

Lower Darling release – water quality monitoring update

This update provides an assessment of water quality data collected up to 16 April 2020.

Key information

- The resumption of flow to the Lower Darling River commenced on 26 March. The flow rate at Weir 32 has been slowly tapering down over the past two weeks and is currently around 780 megalitres (ML)/day.
- The head of the flow arrived at the Burtundy gauging station on 11 April and commenced flowing into the upper reaches of the Darling River arm of the Lock 10 weir pool on 13 April. The current flow rate at Burtundy is about 2,700 ML/day.
- Water quality data shows turbidity in the Darling River remains high. However, electrical conductivity is low and dissolved oxygen levels are above critical ecological thresholds to maintain fish health. No fish deaths have been reported following the resumption of flow.
- Water quality monitoring will now focus on tracking progression of the flow through the Lock 10 weir pool and into the Murray River. The head of the flow could reach the Murray River by this weekend.

Resumption of flow to the Lower Darling River

The resumption of flow event in the Lower Darling River commenced on 26 March 2020. The flow at the Weir 32 gauging station (425012) has been slowly tapering down over the past two weeks, aiming for a final flow target of 300 ML/day. The current flow rate at Weir 32 is around 780 ML/day.

The head of the flow passed Pooncarie on 7 April and reached the Burtundy gauging station (425007) on 11 April. Water commenced flowing into the upper reaches of the Darling River arm of the Lock 10 weir pool on 13 April. Comparison of the flow rates at Weir 32, Pooncarie and Burtundy (Figure 1) shows there has been a small loss in the peak flow as the pulsed release has progressed down the river system.

The turbid water entering the weir pool from the Darling River has passed 'Elerslie' (approximately 80 km by river upstream of Wentworth) and arrived at 'Tapio' (approximately 40 km by river upstream of Wentworth) on 15 April. At the current rate, the turbid water at the head of the flow could start to merge into the Murray River by the weekend.

Water quality monitoring in the Lower Darling River

Water quality monitoring is being undertaken by NSW State and local agencies in Menindee Lakes and the Lower Darling River to inform water management decision-making and identify potential environmental impacts as flows progress down the river.

Table 1 shows the results for monitoring locations from downstream of Weir 32 to 'Elerslie', which is at the upper end of the Lock 10 weir pool. Results in Table 1 have been highlighted to indicate those which could result in an increased risk to aquatic ecosystems or agricultural productivity. A key to the ratings is listed in Table 2. Orange indicates a medium risk and red a high risk.

17 April 2020

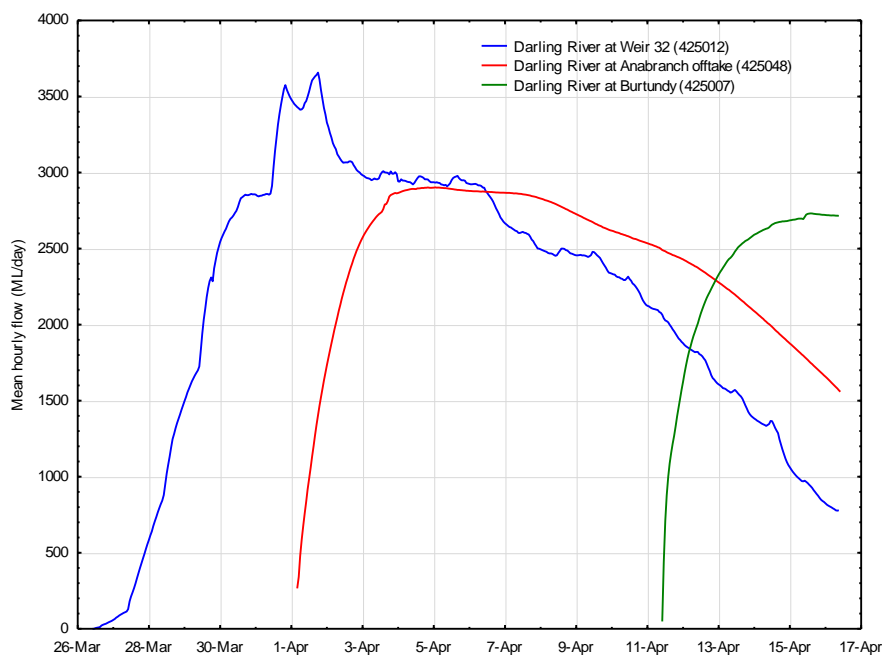


Figure 1: Flow (ML/day) at the Darling River at Weir 32, Anabranche offtake and Burtundy gauging stations

The head of the flow has now passed all the Darling River water quality monitoring sites and entered the upper reaches of the Wentworth weir pool. Monitoring results show the dissolved oxygen levels are remaining above critical thresholds for aquatic ecosystem health. The mixing of the pools by the pulsed flow has not caused dissolved oxygen concentrations to drop to critical levels, remaining above 5 mg/L at all sites. After the initial pulse has passed dissolved oxygen is remaining at safe levels. No fish deaths have been attributed to this resumption of flows in the Darling River.

