Lower Darling release – Water quality monitoring update

Update No. 2 | This update provides an assessment of water quality data collected up to 2 April 2020.

Key information

- The resumption of flow to the Lower Darling River commenced on 26 March incorporating a peak flow of approximately 3,000 megalitres (ML)/day from Sunday 29 March for seven days and then tapering down to 300 ML/day. The flow rate at Weir 32 at 8:00AM on 2 April was 3,106 ML/day.
- The head of the flow arrived at the property 'Karoola' on the afternoon of 1 April. Karoola is approximately halfway between Menindee and Pooncarie. The flow had progressed to Bald Hill on 2 April – approximately 140 km by river downstream of Weir 32.
- Monitoring in Weir 32 downstream of Lake Wetherell identified there was a low risk of fish deaths following the commencement of the release. No fish deaths have been observed in this area during the release.
- The most recent water quality data shows turbidity associated with the released water in the Darling River is high. However, electrical conductivity is low and dissolved oxygen levels are above critical ecological thresholds to maintain fish health.
- Rainfall on 1 April caused the closure of the unsealed section of the Pooncarie/Menindee Road. This has restricted water quality monitoring at some sites.

Resumption of flow to the Lower Darling River

The resumption of flow to the Lower Darling River commenced on 26 March 2020. The design of the release includes an increase in flow to a peak of approximately 3,000 ML/day by Sunday 29 March, remaining at this level for seven days, and then tapering back down to about 300 ML/day. The aim of the initial release is to provide a dilution and flushing action to move poor quality water through the system and into the Murray River. This 'first flush', required to restore water quality in the Lower Darling, will be followed by lower flows to maintain connectivity with the Murray River for as long as possible.

The release could not commence until it was certain that the four block banks across the Darling River would be completely removed before the flow arrived. Three of the banks have been removed, and work on the fourth bank commenced the week of 30 March. The flow at Weir 32 gauging station has increased from zero up to a peak of 3,660 ML/day on 1 April and has dropped back slightly to 3,106 ML/day (Figure 1).

The head of the flow passed the offtake to the Great Darling Anabranch (425048) early on 1 April and arrived at the property Karoola later the same day. Karoola is approximately halfway between Menindee and Pooncarie. The flow progressed to Bald Hill by 2 April, approximately 140 km by river from Weir 32. Figure 2 shows the location of the water quality monitoring sites and the approximate location of the head of the flow on 2 April.

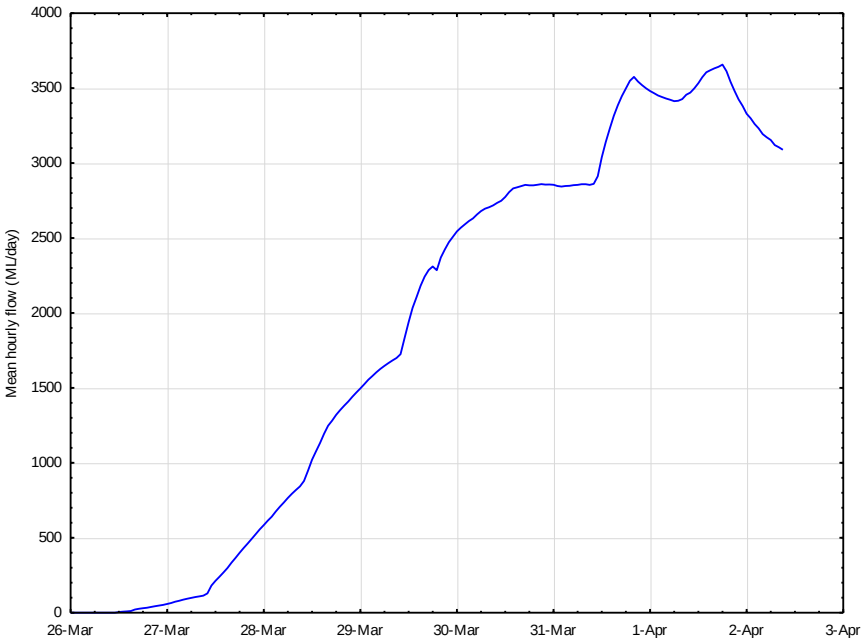

Figure 1: Flow (ML/day) at the Darling River at Weir 32 gauging station.

