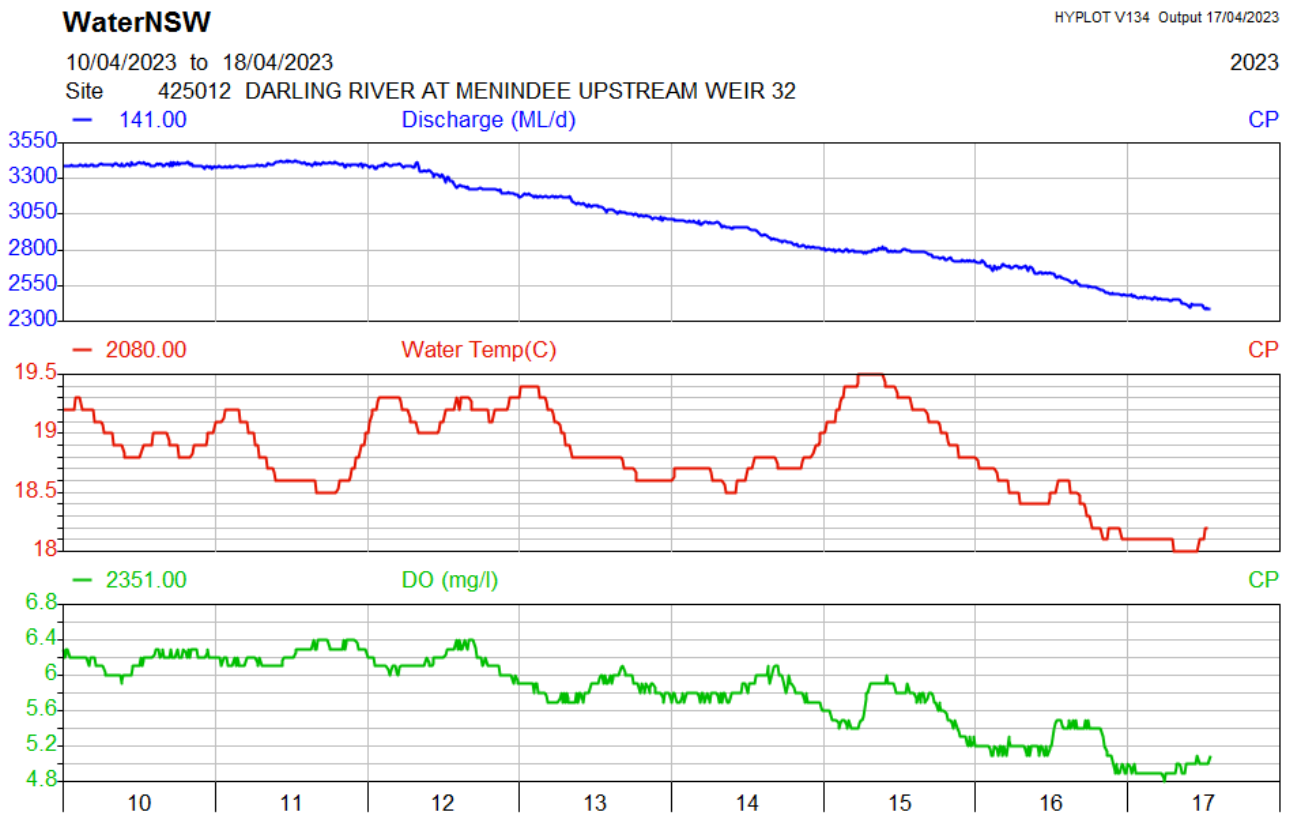


Figure 601: Continuous discharge (ML/day), dissolved oxygen (mg/L) and water temperature (°C) in the Darling River at Weir 32

Lower Darling

The Darling River at Pooncarie is an area of concern as the low oxygen water and impacts from decomposing fish make their way downstream. Monitoring is showing the low dissolved oxygen water has improved slightly over the past week (Table 65). Figure 602 shows sampling locations.

Table 65: Hand-held dissolved oxygen (mg/L) readings in the Darling River between Weir 32 and Wentworth

Monitoring site	30/3/23	31/3/23	01/4/23	02/4/23	03/4/23	4/4/23	6/4/23	11/4/23	13/4/23
Darling River at Weir 32					6.39				
Darling River at Tolarno					4.09				
Darling River at Karoola									4.91
Darling River at Moorara		1.33	1.38	1.71					
Darling River at Pooncarie	1.66	1.75	1.77	2.18	2.56		2.72		3.93
Darling River at Pooncarie bridge	1.76	2.01	1.85	2.31					
Darling River at Lethero	1.82	2.07	1.95	2.14	2.53				
Darling River at Burtundy			2.52	2.93		4.18		5.56	
Darling River at Ellerslie	2.75	3.08	3.15	3.42		5.44		5.7	

Monitoring site	30/3/23	31/3/23	01/4/23	02/4/23	03/4/23	4/4/23	6/4/23	11/4/23	13/4/23
Darling River at Tapio	4.04	3.48	3.7	4.27		5.51		6.03	
Wentworth			3.37						

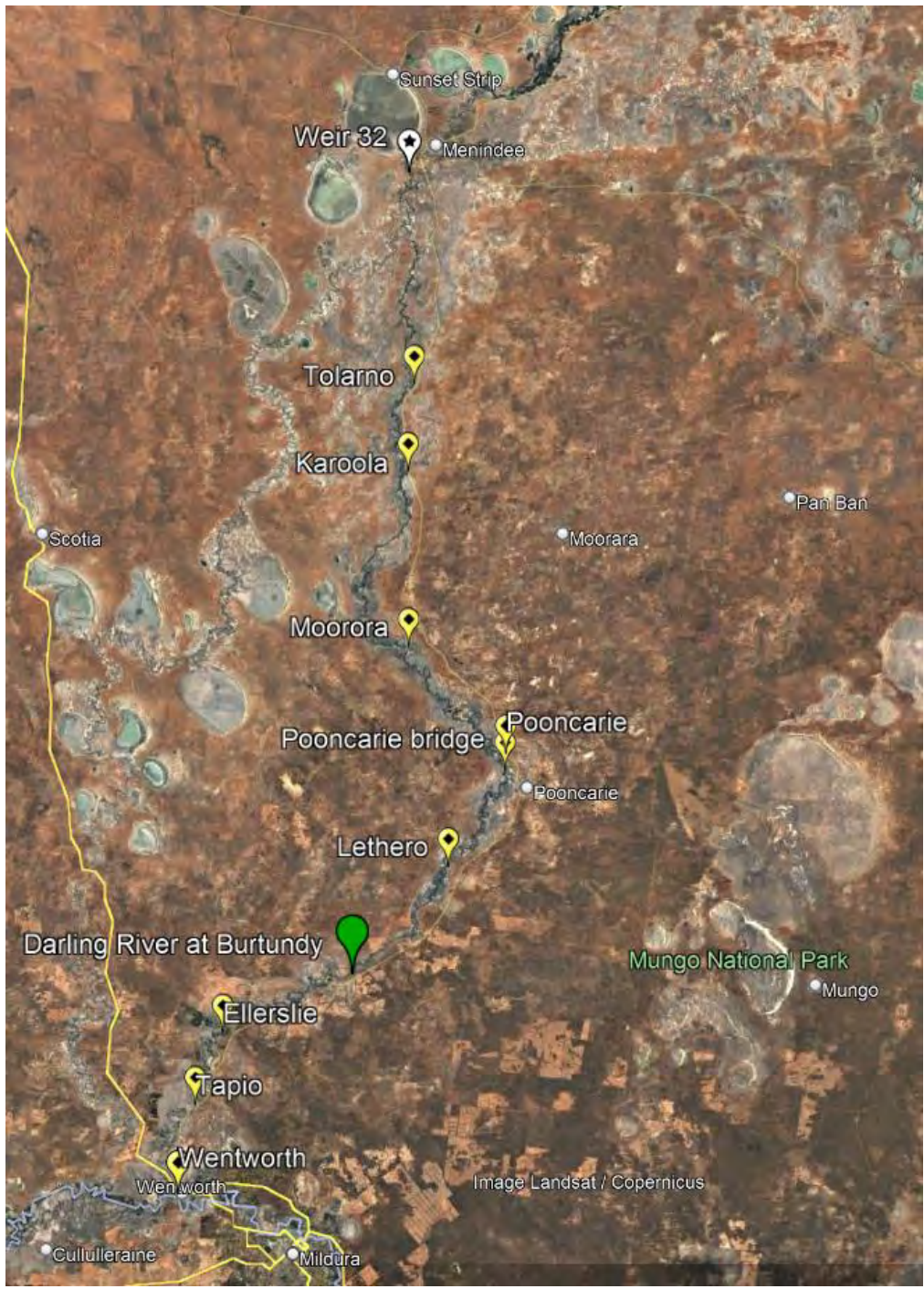


Figure 602: Lower Darling River sampling locations

Discharge in the Darling River at Pooncarie and Burtundy is just below 4,600 ML/day at both sites (Figure 603 and Figure 604). The continuous dissolved oxygen levels at Burtundy (Figure 604) have gradually increased over the past week.

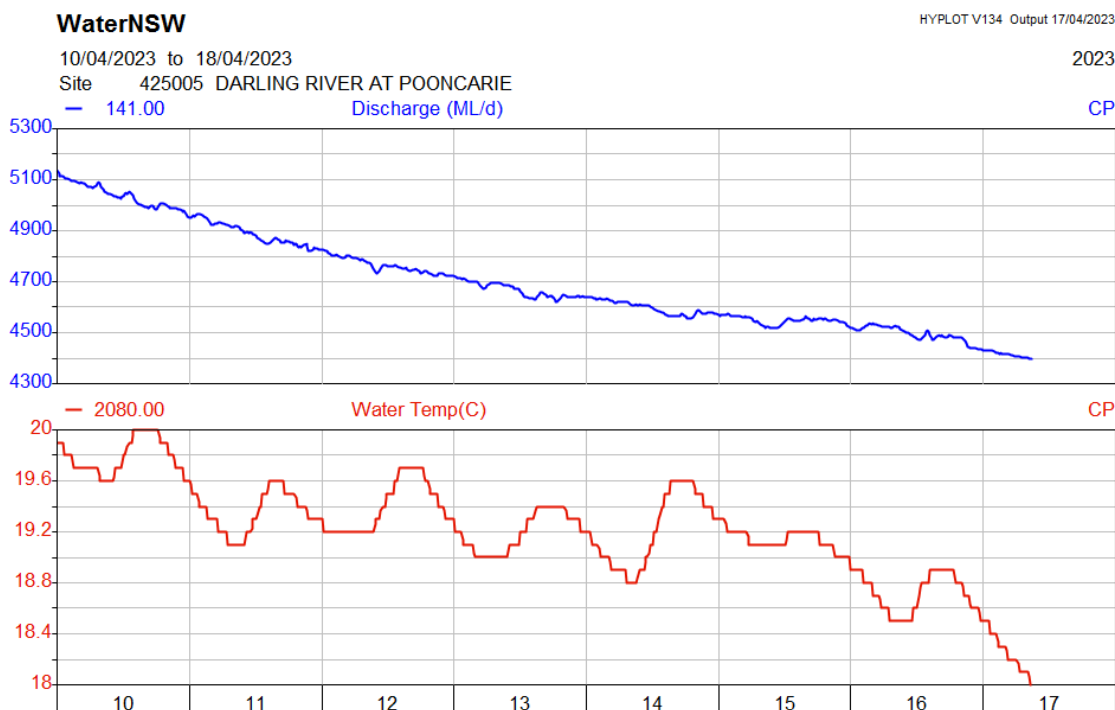


Figure 603: Continuous discharge (ML/day) and water temperature (°C) in the Darling River at Pooncarie

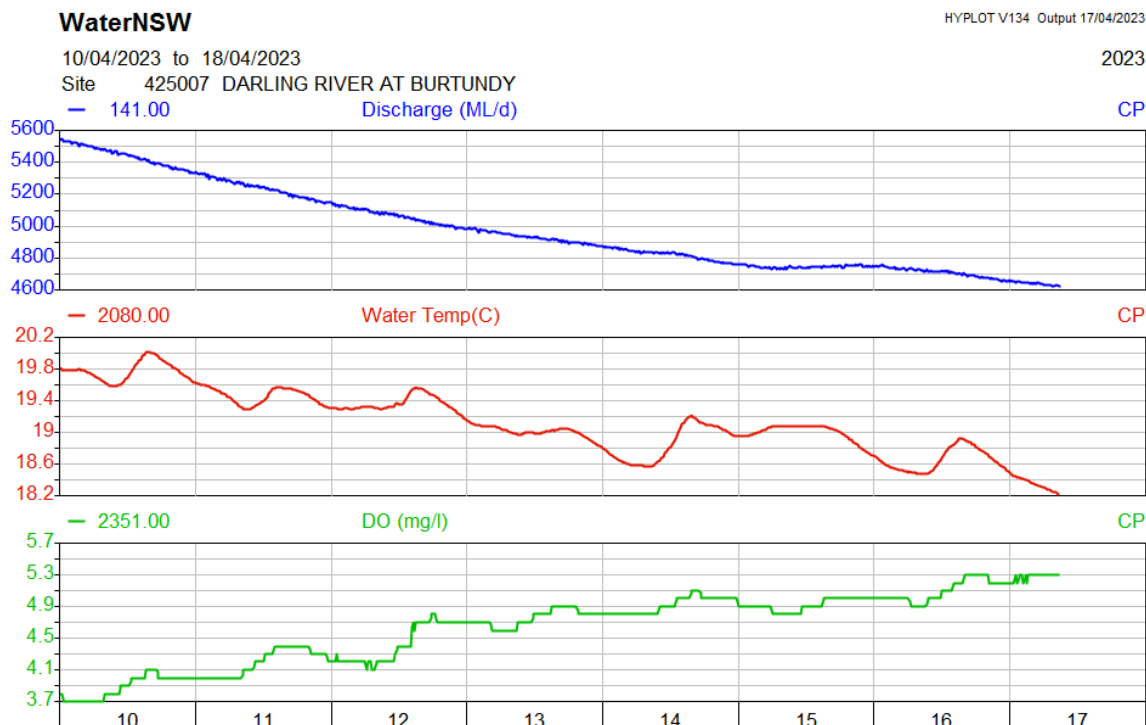


Figure 604: Continuous discharge (ML/day), dissolved oxygen (mg/L), water temperature (°C) in the Darling River at Burtundy

Murray River

Weekly routine hand-held readings in the Murray collected on 4 April, show dissolved oxygen levels above the critical threshold for fish at Merbein and Fort Courage (Table 66). Merbein is currently on amber alert and Fort Courage is on red alert for blue-green algae (Figure 606). Discharge in the Murray River at Colignan is 13600 ML/day.

Table 66: Weekly hand-held dissolved oxygen (mg/L) readings in the Murray River

Location	Date	Time	Dissolved Oxygen (mg/L)
Murray River at Merbein	11/4/2023	9:29 AM	9.10
Murray River at Fort Courage	11/4/2023	03:13 PM	8.80

Continuous dissolved oxygen readings in the Murray River at Wentworth have remained above 8 mg/L with water temperatures decreasing (Figure 605).



Figure 605: Continuous discharge (ML/day) and water temperature (°C) in the Murray River at Wentworth

Algal Alerts

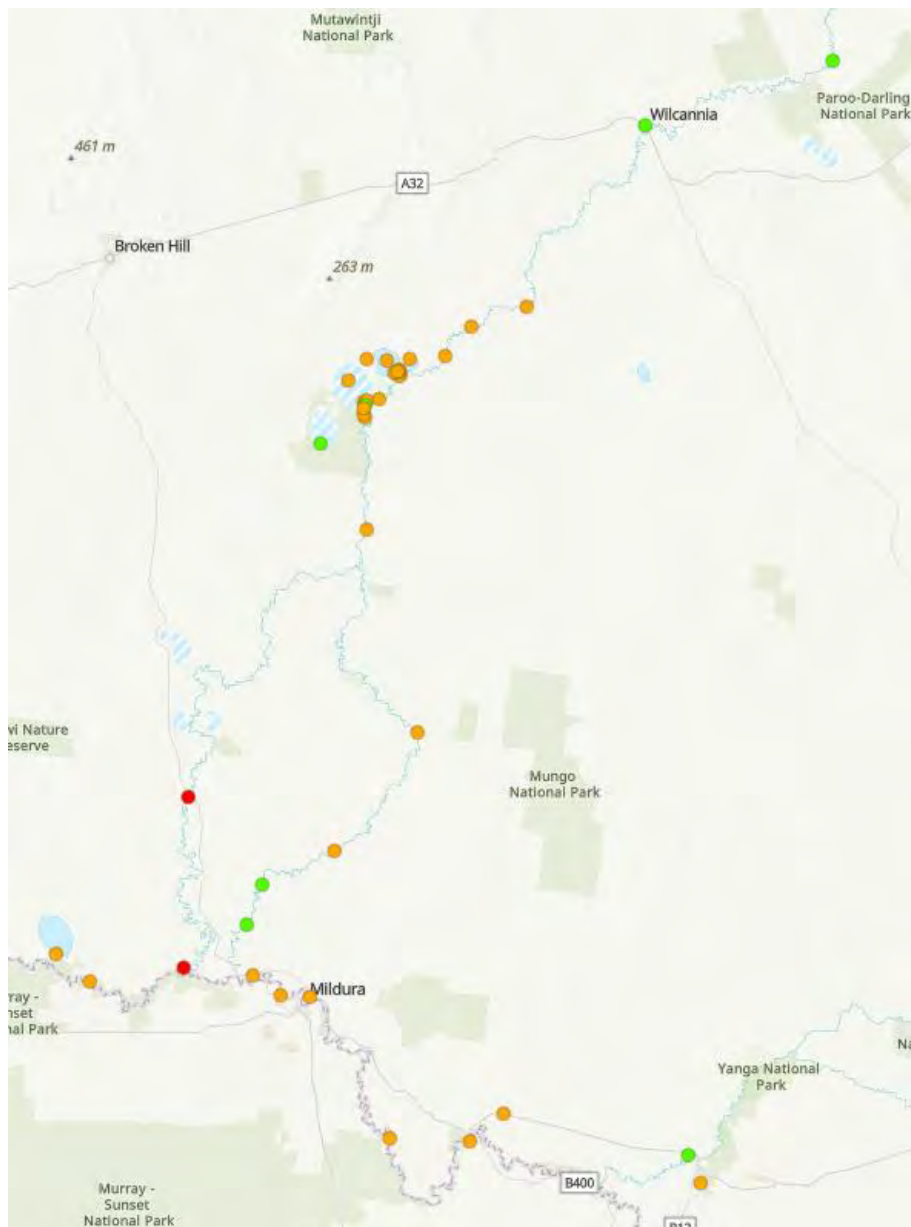


Figure 606: Latest algal alerts for the Darling, Menindee Lakes and Lower Murray.

The latest algal sampling results show most sites along the Darling, Menindee Lakes and Lower Murray are on amber alert for blue-green algae. The Anabranch and Fort Courage both have a red alert (Figure 606). Visit [WaterNSW algal alerts](#) for the most up-to-date information and warnings.

Weather Outlook

The Bureau of Meteorology 8-day total rain forecast (17 April to 24 April) indicates no rainfall predicted in western NSW (Figure 607). The forecast maximum air temperatures at Menindee and Wentworth are in the low 20s early in the week, increasing over the weekend (Figure 608 and Figure 609).

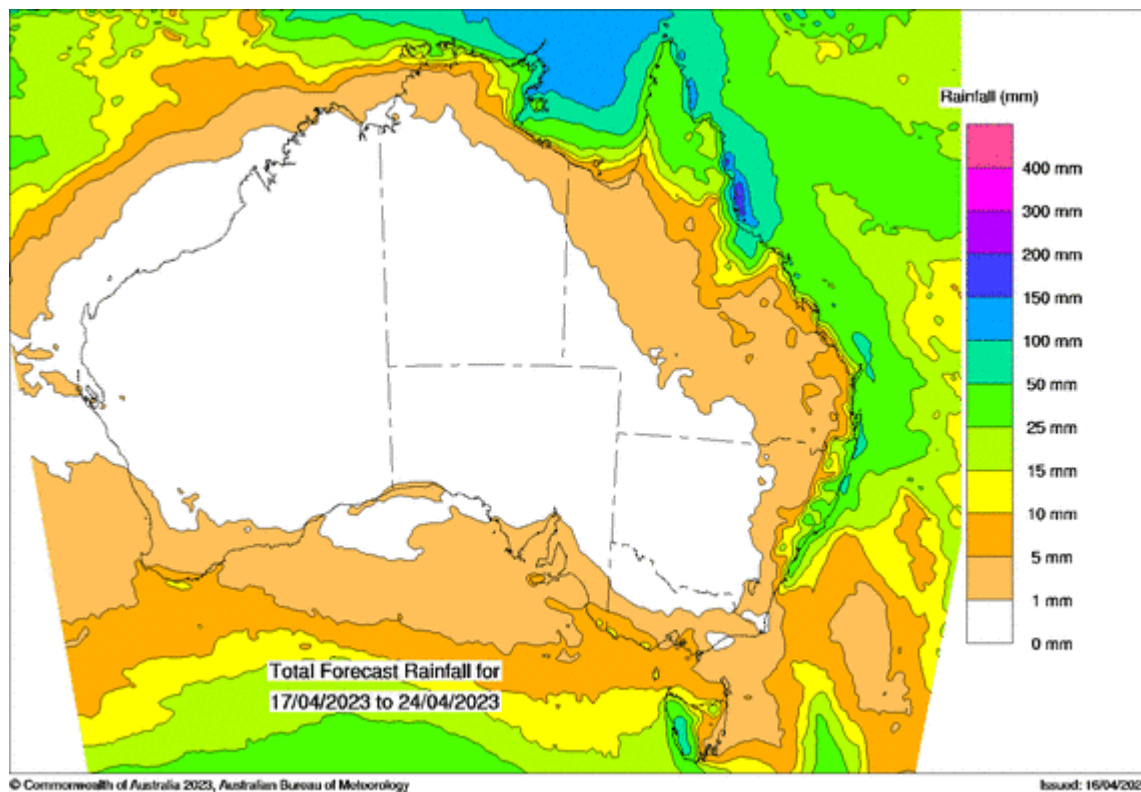
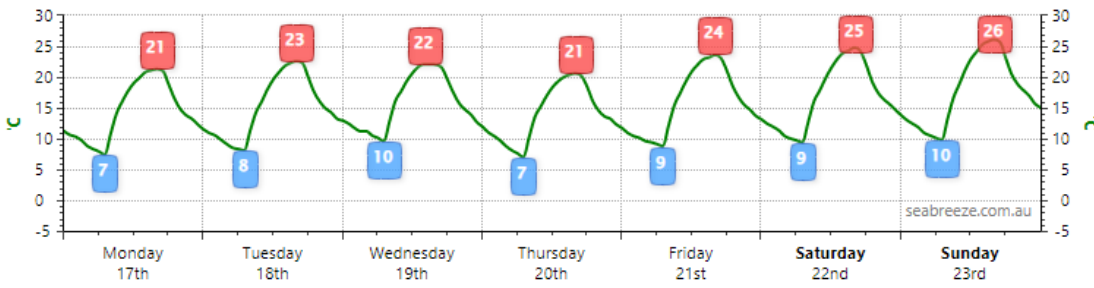


Figure 607: Bureau of Meteorology 8-day total rain forecast

7 Day Temperature Forecast for Menindee



7 Day Rain Forecast for Menindee

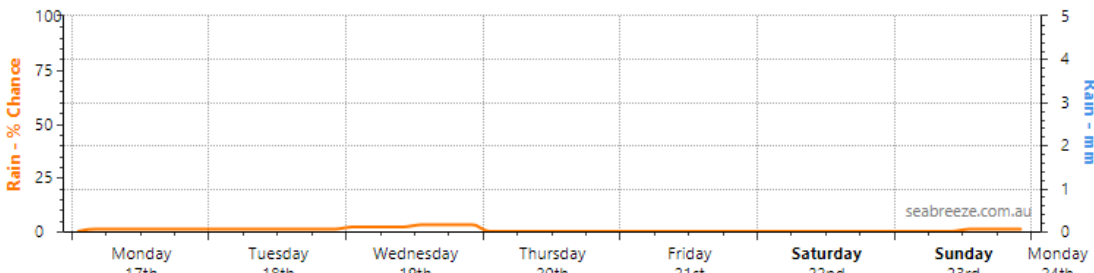
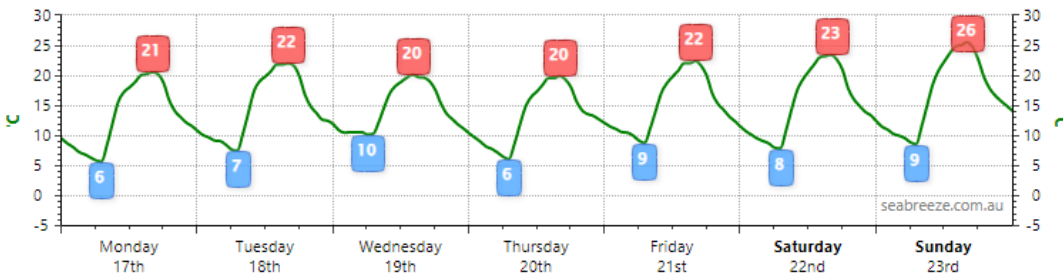


Figure 608: Forecast air temperatures and rainfall for Menindee

7 Day Temperature Forecast for Wentworth



7 Day Rain Forecast for Wentworth

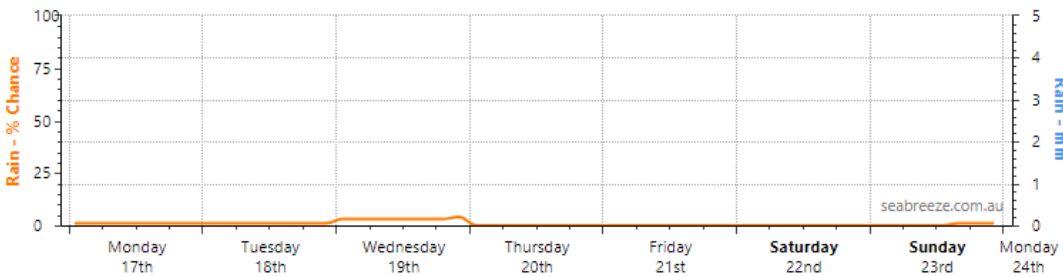


Figure 609: Forecast air temperatures and rainfall for Wentworth

Water quality update for Menindee and Lower Darling – 20 April 2023

Darling River and Menindee Lakes

Dissolved oxygen levels at Wilcannia are remaining above 6 mg/L during the day and above 5 mg/L during the night (Figure 610). As a general guide, native fish and other large aquatic organisms require at least 2 mg/L of dissolved oxygen to survive but may begin to suffer if levels are below 4 to 5 mg/L for prolonged periods.

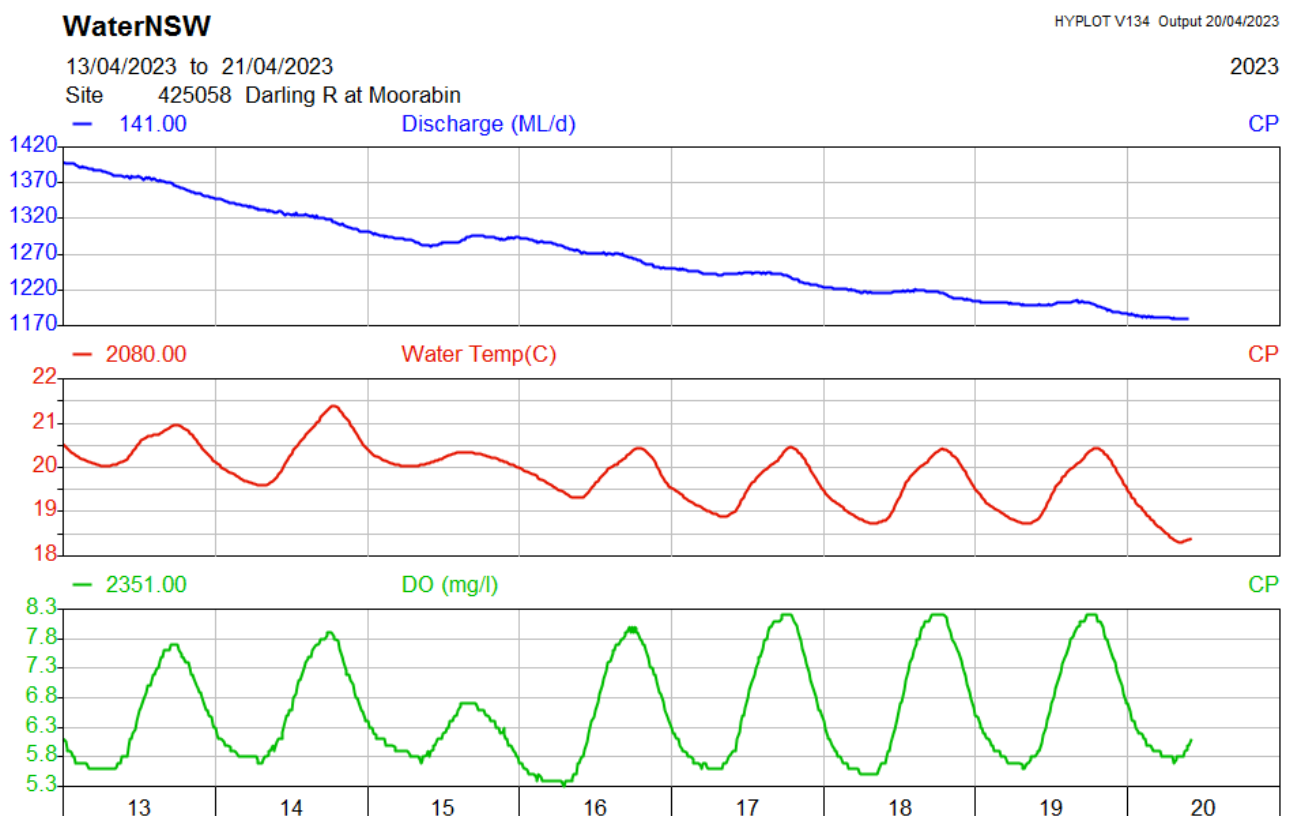


Figure 610: Discharge (ML/d), continuous dissolved oxygen (mg/L) and water temperature (°C) in the Darling River at Wilcannia (Moorabin)

The continuous dissolved oxygen monitoring site in the upper reaches of Lake Wetherell at Nelia Gaari is showing oxygen is dropping overnight and then recovering during the day. For the past 5 days, daytime readings have been increasing (Figure 611), possibly due to algal blooms.

13/04/2023 to 21/04/2023

2023

Site 425060 DARLING RIVER @ NELIA GAARI

— 2080.00 Water Temp(C)

CP

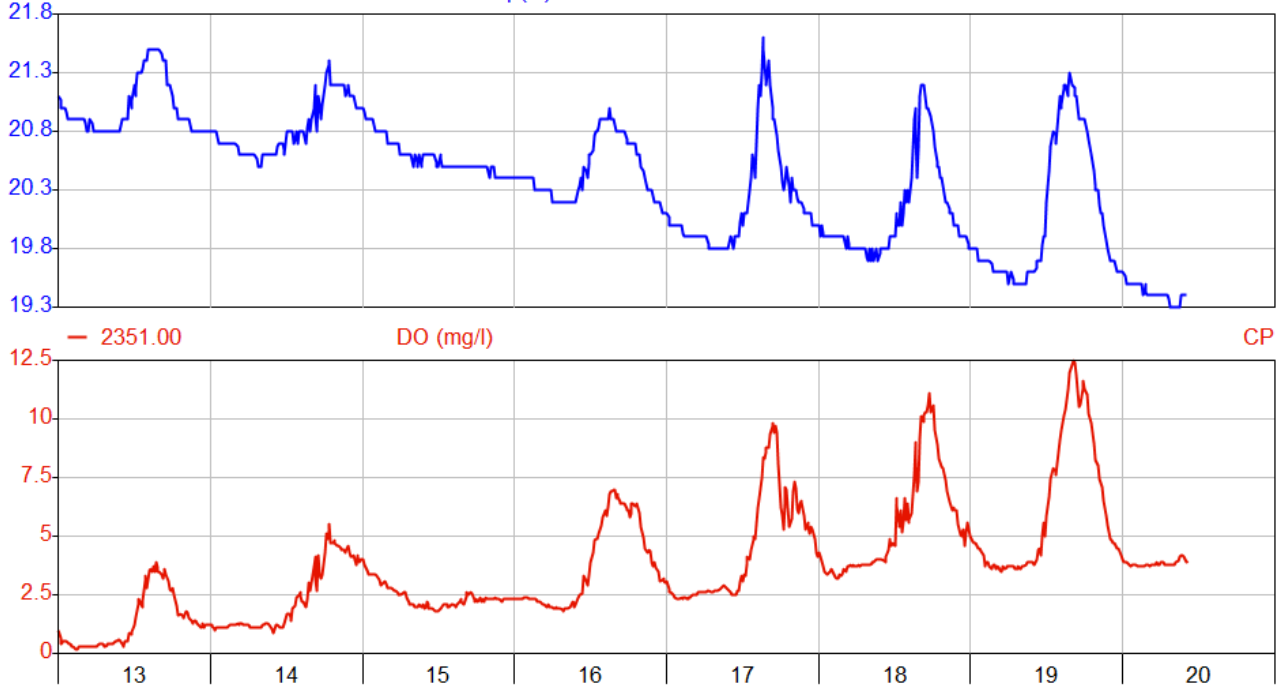


Figure 611: Continuous dissolved oxygen (mg/L) and water temperature (°C) in the Darling River at Nelia Gaari

Longitudinal Survey

Figure 612 is a Google Earth image showing the location and results from a longitudinal survey of dissolved oxygen levels down the Darling River from the Lake Pamamaroo outlet to the Rail Bridge at Menindee on 20 April. Dissolved oxygen levels are above 4 mg/L at most sites between Lake Pamamaroo and Menindee Creek.

Figure 613 is a graph showing the dissolved oxygen results from longitudinal surveys undertaken on 25 March and 1, 13 & 20 April. The graph highlights the gradual improvement of dissolved oxygen over the 3-4 week period.



Figure 612: Google Earth image showing dissolved oxygen results from the Lake Pamamaroo outlet to downstream of Menindee Creek – 20 April 2023

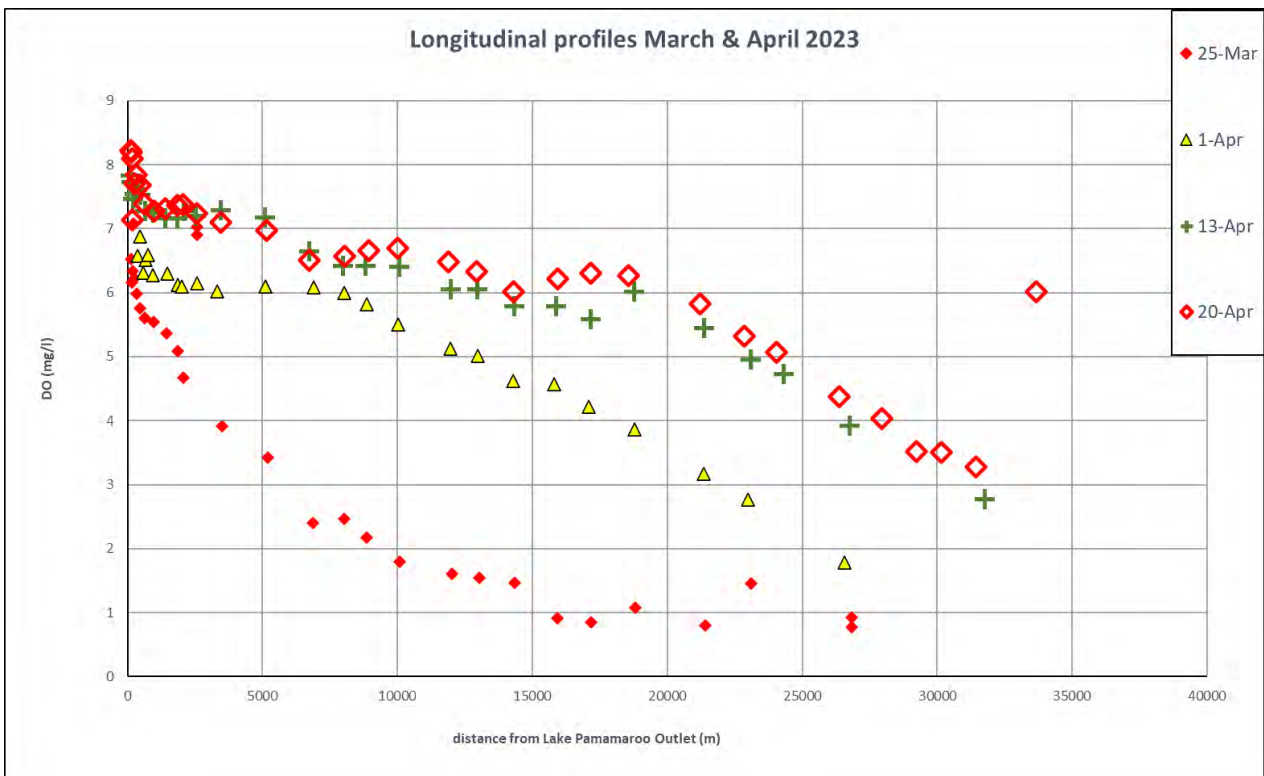


Figure 613: Graph of dissolved oxygen results from longitudinal profiles collected 25 March, 1, 13 and 20 April

The data from the temporary dissolved oxygen sensor installed at the Menindee pump station (at a depth of about 1 m from the water surface) is showing an improvement in overnight dissolved oxygen levels (Figure 614). A second dissolved oxygen sensor at the Menindee Town gauging station is showing dissolved oxygen levels near the riverbed. The dissolved oxygen levels have improved above 4 mg/L in recent days (Figure 615). The two sites are approximately 2 km apart by river.

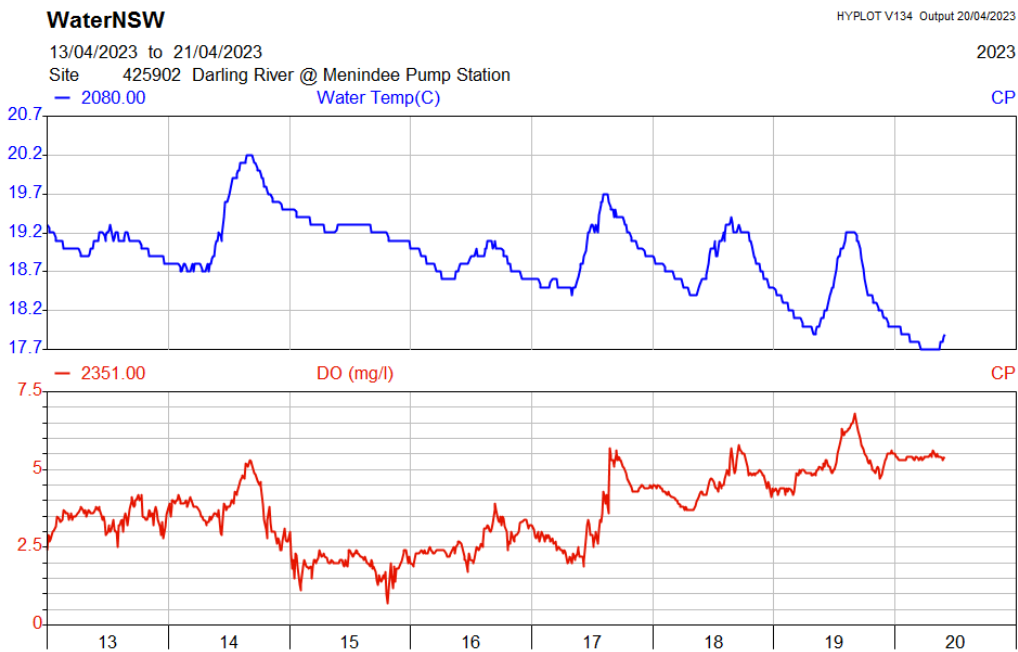


Figure 614: Continuous dissolved oxygen (mg/L) and water temperature (°C) in the Darling River at Menindee pump station

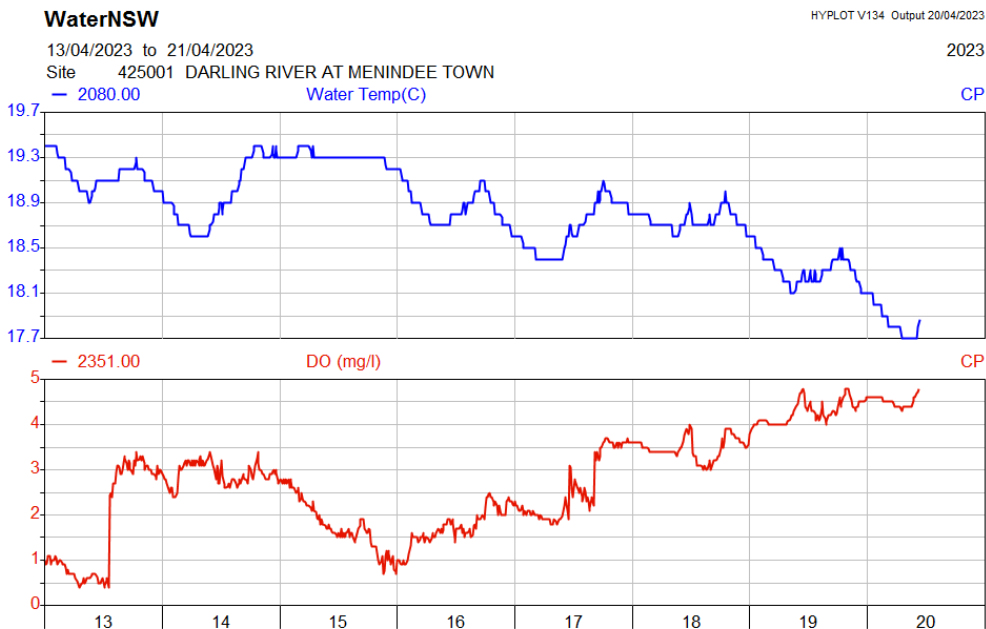


Figure 615: Continuous dissolved oxygen (mg/L) and water temperature (°C) in the Darling River at Menindee town

With a reduction in discharge, dissolved oxygen at Weir 32 briefly decreased below 4 mg/L on 19 April but have since recovered (Figure 616).

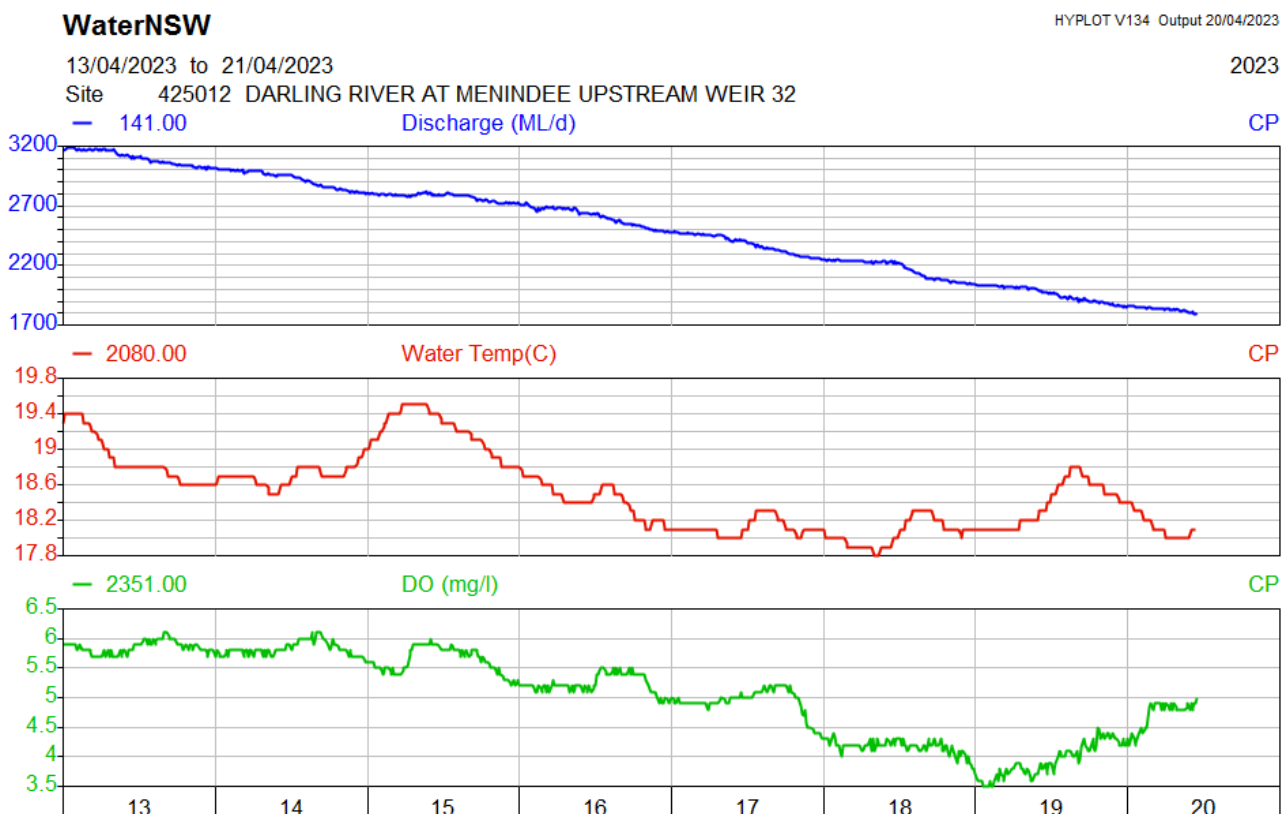


Figure 616: Continuous discharge (ML/day), dissolved oxygen (mg/L) and water temperature (°C) in the Darling River at Weir 32

Lower Darling

The Darling River at Pooncarie is an area of concern as the low oxygen water and impacts from decomposing fish make their way downstream. Monitoring is showing the low dissolved oxygen water has improved slightly over the past week (Table 67). Figure 617 shows sampling locations.

