Lower Darling release – Water quality monitoring update

This update provides an assessment of water quality data collected up to 8 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 maintained at approximately 3,000 megalitres (ML)/day from 30 March to 6 April to provide a flushing flow for seven days. The release rate has now started to decline and at 8:00am on 8 April was 2,460 ML/day.
- The head of the flow arrived at Pooncarie on 7 April. The flow has filled Pooncarie Weir and is progressing toward the property 'Carstairs', approximately 50 km by river downstream of Pooncarie. It is expected that the head of the flow will reach Burtundy and possibly the upper reaches of the Lock 10 weir pool over the Easter weekend.
- The most recent water quality data shows turbidity in the Darling River is remaining 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.

Resumption of flow to the Lower Darling River

The resumption of flow to the Lower Darling River commenced on 26 March 2020. 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. Removal of the fourth and final bank has been completed.

The flow at the Weir 32 gauging station (425012) increased from zero up to a peak of 3,660 ML/day on 1 April and then dropped back to around 3,000 ML/day until 6 April, providing a flushing flow for seven days (Figure 1). The flow rate at Weir 32 decreased to less than 2,500 ML/day on 8 April and will continue to gradually taper down to 300 ML/day.

The head of the flow passed the property 'Maroora' on 3 April and commenced filling the Pooncarie weir pool on the morning of 7 April. The Pooncarie weir pool filled and began to overflow later the same day. The head of the flow is progressing toward the property 'Carstairs' approximately 50 km by river downstream of Pooncarie. It is expected that the head of the flow will reach the Burtundy gauging station (425007), and possibly the upper reaches of the Lock 10 weir pool, over the Easter weekend. Figure 2 shows the location of the water quality monitoring sites and the approximate location of the head of the flow on 8 April.

The data from the Pooncarie gauging station shows that there wasn't a large spike in electrical conductivity as the head of the flow arrived, as was experienced during the 2016 resumption of flow. In 2016, electrical conductivity peaked at 3,700 µS/cm and remained above 1,000 µS/cm for over a week. Electrical conductivity was high this week as the Pooncarie weir pool commenced to fill. However, within 24 hours this had decreased down to less than 300 µS/cm as the larger volumes of water arrived, suggesting there is not the same load of salt as was experienced in 2016.

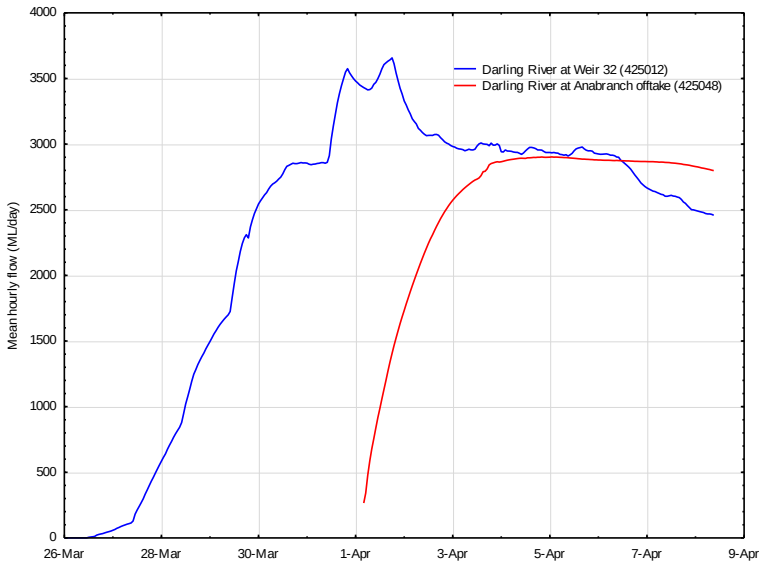

Figure 1: Flow (ML/day) at the Darling River at Weir 32 and Anabranch offtake gauging stations.