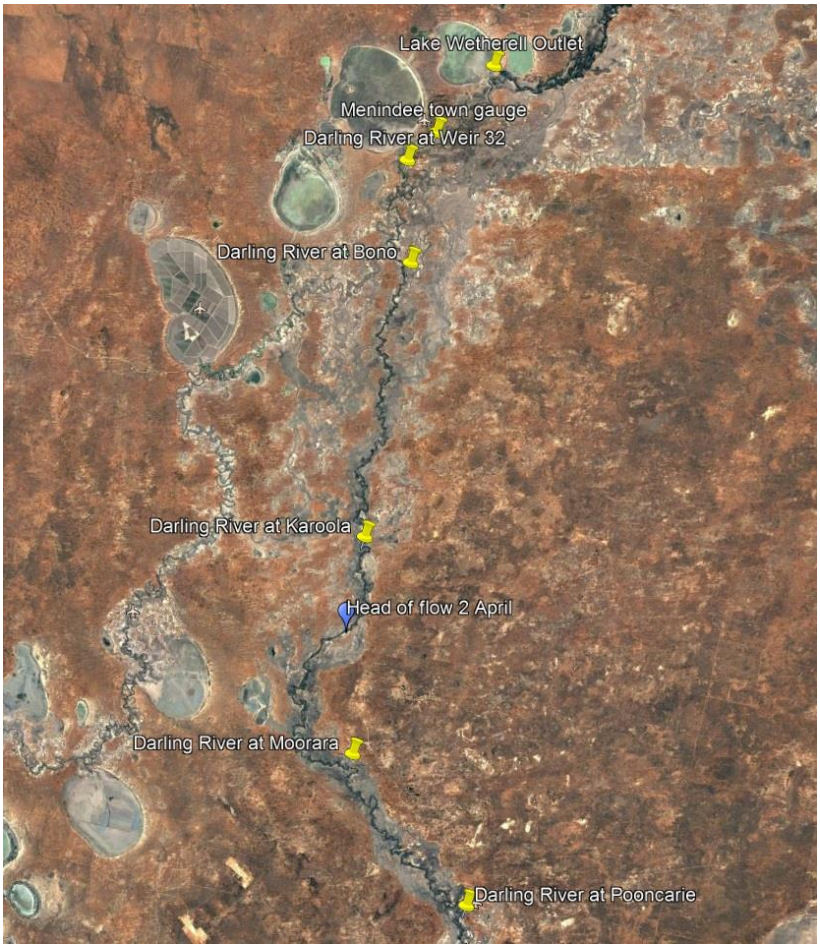

Figure 2: Approximate location of the head of the flow on 2 April.

Water quality monitoring in and downstream of Lake Wetherell

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 Darling River.

Water quality profiles collected downstream of Lake Wetherell prior to the commencement of the release showed there was a low risk of fish deaths when the deeper pools became mixed by the release. Observations from DPI Fisheries found the pools downstream of Weir 32 were mixed and oxygenated. No fish deaths have been reported in or immediately downstream of Weir 32.

Dissolved oxygen levels have decreased slightly following the arrival of the flow, but remain above critical thresholds for aquatic ecosystem health. As the turbidity in Lake Wetherell was high, this meant that the water released into the Darling River was also turbid. Turbidity results are exceeding the upper limit of the turbidity meters - greater than 1,000 NTU (Nephelometric Turbidity Units).

Tables 2 to 5 show the results from monitoring locations prior to and after the arrival of the head of the flow. Results in Tables 2 to 5 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 1. Orange indicates a medium risk and red a high risk.

The commencement of the larger pulsed release on 26 March increased the turbidity to over 1,000 NTU and decreasing the electrical conductivity to around 200 µS/cm at both the Menindee Town and Weir 32 stations. The increased flow did not cause dissolved oxygen concentrations in the pools to drop to critical levels, remaining above 5 mg/L at all sites.

Rainfall on 1 April caused the closure of the Pooncarie/Menindee Road. This restricted access to the Bono and Karoola monitoring sites. The next water quality sampling run is scheduled for Monday 6 April.

Table 1: 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 1000 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

Table 2: Darling River upstream of Weir 32 (closest to Lake Wetherell).

Sampling Occasion	Turbidity (NTU)	Temperature (°C)	Dissolved Oxygen (% Saturation)	Dissolved Oxygen (mg/L)	Electrical Conductivity (µS/cm)	pH
9 March 2020	61	24.6	144	12.00	1,064	9.1
24 March 2020	>1,000	21.7	46	4.07	383	8.5
30 March 2020	>1,000	22.8	76	6.58	223	8.0

Table 3: Darling River at Menindee Town (425001).

Sampling Occasion	Turbidity (NTU)	Temperature (°C)	Dissolved Oxygen (% Saturation)	Dissolved Oxygen (mg/L)	Electrical Conductivity (µS/cm)	pH
24 March 2020	34	22.4	55	4.68	1,179	8.8
26 March 2020	34	22.3	74	6.42	1,264	8.6
30 March 2020	>1,000	22.9	64	5.52	207	7.5
1 April 2020	>1,000	21.8	59	5.21	217	7.7

Table 4: Darling River at Weir 32 (425012).

Sampling Occasion	Turbidity (NTU)	Temperature (°C)	Dissolved Oxygen (% Saturation)	Dissolved Oxygen (mg/L)	Electrical Conductivity (µS/cm)	pH
24 March 2020	38	21.4	63	5.49	1,604	9.0
25 March 2020	42	21.6	75	6.59	1,764	8.6
26 March 2020	34	20.9	78	6.93	1,767	8.7
30 March 2020	>1,000	22.7	57	5.02	205	7.5
1 April 2020	>1,000	22.1	62	5.43	223	7.8

Table 5: Darling River downstream of Weir 32.

Sampling Occasion	Turbidity (NTU)	Temperature (°C)	Dissolved Oxygen (% Saturation)	Dissolved Oxygen (mg/L)	Electrical Conductivity (µS/cm)	pH
30 March 2020	>1,000	21.7	67	5.88	204	7.4

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 DPI Fisheries.

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.