Table 67: Hand-held dissolved oxygen (mg/L) readings in the Darling River between Weir 32 and Wentworth

Monitoring site	30/3/23	31/3/23	01/4/23	02/4/23	03/4/23	4/4/23	6/4/23	11/4/23	13/4/23
Darling River at Weir 32					6.39				
Darling River at Tolarno					4.09				
Darling River at Karoola									4.91
Darling River at Moorara		1.33	1.38	1.71					
Darling River at Pooncarie	1.66	1.75	1.77	2.18	2.56		2.72		3.93
Darling River at Pooncarie bridge	1.76	2.01	1.85	2.31					
Darling River at Lethero	1.82	2.07	1.95	2.14	2.53				
Darling River at Burtundy			2.52	2.93		4.18		5.56	
Darling River at Ellerslie	2.75	3.08	3.15	3.42		5.44		5.7	

Monitoring site	30/3/23	31/3/23	01/4/23	02/4/23	03/4/23	4/4/23	6/4/23	11/4/23	13/4/23
Darling River at Tapio	4.04	3.48	3.7	4.27		5.51		6.03	
Wentworth			3.37						

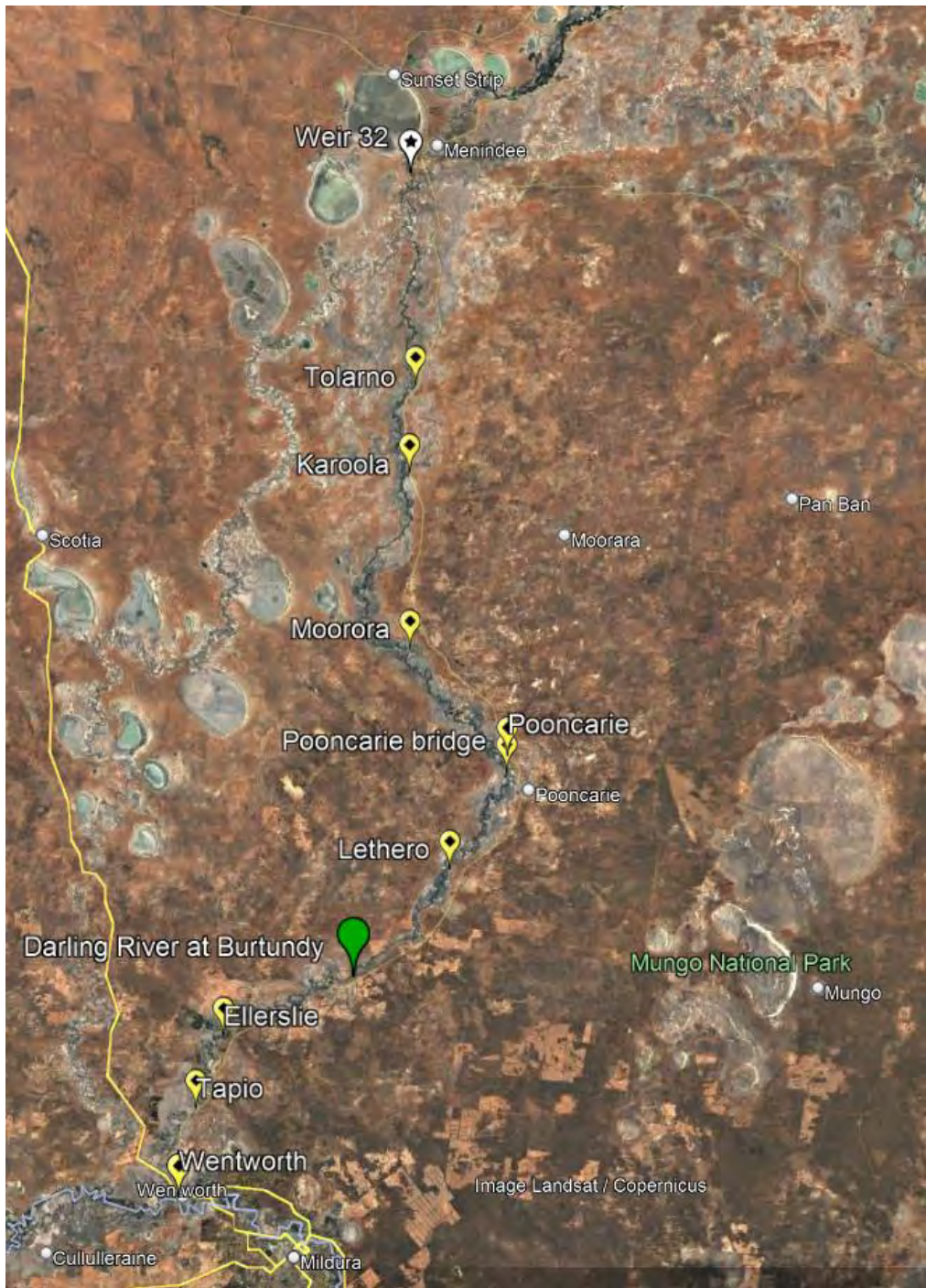


Figure 617: Lower Darling River sampling locations

Discharge in the Darling River at Pooncarie and Burtundy is decreasing at both sites (Figure 618 and Figure 619). The continuous dissolved oxygen level at Burtundy (Figure 619) has gradually increased over the past week and is currently above 5 mg/L.

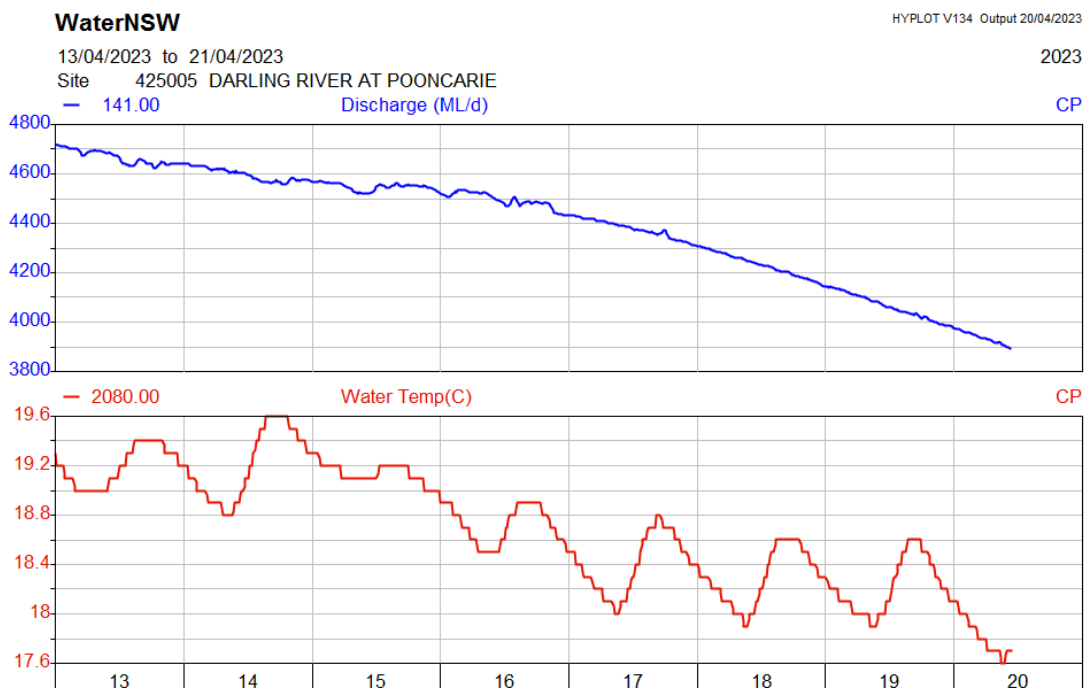


Figure 618: Continuous discharge (ML/day) and water temperature (°C) in the Darling River at Pooncarie

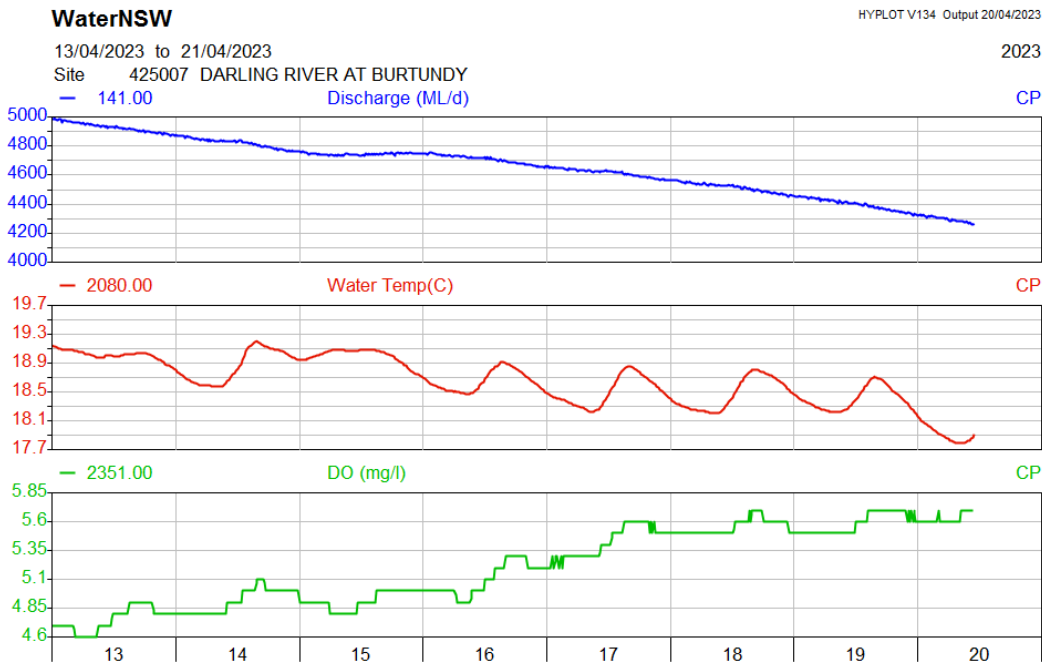


Figure 619: Continuous discharge (ML/day), dissolved oxygen (mg/L), water temperature (°C) in the Darling River at Burtundy

Murray River

Weekly routine hand-held readings in the Murray collected on 18 April, show dissolved oxygen levels above the critical threshold for fish at Merbein and Fort Courage (Table 68). Merbein is currently on amber alert and Fort Courage is on red alert for blue-green algae (Figure 621).

Table 68: Weekly hand-held dissolved oxygen (mg/L) readings in the Murray River

Location	Date	Time	Dissolved Oxygen (mg/L)
Murray River at Merbein	18/4/2023	02:18 PM	9.70
Murray River at Fort Courage	18/4/2023	01:24 PM	8.62

Continuous dissolved oxygen readings in the Murray River at Wentworth have remained above 8 mg/L with water temperatures decreasing (Figure 620).



Figure 620: Continuous discharge (ML/day) and water temperature (°C) in the Murray River at Wentworth

Algal Alerts

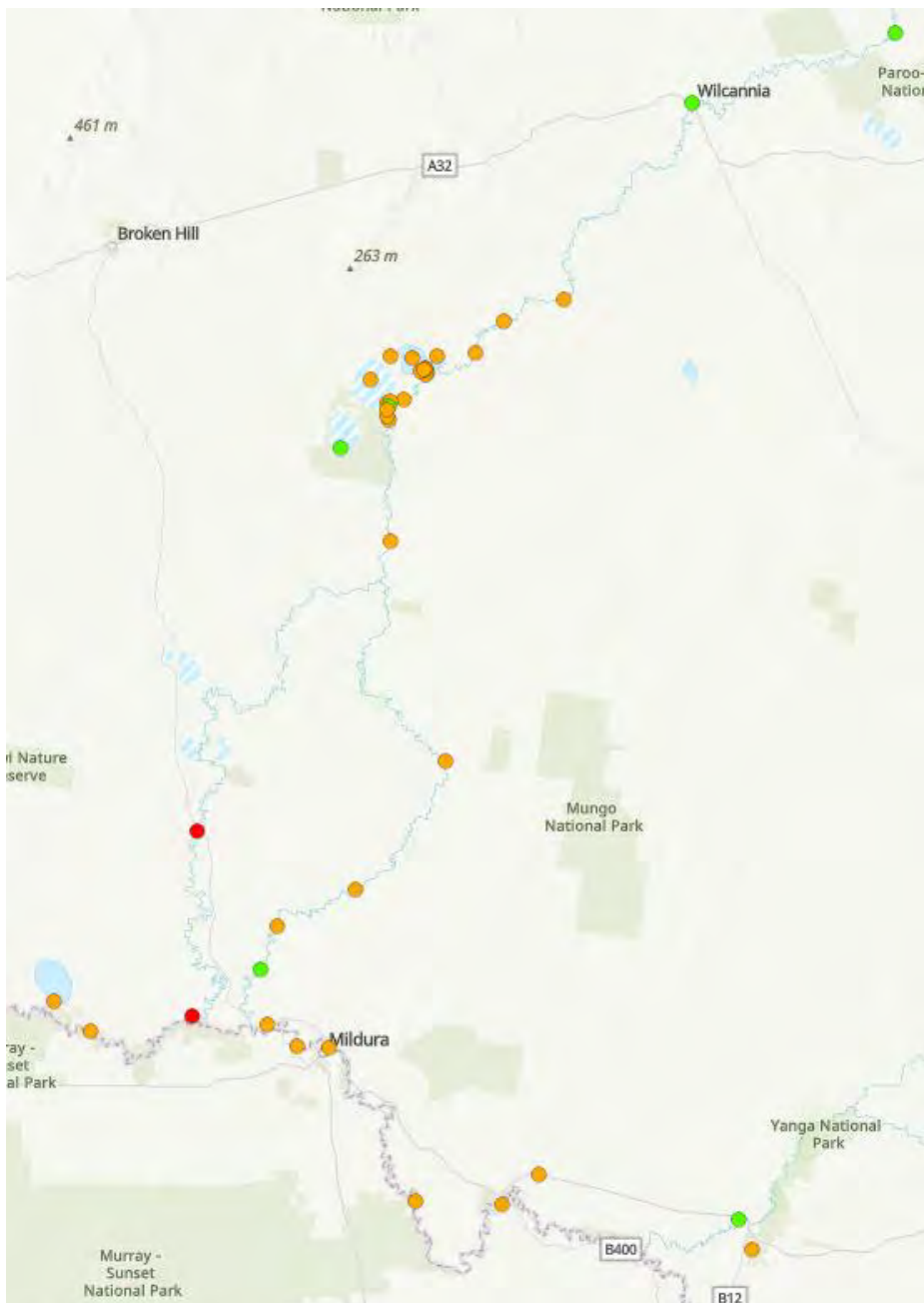


Figure 621: Latest algal alerts for the Darling, Menindee Lakes and Lower Murray.

The latest algal sampling results show most sites along the Darling, Menindee Lakes and Lower Murray are on amber alert for blue-green algae. The Anabranch and Fort Courage both have a red alert (Figure 621). Visit [WaterNSW algal alerts](#) for the most up-to-date information and warnings.

Weather Outlook

The Bureau of Meteorology 8-day total rain forecast (20 April to 27 April) indicates 10-15mm rainfall predicted in western NSW (Figure 622). The forecast maximum air temperatures at Menindee and Wentworth are increasing over the week, reaching high 20's on Monday (Figure 623 and Figure 624).

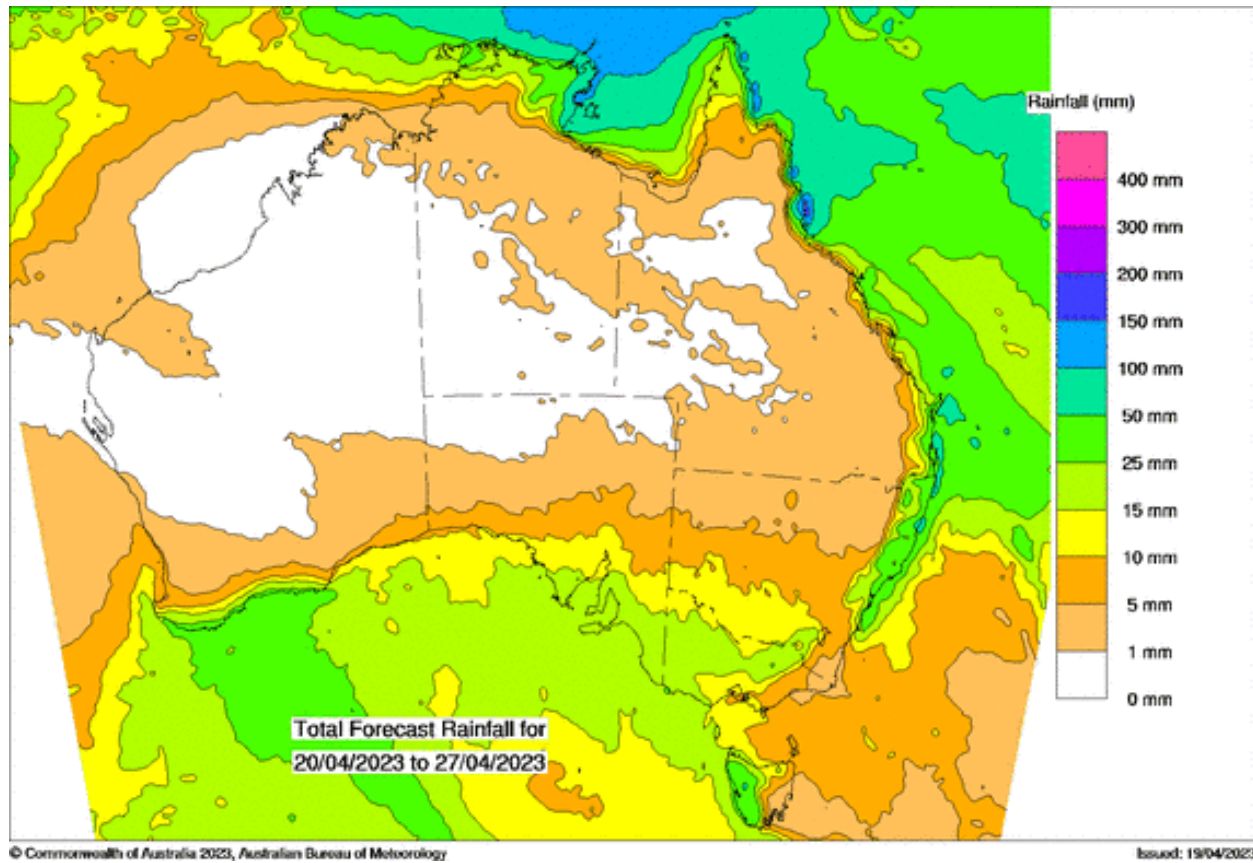


Figure 622: Bureau of Meteorology 8-day total rain forecast

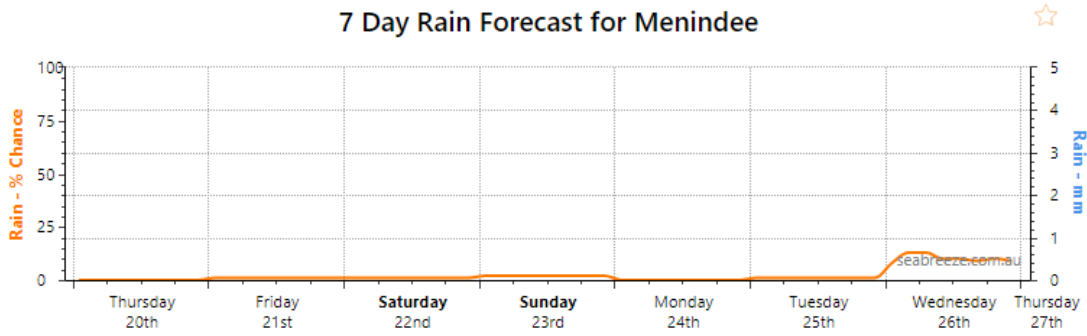
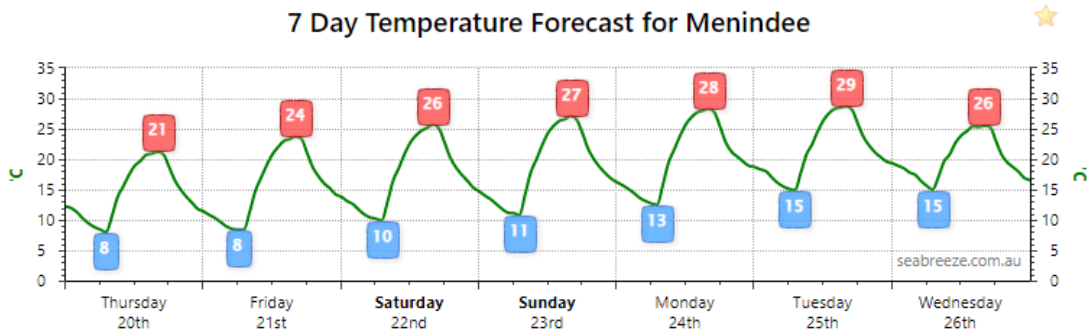
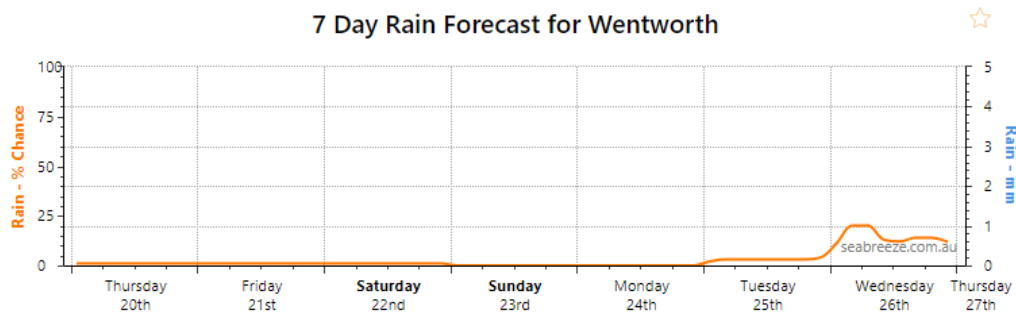
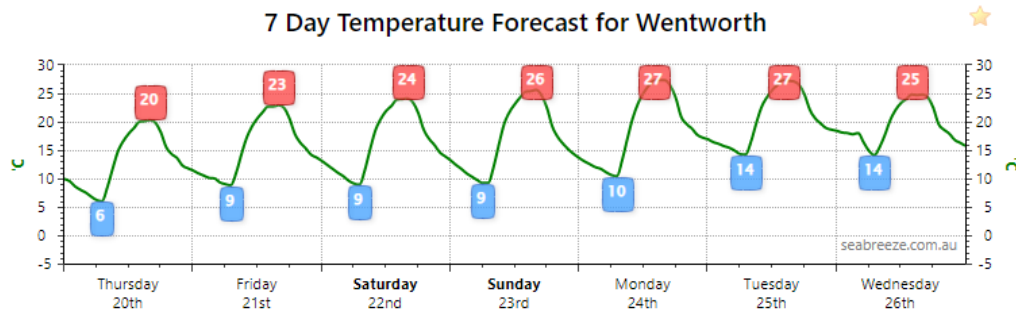


Figure 623: Forecast air temperatures and rainfall for Menindee



Weather information based on data supplied by the Bureau of Meteorology and other sources.

Figure 624: Forecast air temperatures and rainfall for Wentworth

Water quality update for Menindee and Lower Darling – 26 April 2023

Darling River and Menindee Lakes

Dissolved oxygen levels at Wilcannia are remaining above 7 mg/L during the day and above 5 mg/L during the night (Figure 625). As a general guide, native fish and other large aquatic organisms require at least 2 mg/L of dissolved oxygen to survive but may begin to suffer if levels are below 4 to 5 mg/L for prolonged periods.

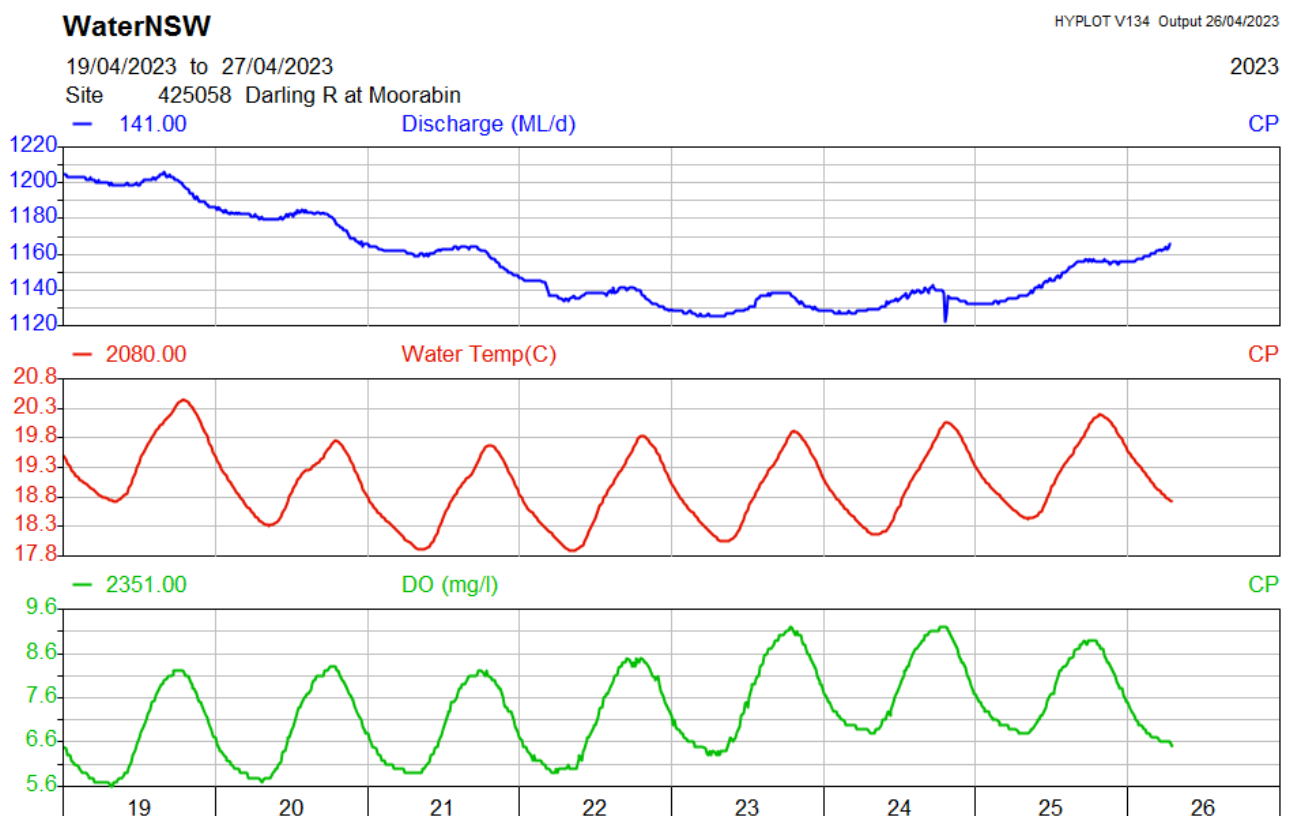


Figure 625: Discharge (ML/d), continuous dissolved oxygen (mg/L) and water temperature (°C) in the Darling River at Wilcannia (Moorabin)

The continuous dissolved oxygen monitoring site in the upper reaches of Lake Wetherell at Nelia Gaari is showing oxygen is dropping overnight and then recovering during the day. Overnight minimums have been remaining above 3 mg/L for the past 7 days (Figure 626).

19/04/2023 to 27/04/2023

2023

Site 425060 DARLING RIVER @ NELIA GAARI

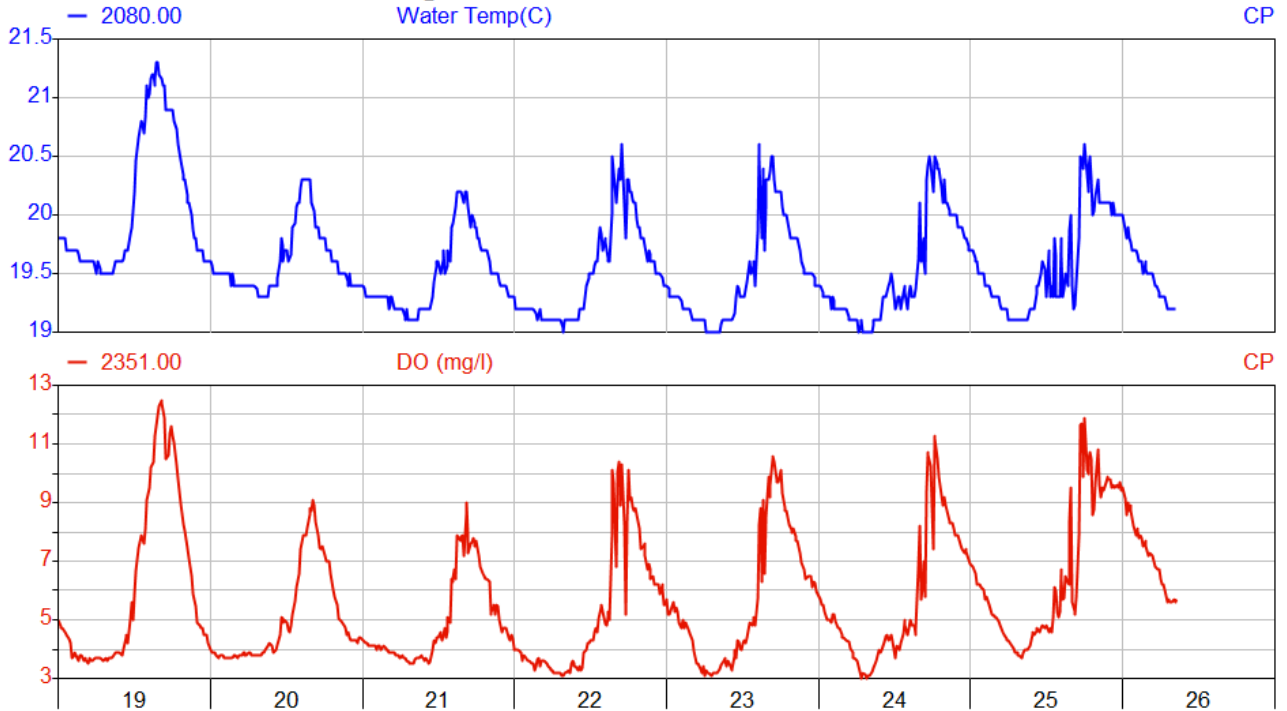


Figure 626: Continuous dissolved oxygen (mg/L) and water temperature (°C) in the Darling River at Nelia Gaari

Table 69: Hand-held dissolved oxygen (mg/L) readings in Lake Wetherell Site 2 - 24 April 2023

Sample depth (m)	Dissolved oxygen (mg/L)	Temperature (°C)
0.25	5.51	20
0.5	2.5	19.5
1	1.79	19.3
2	1.53	19.3
3	1.37	19.2
4	1.28	19.2
5	1.23	19.2
6	1.18	19.2
7	1.11	19.25

Sample depth (m)	Dissolved oxygen (mg/L)	Temperature (°C)
8	1.07	19.2
9	1.03	19.2
9.9	0.99	19.2

Longitudinal Survey

Figure 627 is a Google Earth image showing the location and results from a longitudinal survey of dissolved oxygen levels down the Darling River from the Lake Pamamaroo outlet to the Rail Bridge at Menindee on 24 April. Dissolved oxygen levels are above 4 mg/L at all sites between Lake Pamamaroo and Menindee Creek.

Figure 628 is a graph showing the dissolved oxygen results from longitudinal surveys undertaken on 25 March and 11, 20 and 24 April. The graph highlights continual improvement in dissolved oxygen.

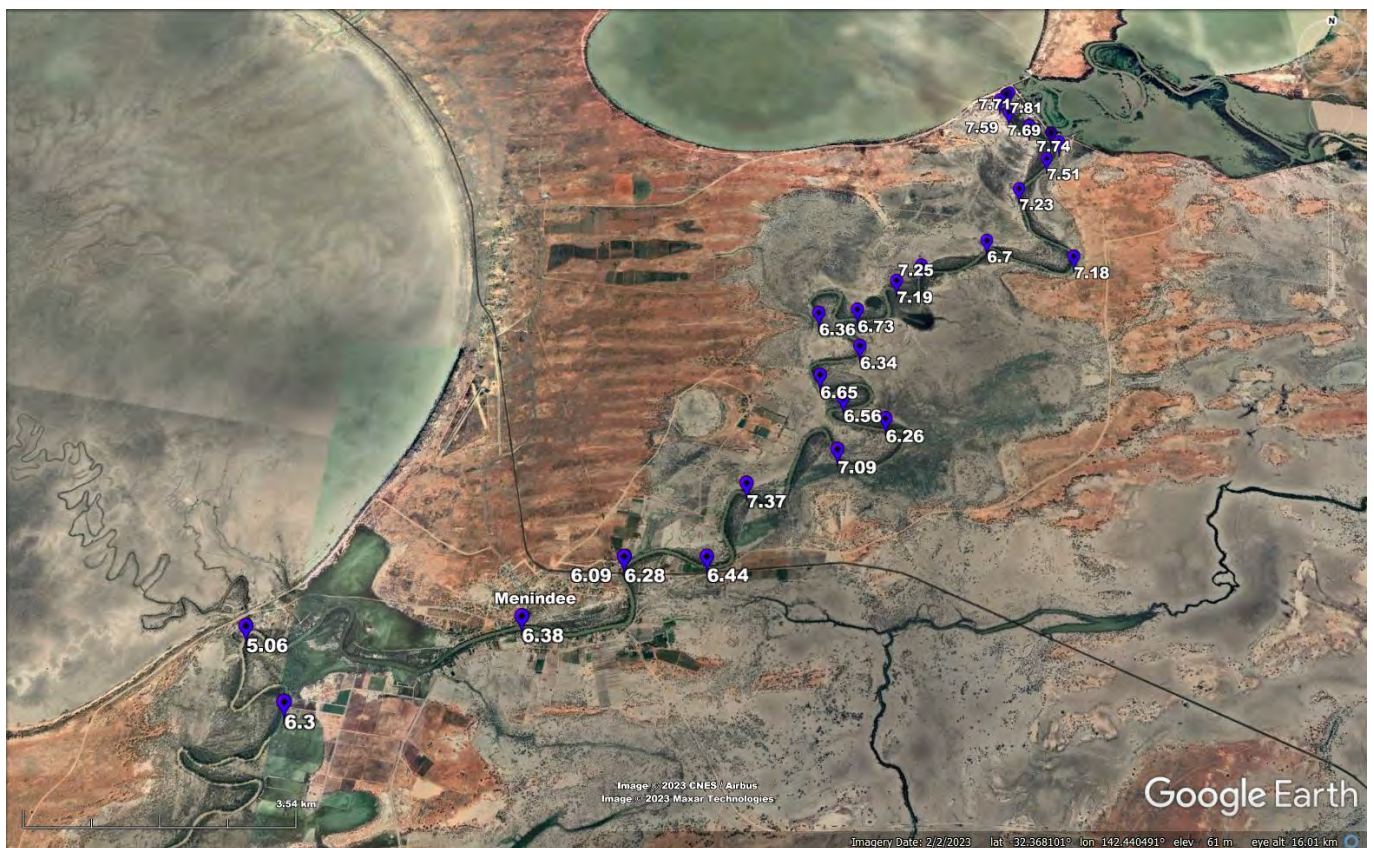
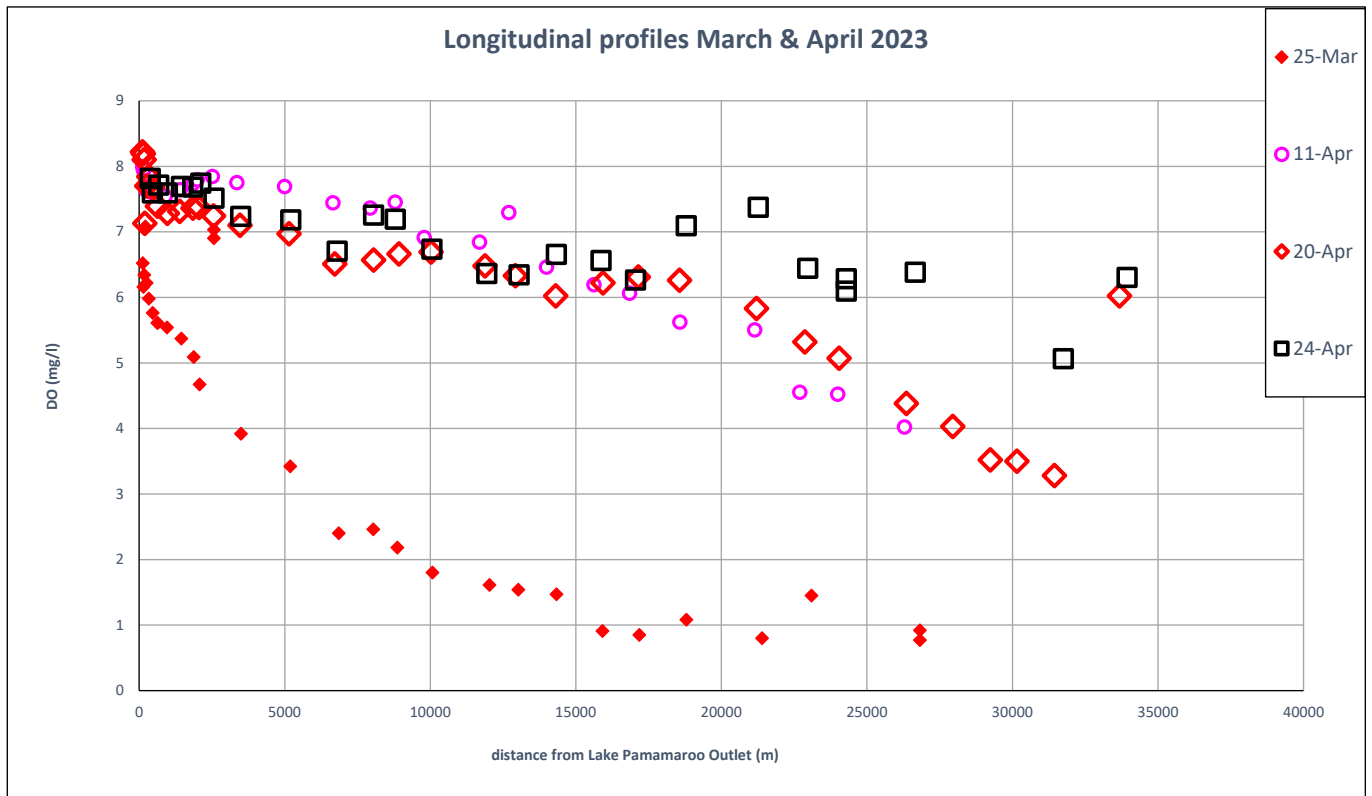


Figure 627: Google Earth image showing dissolved oxygen results from the Lake Pamamaroo outlet to downstream of Menindee Creek – 24 April 2023



WaterNSW

HYPLOT V134 Output 26/04/2023

19/04/2023 to 27/04/2023

2023

Site 425902 Darling River @ Menindee Pump Station

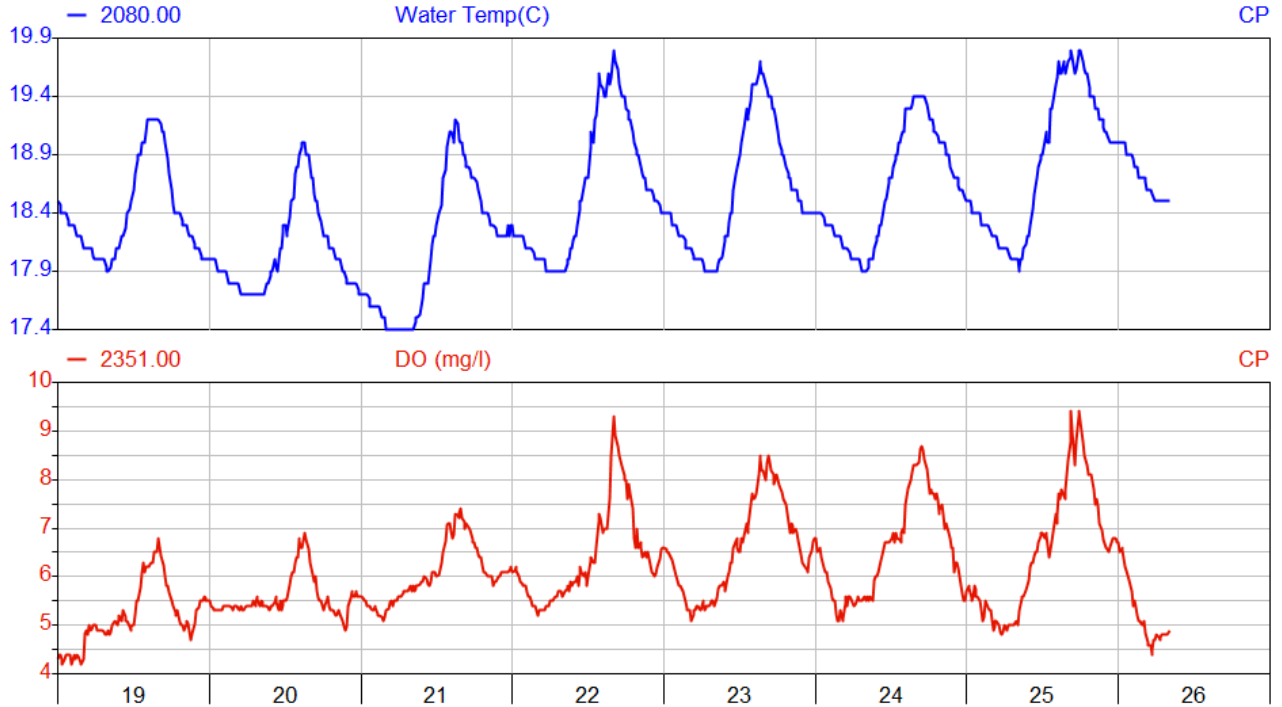


Figure 629: Continuous dissolved oxygen (mg/L) and water temperature (°C) in the Darling River at Menindee pump station

WaterNSW

HYPLOT V134 Output 26/04/2023

19/04/2023 to 27/04/2023

2023

Site 425001 DARLING RIVER AT MENINDEE TOWN

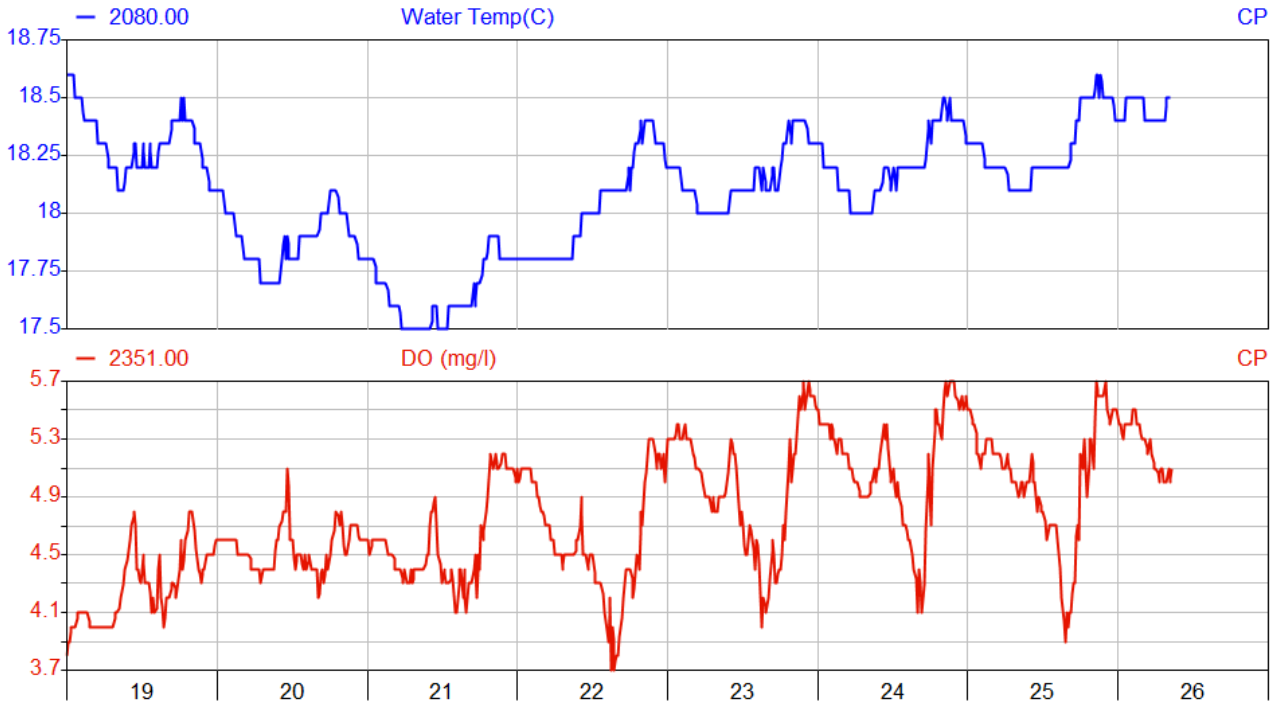


Figure 630: Continuous dissolved oxygen (mg/L) and water temperature (°C) in the Darling River at Menindee town

With a reduction in discharge, dissolved oxygen at Weir 32 briefly decreased below 4 mg/L on 19 April but has since recovered (Figure 631).