Turbidity results remain high and are exceeding the upper limit of the turbidity meters (greater than 1,000 NTU (Nephelometric Turbidity Units)). Electrical conductivity is remaining low at less than 300 μ S/cm.

As the water quality results are stable and dissolved oxygen is above critical thresholds, monitoring in the Darling River will cease. Data from Pooncarie shows the weir pool is well mixed with no variation in water quality with depth. The focus for water quality monitoring will now move to the Darling arm of the Lock 10 weir pool to monitor the progression of the saline water at the head of the flow through the weir pool. Water quality profiles will be collected in the weir pool on 17 April.

The results collected at 'Ellerslie' on 14 April show high turbidity, a slightly elevated electrical conductivity and lower pH, indicating the head of the flow has passed this monitoring point.

Table 1: Darling River water quality sites from Weir 32 to Ellerslie (sites in order down the river)

Sampling Date	Turbidity (NTU)	Temperature (°C)	Dissolved Oxygen (% Saturation)	Dissolved Oxygen (mg/L)	Electrical Conductivity (µS/cm)	pH
Darling River downstream of Weir 32						
30 March 2020	>1,000	21.7	67	5.88	204	7.4
6 April 2020	>1,000	21.1	78	6.91	209	7.4
8 April 2020	>1,000	20.0	79	7.13	213	7.6
14 April 2020	>1,000	19.4	78	7.21	189	7.6
Darling River at Bono						
6 April 2020	>1,000	21.2	76	6.78	210	7.4
8 April 2020	>1,000	20.0	80	7.25	214	7.6
14 April 2020	>1,000	18.8	82	7.67	181	7.6
Darling River at Karoola						
6 April 2020	>1,000	20.7	77	6.90	218	7.5
8 April 2020	>1,000	19.6	81	7.43	212	7.8
14 April 2020	>1,000	18.3	84	7.92	209	7.7
Darling River at Moorara						
6 April 2020	>1,000	20.2	72	6.56	231	7.3
8 April 2020	>1,000	19.4	78	7.13	224	7.8
14 April 2020	>1,000	18.1	83	7.88	224	7.7
Darling River upstream of Pooncarie						
7 April 2020	655	19.4	47	4.35	921	7.8
8 April 2020	>1,000	18.6	59	5.48	278	7.7
14 April 2020	>1,000	17.9	79	7.48	220	7.5
Darling River at Pooncarie Weir						
7 April 2020	511	18.8	55	5.08	1,468	8.0
8 April 2020	>1,000	18.6	55	5.10	284	7.8
14 April 2020	>1,000	18.0	79	7.50	221	7.6
Darling River downstream of Pooncarie						
7 April 2020	559	17.9	86	8.09	2,149	8.2
8 April 2020	>1,000	18.6	80	7.44	300	7.8
14 April 2020	>1,000	18.1	92	8.68	222	7.5
Darling River at Kapana						
14 April 2020	>1,000	18.0	83	7.84	239	7.3
Darling River at Burtundy						
31 March 2020	119	19.2	95	8.63	3,949	9.1
14 April 2020	>1,000	18.1	79	7.42	247	7.4
Darling River at Ellerslie						
31 March 2020	36	20.1	81	7.34	128	8.5
14 April 2020	>1,000	17.8	51	4.83	419	7.4

Table 2: Key to water quality risk ratings during the lower Darling release

Parameter	Low risk	Medium risk	High risk	Impact on use
Dissolved oxygen (mg/L)	> 4.0	2.0 – 4.0	< 2.0	Native fish and other large aquatic organisms require at least 2 mg/L of dissolved oxygen to survive but may begin to suffer at levels below 4 to 5 mg/L (Gerhke 1988)
Electrical conductivity (µS/cm)	< 1,000	1,000 – 2,900	> 2,900	NSW DPI recommend that irrigation specialist technical advice should be sought when electrical conductivity exceeds 1,000 µS/cm. ANZECC and ARMCANZ (2000) water quality guideline is that water with an electrical conductivity exceeding 2,900 µS/cm is only suitable for salt tolerant crops
Turbidity	230	230 - 1,000	> 1,000	High turbidity can have negative impacts on plants through smothering, on fish by clogging gills and can provide a mode of transport for pollutants, such as heavy metals, nutrients, pesticides and bacteria. Basin Plan Schedule 11 turbidity target for the upper Darling River is 230 NTU
pH	7.0 - 8.1	< 7.0 or > 8.1	-	pH outside of natural ranges can be harmful to aquatic ecosystems, but unlikely at the levels found across much of the Murray Darling Basin. Very high or low pH can affect the taste of water, increase corrosion in pipes and pumps, be toxic to plants and reduce the effectiveness of drinking water treatment. Basin Plan Schedule 11 pH target for the upper Darling River is between 7.0 and 8.1