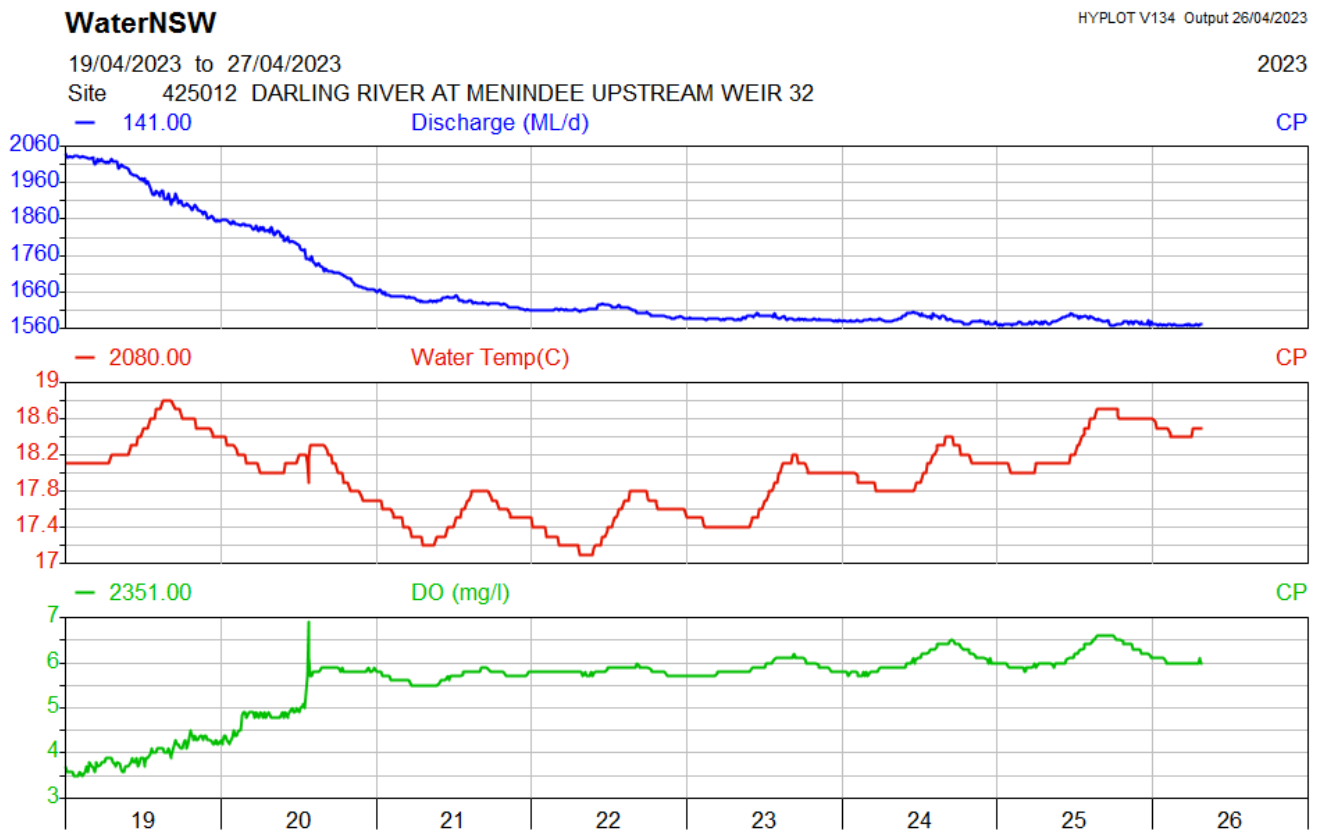


Figure 631: Continuous discharge (ML/day), dissolved oxygen (mg/L) and water temperature (°C) in the Darling River at Weir 32

Lower Darling

The Darling River at Pooncarie is an area of concern as the low oxygen water and impacts from decomposing fish make their way downstream. Monitoring is showing the low dissolved oxygen water has improved slightly over the past week (Table 70). Figure 632 shows sampling locations.

Table 70: Hand-held dissolved oxygen (mg/L) readings in the Darling River between Weir 32 and Wentworth

Monitoring site	30/3/23	31/3/23	01/4/23	02/4/23	03/4/23	4/4/23	6/4/23	11/4/23	13/4/23
Darling River at Weir 32					6.39				
Darling River at Tolarno					4.09				
Darling River at Karoola									4.91
Darling River at Moorara		1.33	1.38	1.71					
Darling River at Pooncarie	1.66	1.75	1.77	2.18	2.56		2.72		3.93
Darling River at Pooncarie bridge	1.76	2.01	1.85	2.31					
Darling River at Lethero	1.82	2.07	1.95	2.14	2.53				
Darling River at Burtundy			2.52	2.93		4.18		5.56	
Darling River at Ellerslie	2.75	3.08	3.15	3.42		5.44		5.7	

Monitoring site	30/3/23	31/3/23	01/4/23	02/4/23	03/4/23	4/4/23	6/4/23	11/4/23	13/4/23
Darling River at Tapio	4.04	3.48	3.7	4.27		5.51		6.03	
Wentworth			3.37						

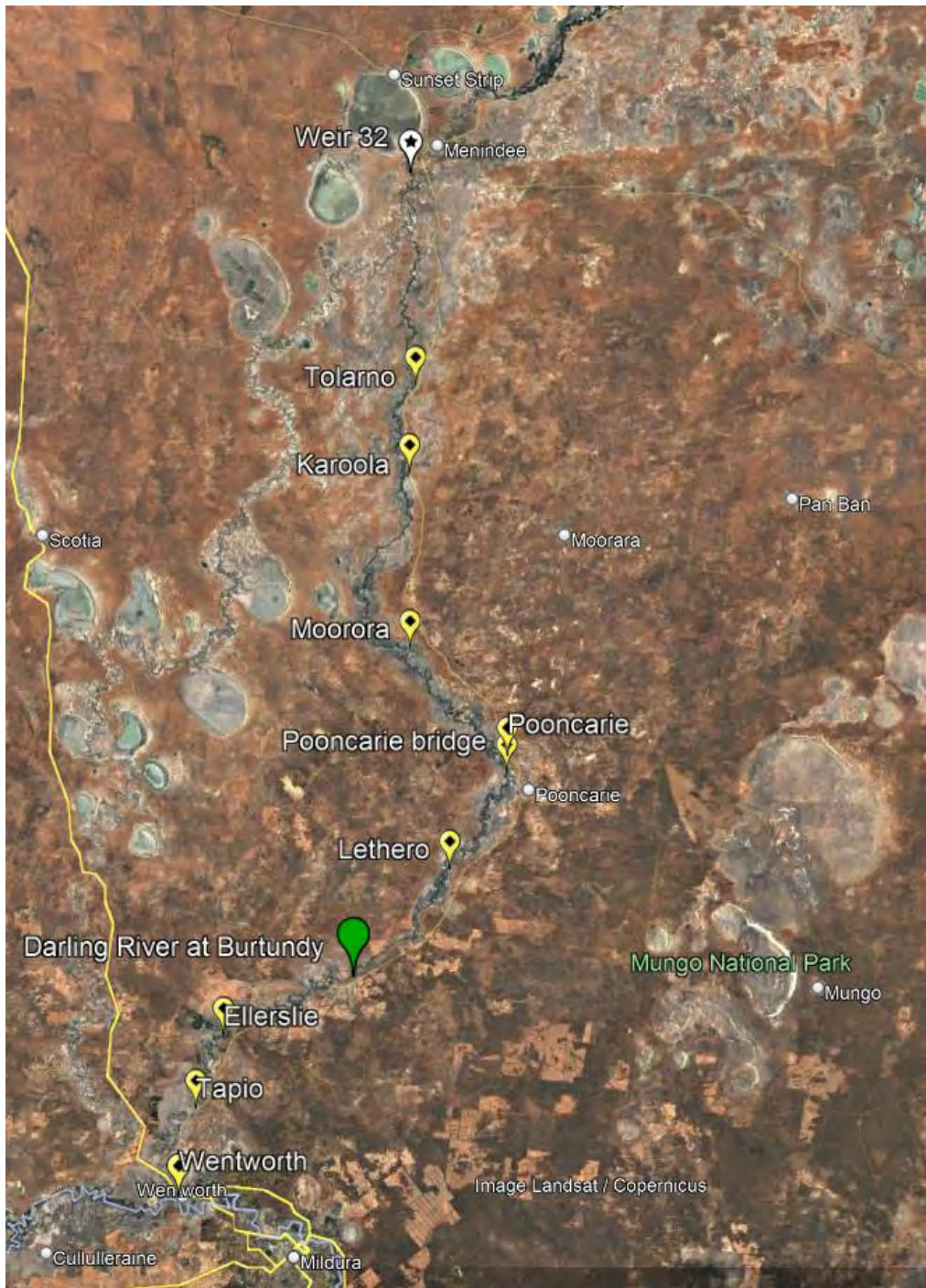


Figure 632: Lower Darling River sampling locations

Discharge in the Darling River at Pooncarie and Burtundy is decreasing at both sites (Figure 633 and Figure 634). The continuous dissolved oxygen level at Burtundy (Figure 634) is remaining above 5 mg/L.

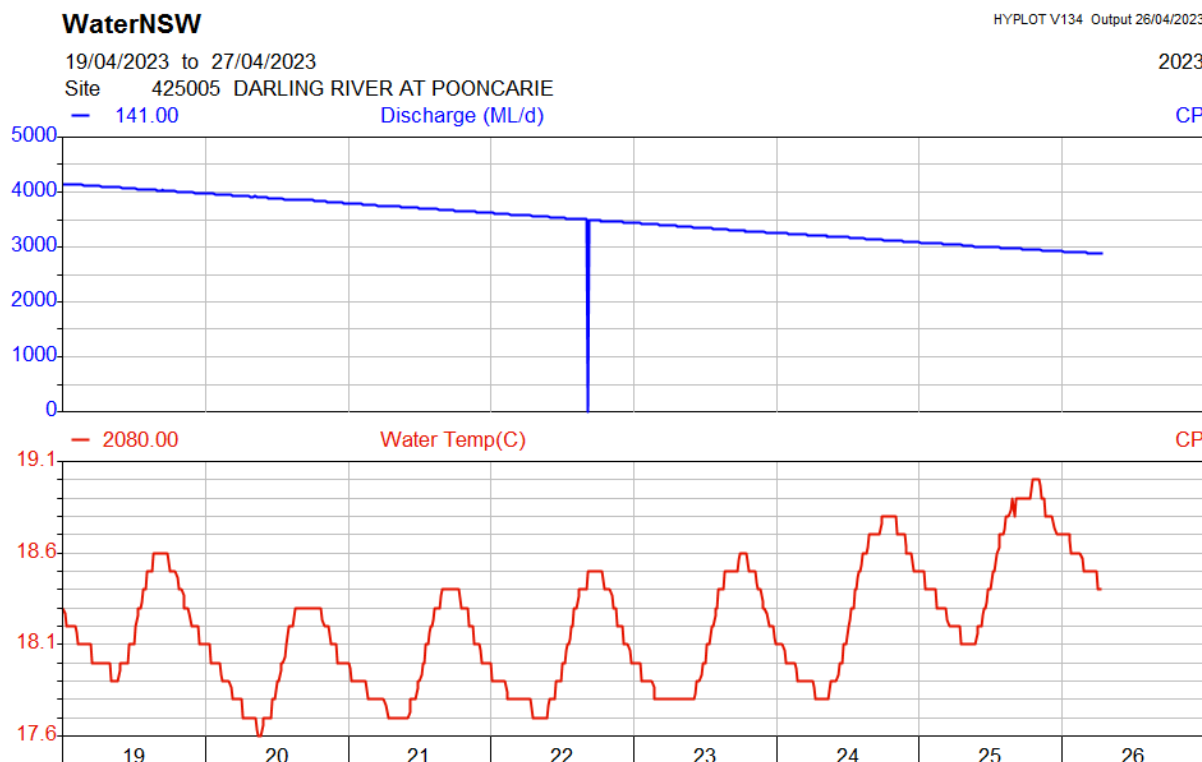


Figure 633: Continuous discharge (ML/day) and water temperature (°C) in the Darling River at Pooncarie

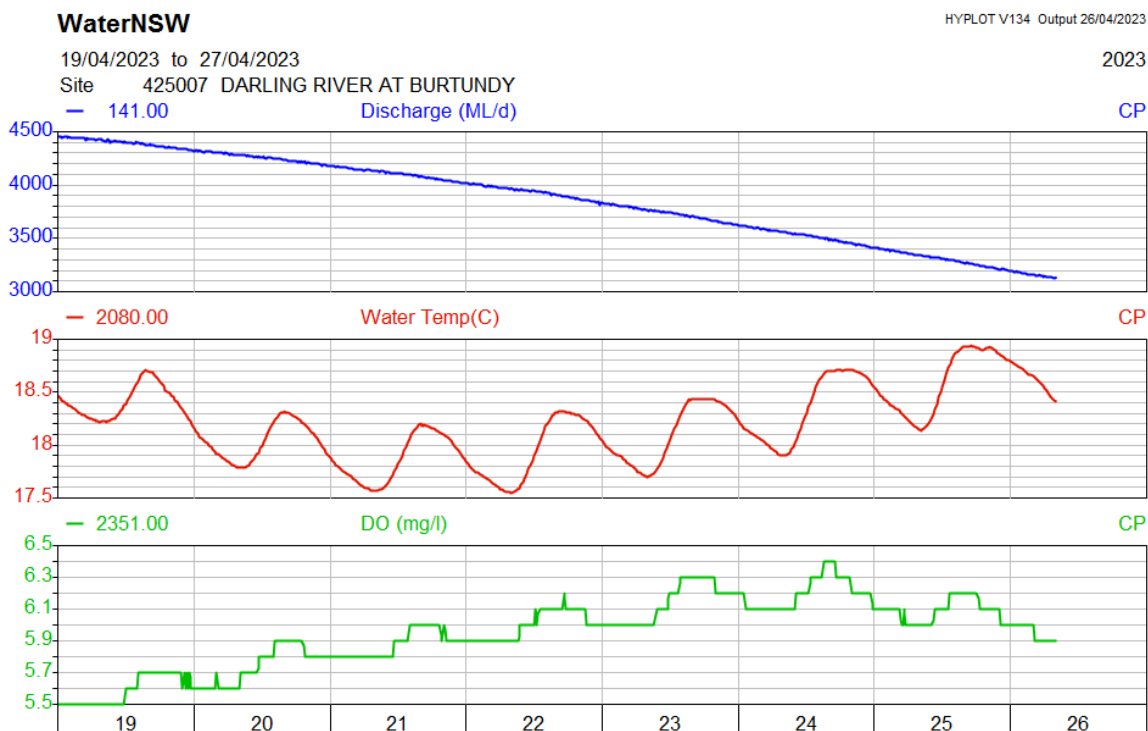


Figure 634: Continuous discharge (ML/day), dissolved oxygen (mg/L), water temperature (°C) in the Darling River at Burtundy

Murray River

Weekly routine hand-held readings in the Murray collected on 18 April, show dissolved oxygen levels above the critical threshold for fish at Merbein and Fort Courage (Table 71). Merbein is currently on amber alert and Fort Courage is on red alert for blue-green algae (Figure 636).

Table 71: Weekly hand-held dissolved oxygen (mg/L) readings in the Murray River

Location	Date	Time	Dissolved Oxygen (mg/L)
Murray River at Merbein	18/4/2023	02:18 PM	9.70
Murray River at Fort Courage	18/4/2023	01:24 PM	8.62

Continuous dissolved oxygen readings in the Murray River at Wentworth are remaining above 9 mg/L (Figure 635).



Figure 635: Continuous discharge (ML/day) and water temperature (°C) in the Murray River at Wentworth

Algal Alerts

The latest algal sampling results show most sites along the Darling, Menindee Lakes and Lower Murray are on amber alert for blue-green algae. The Anabranch and Fort Courage both have a red alert (Figure 636). Visit [WaterNSW algal alerts](#) for the most up-to-date information and warnings.

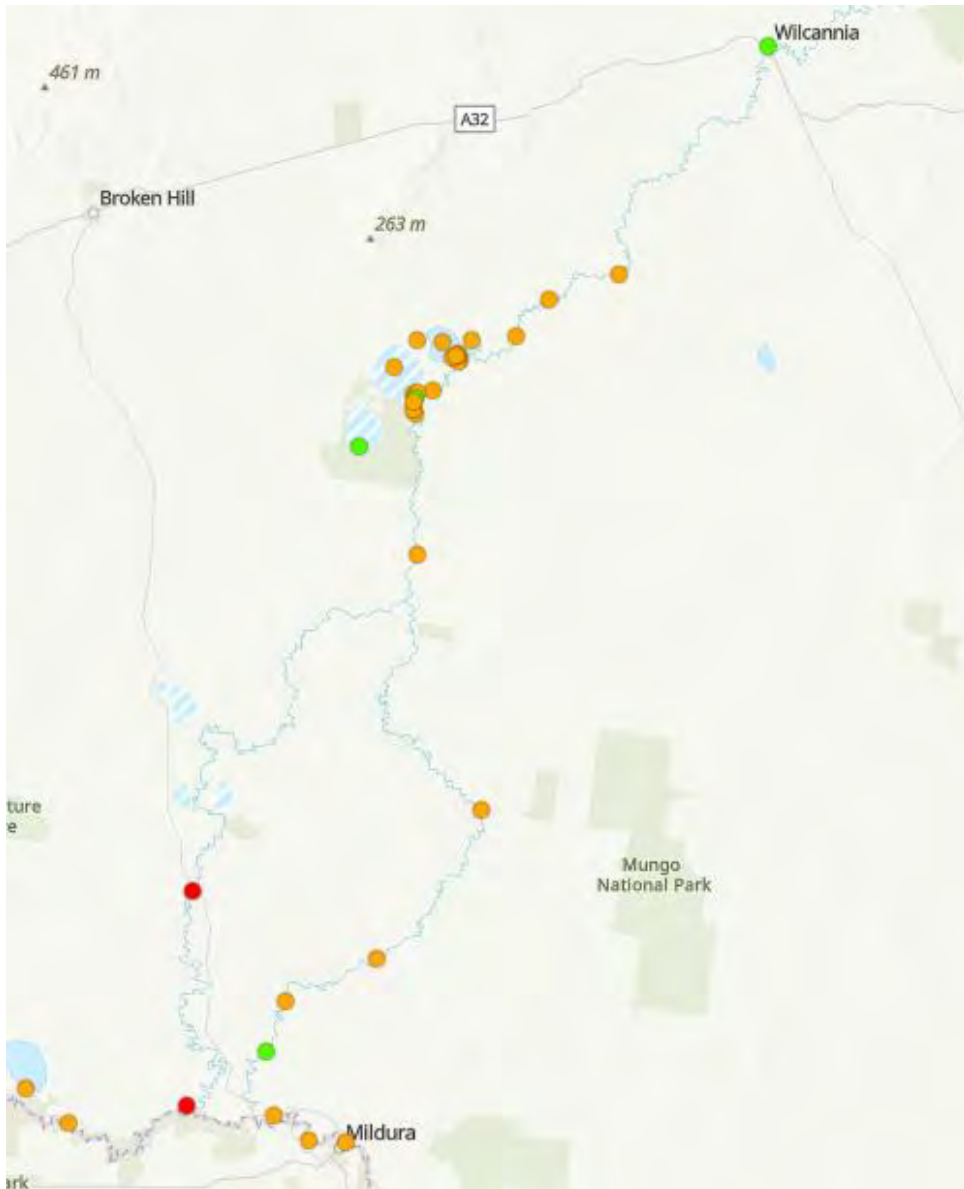


Figure 636: Latest algal alerts for the Darling, Menindee Lakes and Lower Murray.

Weather Outlook

The Bureau of Meteorology 8-day total rain forecast (26 April to 3 May) indicates light rainfall predicted in western NSW (Figure 637). The forecast maximum air temperatures at Menindee and Wentworth are decreasing to less than 20°C over the weekend (Figure 638 and Figure 639).

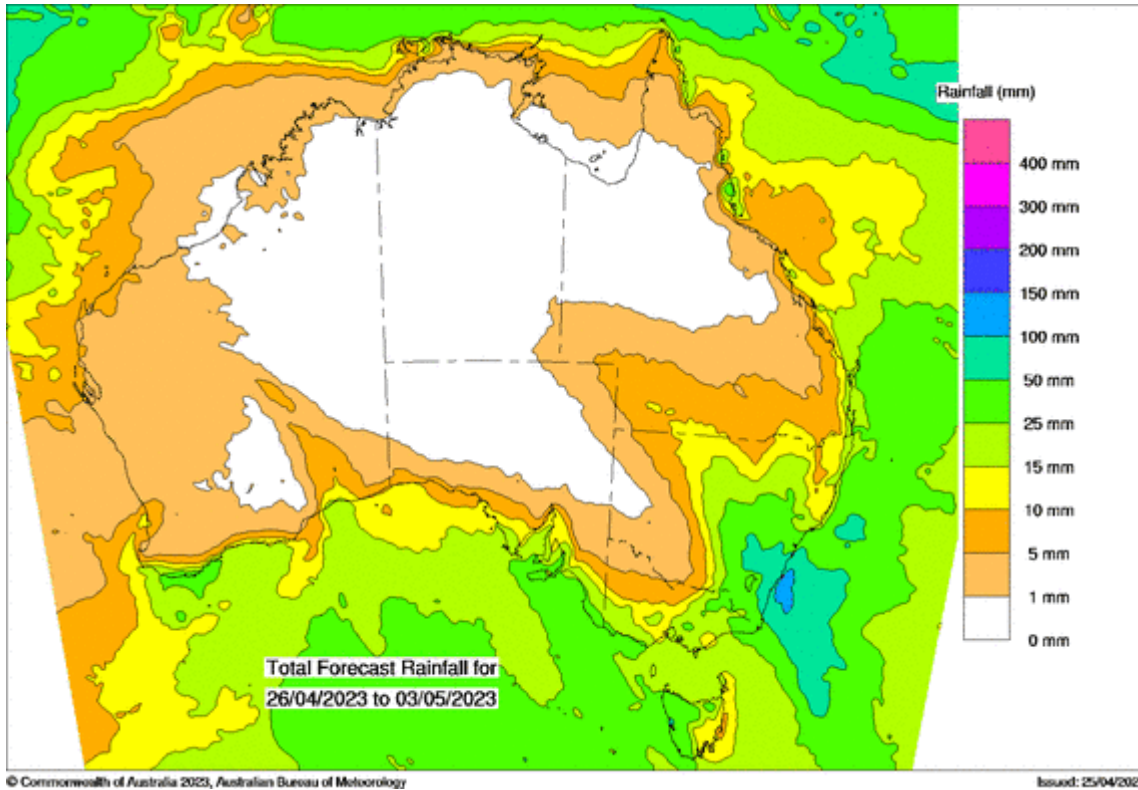


Figure 637: Bureau of Meteorology 8-day total rain forecast

	WED Apr 26	THU Apr 27	FRI Apr 28	SAT Apr 29	SUN Apr 30	MON May 1	TUE May 2
Summary	Mostly cloudy	Windy	Mostly cloudy	Mostly sunny	Mostly sunny	Mostly sunny	Mostly cloudy
Maximum	27°C	30°C	25°C	18°C	18°C	20°C	22°C
Minimum	14°C	16°C	14°C	8°C	5°C	6°C	8°C
Chance Of Rain	5%	10%	20%	10%	5%	5%	30%
Rain Amount	< 1mm	< 1mm	< 1mm	< 1mm	< 1mm	< 1mm	< 1mm

Figure 638: Forecast air temperatures and rainfall for Menindee

	WED Apr 26	THU Apr 27	FRI Apr 28	SAT Apr 29	SUN Apr 30	MON May 1	TUE May 2
Summary	 Mostly cloudy	 Mostly sunny	 Late shower	 Mostly sunny	 Cloud increasing	 Mostly sunny	 Mostly sunny
Maximum	28°C	31°C	24°C	18°C	20°C	21°C	22°C
Minimum	14°C	18°C	13°C	8°C	5°C	8°C	10°C
Chance Of Rain	20%	5%	50%	20%	5%	5%	20%
Rain Amount	< 1mm	< 1mm	< 1mm	< 1mm	< 1mm	< 1mm	< 1mm

Figure 639: Forecast air temperatures and rainfall for Wentworth

Water quality update for Menindee and Lower Darling – 4 May 2023

Darling River and Menindee Lakes

Dissolved oxygen levels at Wilcannia (Moorabin) are remaining above 6 mg/L (Figure 640). As a general guide, native fish and other large aquatic organisms require at least 2 mg/L of dissolved oxygen to survive but may begin to suffer if levels are below 4 to 5 mg/L for prolonged periods. Discharge is slowly increasing following earlier rainfall in the upper catchments.

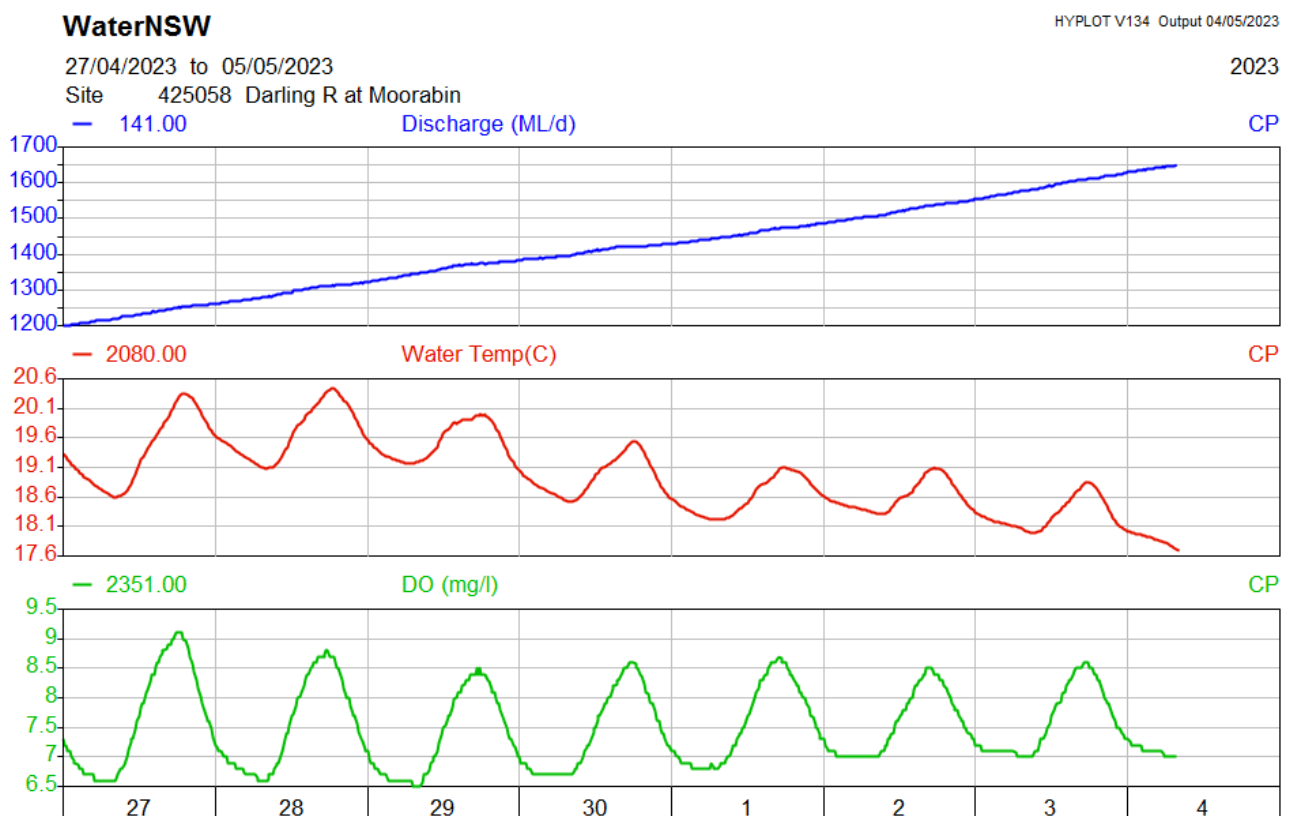


Figure 640: Discharge (ML/d), continuous dissolved oxygen (mg/L) and water temperature (°C) in the Darling River at Wilcannia (Moorabin)

The continuous dissolved oxygen monitoring site in the upper reaches of Lake Wetherell at Nelia Gaari is showing oxygen is dropping overnight and then recovering during the day. Overnight minimums have been remaining above 2 mg/L for the past 7 days (Figure 641). The daytime dissolved oxygen recovery has been decreasing as water temperatures decline.

27/04/2023 to 05/05/2023

2023

Site 425060 DARLING RIVER @ NELIA GAARI

— 2080.00 Water Temp(C)

CP

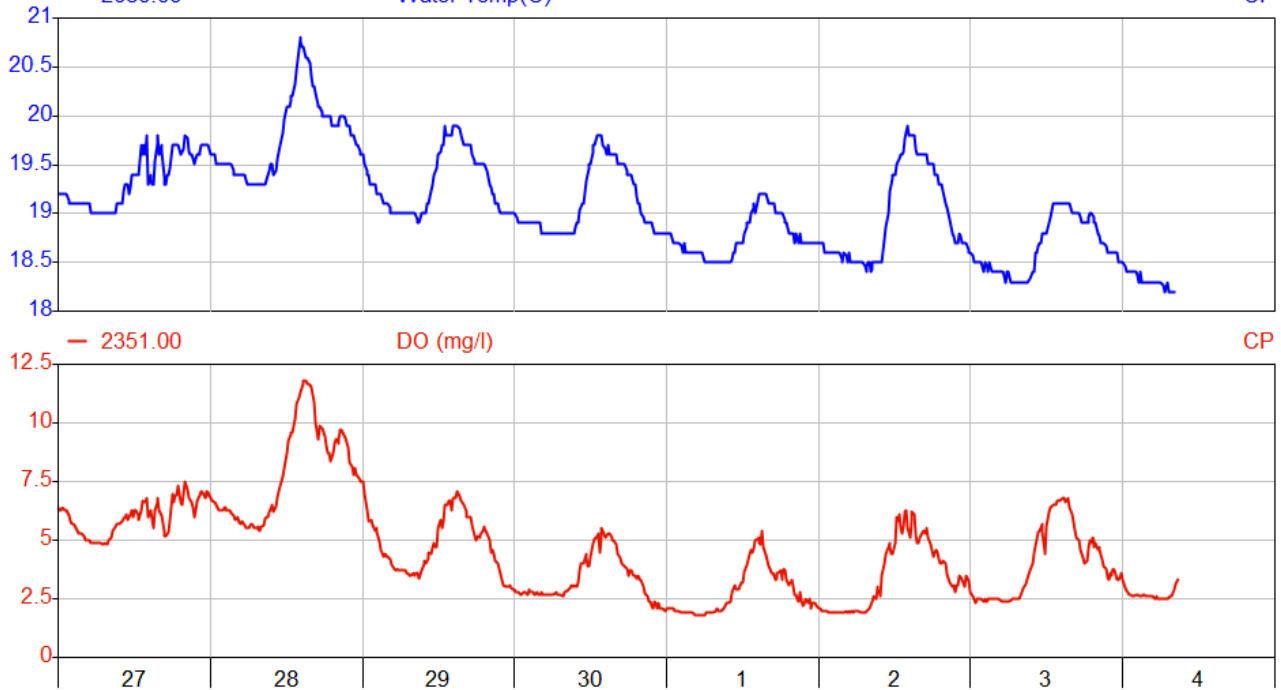


Figure 641: Continuous dissolved oxygen (mg/L) and water temperature (°C) in the Darling River at Nelia Gaari

Monitoring undertaken on 24 April in Menindee Lakes shows low dissolved oxygen at depth in the upper reaches of Lake Wetherell, with higher oxygen levels closer to the Lake Pamamaroo inlet at Lake Wetherell Site 4. Depth profile results show the water was oxygenated through the water column in Lake Pamamaroo and the Darling River at Menindee. Sentinel satellite imagery (23 April) shows the water from Lake Wetherell pushing into Lake Pamamaroo and dissolved oxygen results close to the water surface (Figure 642).

Table 72: Hand-held dissolved oxygen (mg/L) readings in Menindee Lakes - 24 April 2023

Sample depth (m)	Lake Wetherell Site 2	Lake Wetherell Site 3	Lake Wetherell Site 4	Lake Pamamaroo	Darling River at Pump station	Darling River at Menindee	Darling River at Weir 32
0.25	5.5	7.5	10.8	9.4	8.0	7.0	6.3
0.5	2.5	6.9	10.6	9.7	6.6	6.8	6.1
1	1.8	4.6	8.4	9.6	5.9	6.0	6.1
2	1.5	3.3	6.9	9.6	5.4	5.5	6.0
3	1.4	1.9	5.6	9.5	4.9	4.9	6.0
4	1.3	1.7	4.6	9.0	4.9	4.8	6.0
5	1.2	1.6	4.5	8.5	4.8	4.6	5.9
6	1.2	1.7	4.3		4.0	4.2	
7	1.1	2.0	3.5				
8	1.1	2.0					
9	1.0						
10	1.0						

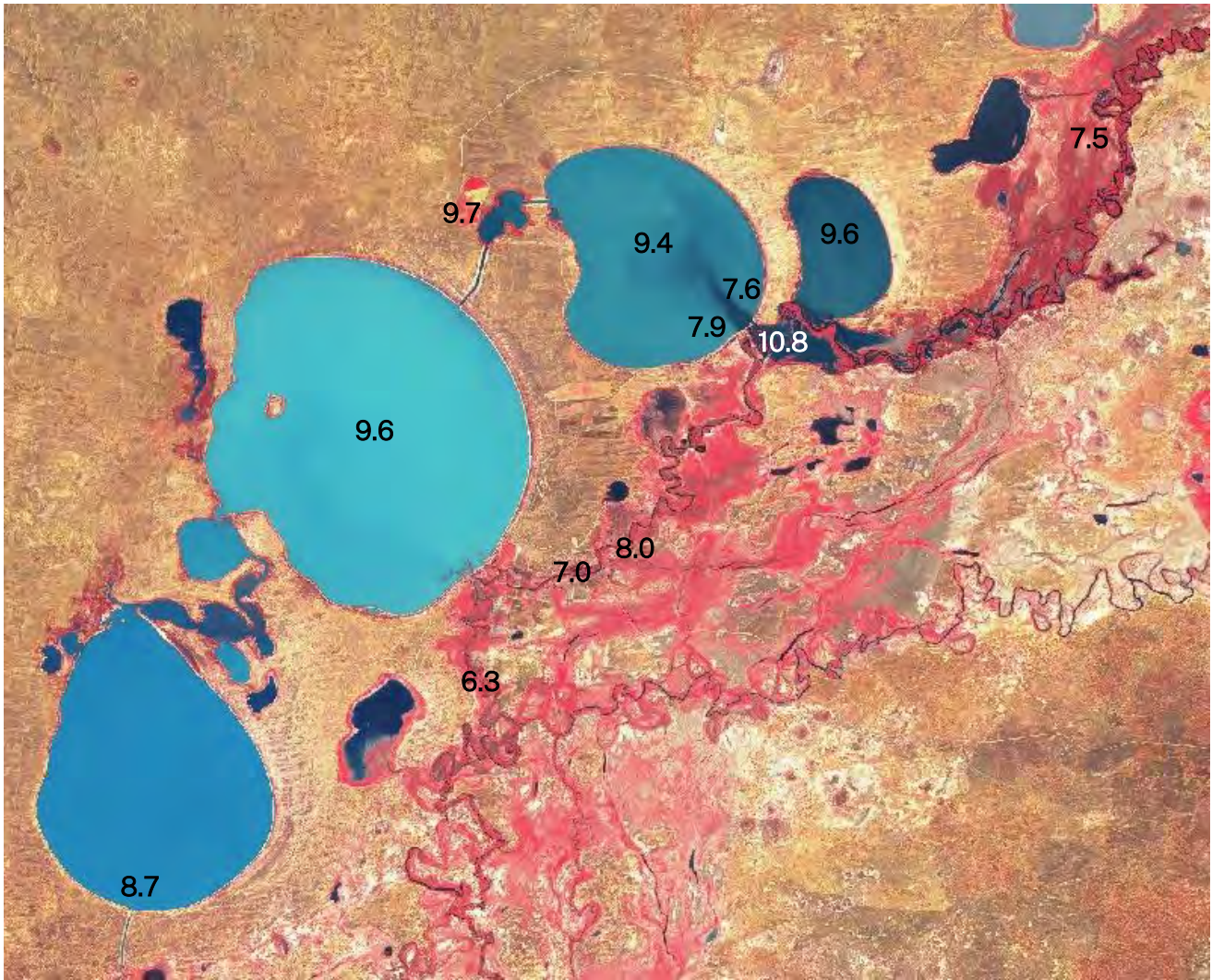


Figure 642: Satellite derived Sentinel image (23 April) showing dissolved oxygen (mg/L) results, 24-25 April 2023

Longitudinal Survey

Figure 643 is a Google Earth image showing the location and results from a longitudinal survey of dissolved oxygen levels down the Darling River from the Lake Pamamaroo outlet to downstream of the Darling River-Menindee Creek junction on 3 May. Dissolved oxygen levels are above 4 mg/L at all sites.

Figure 644 is a graph showing the dissolved oxygen results from longitudinal surveys undertaken on 25 March, 20 and 24 April and 3 May. The graph highlights there has been a slight decrease in dissolved oxygen levels following the reduction in releases from Lake Pamamaroo.

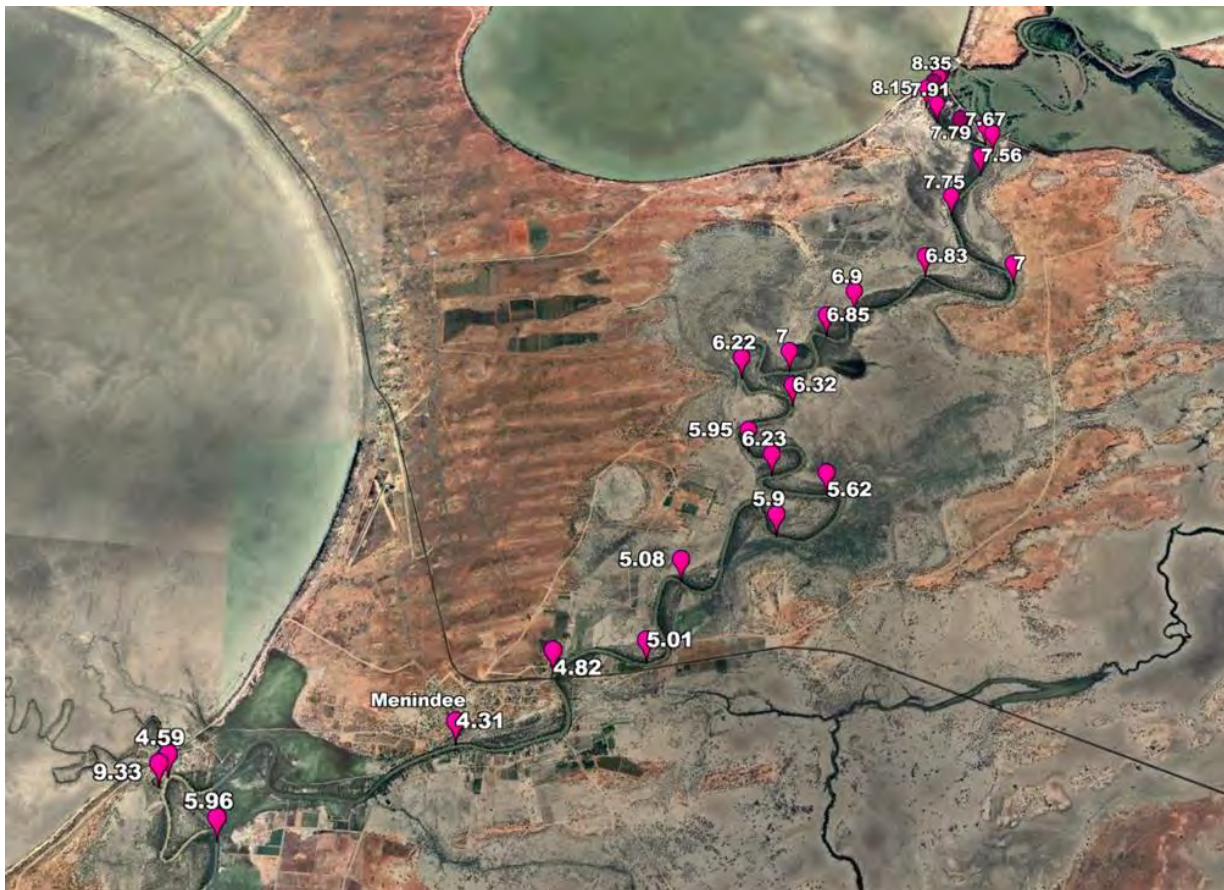


Figure 643: Google Earth image showing dissolved oxygen results from the Lake Pamamaroo outlet to downstream of Menindee Creek junction – 3 May 2023

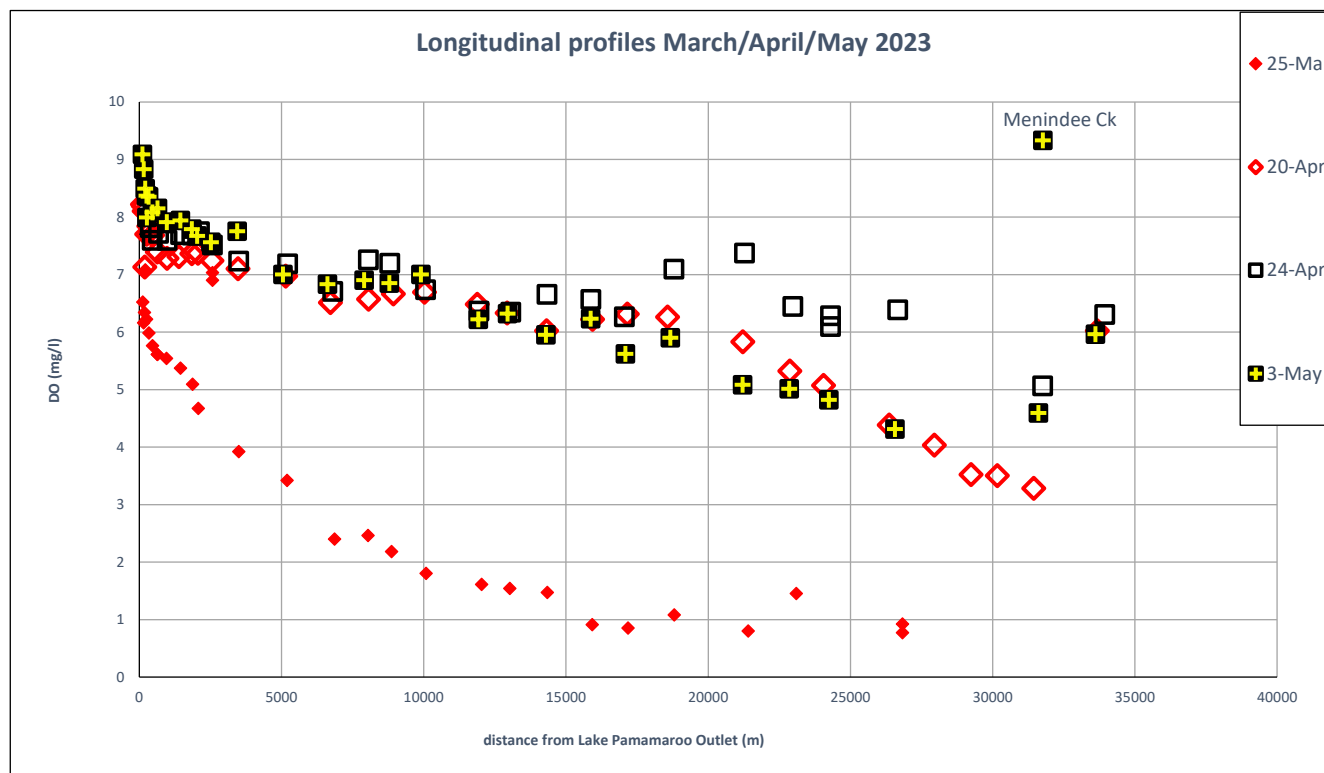


Figure 644: Graph of dissolved oxygen results from longitudinal profiles collected 25 March, 20 and 24 April, and 3 May

The data from the temporary dissolved oxygen sensor installed at the Menindee pump station (at a depth of about 1 m from the water surface) is showing a decline in overnight dissolved oxygen levels (Figure 645). A second dissolved oxygen sensor at the Menindee Town gauging station is showing dissolved oxygen levels near the riverbed. The dissolved oxygen levels are improving during the day but also dropping below 4 mg/L overnight. The two sites are approximately 2 km apart by river. Water temperature in this area has decreased below 18°C.

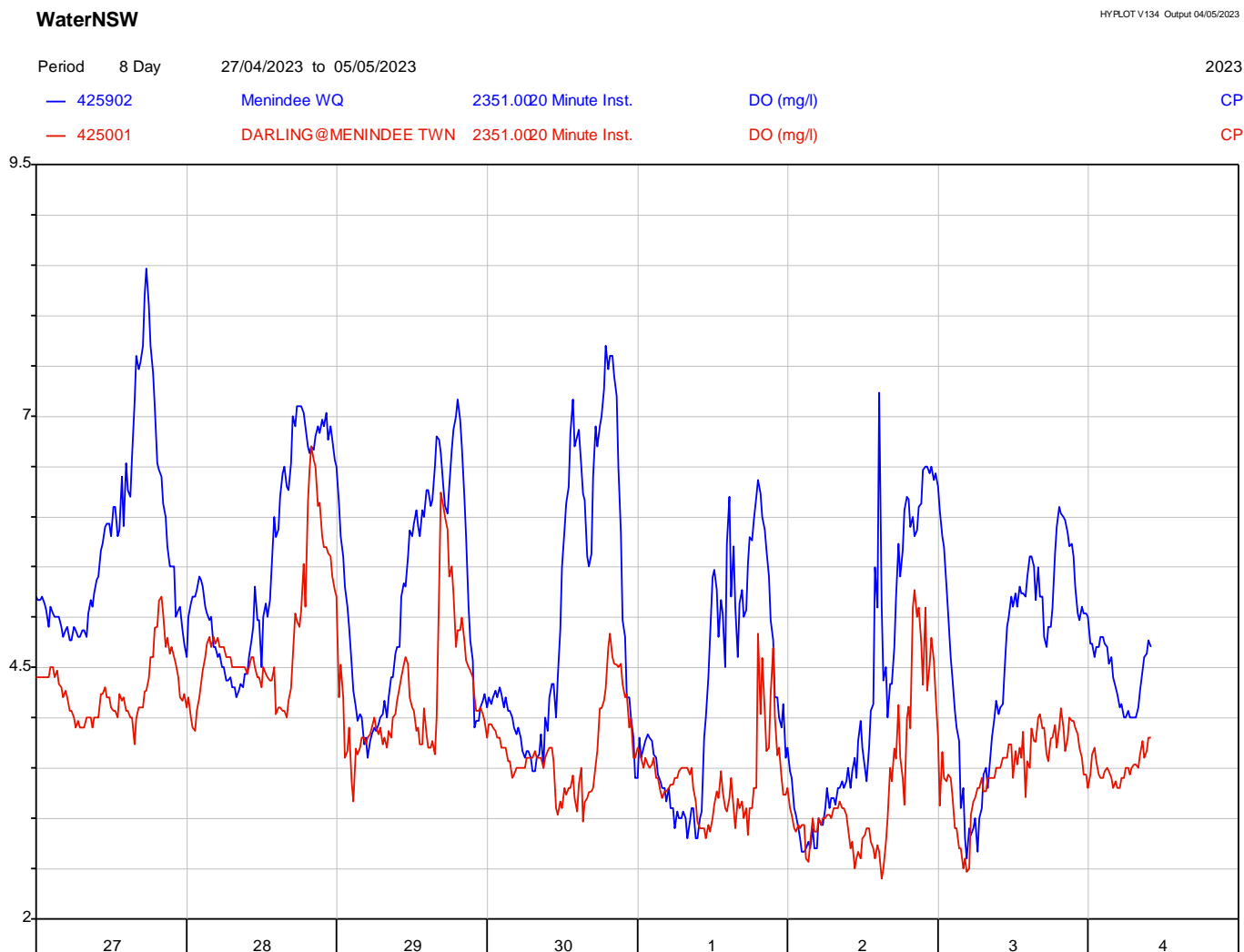


Figure 645: Continuous dissolved oxygen (mg/L) in the Darling River at Menindee pump station and Menindee town gauging stations

Discharge at Weir 32 is steady at around 1,200 ML/day. Dissolved oxygen is remaining above 4 mg/L (Figure 646).

27/04/2023 to 05/05/2023

2023

Site 425012 DARLING RIVER AT MENINDEE UPSTREAM WEIR 32

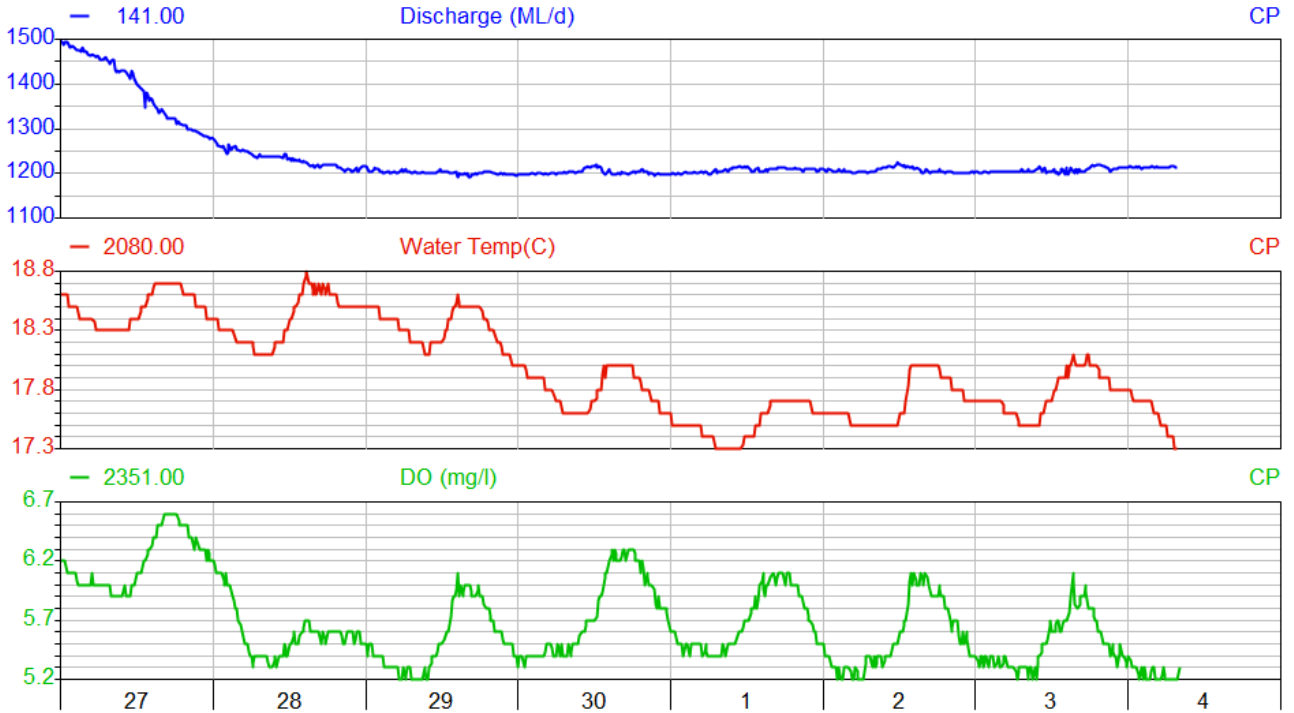


Figure 646: Continuous discharge (ML/day), dissolved oxygen (mg/L) and water temperature (°C) in the Darling River at Weir 32

Lower Darling

Monitoring is showing dissolved oxygen levels in the lower Darling River from Weir 32 to the Wentworth weir pool at Tapio are above the critical threshold of 4 mg/L for fish health (Table 73).

Table 73: Hand-held dissolved oxygen (mg/L) readings in the lower Darling River from Weir 32 to Tapio

Monitoring site	Sample Date Time	Dissolved Oxygen (mg/L)
Darling River at Weir 32	03/05/2023 14:51	6.67
Darling River at Tolarno	03/05/2023 15:44	6.71
Darling River at Pooncarie	02/05/2023 11:58	5.84
Darling River at Burtundy	02/05/2023 10:36	6.17
Darling River at Ellerslie	02/05/2023 9:47	6.06
Darling River at Tapio	02/05/2023 13:53	6.50
Darling Anabranh at Silver City Highway	01/05/2023 11:47	9.33

Discharge in the Darling River at Burtundy is decreasing (Figure 647). The continuous dissolved oxygen level at Burtundy is remaining above 5 mg/L.

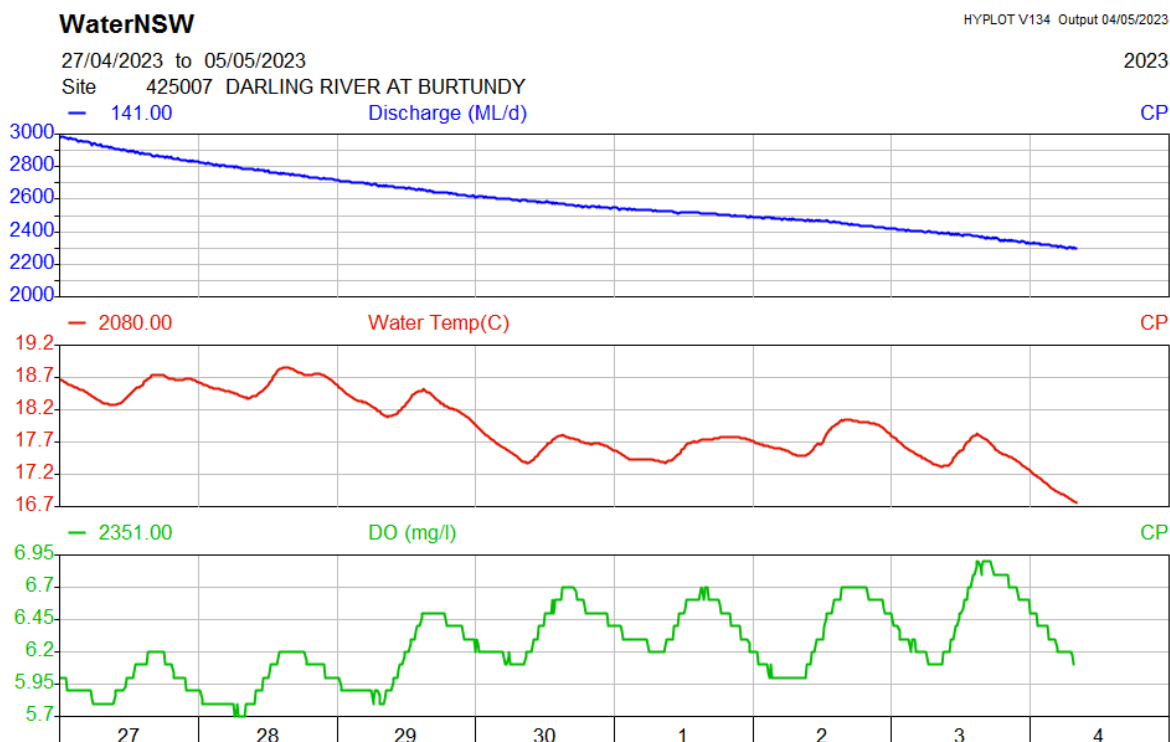


Figure 647: Continuous discharge (ML/day), dissolved oxygen (mg/L), water temperature (°C) in the Darling River at Burtundy

Murray River

Weekly routine hand-held readings in the Murray collected on 1 and 2 May, show dissolved oxygen levels above the critical threshold for fish health (Table 74). Merbein is currently on amber alert and Fort Courage is on red alert for blue-green algae (Figure 649).

Table 74: Weekly hand-held dissolved oxygen (mg/L) readings in the Murray River

Monitoring Location	Sample Date Time	Dissolved oxygen (mg/L)
Murray River at Euston	01/05/2023 11:57	8.89
Murray River at Merbein	02/05/2023 14:47	10.07
Murray River at Buronga	01/05/2023 14:09	9.16
Murray River at Fort Courage	01/05/2023 12:54	8.86
Murray River at Lock 8	01/05/2023 14:04	9.08
Lake Victoria at the outlet regulator	01/05/2023 14:50	9.23

Continuous dissolved oxygen readings in the Murray River at Wentworth are remaining above 9 mg/L (Figure 648).

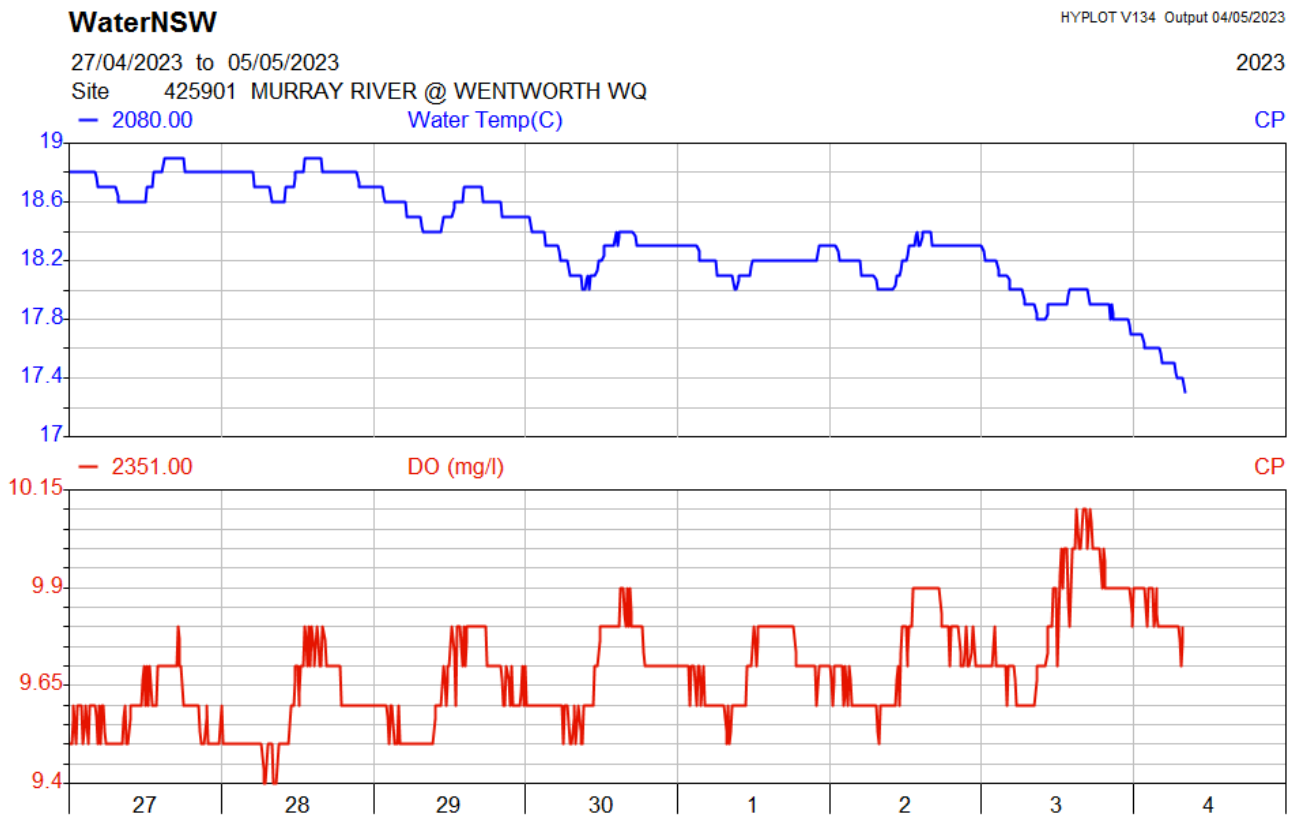


Figure 648: Continuous dissolved oxygen (mg/L) and water temperature (°C) in the Murray River at Wentworth

Algal Alerts

The latest algal sampling results show most sites along the Darling, Menindee Lakes and Lower Murray are on amber alert for blue-green algae. The Anabranch and Fort Courage both have a red alert (Figure 649). Visit [WaterNSW algal alerts](#) for the most up-to-date information and warnings.

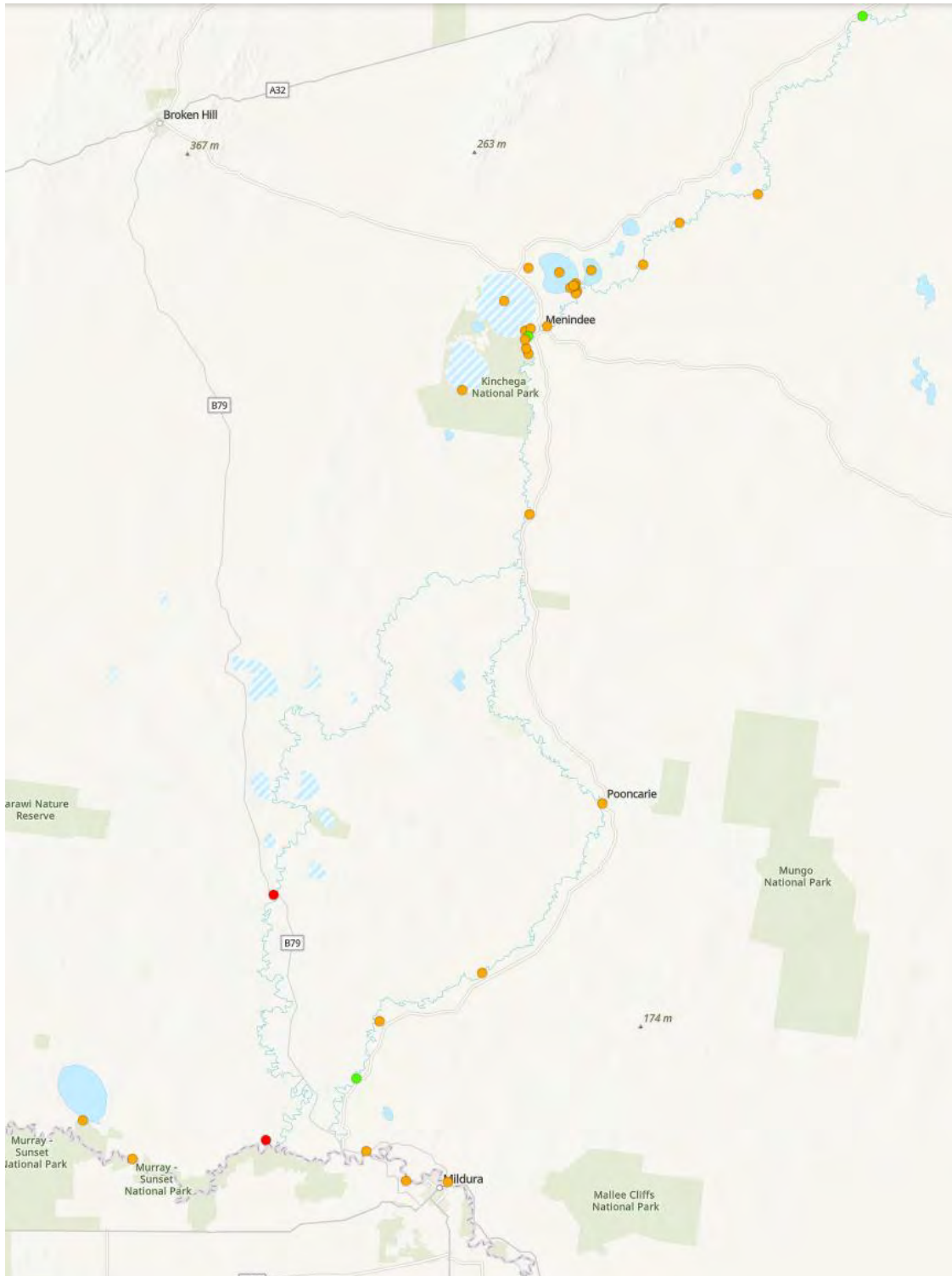
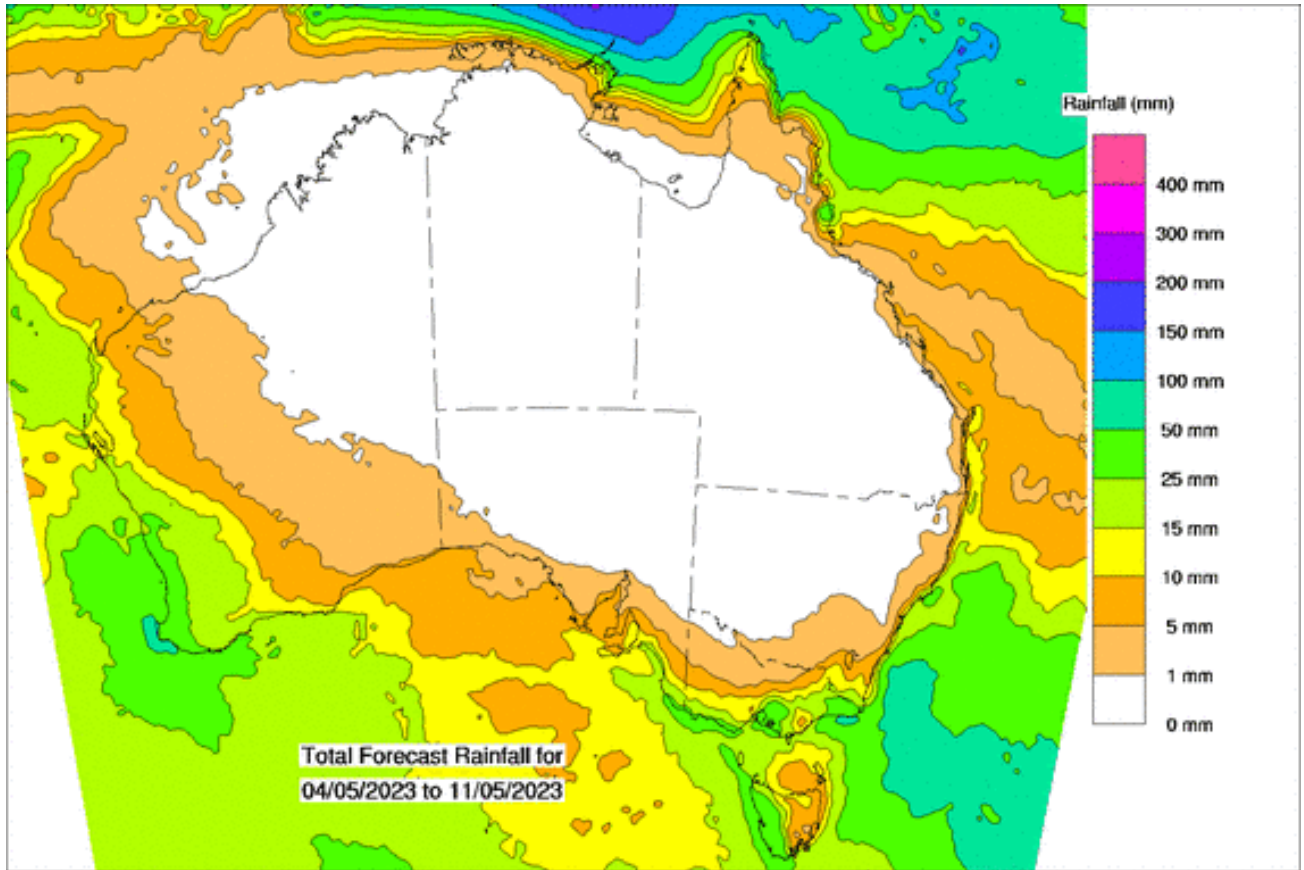


Figure 649: Latest algal alerts for the Darling, Menindee Lakes and Lower Murray.

Weather Outlook

The Bureau of Meteorology 8-day total rain forecast (4 to 11 May) indicates light rainfall predicted along the NSW/Victorian border and the east coast (Figure 650). The forecast maximum daily air temperatures at Menindee and Wentworth are mostly less than 20°C (Figure 651 and Figure 575).



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Issued: 03/05/2023

Figure 650: Bureau of Meteorology 8-day total rain forecast

	THU May 4	FRI May 5	SAT May 6	SUN May 7	MON May 8	TUE May 9	WED May 10
Summary	Sunny	Mostly sunny	Clearing shower	Mostly sunny	Mostly sunny	Mostly sunny	Mostly sunny
Maximum	19°C	21°C	17°C	15°C	15°C	18°C	19°C
Minimum	6°C	6°C	8°C	2°C	2°C	4°C	6°C
Chance Of Rain	5%	20%	40%	5%	5%	20%	5%
Rain Amount	< 1mm	< 1mm	< 1mm	< 1mm	< 1mm	< 1mm	< 1mm

Figure 651: Forecast air temperatures and rainfall for Menindee

	THU May 4	FRI May 5	SAT May 6	SUN May 7	MON May 8	TUE May 9	WED May 10
Summary	 Mostly sunny	 Mostly sunny	 Mostly sunny	 Sunny	 Cloud increasing	 Mostly sunny	 Sunny
Maximum	18°C	21°C	17°C	16°C	17°C	19°C	20°C
Minimum	4°C	5°C	7°C	1°C	1°C	5°C	4°C
Chance Of Rain	5%	30%	30%	5%	5%	20%	5%
Rain Amount	< 1mm	< 1mm	< 1mm	< 1mm	< 1mm	< 1mm	< 1mm

Figure 652: Forecast air temperatures and rainfall for Wentworth

Water quality update for Menindee and Lower Darling – 16 May 2023

Darling River and Menindee Lakes

Dissolved oxygen levels at Wilcannia (Moorabin) are remaining above 7 mg/L (Figure 653). As a general guide, native fish and other large aquatic organisms require at least 2 mg/L of dissolved oxygen to survive but may begin to suffer if levels are below 4 to 5 mg/L for prolonged periods. Discharge is continuing to slowly increase following earlier rainfall in the upper catchments.

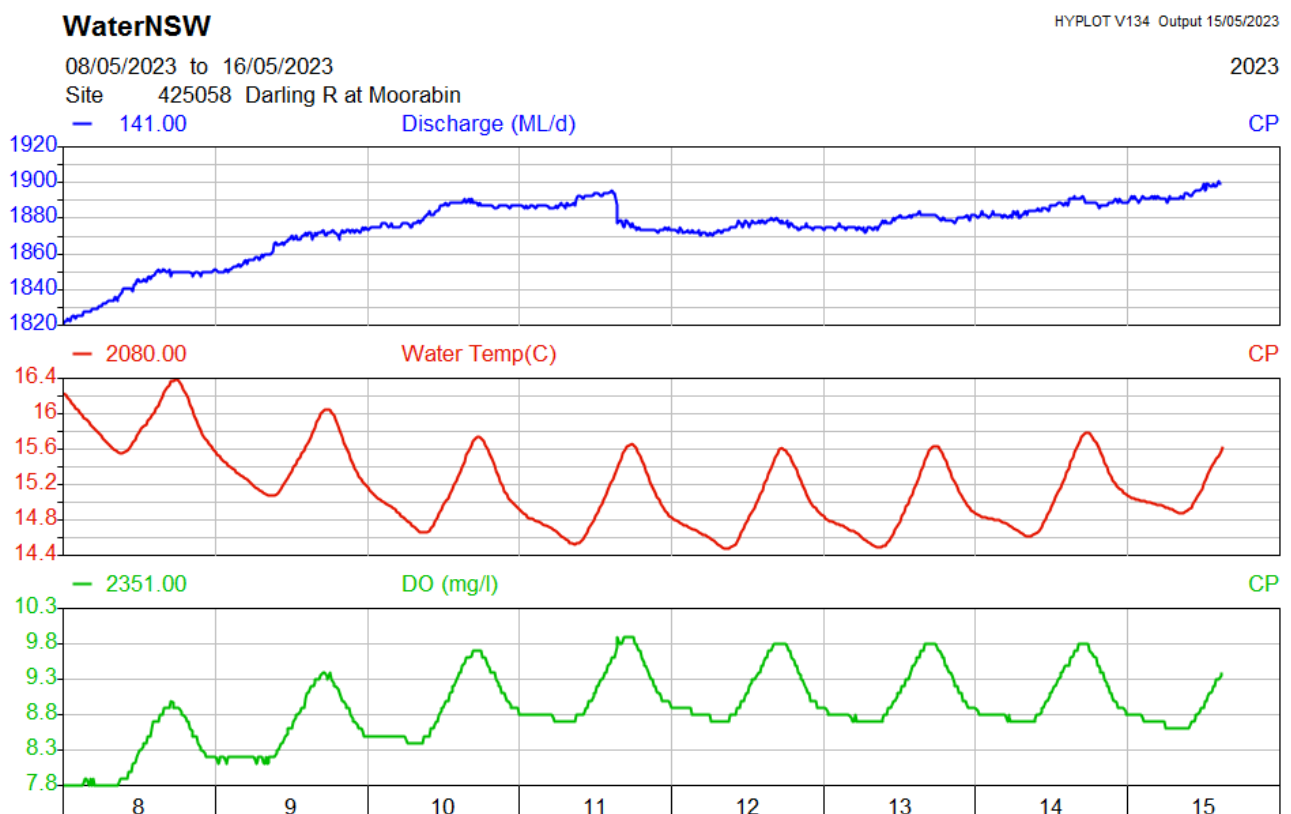


Figure 653: Discharge (ML/d), continuous dissolved oxygen (mg/L) and water temperature (°C) in the Darling River at Wilcannia (Moorabin)

The continuous dissolved oxygen monitoring site in the upper reaches of Lake Wetherell at Nelia Gaari is showing oxygen is still dropping overnight, but not to the same extent as last week. Dissolved oxygen has been recovering above critical levels for fish health during the day (Figure 654).

08/05/2023 to 16/05/2023

2023

Site 425060 DARLING RIVER @ NELIA GAARI

— 2080.00 Water Temp(C)

CP

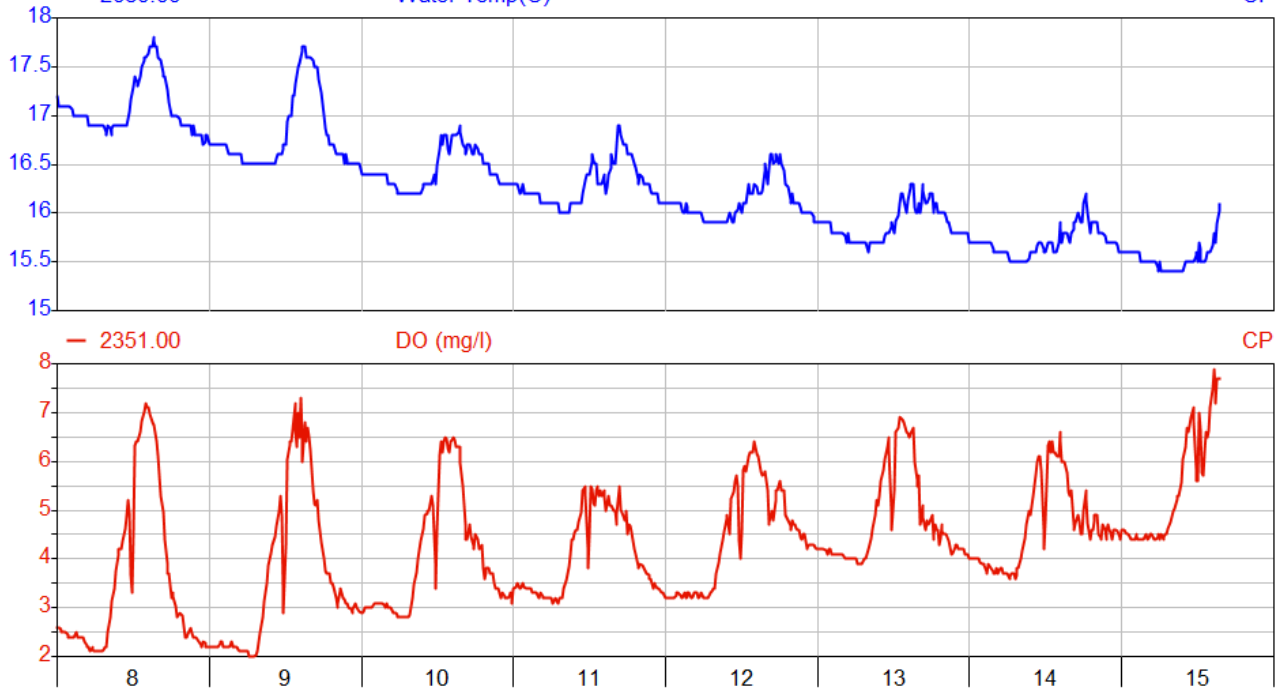


Figure 654: Continuous dissolved oxygen (mg/L) and water temperature (°C) in the Darling River at Nelia Gaari

Longitudinal Survey

Figure 655 is a Google Earth image showing the location and results from a longitudinal survey of dissolved oxygen levels down the Darling River from the Lake Pamamaroo outlet to downstream of the Darling River-Menindee Creek junction on 15 May. Dissolved oxygen levels are above 4 mg/L at all sites.

Figure 656 is a graph showing the dissolved oxygen results from longitudinal surveys undertaken on 25 March, 11, 13, 17 and 18 April and 3 and 15 May. The graph highlights there was still a slight decrease in dissolved oxygen levels with increasing distance from Lake Pamamaroo outlet. Despite the reduction in releases from Lake Pamamaroo, dissolved oxygen levels have improved since the most recent profile taken on 3 May.



Figure 655: Google Earth image showing dissolved oxygen results from the Lake Pamamaroo outlet to downstream of Menindee Creek junction – 15 May 2023

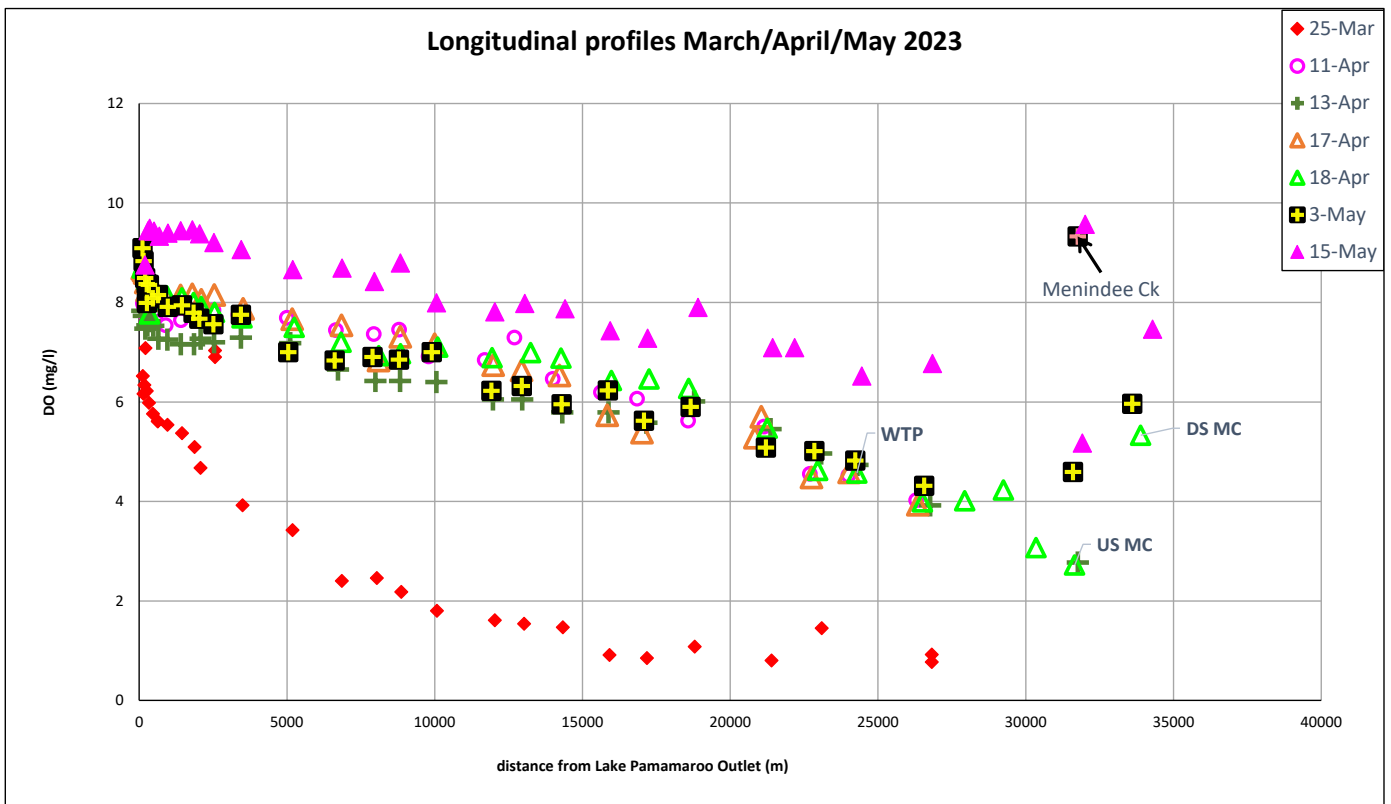


Figure 656: Graph of dissolved oxygen results from longitudinal profiles collected 25 March, 11, 13, 17 and 18 April, and 3 and 15 May

The data from the temporary dissolved oxygen sensor installed at the Menindee pump station (at a depth of about 1 m from the water surface) is showing continued improvement in dissolved oxygen levels (Figure 657). A second dissolved oxygen sensor at the Menindee Town gauging station is showing dissolved oxygen levels near the riverbed. The dissolved oxygen levels are also improving and are now remaining above 4 mg/L. The two sites are approximately 2 km apart by river. Water temperature in this area has decreased below 17°C.

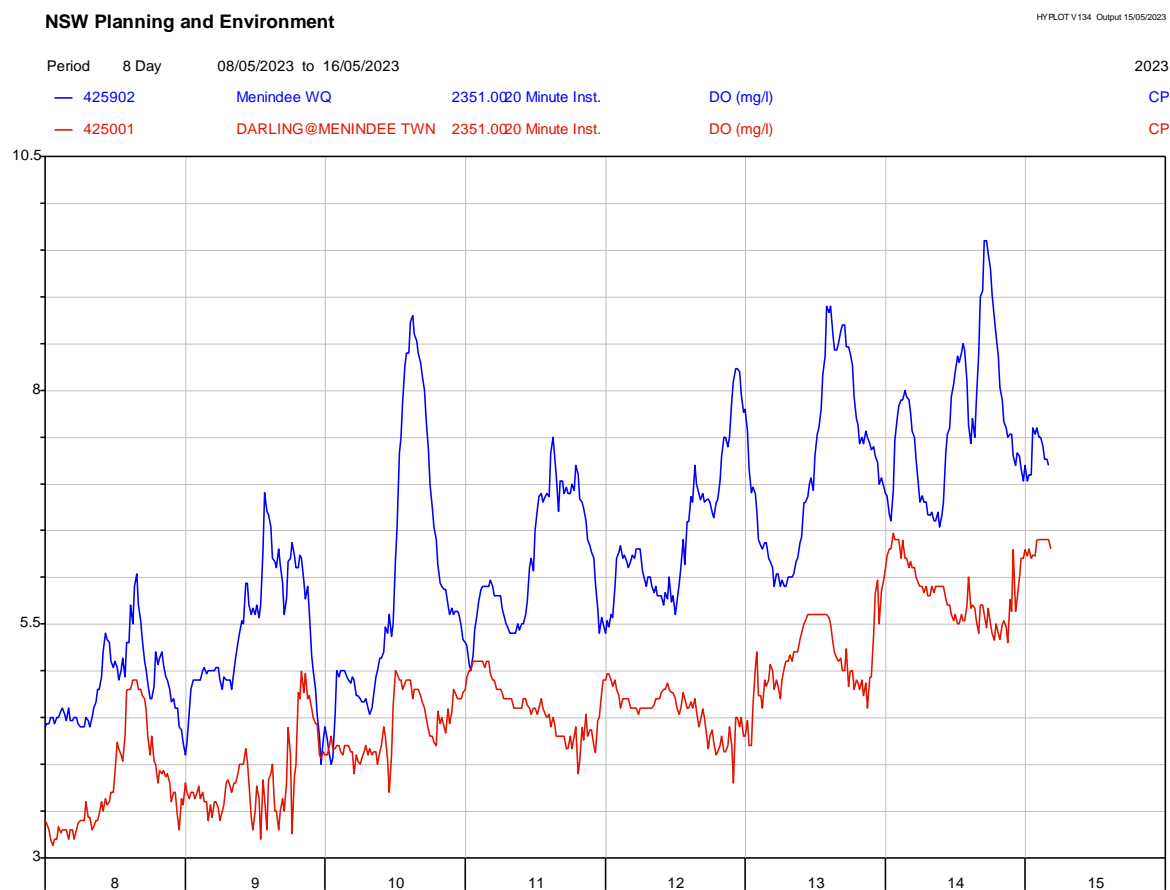


Figure 657: Continuous dissolved oxygen (mg/L) in the Darling River at Menindee pump station and Menindee town gauging stations

Discharge at Weir 32 is steady at around 1,100 ML/day. There were spikes in the discharge due to the gate work being done at the Wetherell outlet. Dissolved oxygen is remaining above 4 mg/L (Figure 658).

08/05/2023 to 16/05/2023

2023

Site 425012 DARLING RIVER AT MENINDEE UPSTREAM WEIR 32

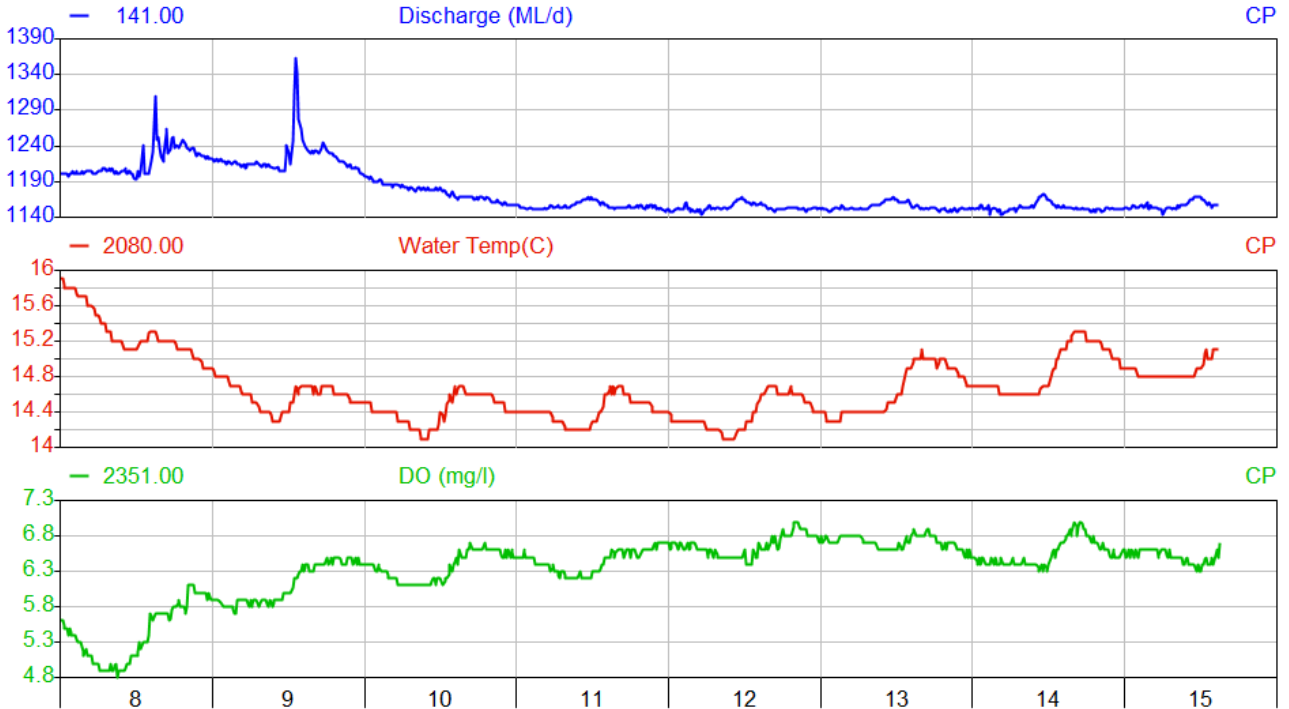


Figure 658: Continuous discharge (ML/day), dissolved oxygen (mg/L) and water temperature (°C) in the Darling River at Weir 32

Lower Darling

Monitoring last week showed dissolved oxygen levels in the lower Darling River at Weir 32, Tolarno and Burtundy were above the critical threshold of 4 mg/L for fish health (Table 75).

Table 75: Hand-held dissolved oxygen (mg/L) readings in the lower Darling River

Monitoring site	Sample Date Time	Dissolved Oxygen (mg/L)
Darling River at Weir 32	12/05/2023 10:18	6.66
Darling River at Tolarno	12/05/2023 11:24	8.15
Darling River at Burtundy	09/05/2023 16:05	7.89

Discharge in the Darling River at Burtundy is decreasing (Figure 659). The continuous dissolved oxygen level at Burtundy is remaining above 7 mg/L.