Comparison of salt loads during the 2016 and 2020 resumption of flow events

Electrical conductivity at Burtundy was high last week prior to the arrival of the resumption flow (3,949 µS/cm). The continuous electrical conductivity data from the Burtundy gauging station showed that there was high salinity water as the head of the flow arrived, however; within 24 hours of the recommencement of flow this had decreased to less than 400 µS/cm. In 2016, electrical conductivity at Burtundy peaked at 3,600 µS/cm and remained above the 1,000 µS/cm irrigation guideline for over three weeks, resulting in a large salt load entering the Lock 10 weir pool. Figure 2 is a comparison of the electrical conductivity behaviour during the 2016 and 2020 events.

The reason for different salt loads between the two resumption of flow events is a combination of the quality of the water being released from Lake Wetherell and the peak volume released. In both cases, the remaining isolated pools in the Lower Darling River were highly saline. In 2016, the electrical conductivity of the water in Lake Wetherell at the commencement of the release was approximately 1,000 µS/cm, while in 2020, the electrical conductivity of the water being released was less than 200 µS/cm. In addition to the release water being of better quality, the 2020 release had a larger peak flow rate (3,000 ML/day) compared to the 2016 release (1,500 ML/day).

The larger volume of better quality water released in 2020 has flushed the saline water from the remnant pools and is diluting any saline shallow groundwater inputs. The outcome will be a significantly smaller salt load being flushed into the Lock 10 weir pool and reduced impact to water users.

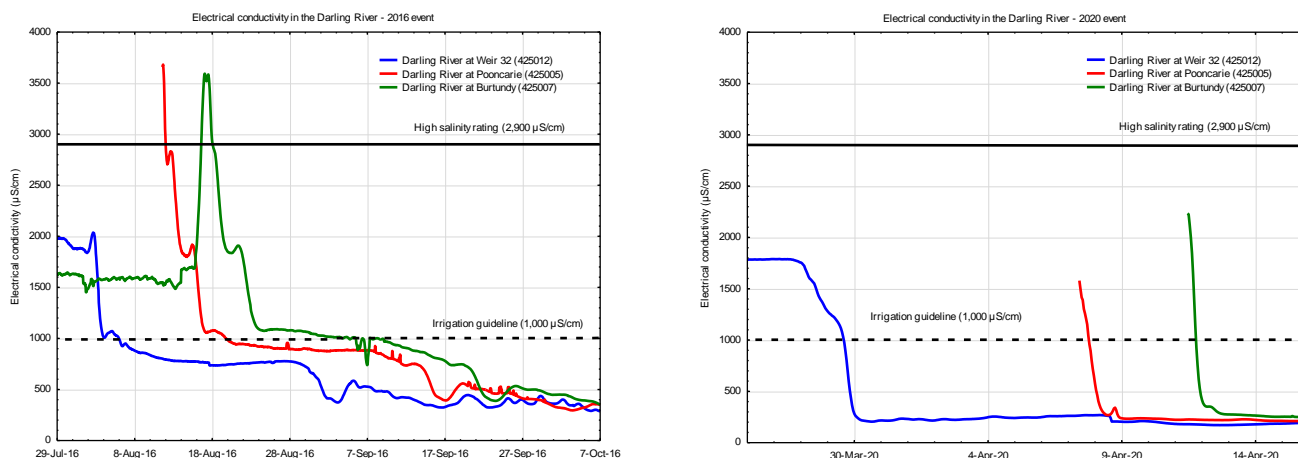


Figure 2: Comparison of continuous electrical conductivity results during the 2016 (left) and 2020 (right) resumption of flow events

Further information

Previous water quality updates and Lower Darling resumption of flow fact sheets can be found on the DPIE Water web site [here](#).

Additional flow and water quality information from the WaterNSW real time data web site is available [here](#).

The Water Quality Australia website (available [here](#)) is a product of the National Water Quality Management Strategy (NWQMS), an Australian Government initiative in partnership with state and territory governments. It provides information on issues affecting water quality, water quality guidelines and water quality planning.

Acknowledgements

This report is based on data, information and products gratefully received from WaterNSW and Wentworth Shire Council. The water quality data provided in this report is 'raw data' and no interpretation has been included as to its usability for various agricultural enterprises. Additional information on water suitability can be found on the NSW Department of Primary Industries web site to determine if the water is fit for your purpose.

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