08/05/2023 to 16/05/2023

2023

Site 425007 DARLING RIVER AT BURTUNDY

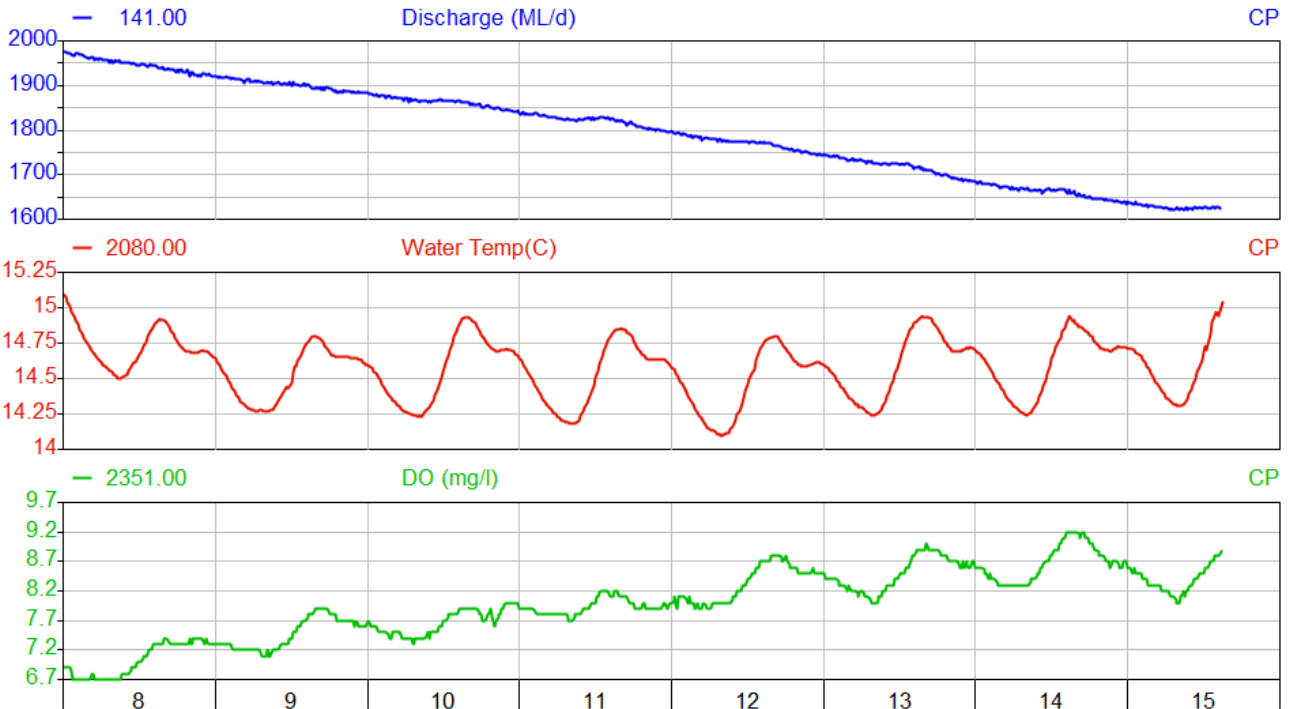


Figure 659: Continuous discharge (ML/day), dissolved oxygen (mg/L), water temperature (°C) in the Darling River at Burtundy

Murray River

Routine hand-held readings in the Murray collected on 9 May, show dissolved oxygen levels above the critical threshold for fish health (Table 76). Fort Courage is on red alert for blue-green algae. Continuous dissolved oxygen readings in the Murray River at Wentworth are remaining above 9 mg/L.

Table 76: Hand-held dissolved oxygen (mg/L) readings in the Murray River

Monitoring Location	Sample Date Time	Dissolved oxygen (mg/L)
Murray River at Merbein	09/05/2023 13:59	10.30
Murray River at Fort Courage	09/05/2023 14:57	10.37

Weather Outlook

The Bureau of Meteorology 8-day total rain forecast (15 to 22 May) indicates light rainfall predicted across the eastern third of NSW with the heaviest falls on the far north coast (Figure 660). The forecast maximum daily air temperatures at Menindee and Wentworth will decrease below 20°C on Wednesday (Figure 661 and Figure 662).

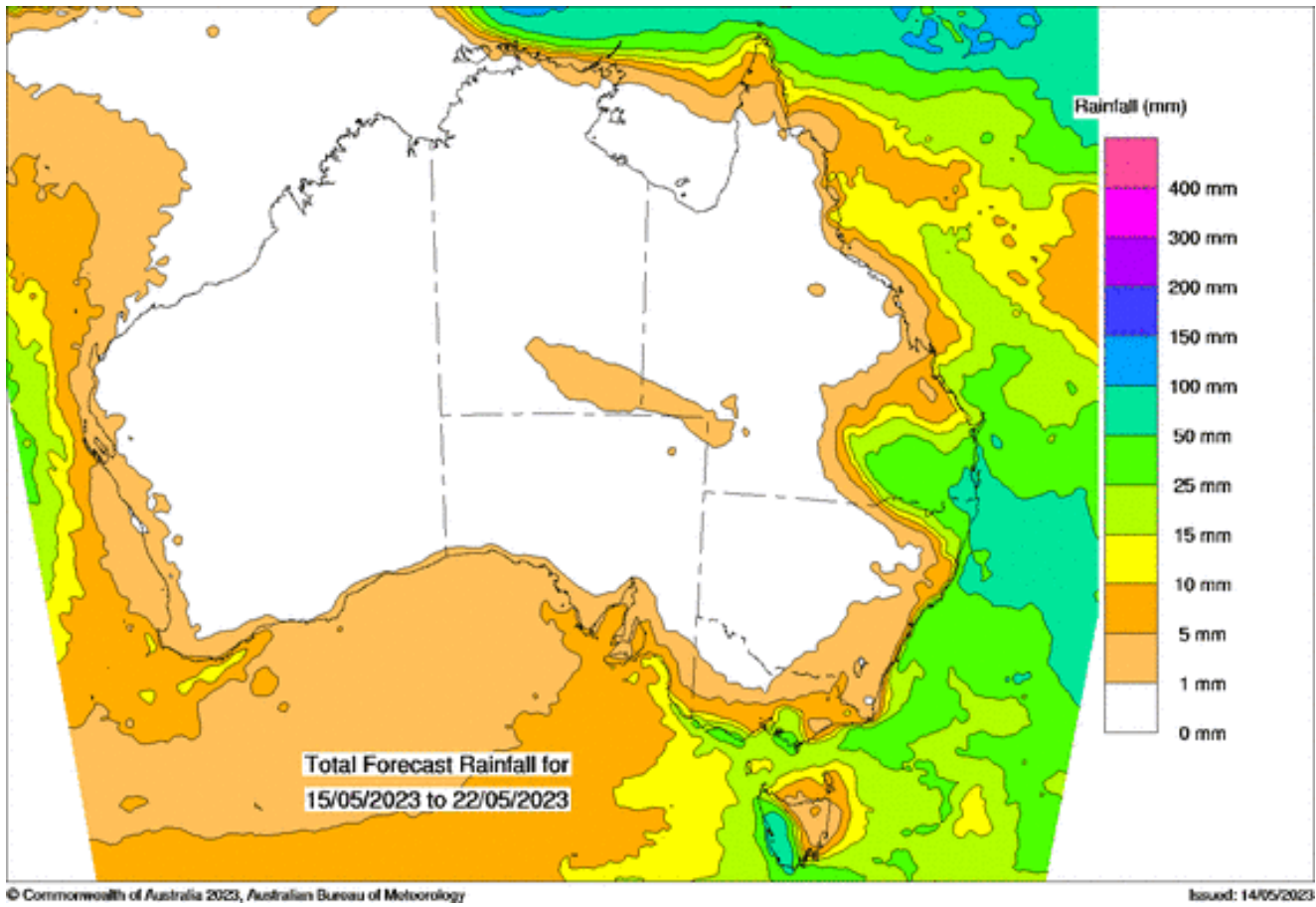


Figure 660: Bureau of Meteorology 8-day total rain forecast








	MON May 15	TUE May 16	WED May 17	THU May 18	FRI May 19	SAT May 20	SUN May 21
Summary	 Mostly cloudy	 Sunny	 Mostly sunny	 Sunny	 Mostly sunny	 Mostly cloudy	 Mostly sunny
Maximum	21°C	22°C	17°C	15°C	16°C	17°C	17°C
Minimum	9°C	7°C	6°C	2°C	2°C	4°C	5°C
Chance Of Rain	5%	5%	5%	5%	5%	10%	20%
Rain Amount	< 1mm	< 1mm	< 1mm	< 1mm	< 1mm	< 1mm	< 1mm

Figure 661: Forecast air temperatures and rainfall for Menindee








	MON May 15	TUE May 16	WED May 17	THU May 18	FRI May 19	SAT May 20	SUN May 21
Summary	 Sunny	 Mostly sunny	 Mostly sunny	 Mostly sunny	 Mostly sunny	 Cloudy	 Cloudy
Maximum	24°C	20°C	16°C	16°C	17°C	18°C	18°C
Minimum	7°C	7°C	4°C	3°C	3°C	6°C	6°C
Chance Of Rain	10%	20%	5%	10%	10%	30%	5%
Rain Amount	< 1mm	< 1mm	< 1mm	< 1mm	< 1mm	< 1mm	< 1mm

Figure 662: Forecast air temperatures and rainfall for Wentworth

Water quality update for Menindee and Lower Darling – 26 May 2023

Darling River and Menindee Lakes

Dissolved oxygen levels at Wilcannia (Moorabin) are remaining above 8 mg/L (Figure 663). As a general guide, native fish and other large aquatic organisms require at least 2 mg/L of dissolved oxygen to survive but may begin to suffer if levels are below 4 to 5 mg/L for prolonged periods. Discharge at Wilcannia is slowly declining.

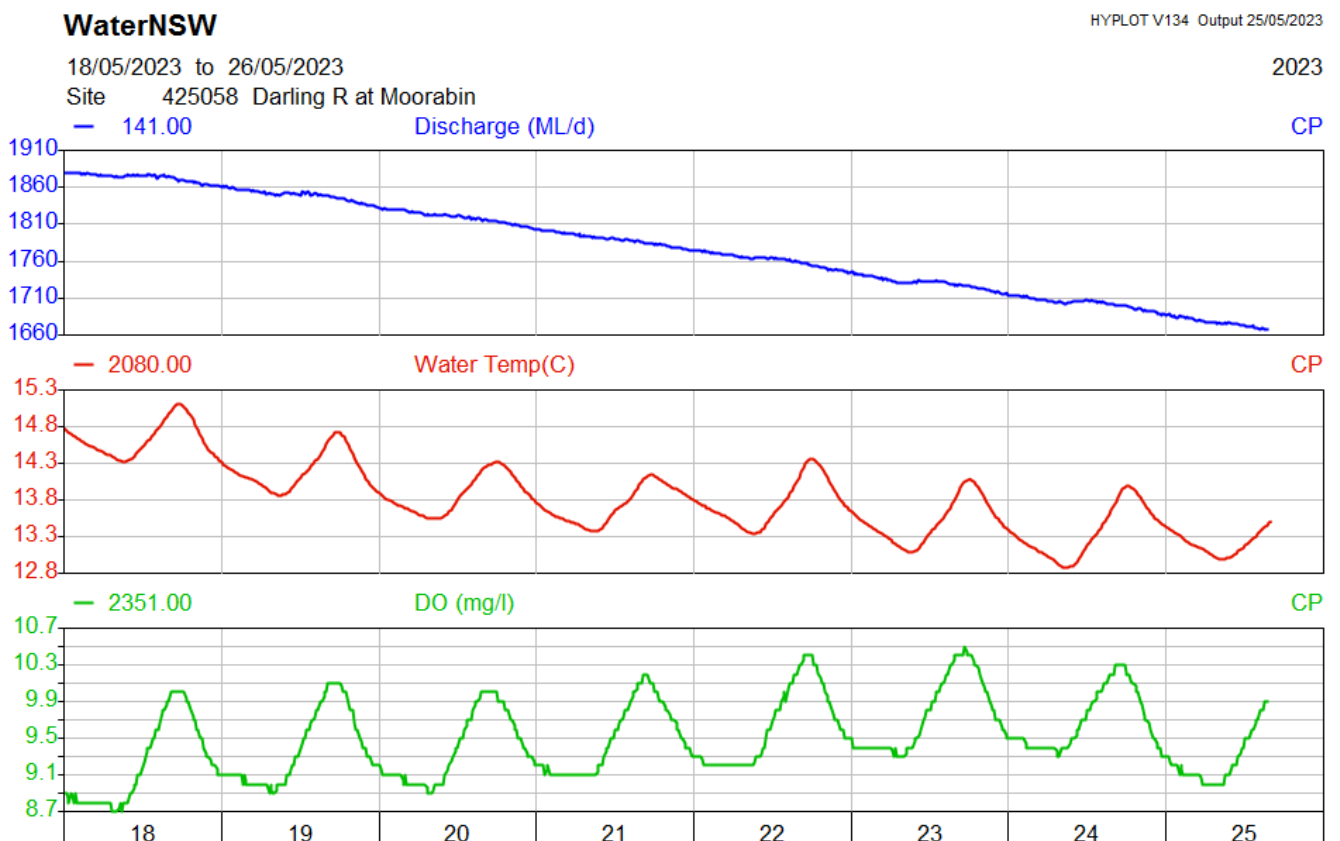


Figure 663: Discharge (ML/day), continuous dissolved oxygen (mg/L) and water temperature (°C) in the Darling River at Wilcannia (Moorabin)

Dissolved oxygen in the upper reaches of Lake Wetherell at Nelia Gaari has been remaining above 6 mg/L (Figure 664).

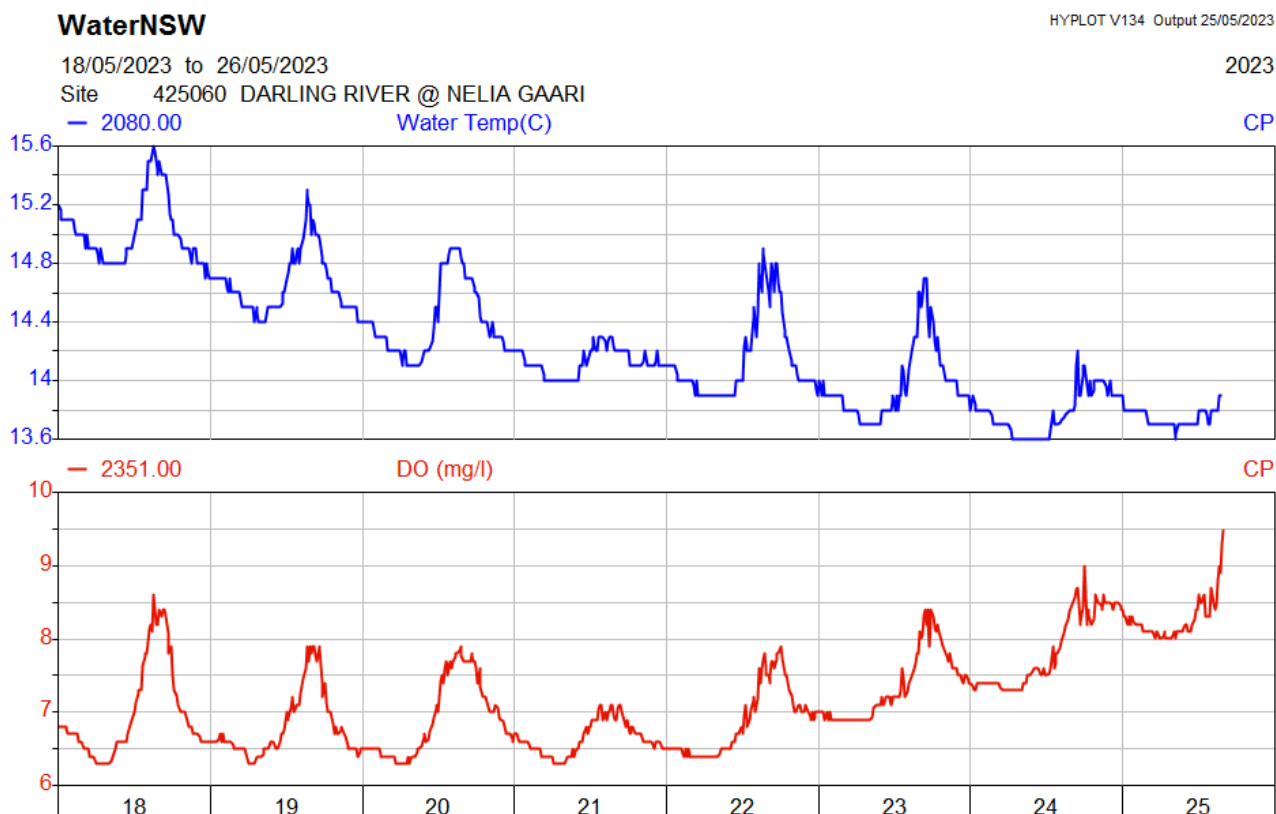


Figure 664: Continuous dissolved oxygen (mg/L) and water temperature (°C) in the Darling River at Nelia Gaari

Longitudinal Survey

Figure 665 is a Google Earth image showing the location and results from a longitudinal survey of dissolved oxygen levels down the Darling River from the Lake Pamamaroo outlet to downstream of the Darling River-Menindee Creek junction on 25 May. Dissolved oxygen levels are above 4 mg/L at all sites.

Figure 666 is a graph showing the dissolved oxygen results from longitudinal surveys undertaken on 25 March, 18 April and 3, 15 and 25 May. The graph highlights there was still a slight decrease in dissolved oxygen levels with increasing distance from Lake Pamamaroo outlet. Despite the reduction in releases from Lake Pamamaroo, dissolved oxygen levels have improved slightly since the most recent profile taken on 15 May.



Figure 665: Google Earth image showing dissolved oxygen results from the Lake Pamamaroo outlet to downstream of Menindee Creek junction – 25 May 2023

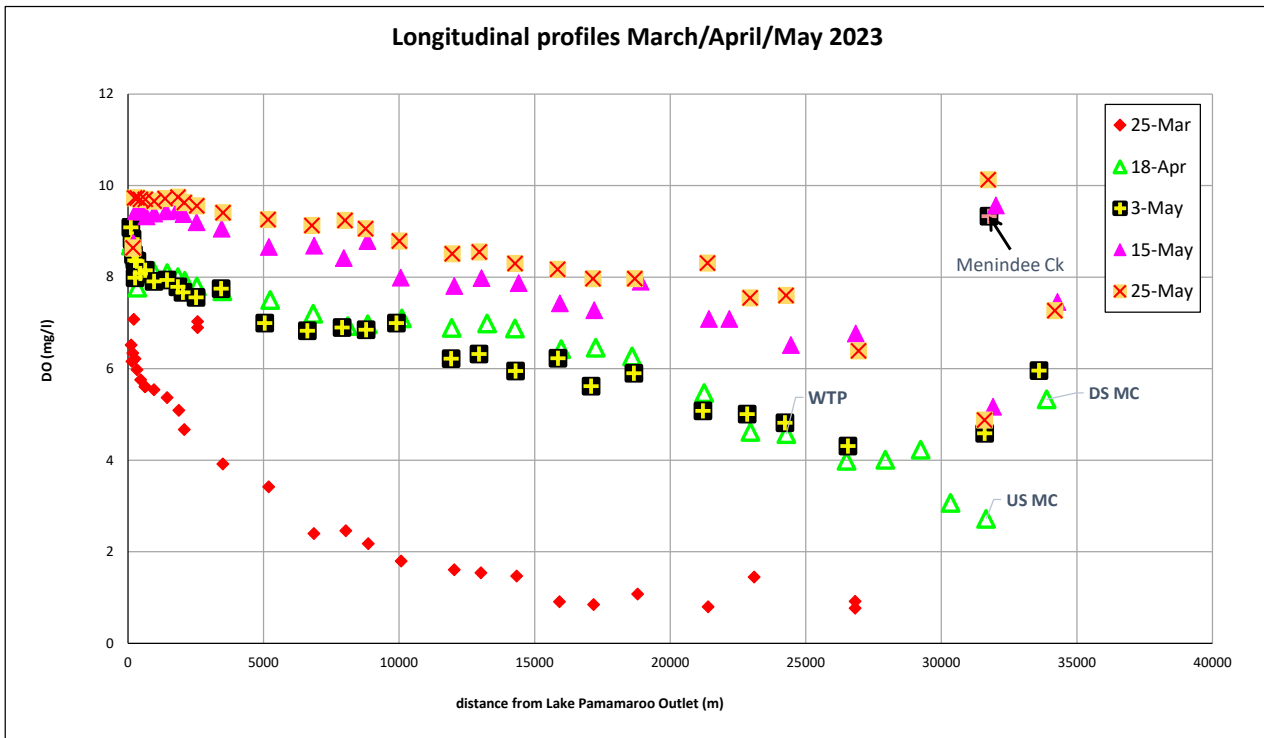


Figure 666: Graph of dissolved oxygen results from longitudinal profiles collected 25 March, 18 April, and 3, 15 and 25 May

Depth profile monitoring undertaken on 22 and 23 May in Menindee Lakes shows the water was oxygenated through the water column at all sites (Table 77). Sentinel satellite imagery (24 May) shows the dissolved oxygen results (mg/L) collected close to the water surface (Figure 667).

Table 77: Hand-held dissolved oxygen (mg/L) readings in Menindee Lakes – 22 to 23 May 2023

Sample depth (m)	Lake Wetherell Site 2	Lake Wetherell Site 3	Lake Wetherell Site 4	Lake Pamamaroo	Darling River at Pump station	Darling River at Weir 32
0.25	6.88	7.13	9.84	10.70	8.06	7.73
0.5	6.29	6.19	9.84	10.50	7.40	7.47
1.0	6.16	5.77	8.00	10.42	7.07	7.22
2.0	6.07	5.11	7.30	10.37	6.53	7.16
3.0	6.00	4.77	6.97	10.33	6.26	7.14
4.0	5.95	4.69	6.48	10.27	5.99	6.99
5.0	5.89	4.44	5.70	10.24	5.41	
6.0	5.80	4.46	4.49			
7.0	5.76	4.87				
8.0	5.71	4.86				
9.0	5.75					
10.0	5.72					
11.0	4.89					

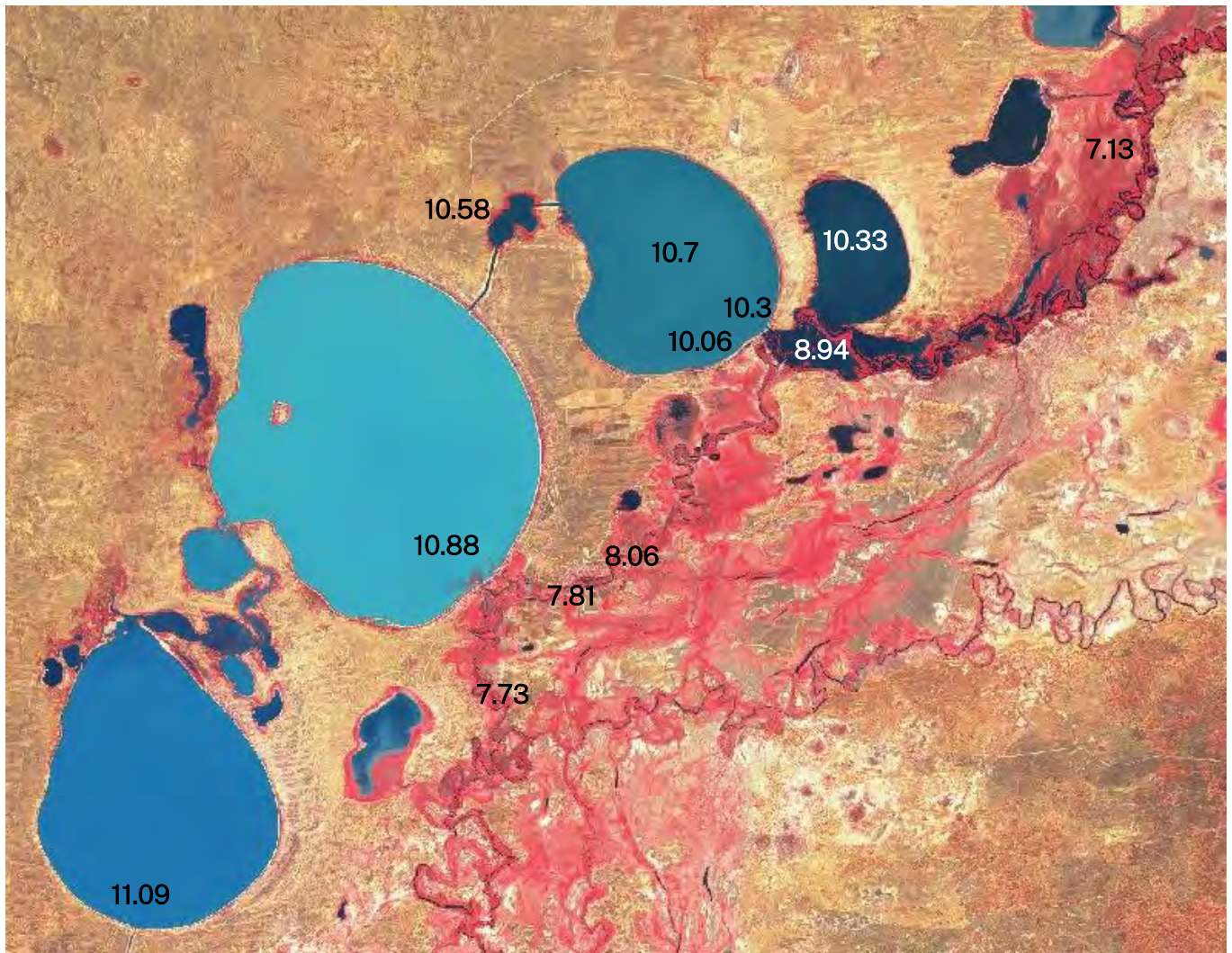


Figure 667: Satellite derived Sentinel image (24 May) showing dissolved oxygen (mg/L) results, 22 and 23 May 2023

The data from the temporary dissolved oxygen sensor installed at the Menindee pump station (at a depth of about 1 m from the water surface) is showing continued improvement in dissolved oxygen levels (Figure 668). A second dissolved oxygen sensor at the Menindee Town gauging station is showing dissolved oxygen levels near the riverbed. The dissolved oxygen level at Menindee Town has been dropping below 5 mg/L overnight, but mostly above 6 mg/L at the pump station. The two sites are approximately 2 km apart by river. Water temperature in this area has decreased to 13°C.

Releases from lakes Pamamaroo and Menindee were both reduced to 425 ML/day on 16 May. There has not been any major impact on dissolved oxygen levels at either the Menindee or Weir 32 monitoring sites. Dissolved oxygen at Weir 32 is remaining above 6 mg/L (Figure 669). Discharge at Weir 32 is steady at around 1,000 ML/day.

Period 8 Day 18/05/2023 to 26/05/2023 2023
— 425902 Menindee WQ 2351.0020 Minute Inst. DO (mg/l) CP
— 425001 DARLING@MENINDEE TWN 2351.0020 Minute Inst. DO (mg/l) CP

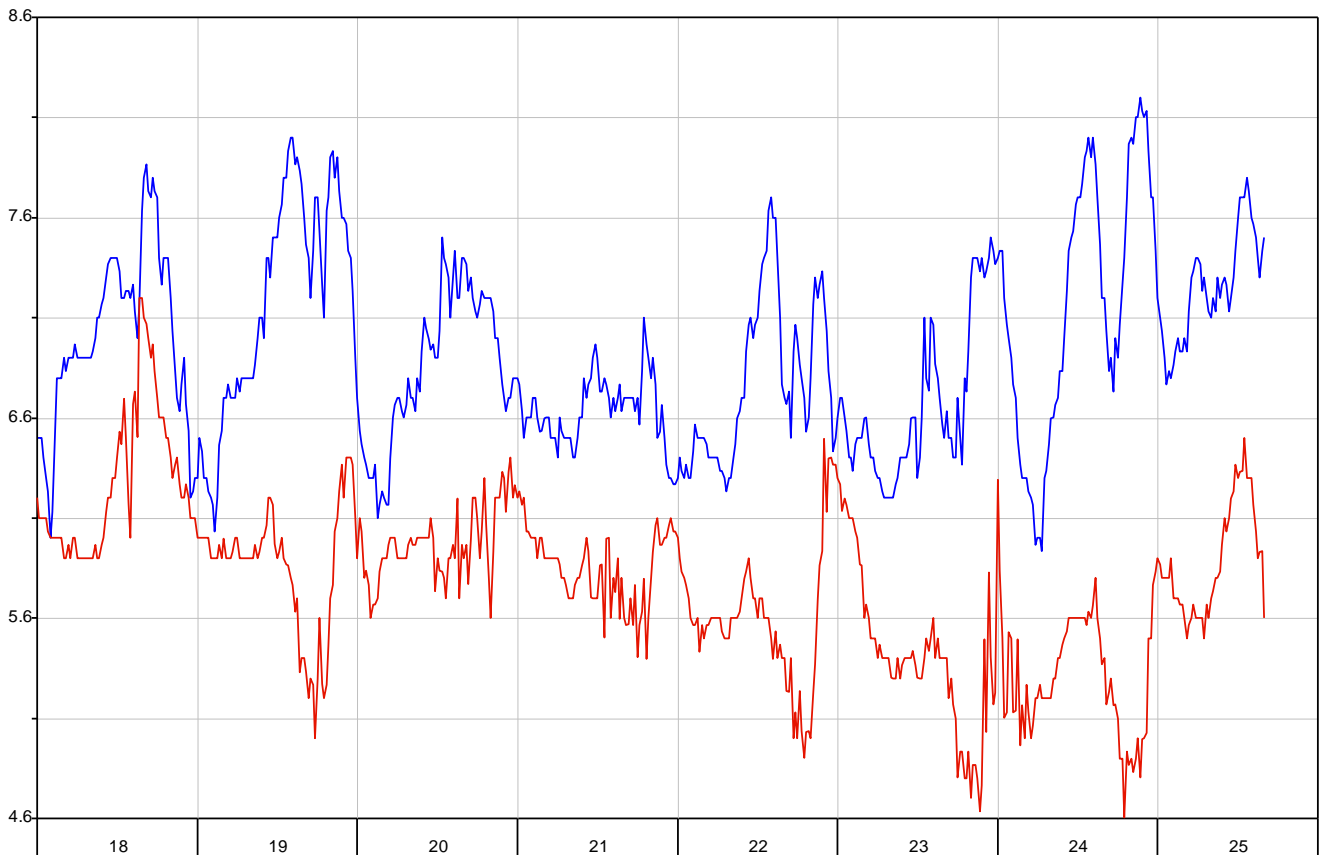


Figure 668: Continuous dissolved oxygen (mg/L) in the Darling River at Menindee pump station and Menindee town gauging stations

18/05/2023 to 26/05/2023

2023

Site 425012 DARLING RIVER AT MENINDEE UPSTREAM WEIR 32

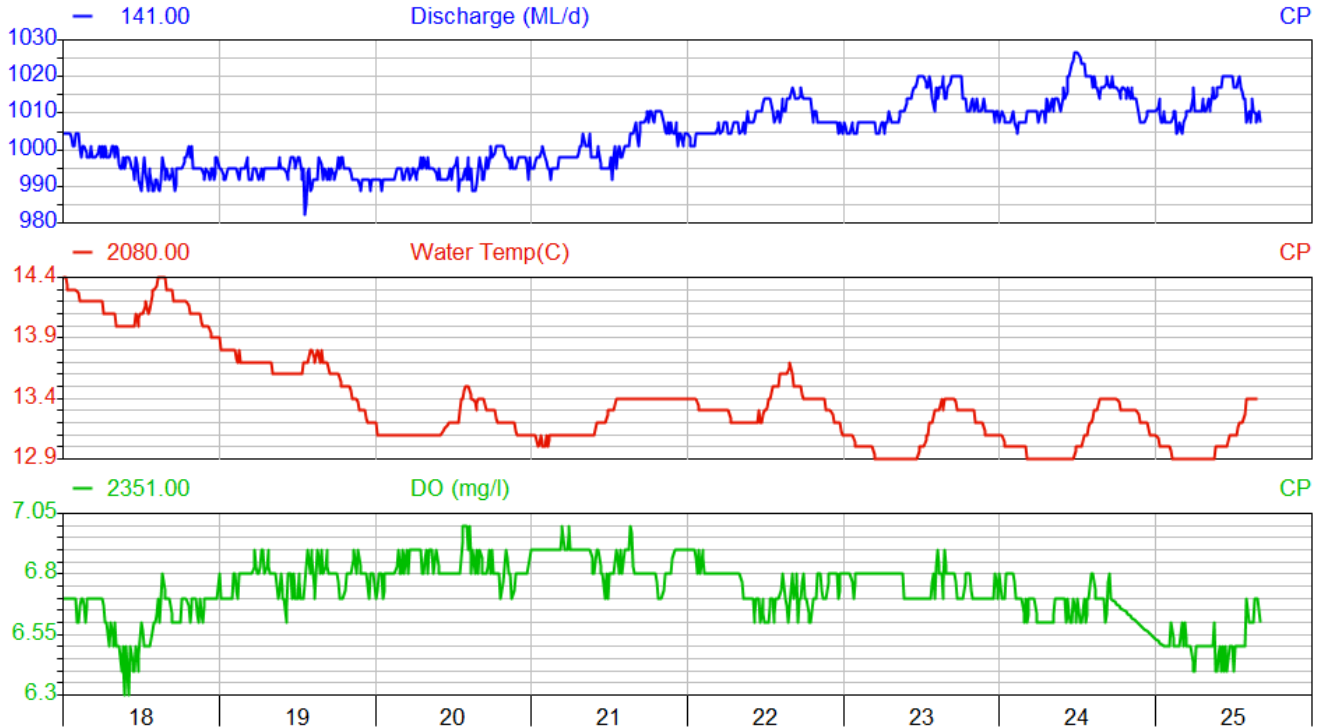


Figure 669: Continuous discharge (ML/day), dissolved oxygen (mg/L) and water temperature (°C) in the Darling River at Weir 32

Lower Darling

Monitoring last week showed dissolved oxygen levels in the lower Darling River at Weir 32 and Burtundy were above the critical threshold of 4 mg/L for fish health (Table 78).

Table 78: Hand-held dissolved oxygen (mg/L) readings in the lower Darling River

Monitoring site	Sample Date Time	Dissolved Oxygen (mg/L)
Darling River at Weir 32	23/05/2023 12:47	7.73
Darling River at Burtundy	23/05/2023 13:57	10.36
Darling Anabranh at Silver City Highway	23/05/2023 12:30	10.33

Discharge in the Darling River at Burtundy is decreasing toward 1,300 ML/day (Figure 670). The continuous dissolved oxygen level at Burtundy is remaining above 9 mg/L.

18/05/2023 to 26/05/2023

2023

Site 425007 DARLING RIVER AT BURTUNDY

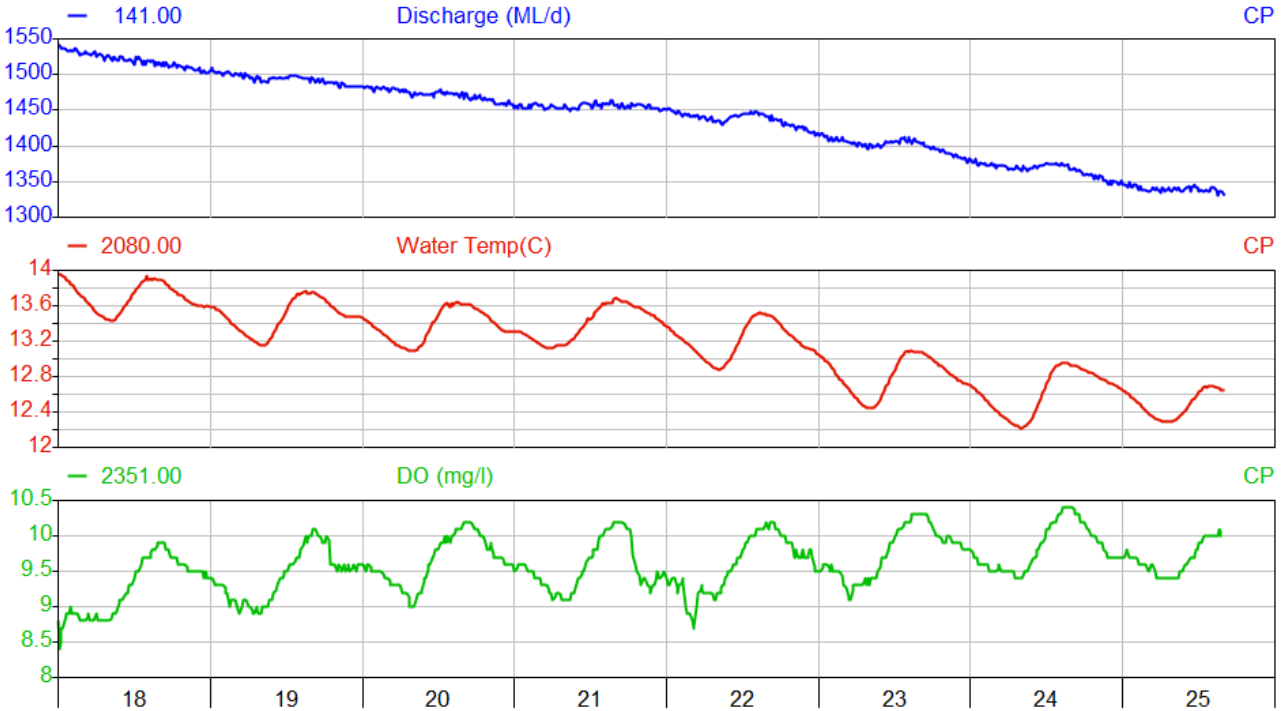
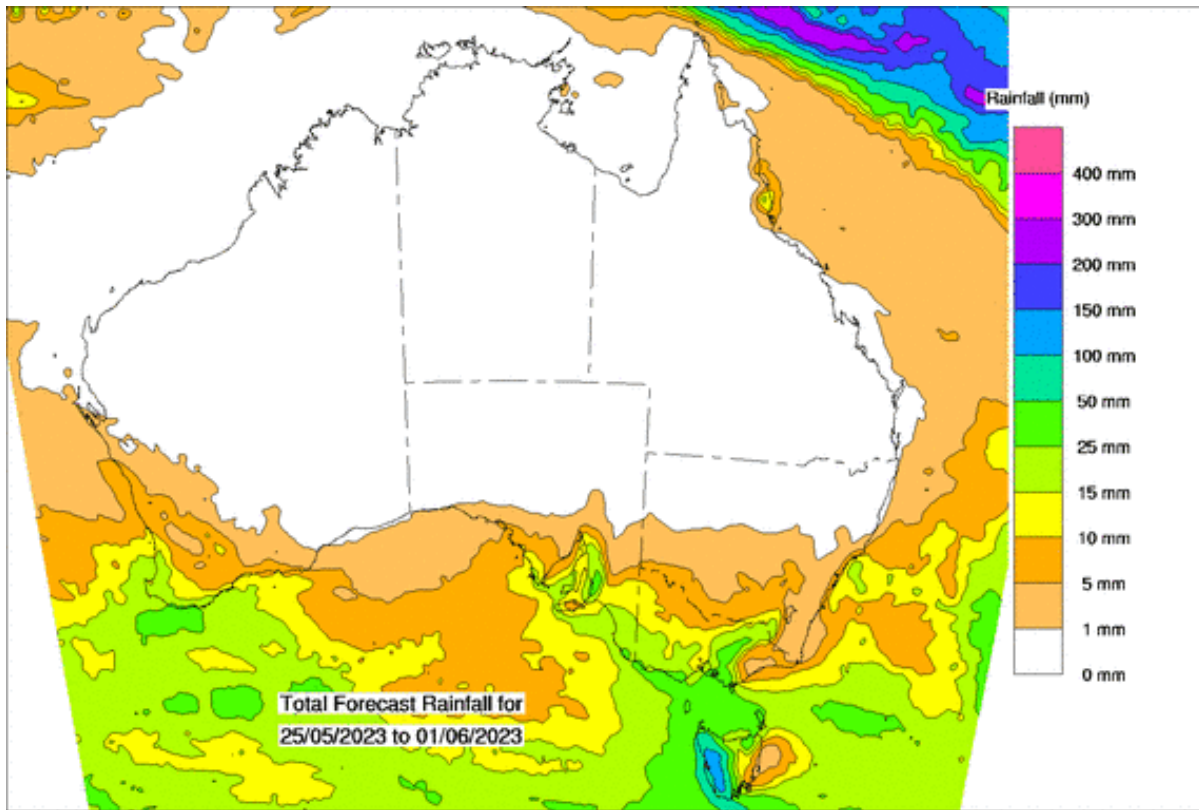


Figure 670: Continuous discharge (ML/day), dissolved oxygen (mg/L), water temperature (°C) in the Darling River at Burtundy

Weather Outlook

The Bureau of Meteorology 8-day total rain forecast (25 May to 1 June) indicates light rainfall predicted across the lower half of NSW (Figure 671). The forecast maximum daily air temperatures at Menindee will be below 20°C until next Wednesday (Figure 672).



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Issued: 24/05/2023

Figure 671: Bureau of Meteorology 8-day total rain forecast








	THU May 25	FRI May 26	SAT May 27	SUN May 28	MON May 29	TUE May 30	WED May 31
Summary	 Wind and rain increasing	 Cloud increasing	 Mostly cloudy	 Mostly cloudy	 Mostly sunny	 Mostly cloudy	 Mostly cloudy
Maximum	22°C	14°C	15°C	17°C	18°C	19°C	21°C
Minimum	11°C	4°C	4°C	6°C	6°C	7°C	7°C
Chance Of Rain	80%	20%	20%	20%	5%	5%	5%
Rain Amount	1-5mm	< 1mm	< 1mm	< 1mm	< 1mm	< 1mm	< 1mm

Figure 672: Forecast air temperatures and rainfall for Menindee

Water quality update for Menindee and Lower Darling – 6 June 2023

Darling River and Menindee Lakes

Dissolved oxygen levels at Wilcannia (Moorabin) are remaining above 8 mg/L (Figure 673). As a general guide, native fish and other large aquatic organisms require at least 2 mg/L of dissolved oxygen to survive but may begin to suffer if levels are below 4 to 5 mg/L for prolonged periods. Discharge at Wilcannia has slightly increased due to rainfall on 5th June.

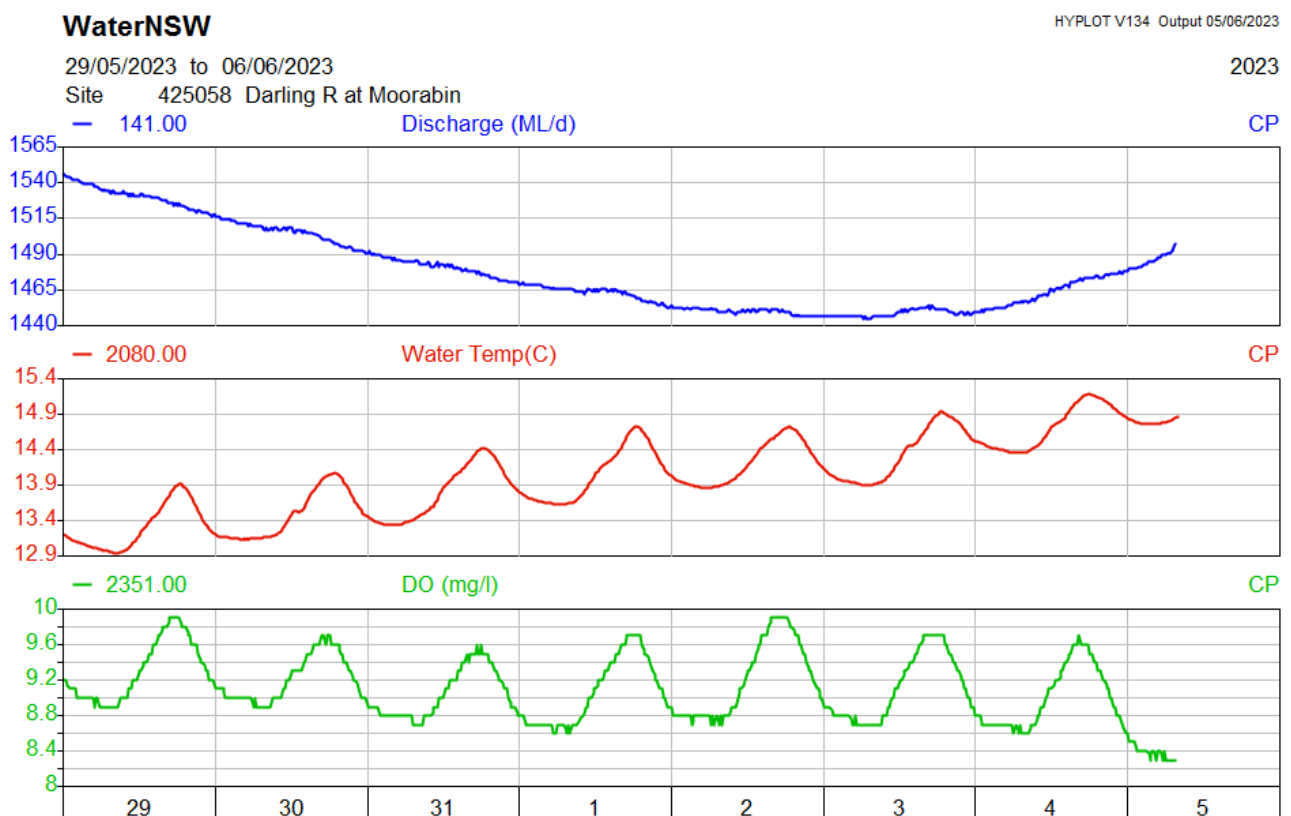


Figure 673: Discharge (ML/day), continuous dissolved oxygen (mg/L) and water temperature (°C) in the Darlin River at Wilcannia (Moorabin)

Dissolved oxygen in the upper reaches of Lake Wetherell at Nelia Gaari has been remaining above 6 mg/L (Figure 674).

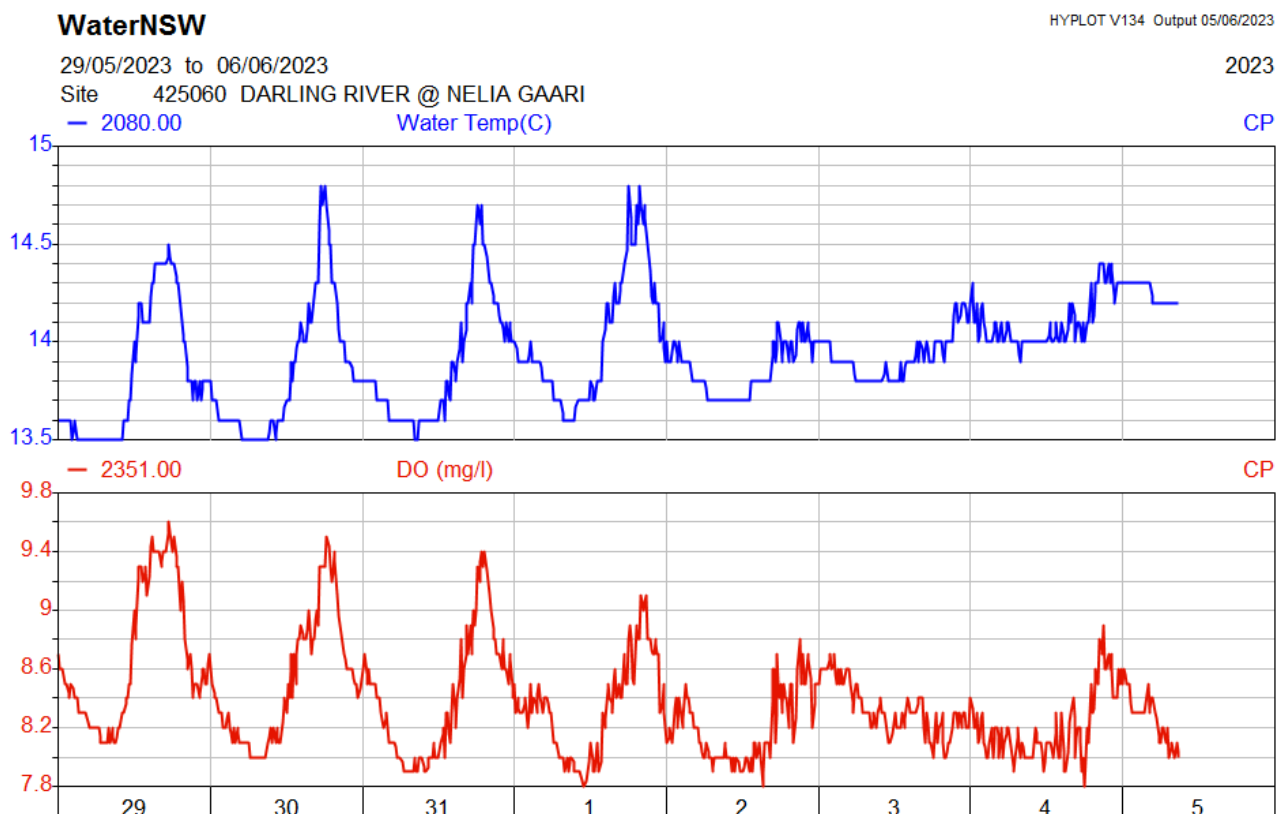


Figure 674: Continuous dissolved oxygen (mg/L) and water temperature (°C) in the Darling River at Nelia Gaari

Longitudinal Survey

Figure 675 is a Google Earth image showing the location and results from a longitudinal survey of dissolved oxygen levels down the Darling River from the Lake Pamamaroo outlet to downstream of Menindee Creek on 5 & 6 June. Dissolved oxygen levels are above 5 mg/L at all sites except immediately upstream of the Menindee Creek outlet.

Figure 676 is a graph showing the dissolved oxygen results from longitudinal surveys undertaken on 25 March, 18 April and 3, 15 May and 5 & 6 June.



Figure 675: Google Earth image showing dissolved oxygen results from the Lake Pamamaroo outlet to Menindee– 5 & 6 June 2023

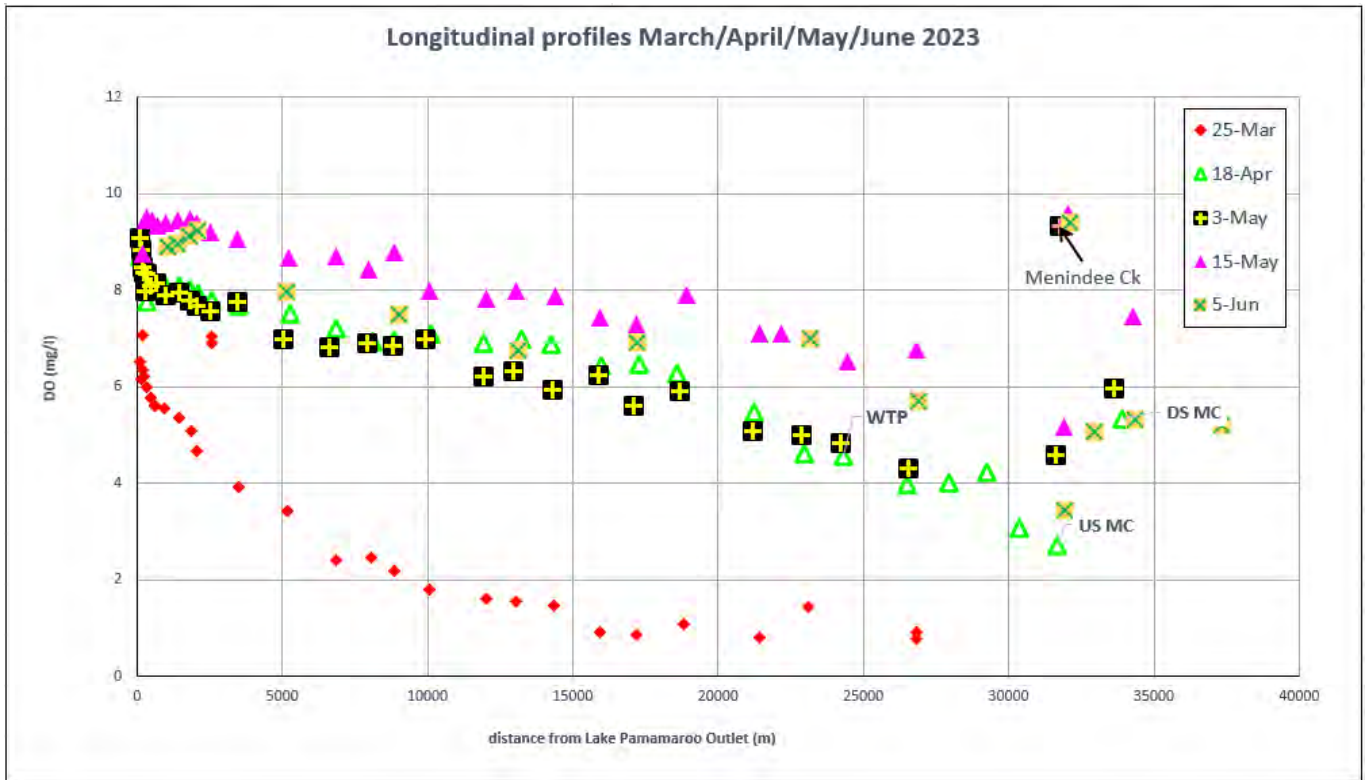


Figure 676: Graph of dissolved oxygen results from longitudinal profiles collected 25 March, 18 April, and 3, 15 May and 5 June

The data from the temporary dissolved oxygen sensor (425902) installed at the Menindee pump station (at a depth of about 1 m from the water surface) is showing consistent dissolved oxygen levels (Figure 677). Overnight dissolved oxygen levels remain above 5 mg/L.

A second dissolved oxygen sensor at the Menindee Town gauging station is showing dissolved oxygen levels near the riverbed. The dissolved oxygen level at Menindee Town has been dropping below 4 mg/L overnight but remains above 4 mg/L during the day. The two sites are approximately 2 km apart by river. Water temperature in this area is around 15°C.



Figure 677: Continuous dissolved oxygen (mg/L) in the Darling River at Menindee pump station and Menindee town gauging stations

As of 31 May, releases from Lake Pamamaroo outlet were 350 ML/day and Menindee outlet was further reduced to 150ML/day. Readings collected at and downstream of the Menindee Creek junction between 1 & 6 June are shown in Table 79.

Table 79: Hand-held dissolved oxygen (mg/L) readings downstream of Menindee Creek

Sample Date Time	Upstream Menindee Creek	Menindee Creek junction	1 km downstream of Menindee Creek	2 km downstream of Menindee Creek	3 km downstream of Menindee Creek	4 km downstream of Menindee Creek
01/06/2023 11:56 – 12:19 PM		8.02	8.44			
02/06/2023 08:59-09:10 AM		9.05	8.54	7.94		
03/06/2023 10:07-10:44 AM		8.38	7.23	6.98	7.05	6.16
06/06/2023	3.45	9.40	5.08	5.32	5.50	5.21

At Weir 32, there has been a decline in dissolved oxygen levels, with water temperature also increasing. (Figure 678).

30/05/2023 to 07/06/2023

2023

Site 425012 DARLING RIVER AT MENINDEE UPSTREAM WEIR 32

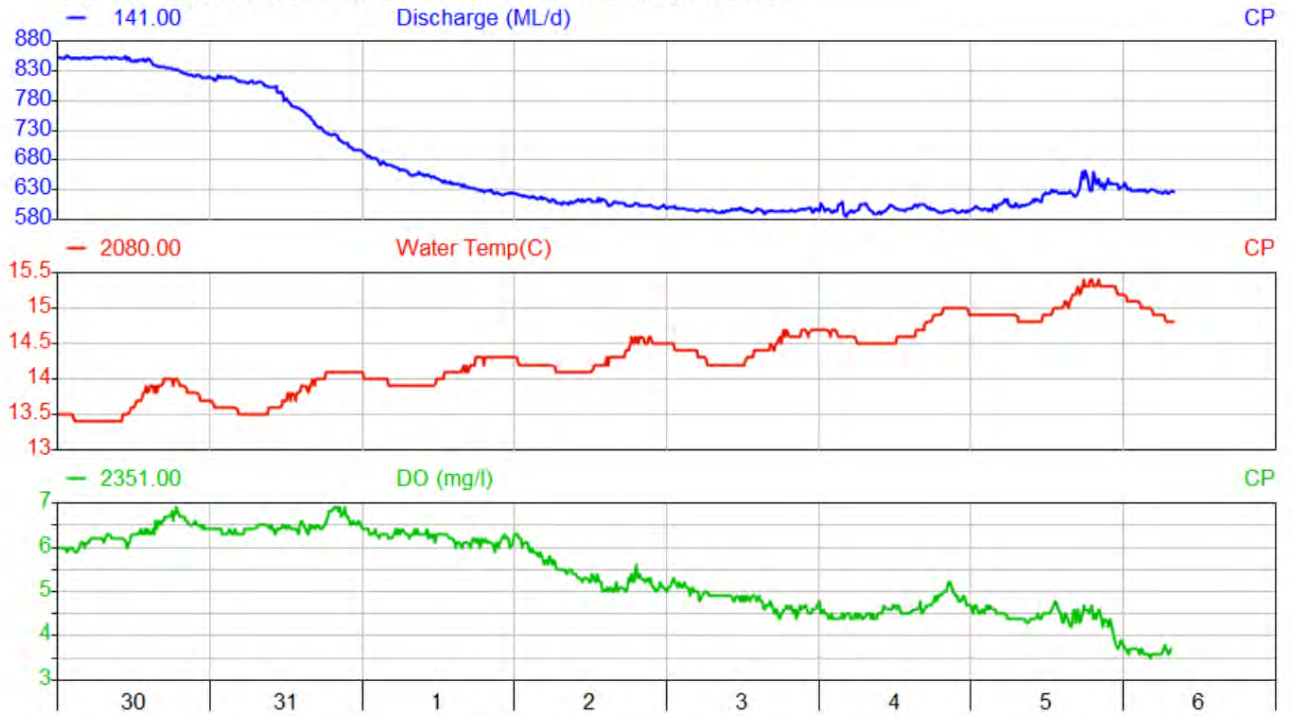


Figure 678: Continuous discharge (ML/day), dissolved oxygen (mg/L) and water temperature (°C) in the Darling River at Weir 32

Lower Darling

Monitoring last week showed dissolved oxygen levels in the lower Darling River at Burtundy were above the critical threshold of 4 mg/L for fish health (Table 80).

Table 80: Hand-held dissolved oxygen (mg/L) readings in the lower Darling River

Monitoring site	Sample Date Time	Dissolved Oxygen (mg/L)
Darling River at Tolarno	30/05/2023 12:43:00 PM	8.03
Darling River at Burtundy	30/05/2023 12:43:00 PM	9.93
Darling Anabranh at Silver City Highway	31/05/2023 10:18:00 AM	9.29

Discharge in the Darling River at Burtundy is decreasing toward 1,200 ML/day (Figure 679). The continuous dissolved oxygen level at Burtundy is remaining above 9 mg/L.

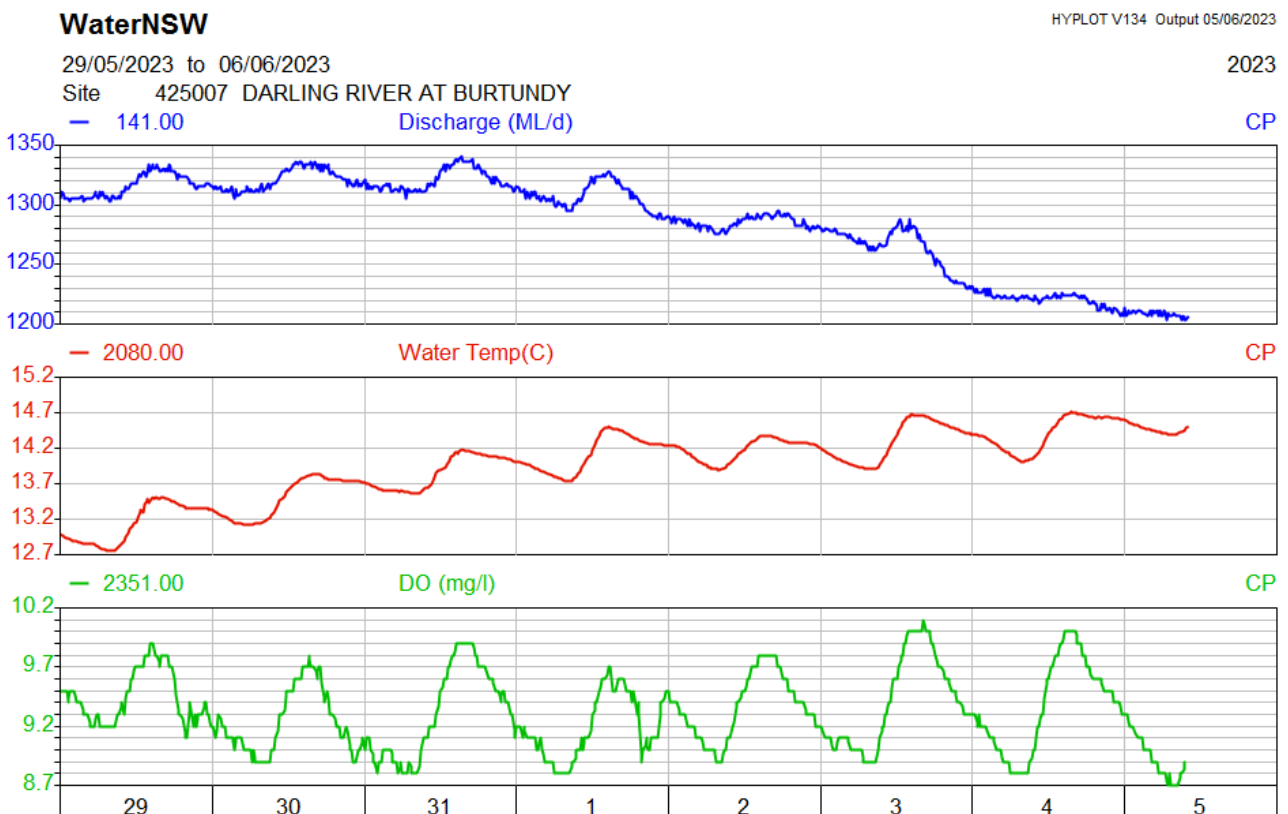


Figure 679: Continuous discharge (ML/day), dissolved oxygen (mg/L), water temperature (°C) in the Darling River at Burtundy

Weather Outlook

The Bureau of Meteorology 8-day total rain forecast (5 to 12 June) predicts 25-50mm rainfall across the lower half of NSW (Figure 680). From Thursday, Menindee's forecast maximum daily air temperatures will be below 20°C (Figure 681).

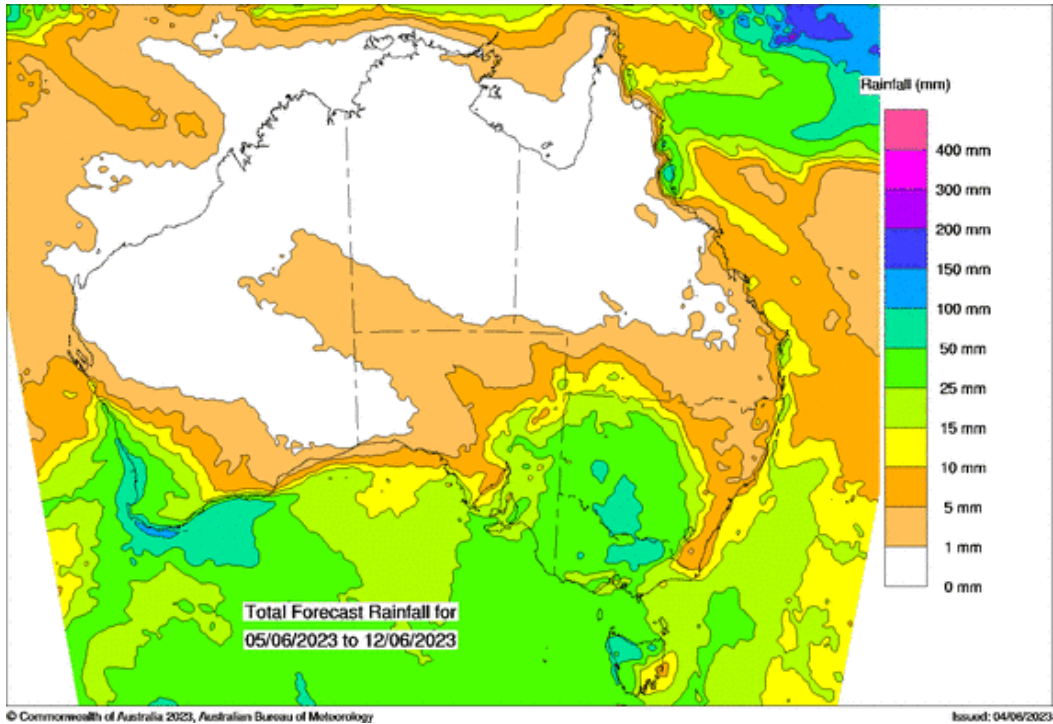


Figure 680: Bureau of Meteorology 8-day total rain forecast

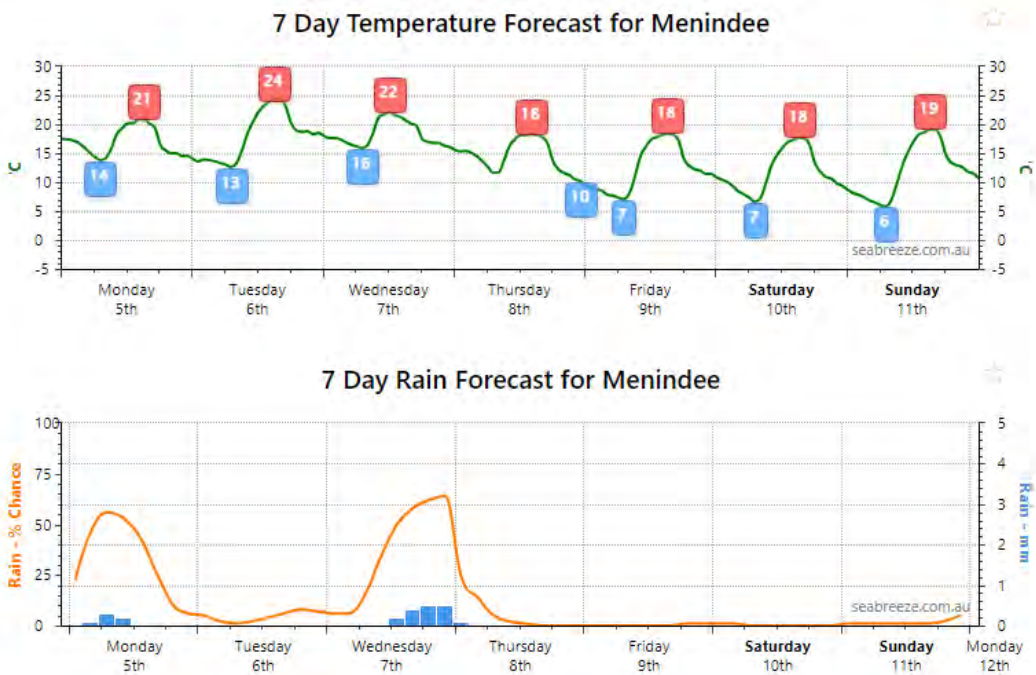


Figure 681: Forecast air temperatures and rainfall for Menindee

Water quality update for Menindee and Lower Darling – 15 June 2023

Darling River and Menindee Lakes

Dissolved oxygen levels at Wilcannia (Moorabin) are remaining above 9 mg/L (Figure 682). As a general guide, native fish and other large aquatic organisms require at least 2 mg/L of dissolved oxygen to survive but may begin to suffer if levels are below 4 to 5 mg/L for prolonged periods.

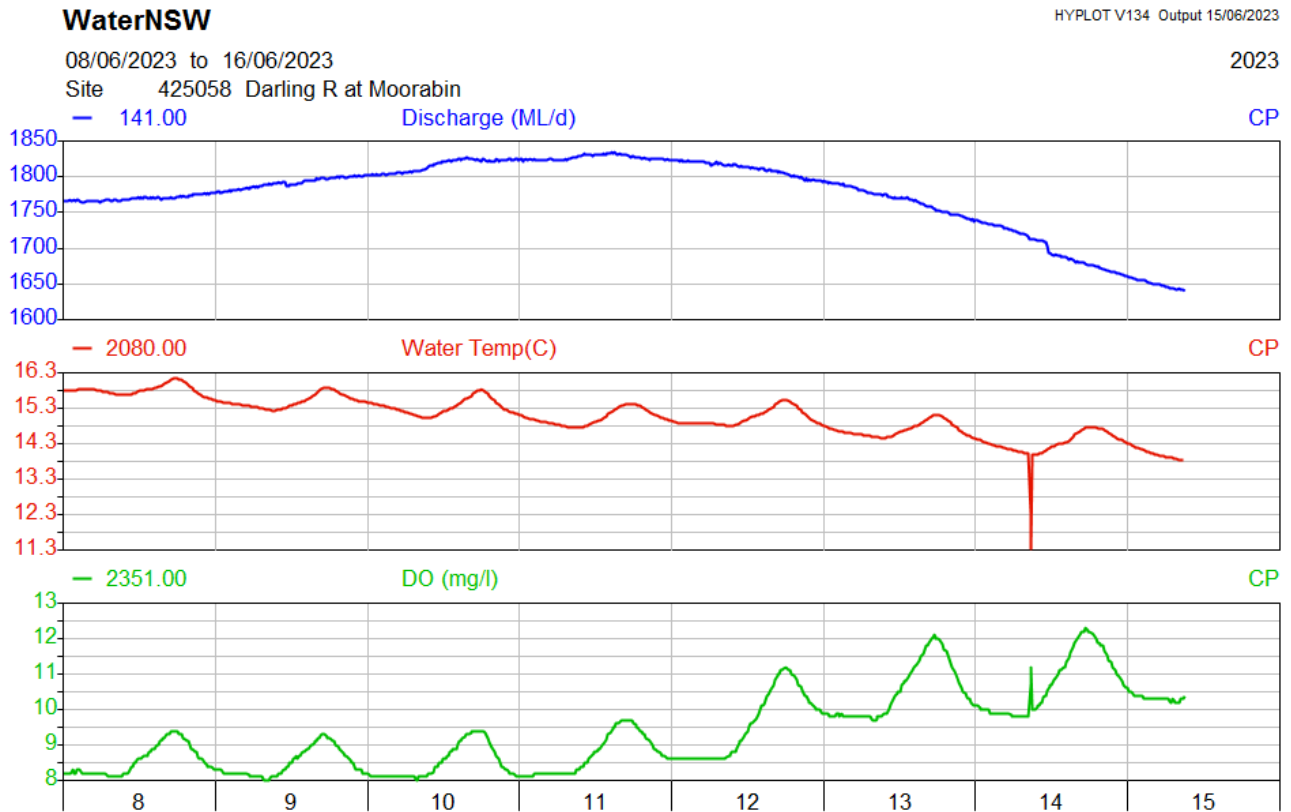


Figure 682: Discharge (ML/day), continuous dissolved oxygen (mg/L) and water temperature (°C) in the Darling River at Wilcannia (Moorabin)

Dissolved oxygen in the upper reaches of Lake Wetherell at Nelia Gaari has been remaining above 6 mg/L (Figure 683).

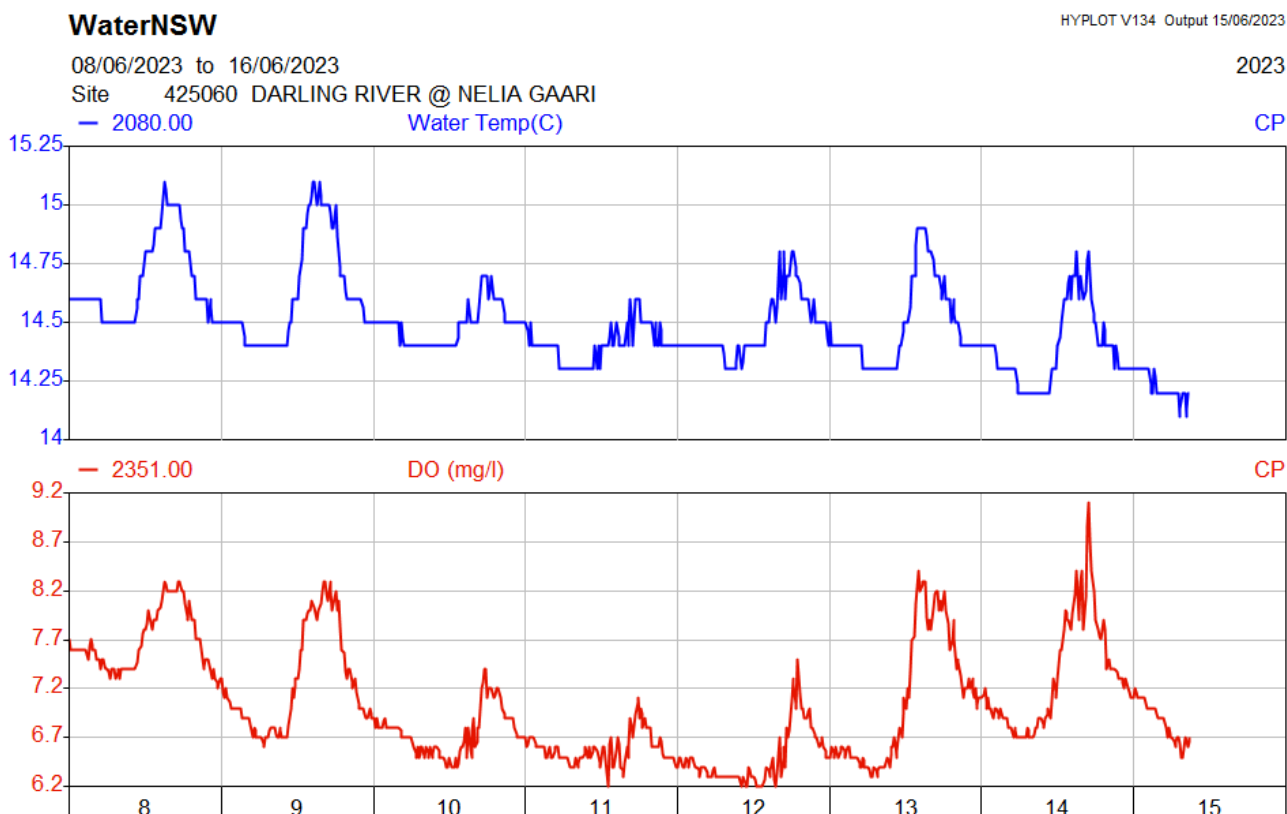


Figure 683: Continuous dissolved oxygen (mg/L) and water temperature (°C) in the Darling River at Nelia Gaari

The Pamamaroo inlet has been opened. Figure 684 shows water from Lake Wetherell starting to push into Lake Pamamaroo. The Planet satellite image from 12 June (Figure 685) shows the water from Lake Wetherell is mixing with the water in Lake Pamamaroo. Table 81 lists the dissolved oxygen monitoring results from the Darling River downstream of Lake Wetherell Main Weir. There has been minimal change in dissolved oxygen since the Pamamaroo inlet was opened.



Figure 684: Planet satellite image 9 June



Figure 685: Planet satellite image 12 June

Table 81: Hand-held dissolved oxygen (mg/L) readings Darling River downstream of Main Weir

	10/6/2023	11/6/2023	12/6/2023	13/6/2023	14/6/2023
Darling River downstream Main Weir	9.27	9.67	9.59	8.77	9.63

Longitudinal Survey

Figure 686 is a Google Earth image showing the location and results from a longitudinal survey of dissolved oxygen levels down the Darling River from the Lake Pamamaroo outlet to downstream of Menindee Creek on 14 June. Dissolved oxygen levels are above 4 mg/L at all sites except immediately upstream of the Menindee Creek outlet (3.46 mg/L). Dissolved oxygen in the Darling River downstream of the Menindee Creek junction toward Weir 32 is remaining above 5 mg/L.

Figure 687 is a graph showing the dissolved oxygen results from longitudinal surveys undertaken on 25 March, 5 April, 3 May and 5 and 14 June.



Figure 686: Google Earth image showing dissolved oxygen results from the Lake Pamamaroo outlet to downstream of Menindee Creek-Darling River junction– 14 June 2023

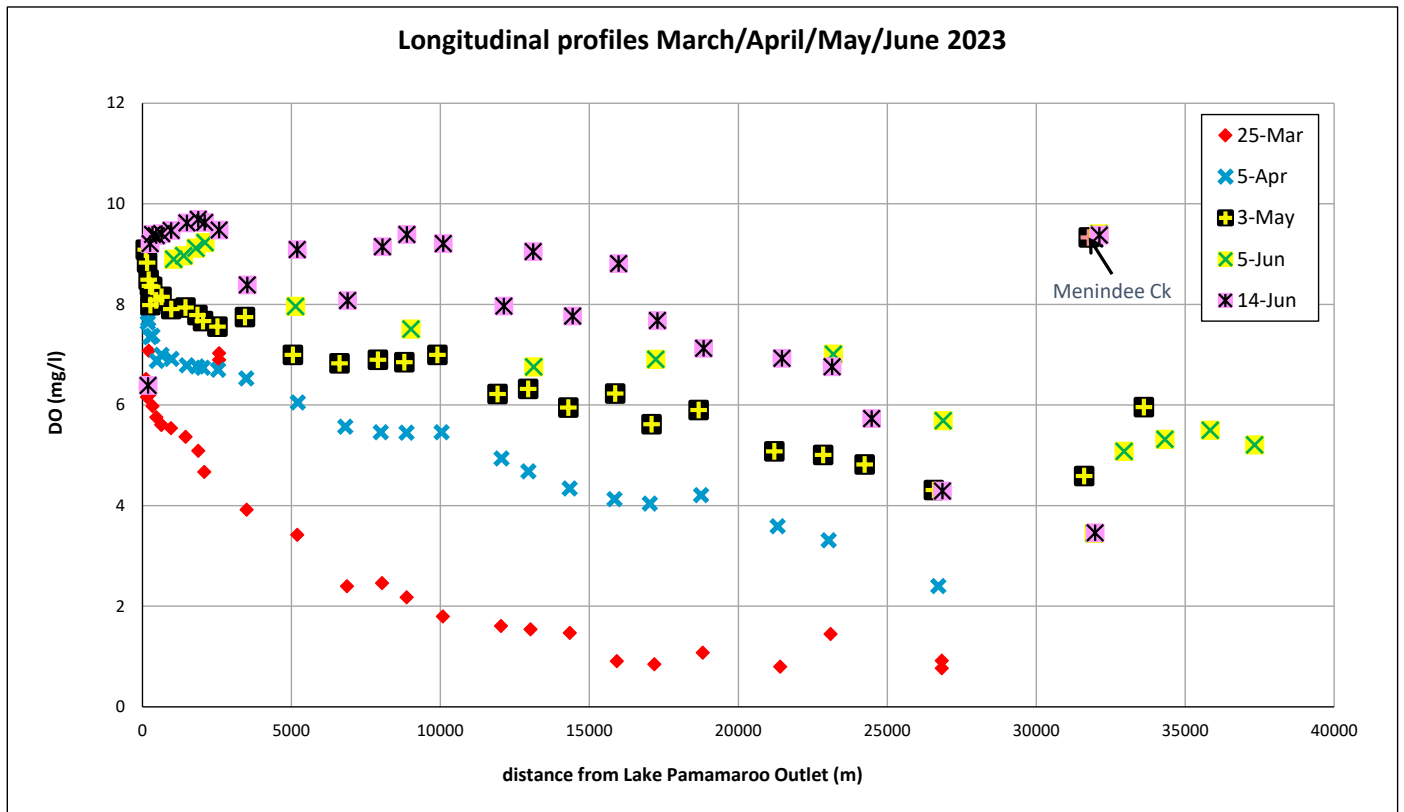


Figure 687: Graph of dissolved oxygen results from longitudinal profiles collected 25 March, 18 April, and 3, 15 May and 5 June

The data from the temporary dissolved oxygen sensor (425902) installed at the Menindee pump station (at a depth of about 1 m from the water surface) is showing diurnal fluctuations in dissolved oxygen levels (Figure 688). Overnight dissolved oxygen levels remain above 4 mg/L.

A second dissolved oxygen sensor at the Menindee Town gauging station is showing dissolved oxygen levels near the riverbed. The dissolved oxygen level at Menindee Town has been dropping below 4 mg/L overnight but remains above 4 mg/L during the day. The two sites are approximately 2 km apart by river. Water temperature in this area is around 14°C.

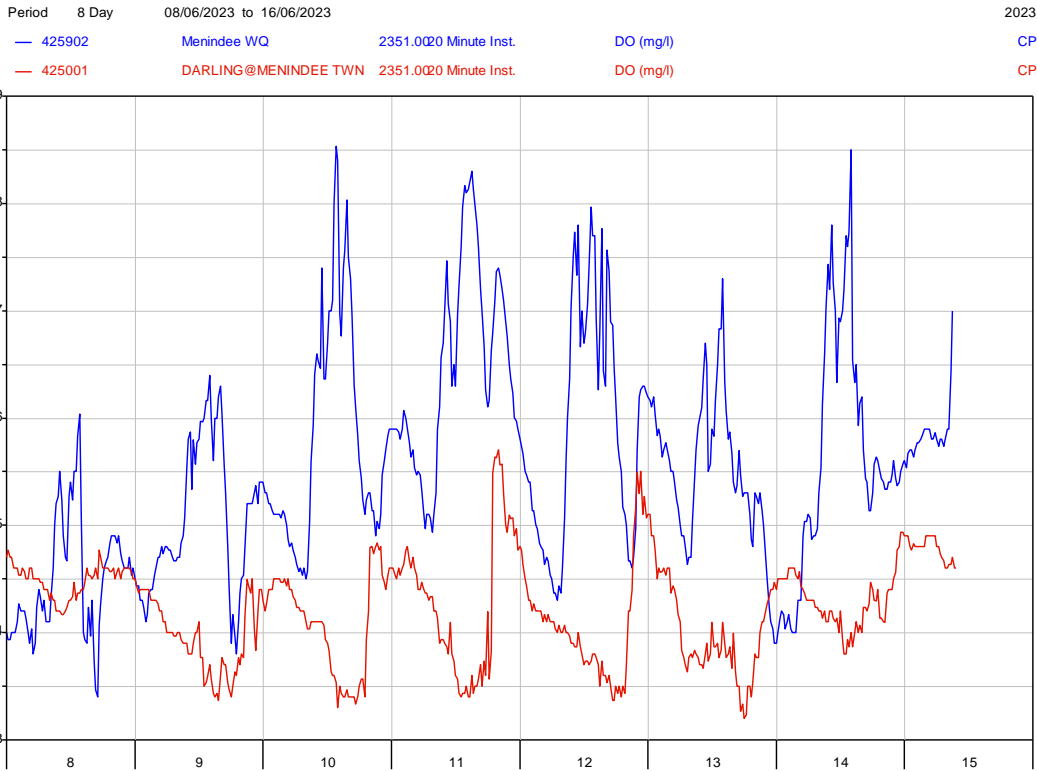


Figure 688: Continuous dissolved oxygen (mg/L) in the Darling River at Menindee pump station and Menindee town gauging stations

At Weir 32, dissolved oxygen levels are now remaining above 4 mg/L (Figure 689).

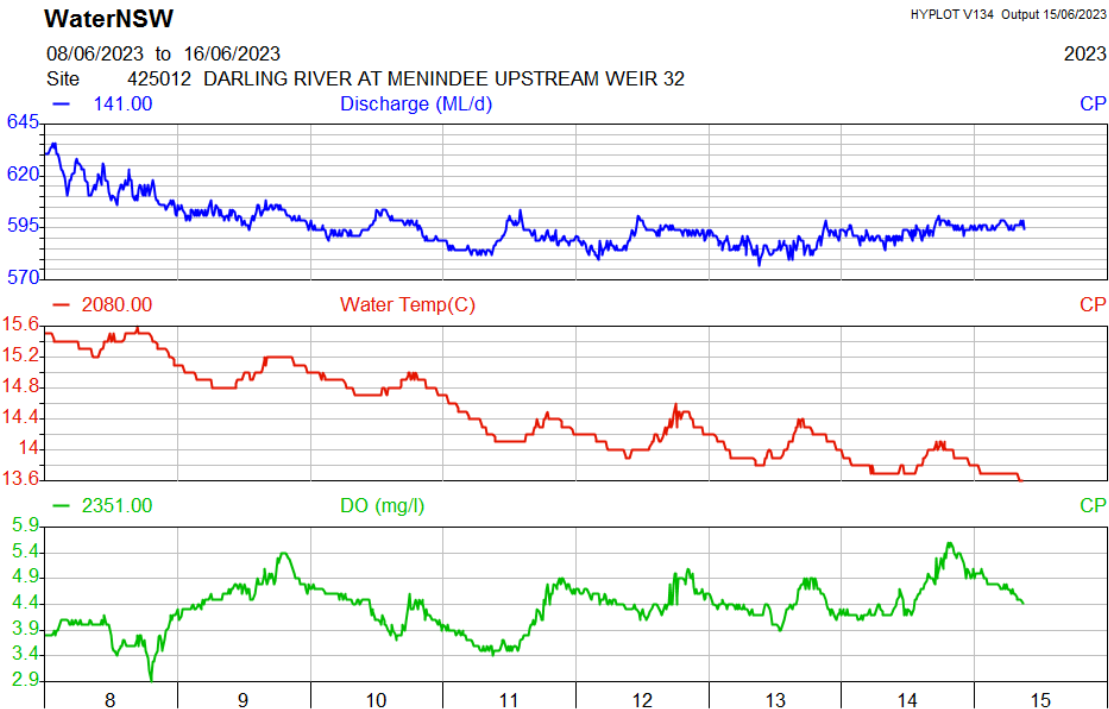


Figure 689: Continuous discharge (ML/day), dissolved oxygen (mg/L) and water temperature (°C) in the Darling River at Weir 32

Lower Darling

Monitoring is showing dissolved oxygen levels in the lower Darling River were above the critical threshold of 4 mg/L for fish health (Table 82).

Table 82: Hand-held dissolved oxygen (mg/L) readings in the lower Darling River

Monitoring site	Sample Date Time	Dissolved Oxygen (mg/L)
Darling River at Pooncarie	06/06/2023 12:17	7.81
Darling River at Burtundy	13/06/2023 10:20	8.11
Darling River at Ellerslie	06/06/2023 10:29	8.68
Darling River at Tapio	06/06/2023 9:54	8.28

Discharge in the Darling River at Burtundy is decreasing toward 1,000 ML/day (Figure 690). The continuous dissolved oxygen level at Burtundy is remaining above 7 mg/L.

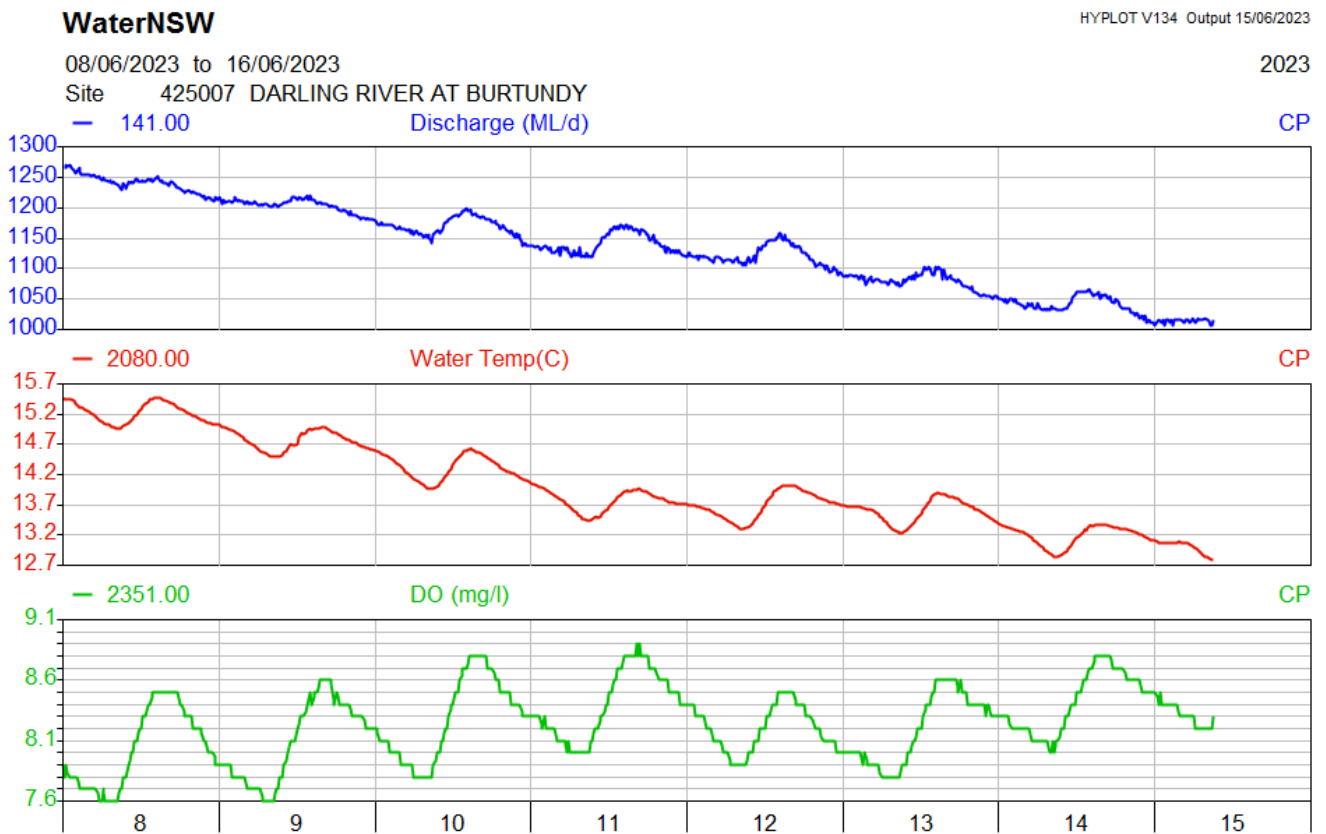


Figure 690: Continuous discharge (ML/day), dissolved oxygen (mg/L), water temperature (°C) in the Darling River at Burtundy

Weather Outlook

The Bureau of Meteorology 8-day total rain forecast (15 to 22 June) predicts minimal rainfall across most of NSW (Figure 691). Menindee forecast maximum daily air temperatures are below 20°C (Figure 692).

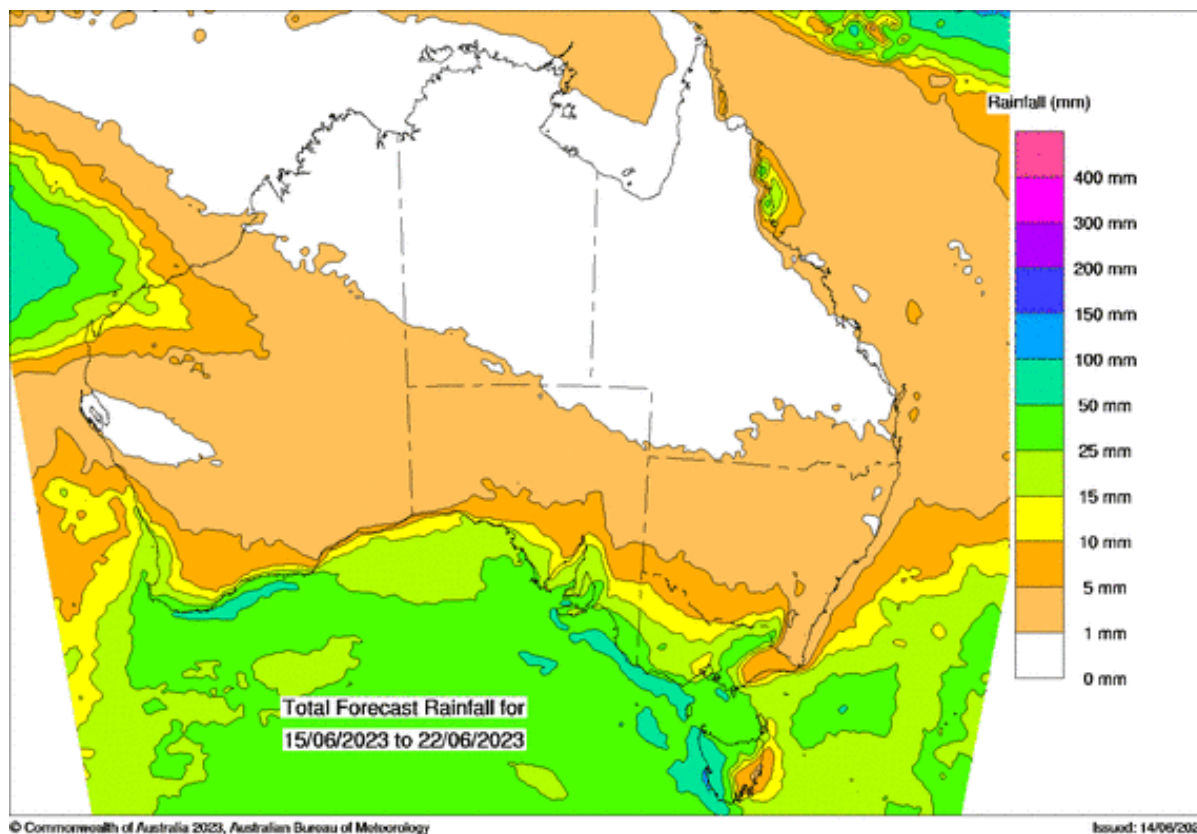


Figure 691: Bureau of Meteorology 8-day total rain forecast





	THU Jun 15	FRI Jun 16	SAT Jun 17	SUN Jun 18	MON Jun 19	TUE Jun 20	WED Jun 21
Summary	Mostly sunny	Sunny	Windy	Mostly sunny	Mostly sunny	Mostly cloudy	Mostly cloudy
Maximum	17°C	17°C	18°C	15°C	15°C	15°C	15°C
Minimum	6°C	5°C	7°C	5°C	4°C	3°C	5°C
Chance Of Rain	5%	5%	50%	5%	20%	20%	60%
Rain Amount	< 1mm	< 1mm	< 1mm	< 1mm	< 1mm	< 1mm	< 1mm

Figure 692: Forecast air temperatures and rainfall for Menindee

Appendix G. Water quality stages for hypoxic blackwater

This appendix covers the period 16 November 2022 to 19 June 2023.

Table 83 - Description of water quality stages

Stage	Evidence
<p>Stage 1 Water quality monitoring shows indicators within normal range.</p> 	<ul style="list-style-type: none"> • All water quality and climatic indicators within normal/tolerable ranges. • Dissolved oxygen above 4 mg/L at all times. Low risk to aquatic ecosystems.
<p>Stage 2 Water quality monitoring has detected conditions which indicate a potential threat to the aquatic ecosystem.</p> 	<p>Any or all of:</p> <ul style="list-style-type: none"> • Daily dissolved oxygen levels dropping below 4 mg/L at night/early morning but increasing to above 4 mg/L during the day. Can impact on fish health, but may not result in deaths. • Forecast rainfall, existing inflows and storage levels indicate increased likelihood of unregulated, overbank flows that will inundate dry floodplain, which is likely to have significant build-up of organic material.
<p>Stage 3 Water quality presents an immediate threat to aquatic ecosystems. Urgent management response is required to avoid fish death or similar event of high ecological implications.</p> 	<p>Further deterioration of water quality conditions indicated by any, or all of:</p> <ul style="list-style-type: none"> • Local reports of fish gasping at the water surface or deaths. Reports of crayfish leaving the water. • Dissolved oxygen dropping below 2 mg/L at night/early morning. Water temperature remaining below 25 °C. High risk to aquatic ecosystems. Fish deaths may occur. • Storage levels at near full capacity. Existing high flows already in the system. Forecast for heavy rain which will result in the inundation of previously dry floodplain.
<p>Stage 4 Water quality is causing significant impact on aquatic ecosystems with potentially catastrophic outcomes – action is required to minimise or mitigate against further mass fish death.</p> 	<ul style="list-style-type: none"> • Confirmed reports of widespread fish deaths. • Dissolved oxygen level remaining below 2 mg/L and water temperature above 25°C. Very high risk to aquatic ecosystems, and fish deaths occurring. • Weather forecasts indicate poor water quality is likely to deteriorate further.

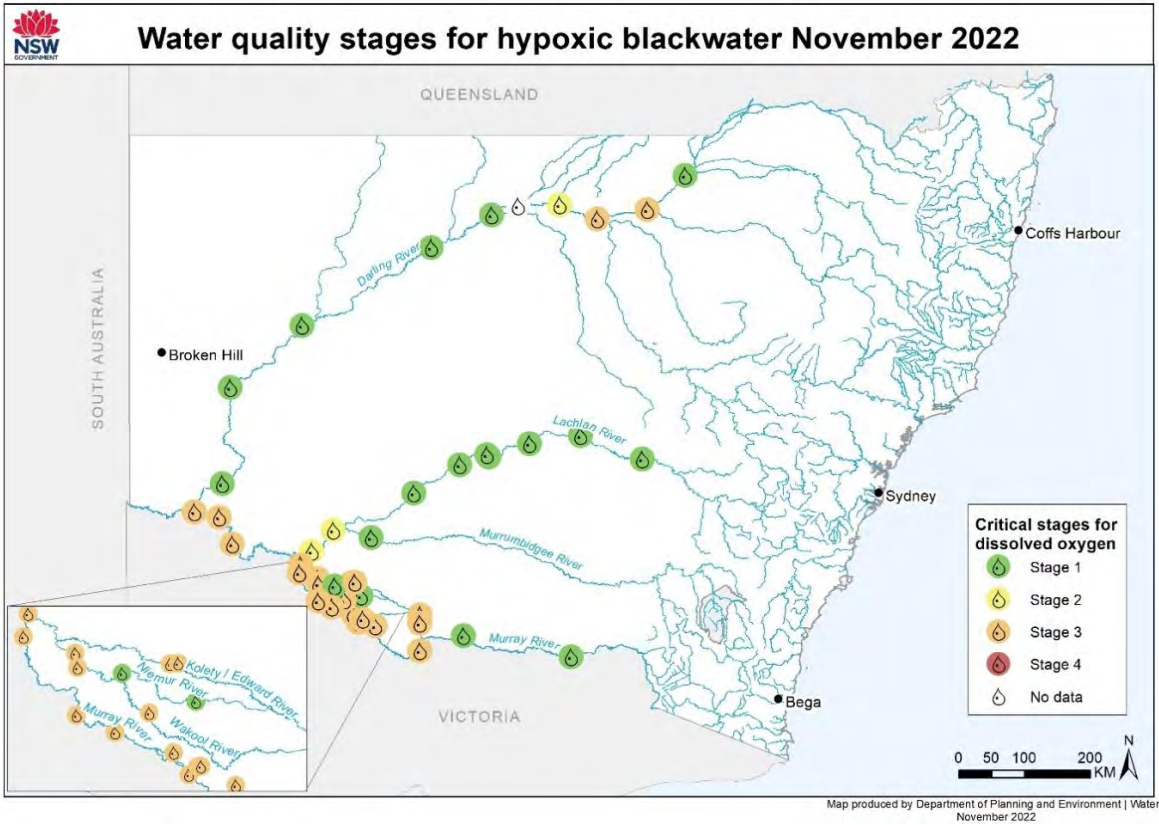


Figure 693 - Water quality stages for hypoxic blackwater November 2022

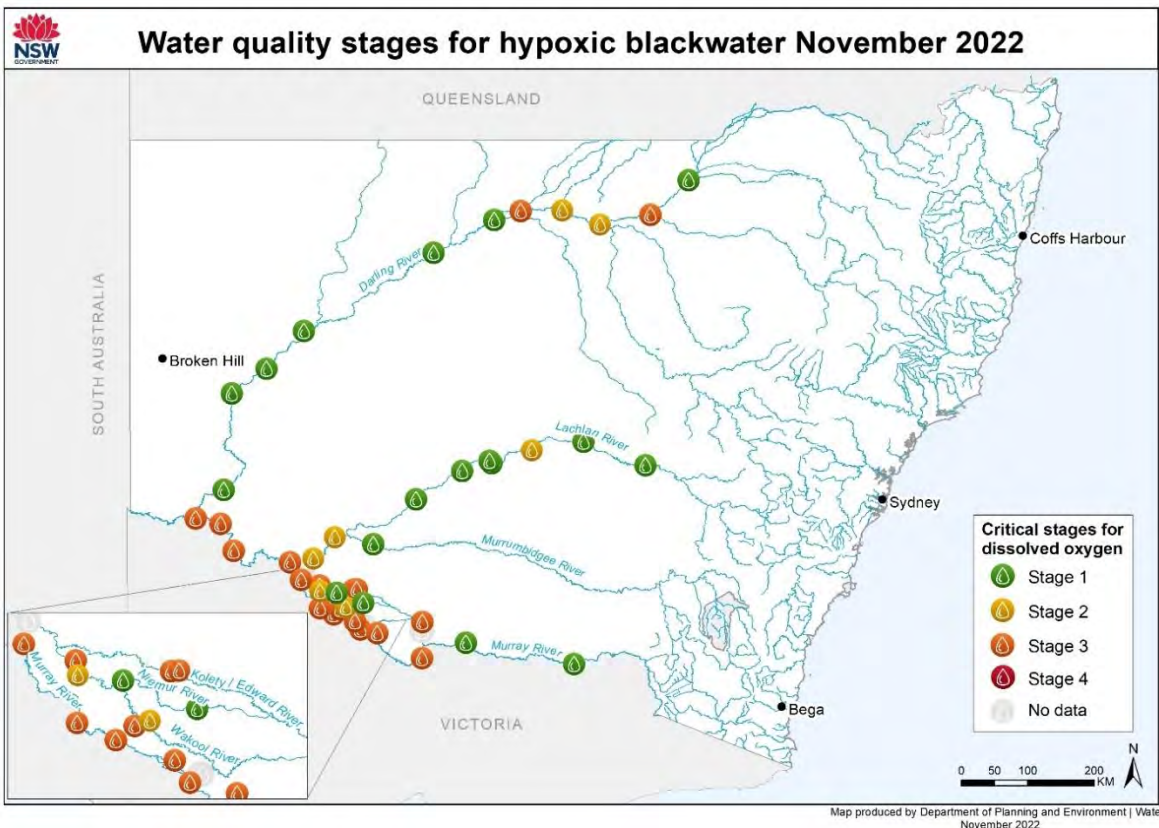


Figure 694 - Water quality stages for hypoxic blackwater November 2022

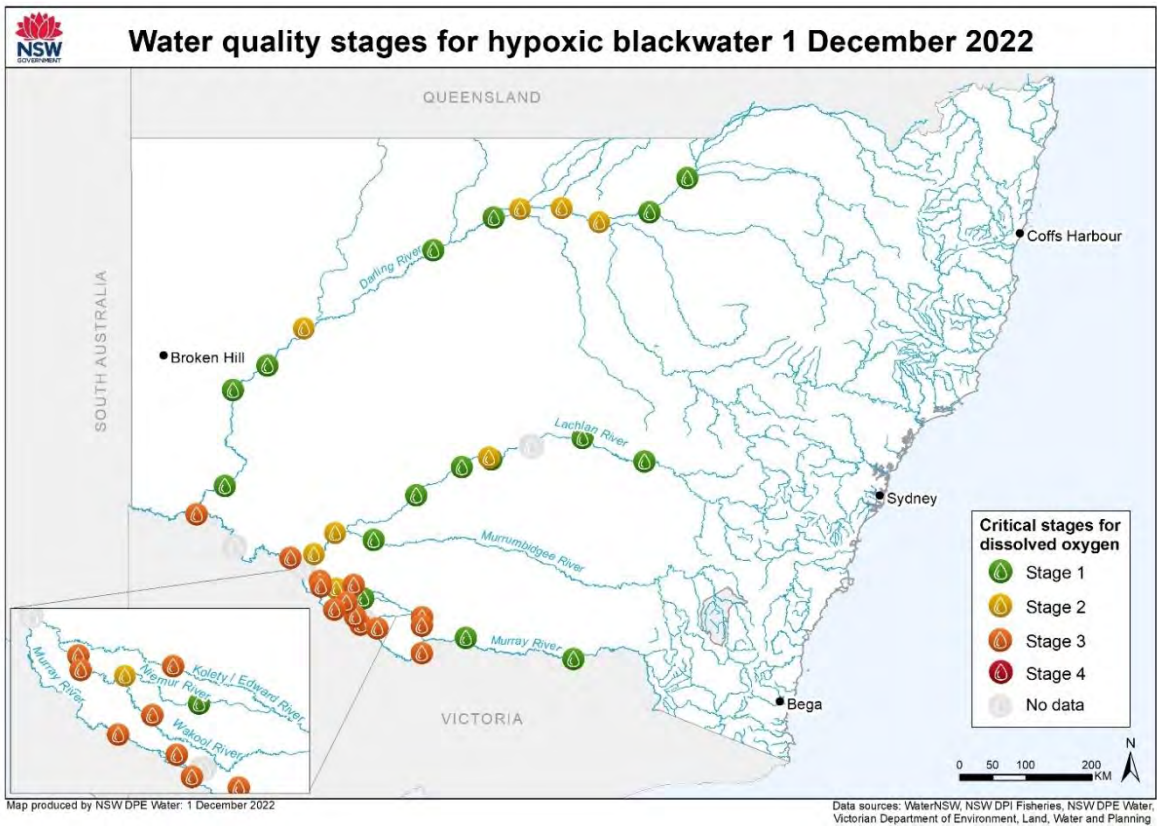


Figure 695 - Water quality stages for hypoxic blackwater 1 December 2022

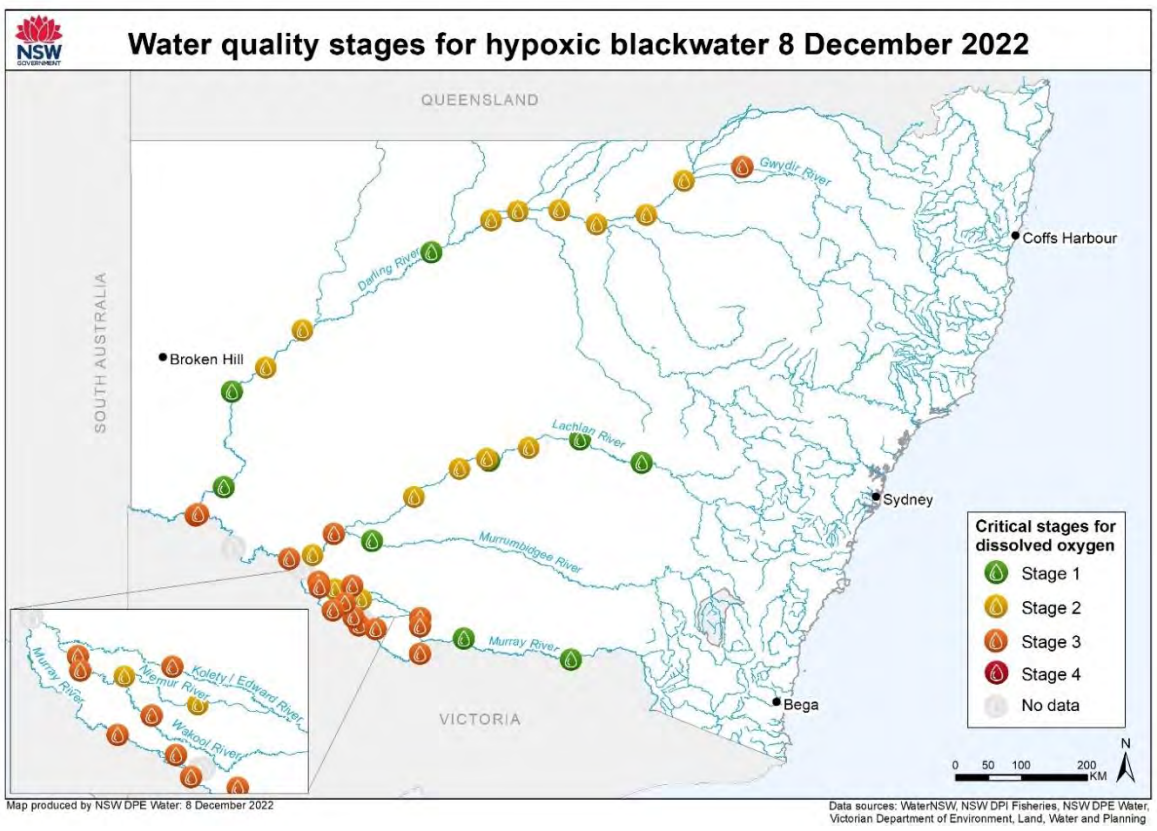


Figure 696 - Water quality stages for hypoxic blackwater 8 December 2022

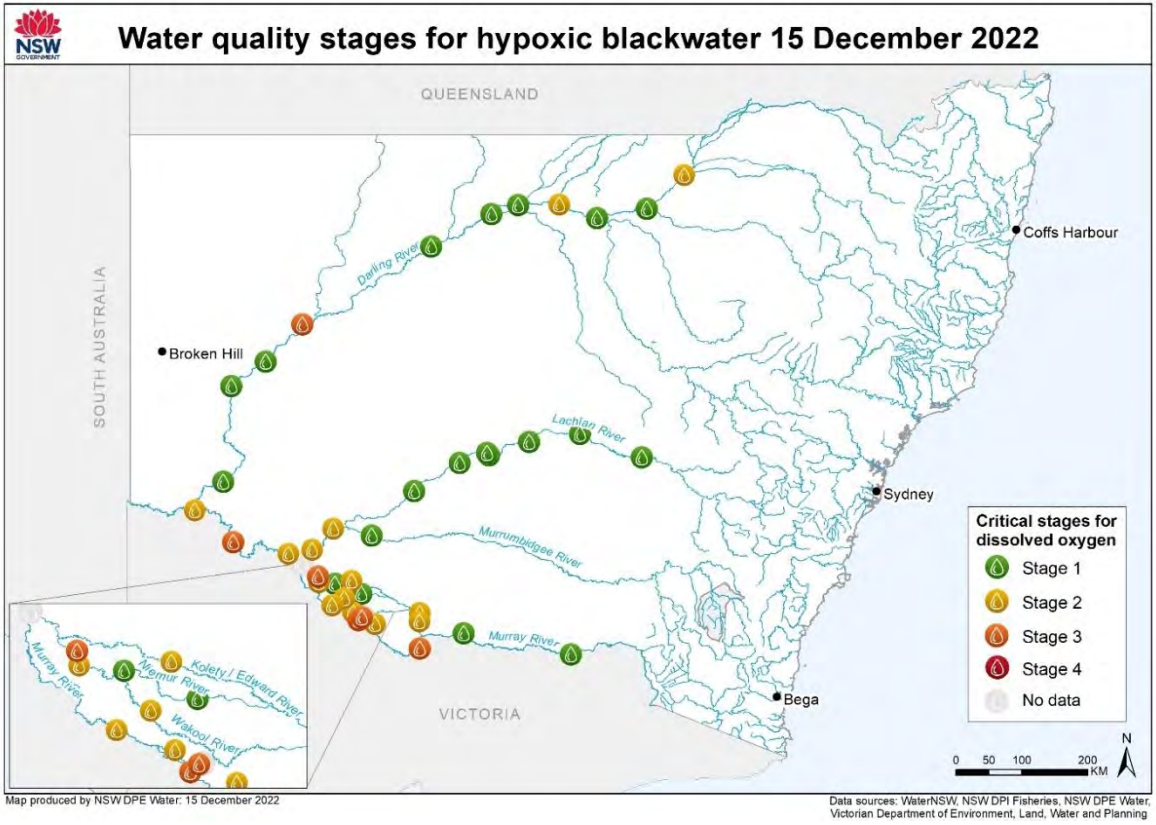


Figure 697- Water quality stages for hypoxic blackwater 15 December 2022

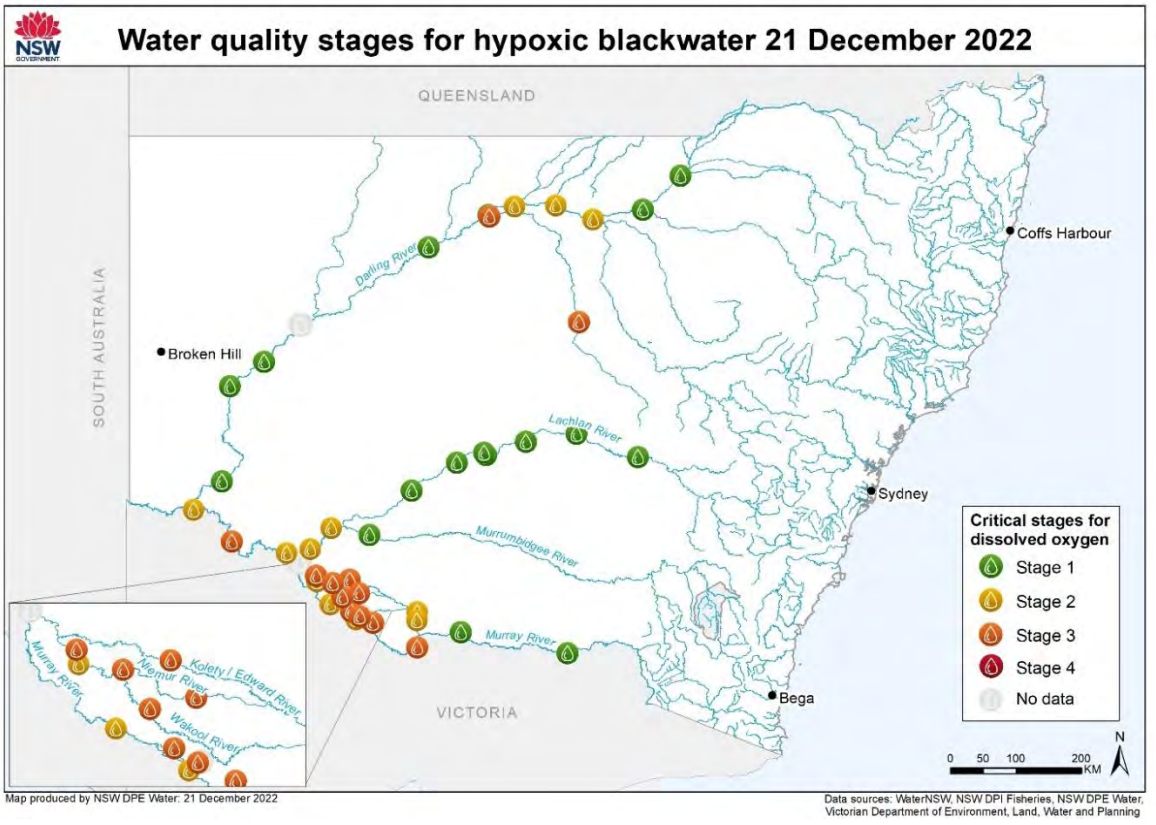


Figure 698- Water quality stages for hypoxic blackwater 21 December 2022

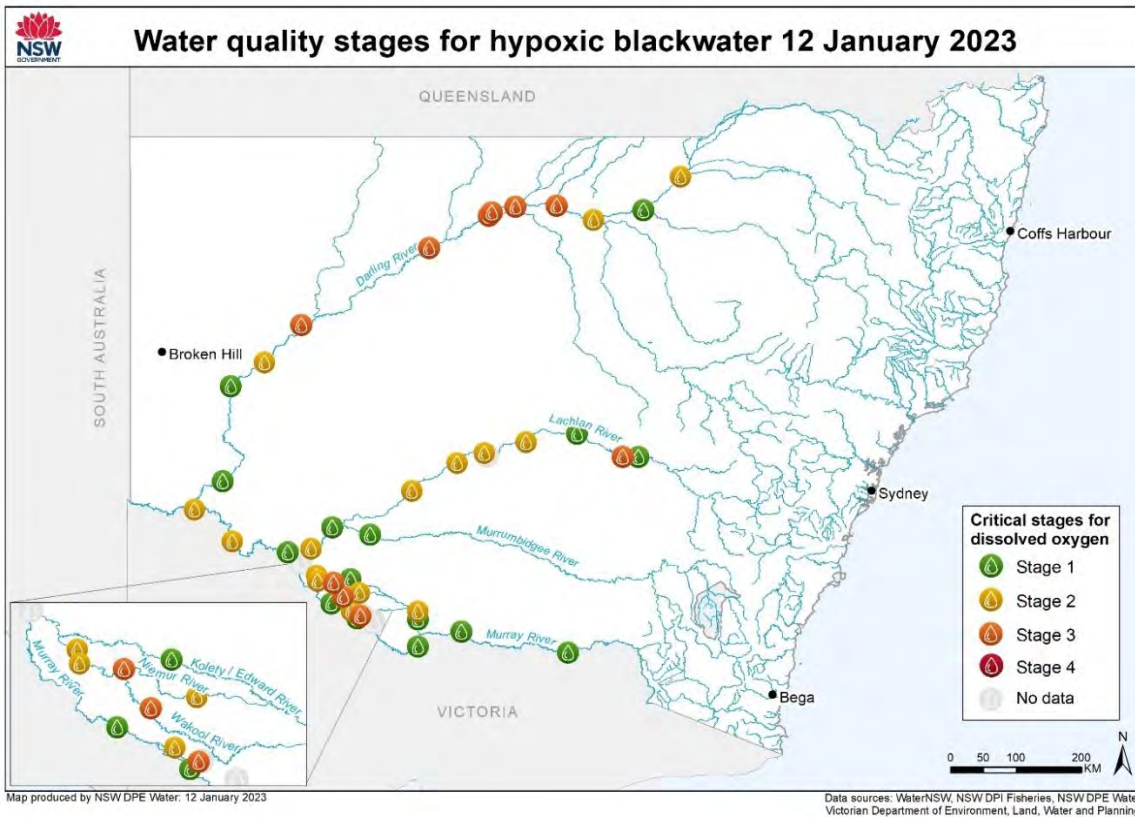


Figure 699 - Water quality stages for hypoxic blackwater 12 January 2023

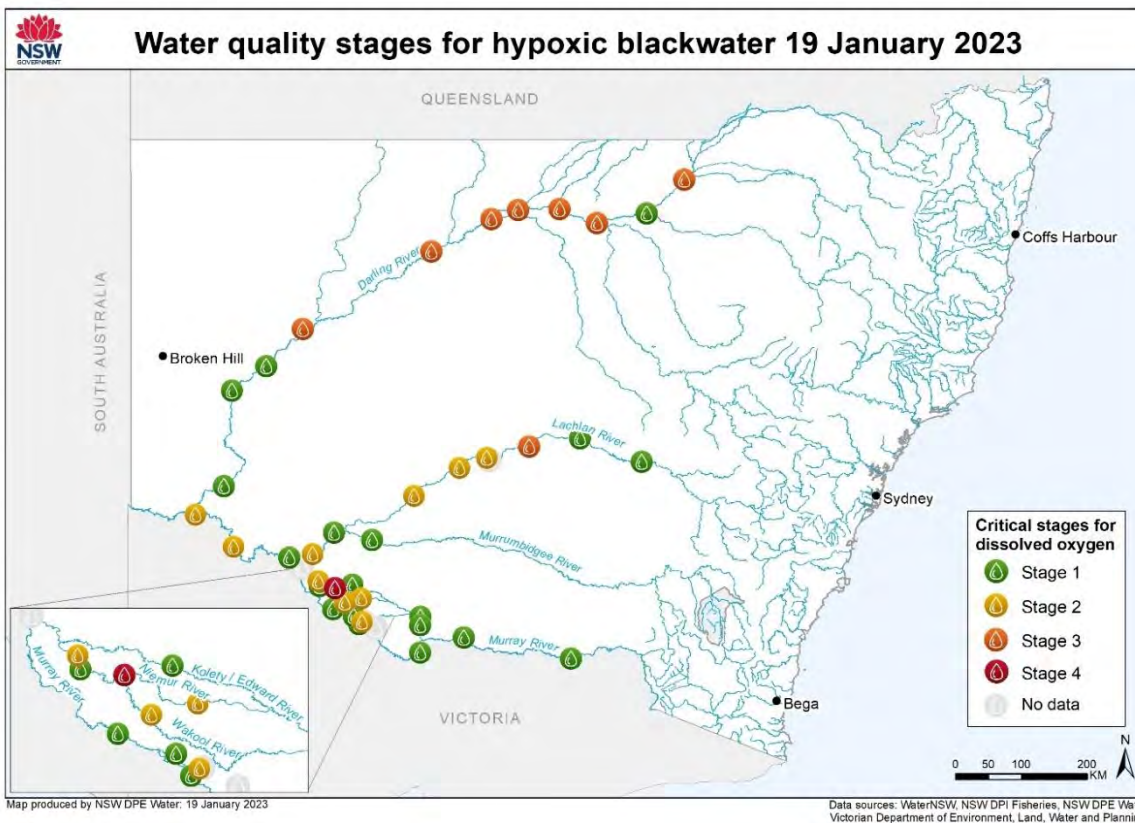


Figure 700 - Water quality stages for hypoxic blackwater 19 January 2023

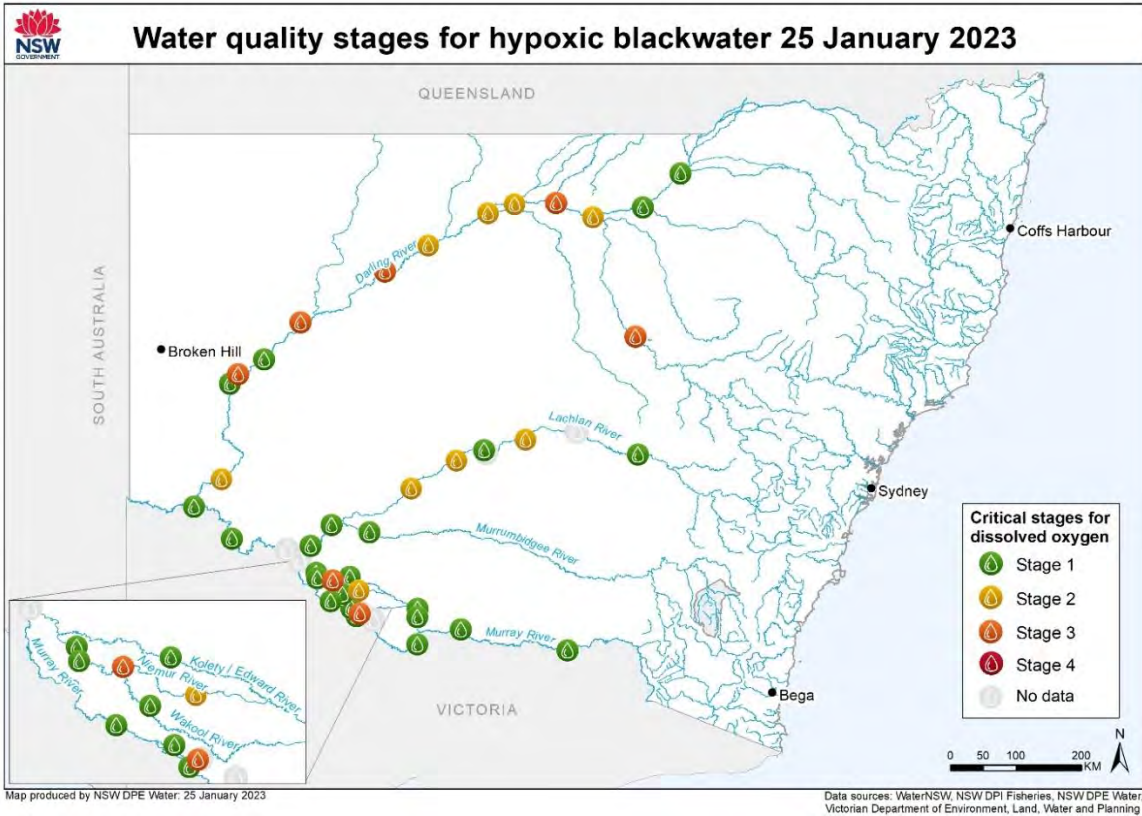


Figure 701 - Water quality stages for hypoxic blackwater 25 January 2023

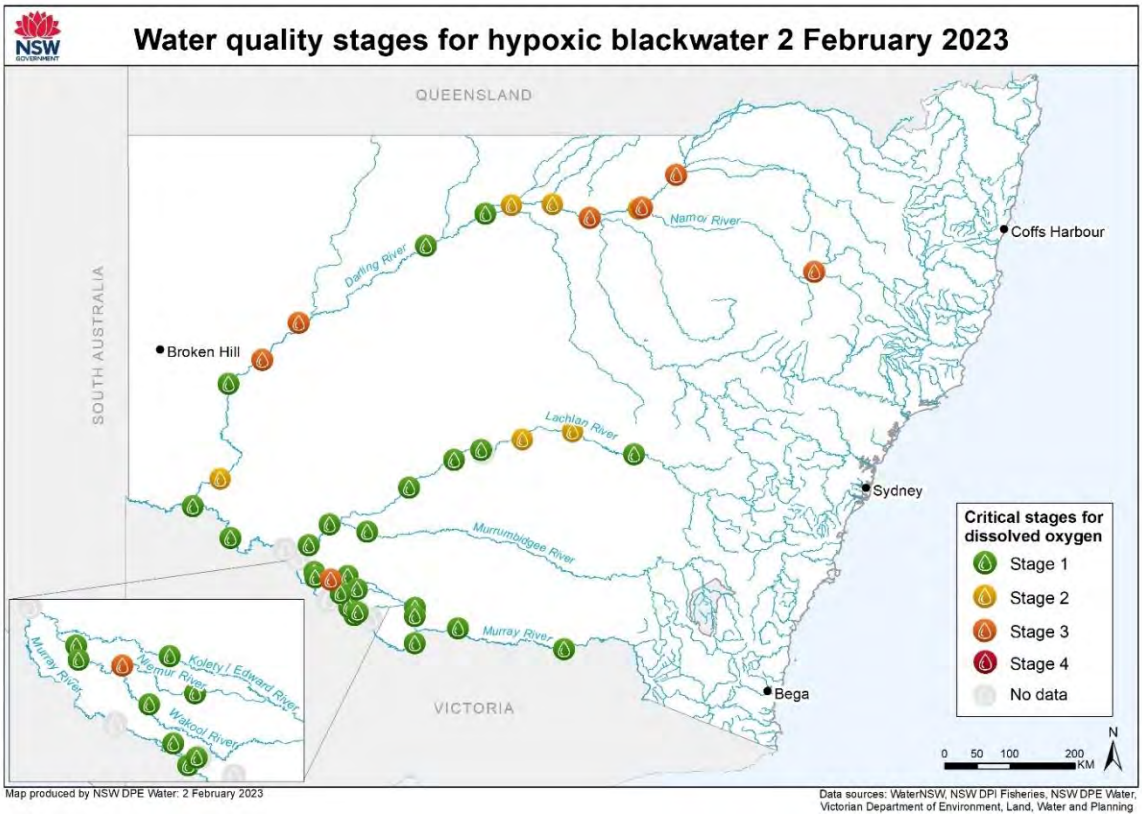


Figure 702 - Water quality stages for hypoxic blackwater 2 February 2023

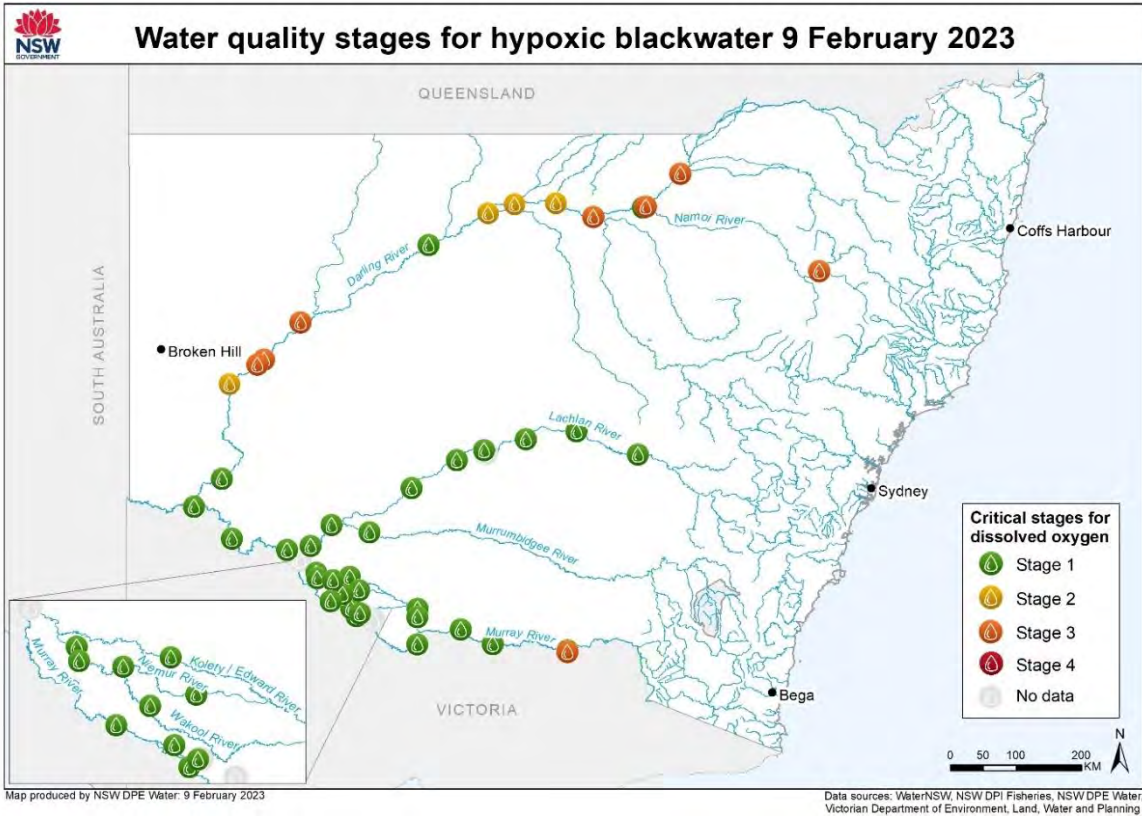


Figure 703 - Water quality stages for hypoxic blackwater 9 February 2023

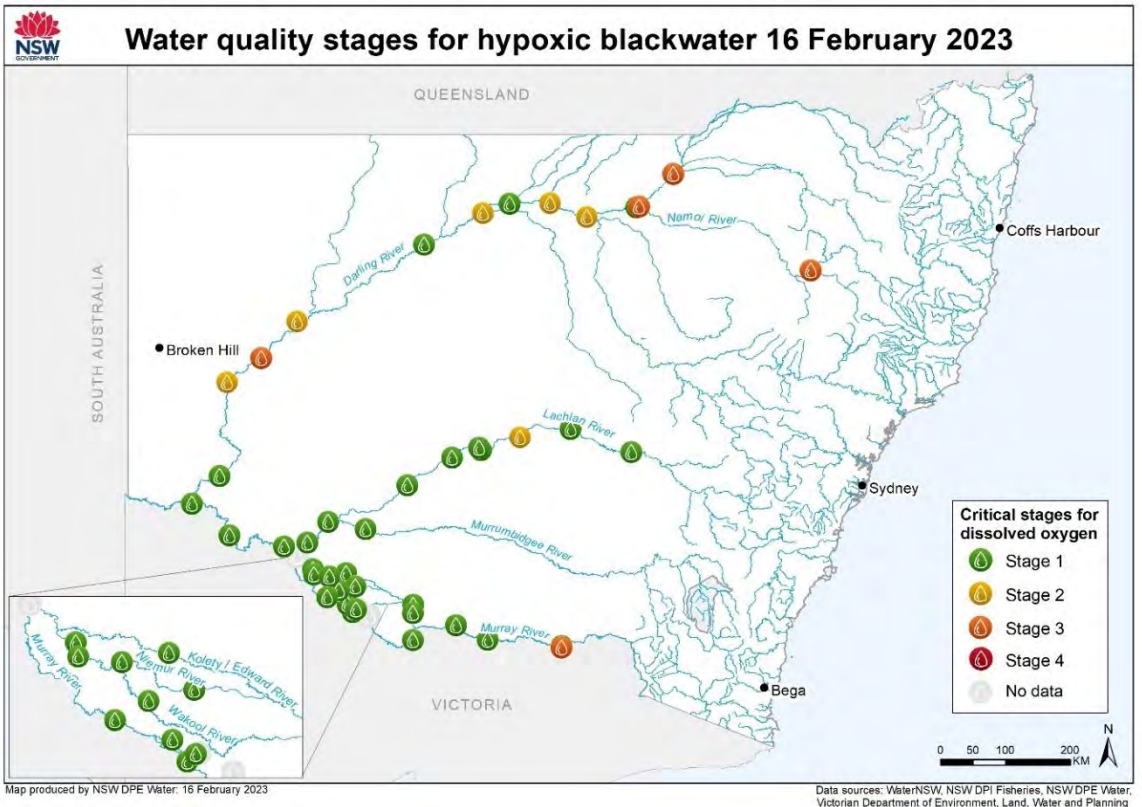


Figure 704 - Water quality stages for hypoxic blackwater 16 February 2023

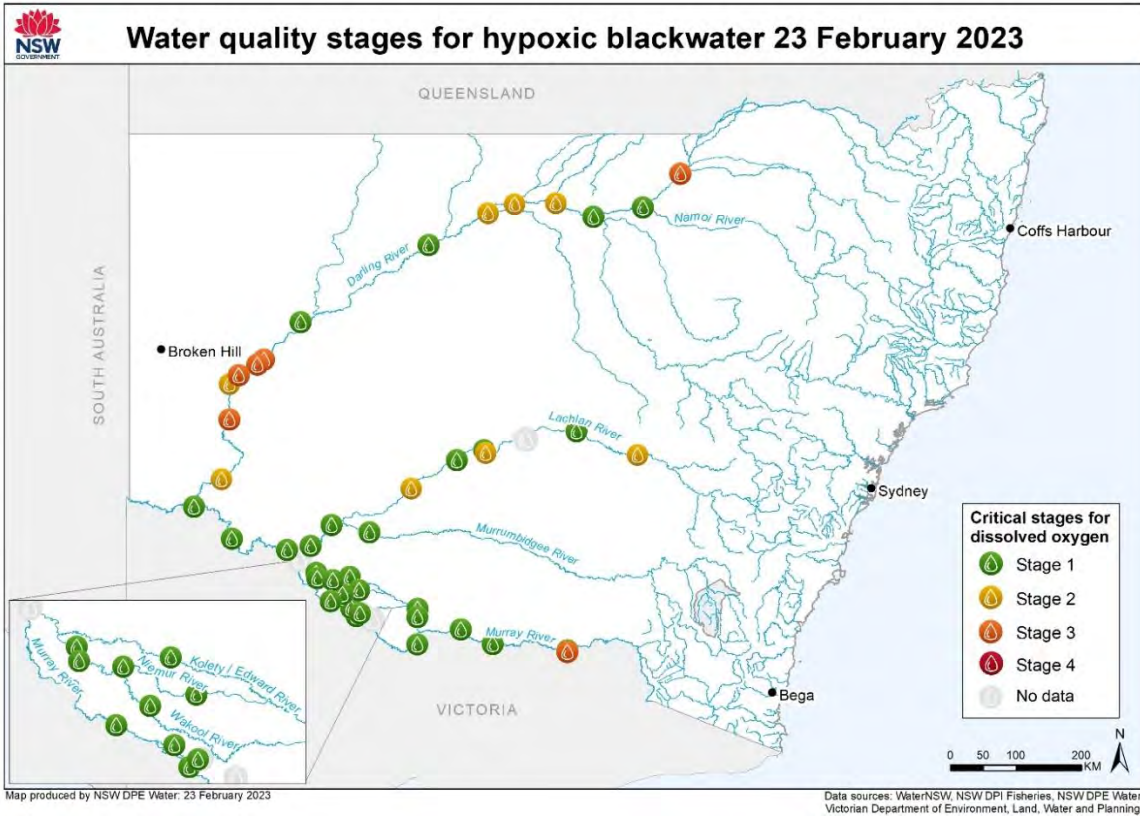


Figure 705 - Water quality stages for hypoxic blackwater 23 February 2023

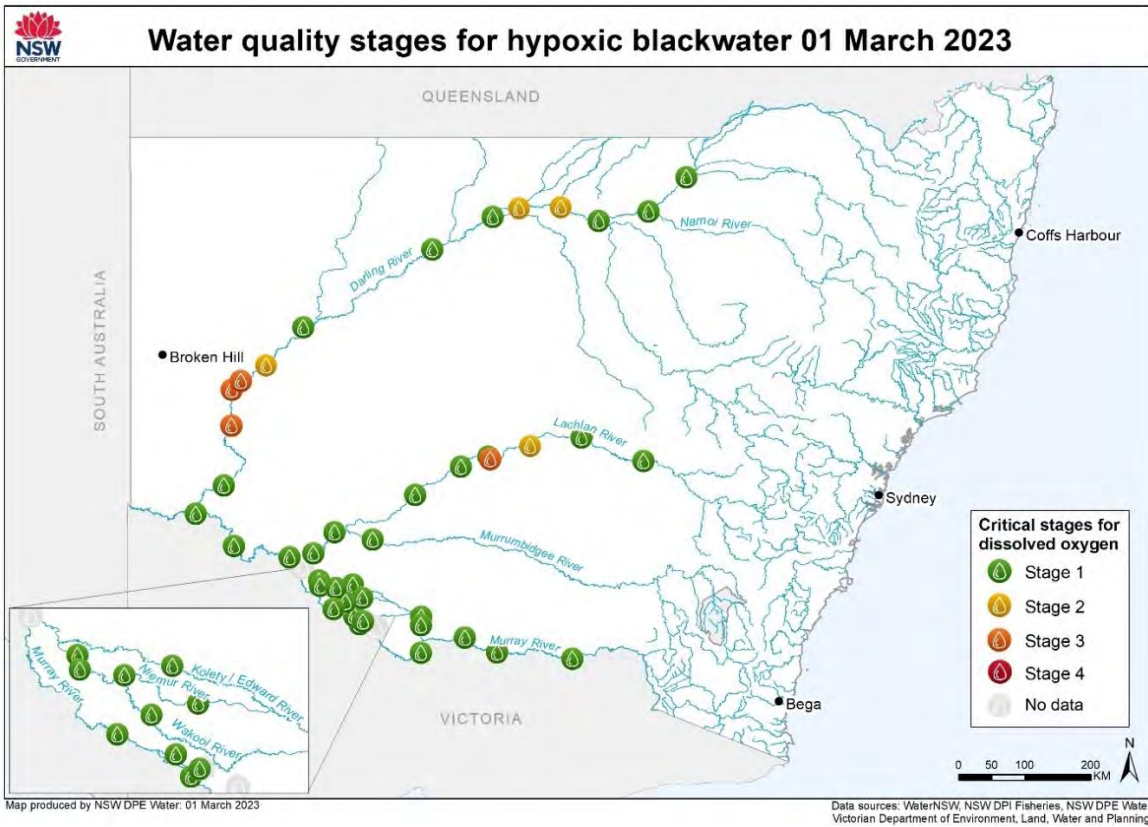


Figure 706 - Water quality stages for hypoxic blackwater 1 March 2023

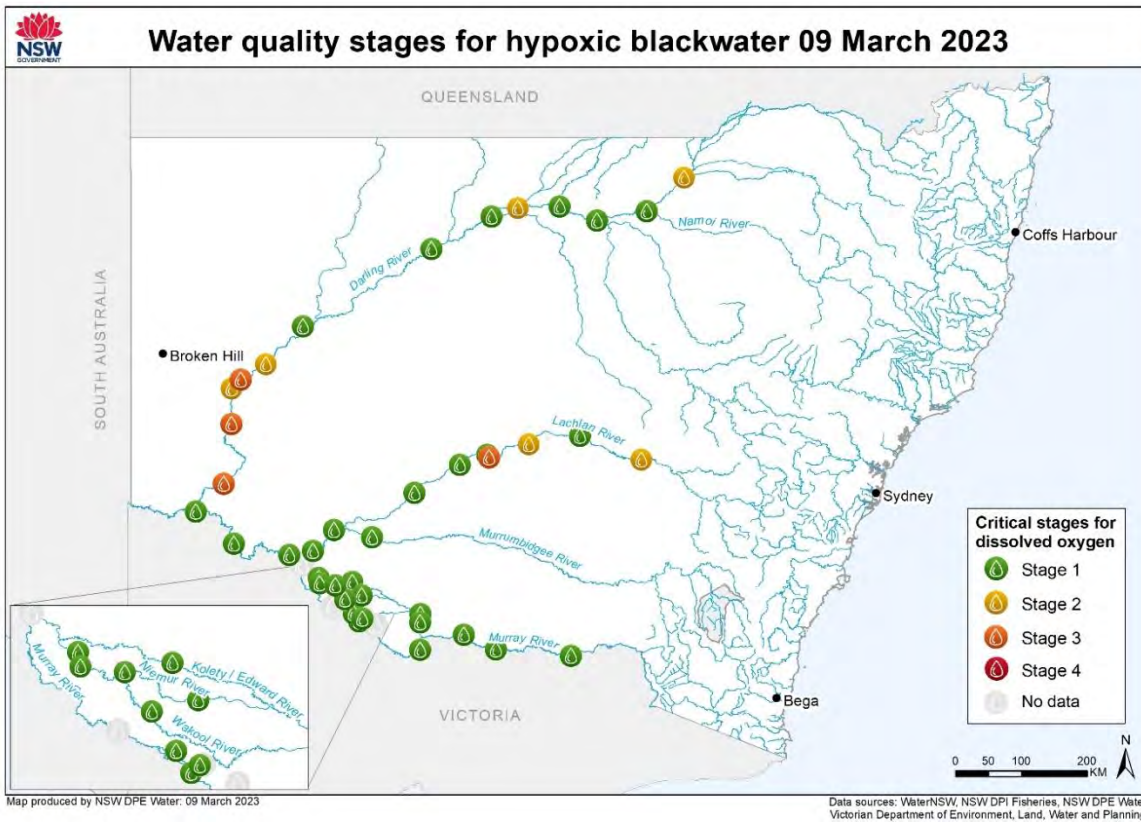


Figure 707 - Water quality stages for hypoxic blackwater 9 March 2023

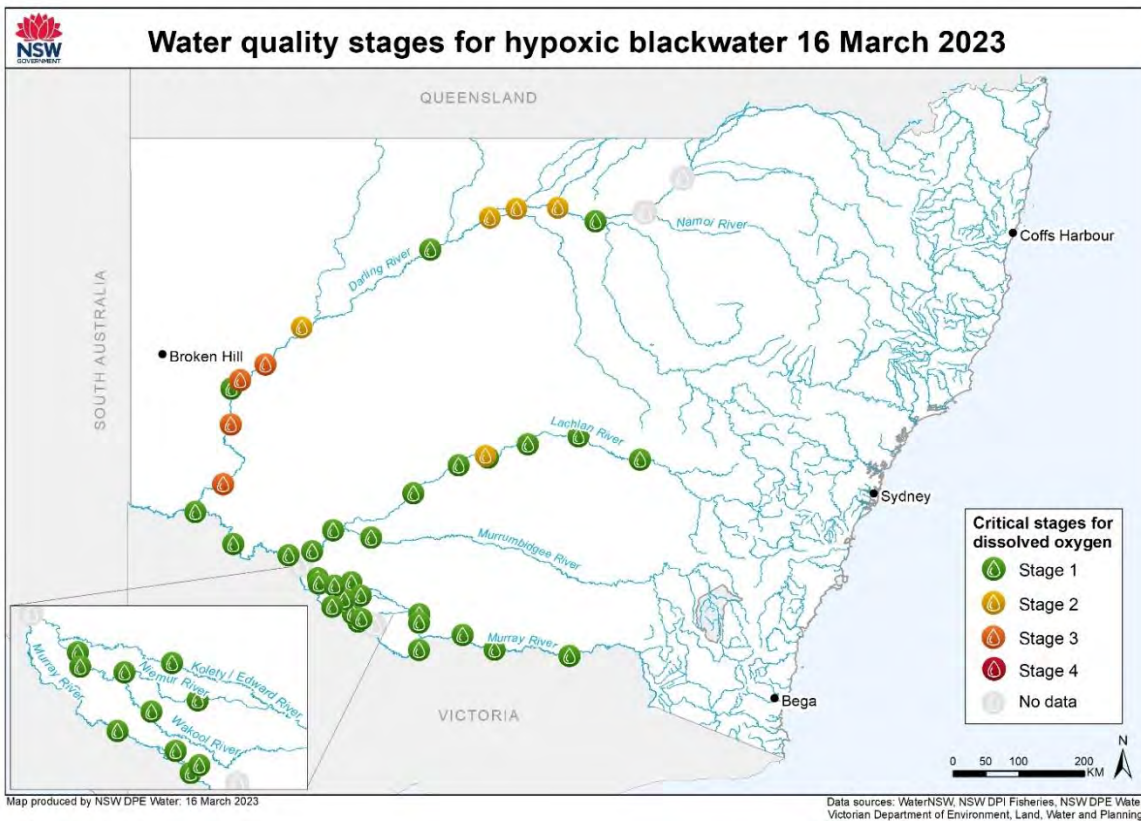


Figure 708 - Water quality stages for hypoxic blackwater 16 March 2023

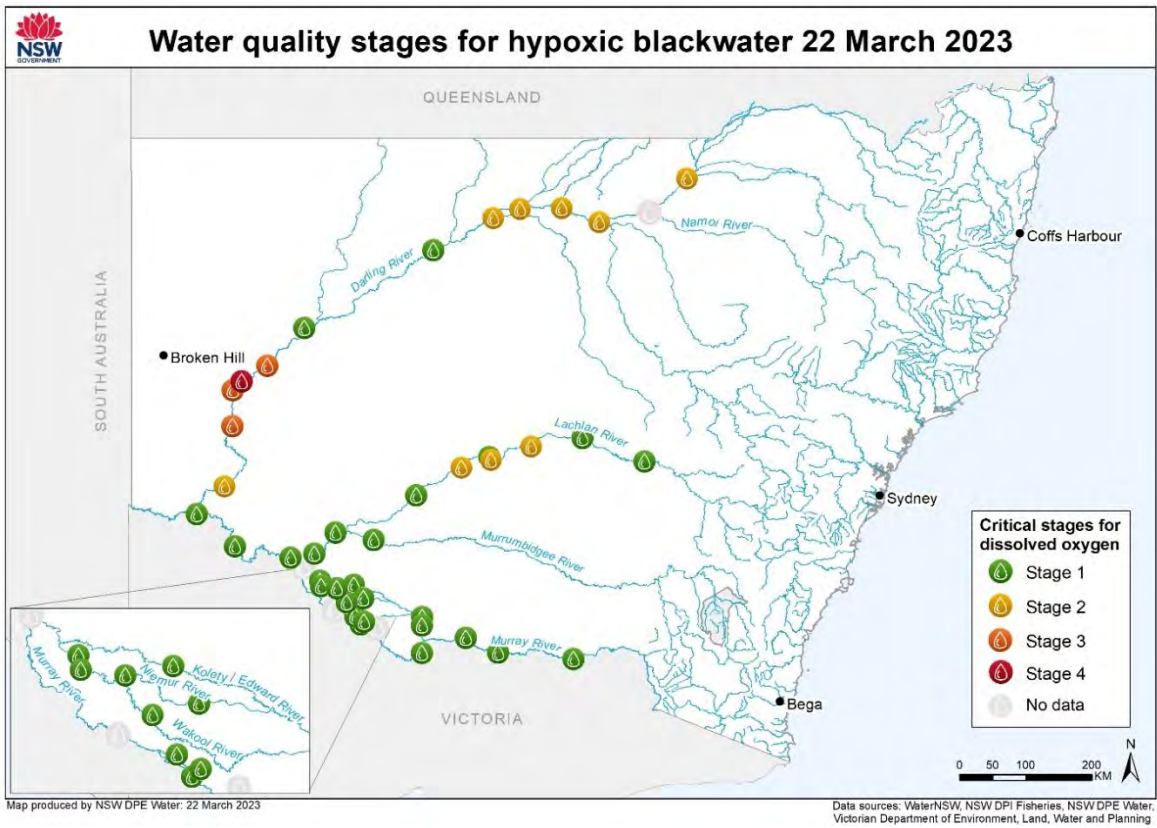


Figure 709 - Water quality stages for hypoxic blackwater 22 March 2023

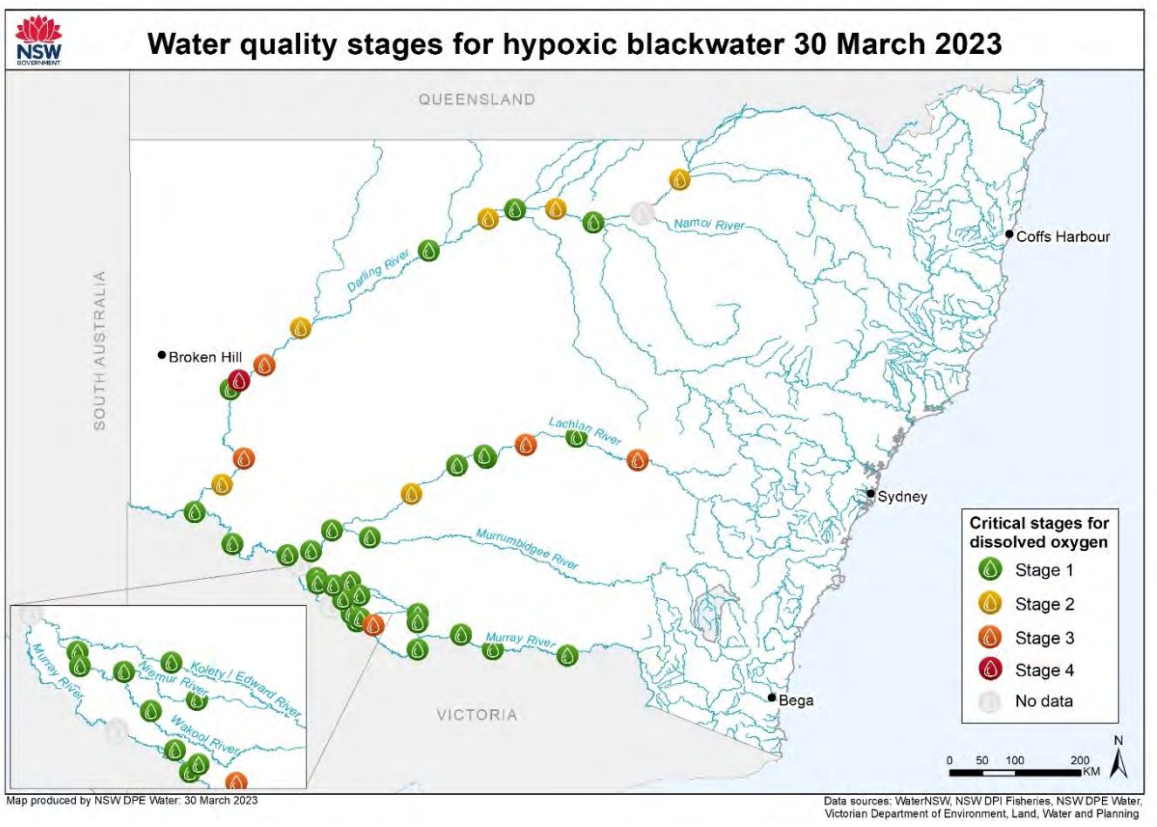


Figure 710 - Water quality stages for hypoxic blackwater 30 March 2023

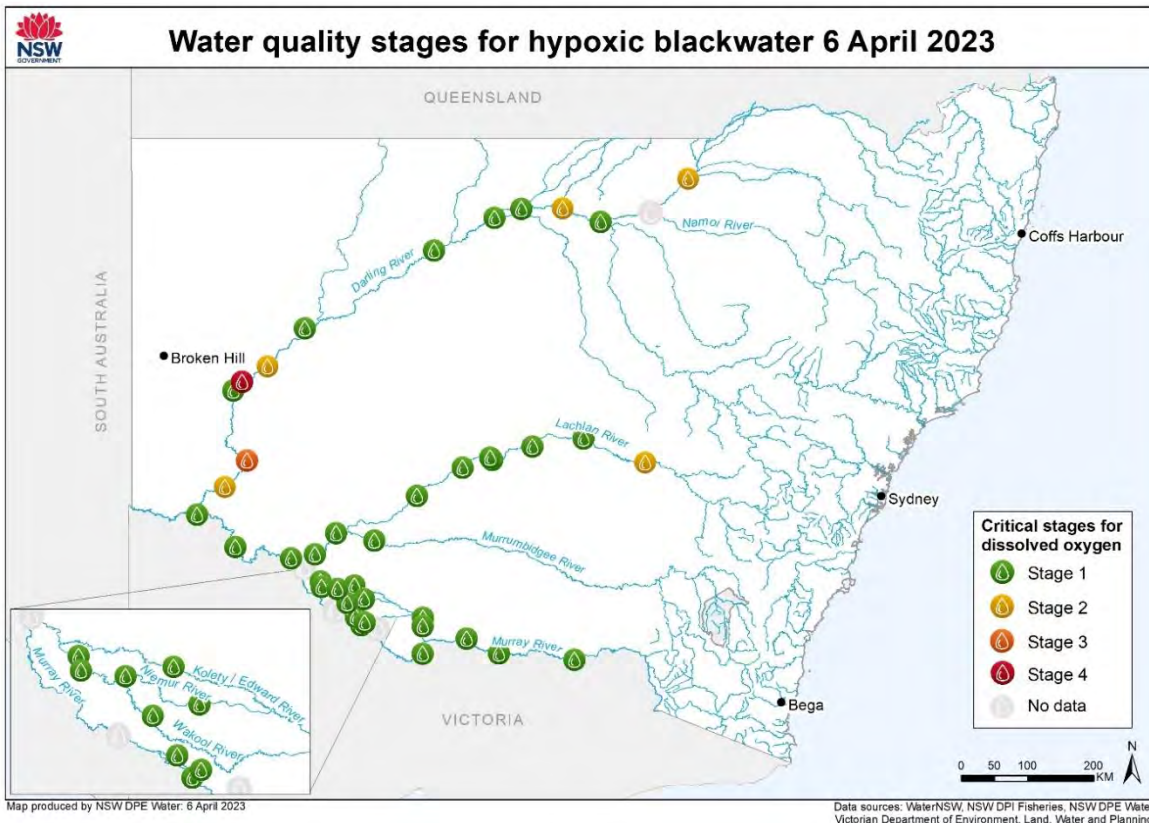


Figure 711 - Water quality stages for hypoxic blackwater 6 April 2023

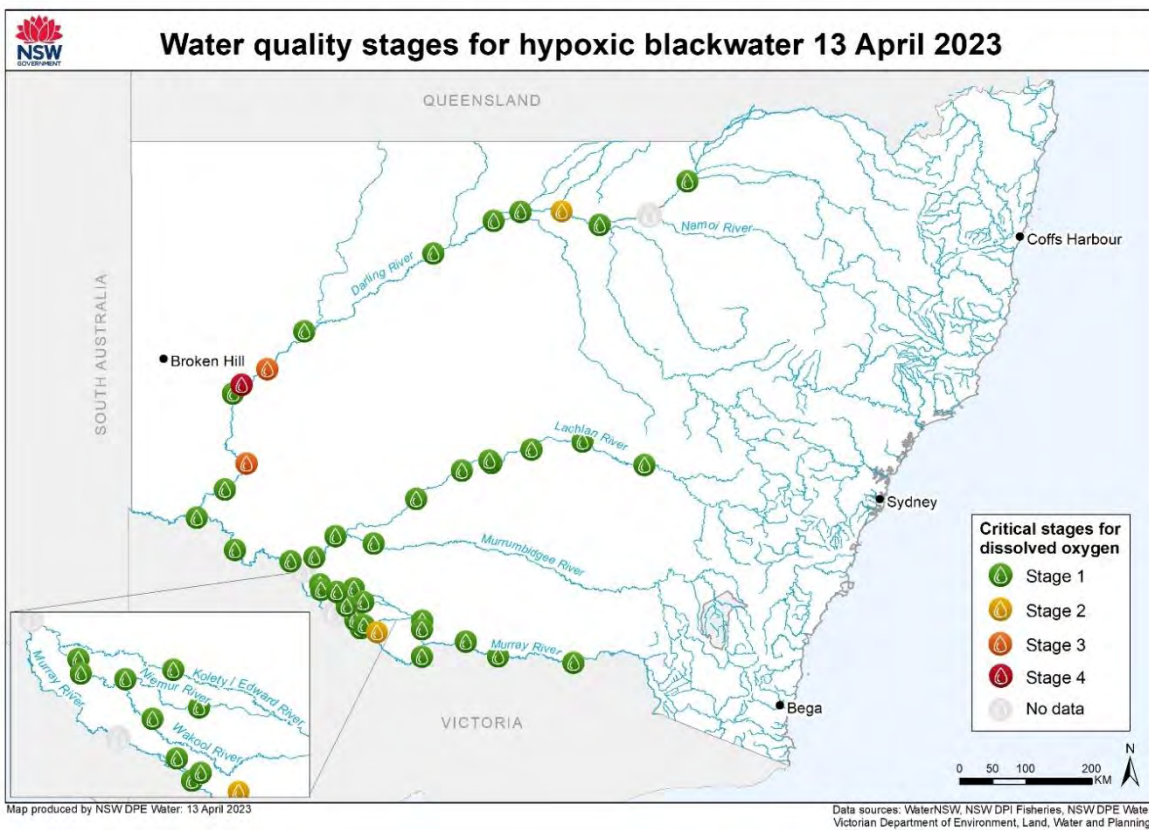


Figure 712 - Water quality stages for hypoxic blackwater 13 April 2023

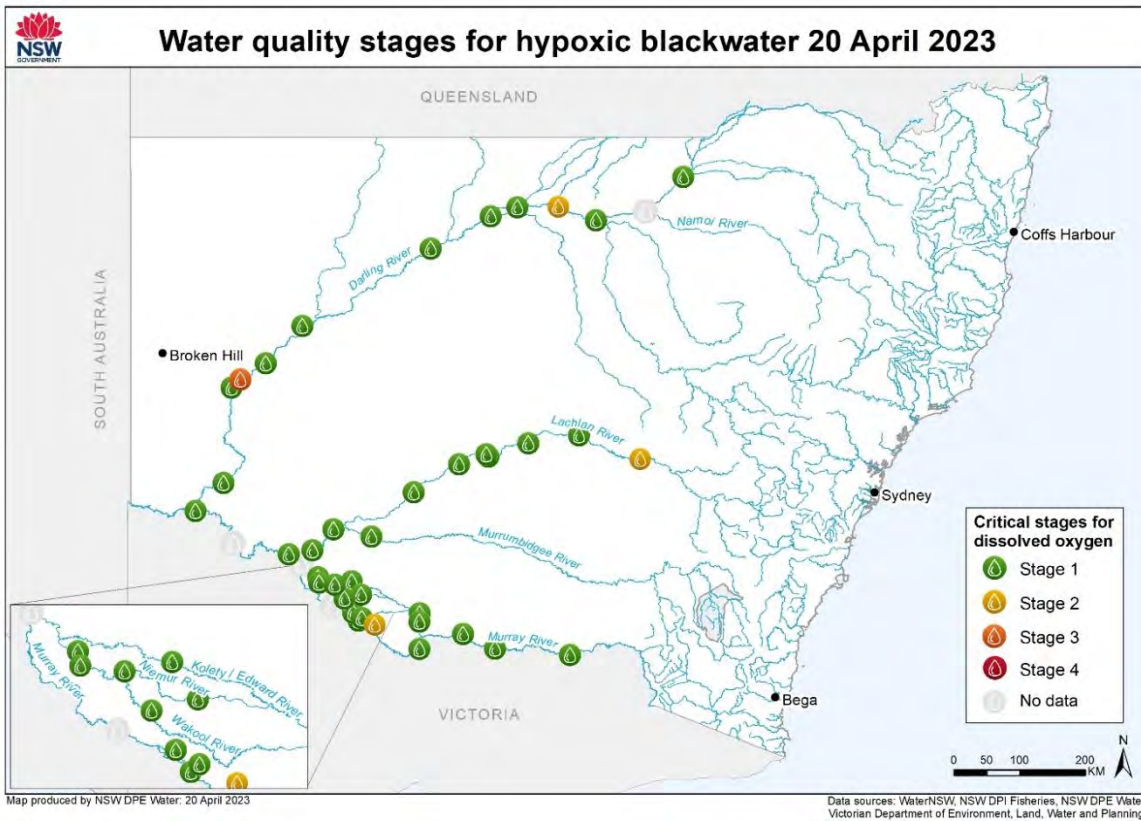


Figure 713 - Water quality stages for hypoxic blackwater 20 April 2023

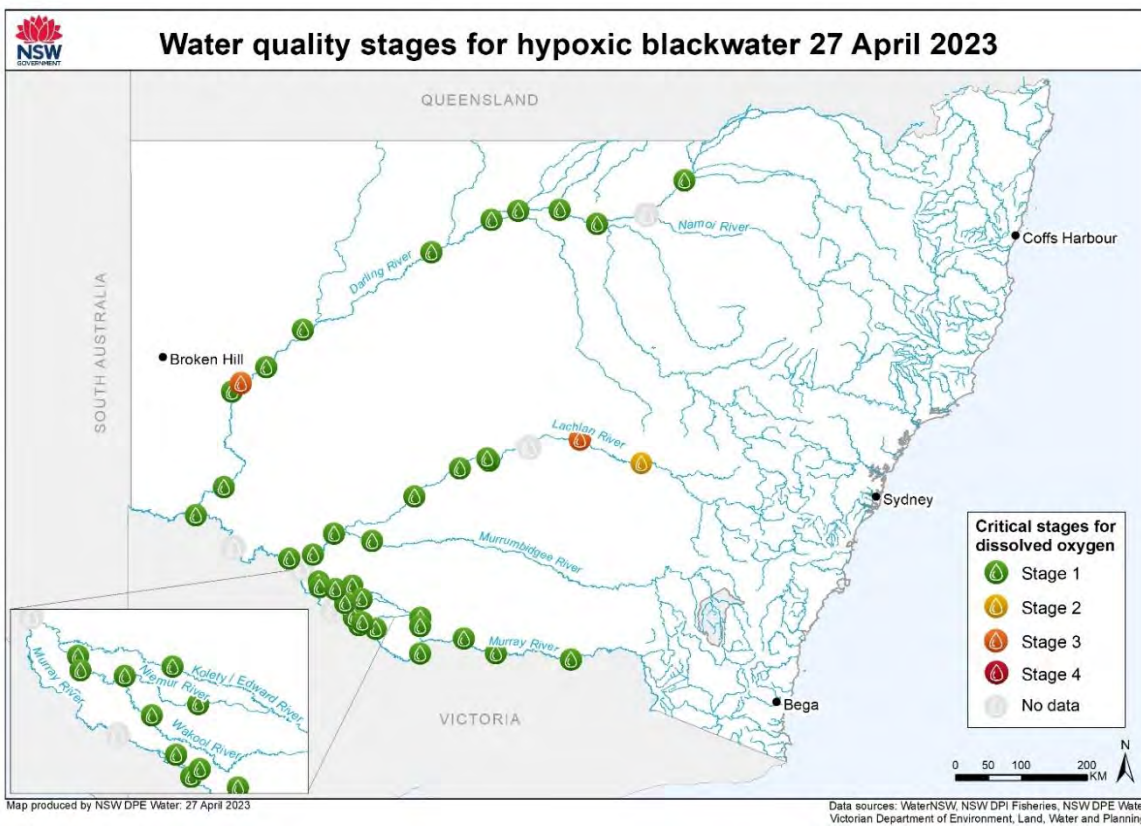


Figure 714 - Water quality stages for hypoxic blackwater 27 April 2023

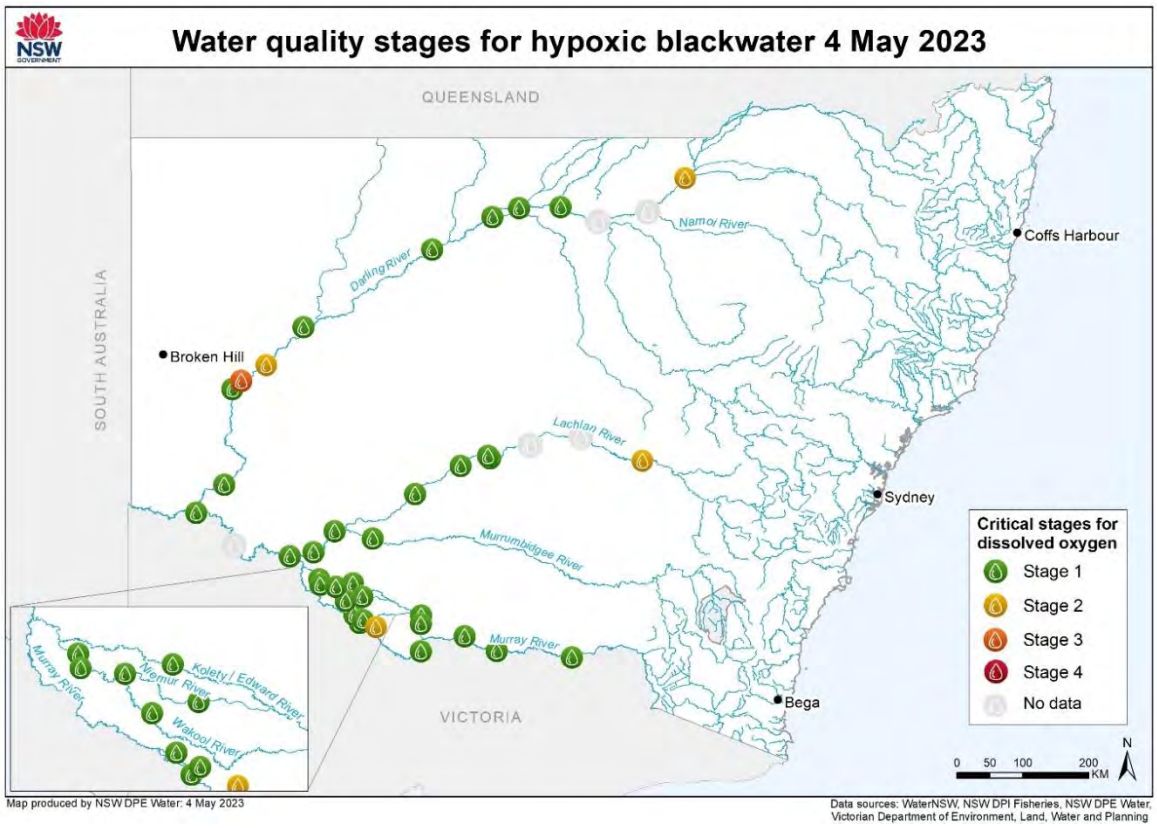


Figure 715 - Water quality stages for hypoxic blackwater 4 May 2023

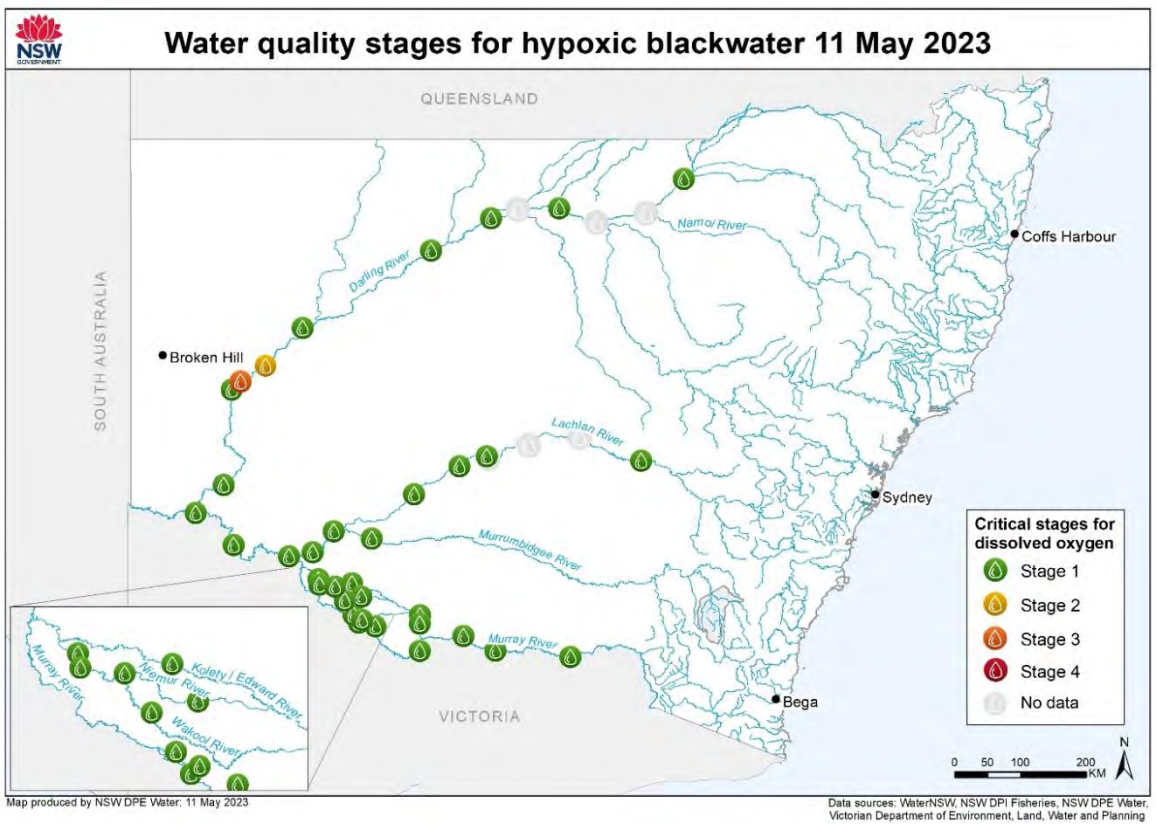


Figure 716 - Water quality stages for hypoxic blackwater 11 May 2023

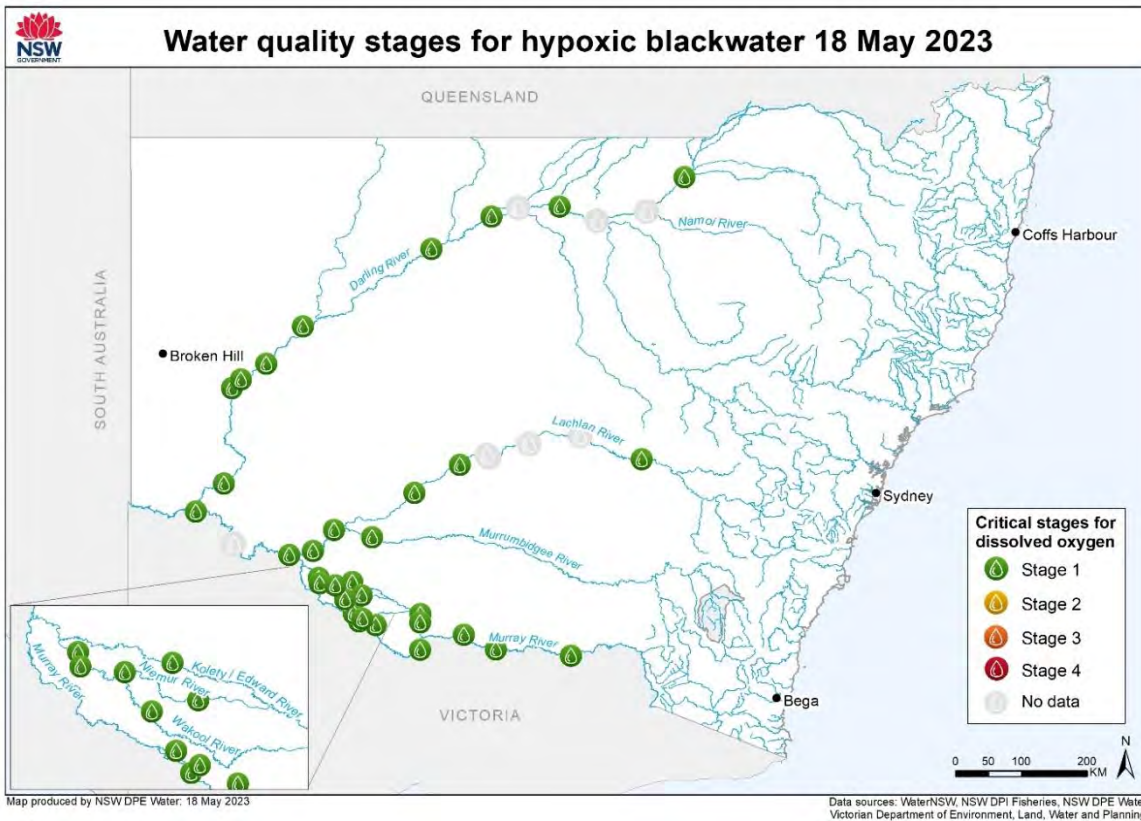


Figure 717 - Water quality stages for hypoxic blackwater 18 May 1023

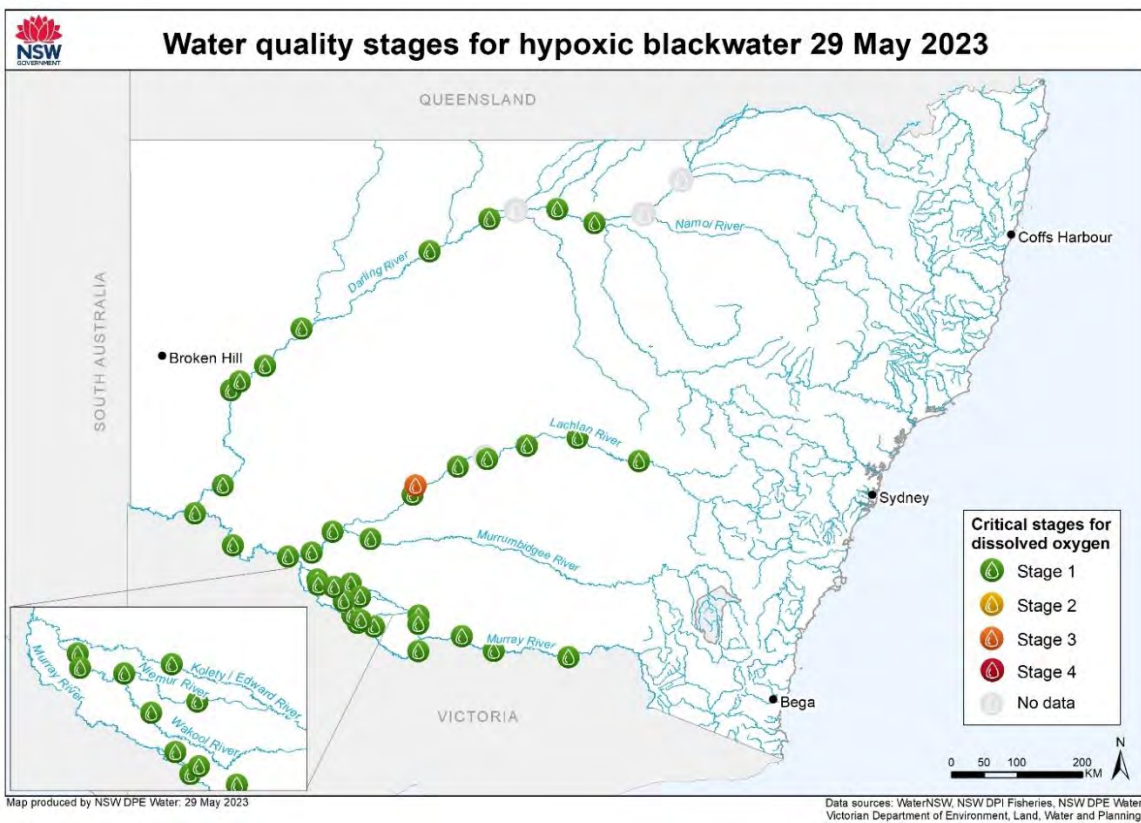


Figure 718 - Water quality stages for hypoxic blackwater 29 May 2023

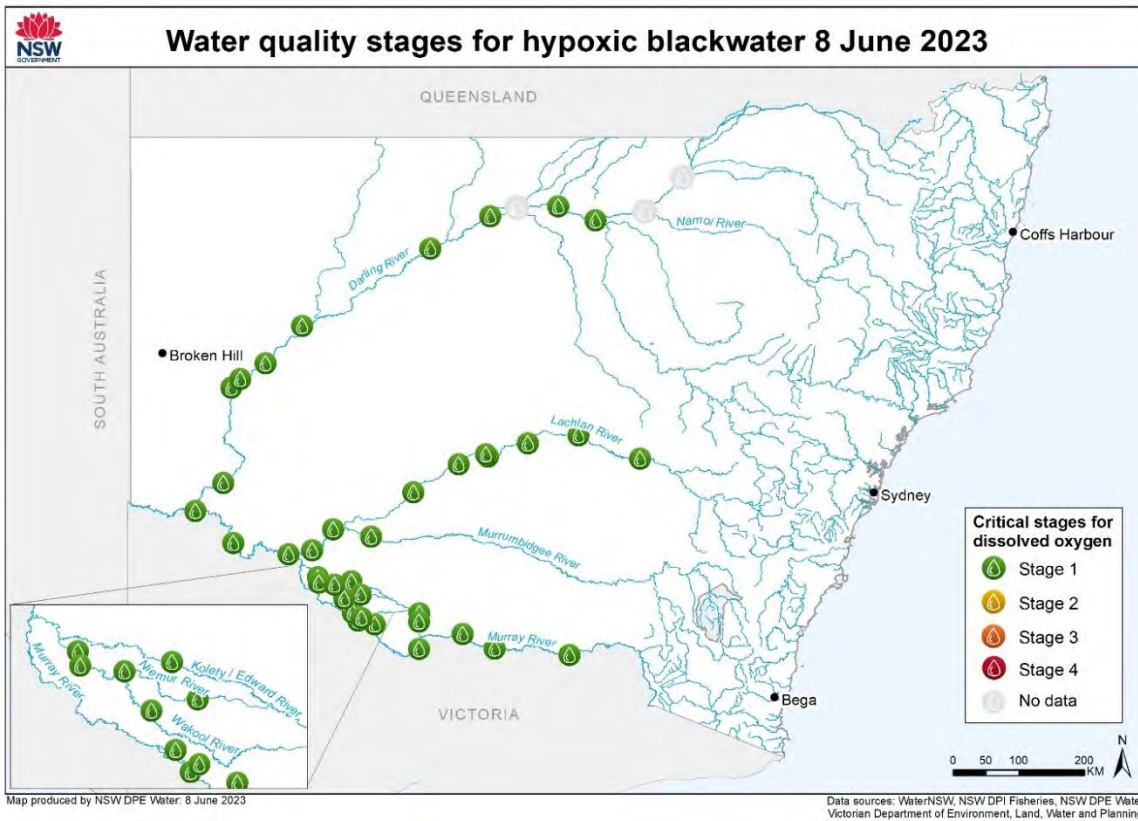


Figure 719 - Water quality stages for hypoxic blackwater 8 June 2023

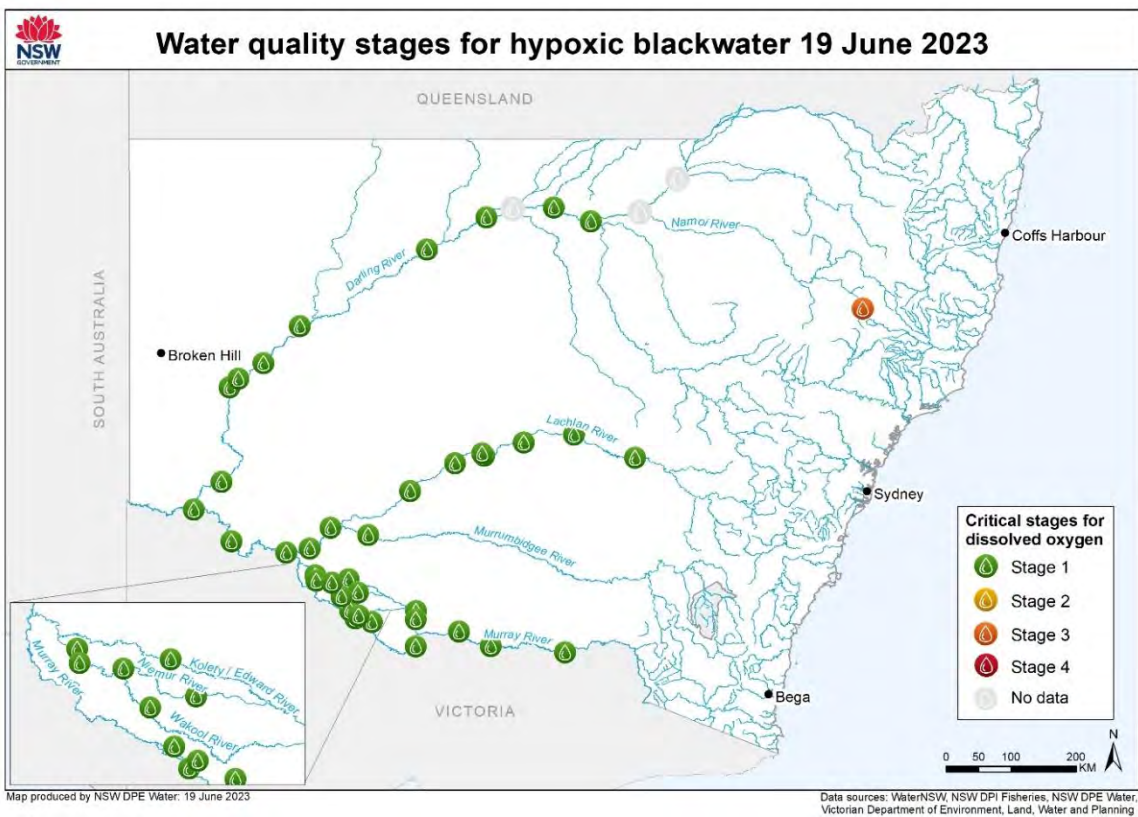


Figure 720 - Water quality stages for hypoxic blackwater 19 June 2023