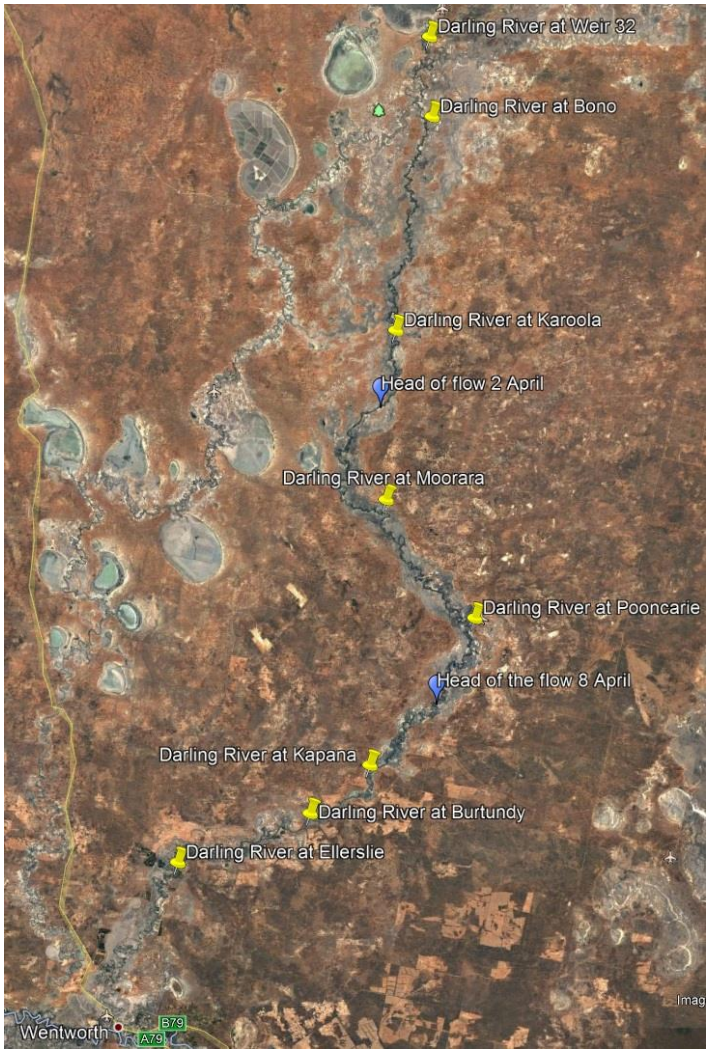

Figure 2: Approximate location of the head of the flow on 8 April.

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 2 shows the results for monitoring locations from downstream of Weir 32 to downstream of Pooncarie Weir. Results in Table 2 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.

After the head of the flow has passed the water quality monitoring sites, the dissolved oxygen levels have remained above critical thresholds for aquatic ecosystem health. The mixing of the pools by the increased flow has not caused dissolved oxygen concentrations to drop to critical levels, remaining above 5 mg/L at all sites. No fish deaths have been attributed to the 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 µS/cm.

The next water quality sampling run is scheduled for Tuesday 14 April. It is expected by this time the head of the flow will have reached the upper section of the Lock 10 weir pool.

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 water quality sites from Weir 32 to Pooncarie Weir (sites listed in order down the Darling 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
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
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
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
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
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
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

Water quality monitoring in the Pooncarie weir pool

Wentworth Shire Council staff monitored the water quality as the head of the flow reached Pooncarie weir pool. Table 3 displays the dissolved oxygen and electrical conductivity data collected from the weir wall as the pool began to fill. Most readings were taken close to the water surface with some taken at depth.

The first readings collected at 8:00am show the water remaining at the weir wall was mixed and oxygenated from the surface to the bottom. As the flow arrived, the surface waters remained oxygenated, apart from one low result (2.01 mg/L). The final reading shows there was a small volume of hypoxic water at the bottom of the weir pool. As the flow would go over the top of the weir, this would have minimal impact on downstream ecosystems. Photos taken of the weir spilling

show a volume of organic matter against the wall. The breakdown of this material is unlikely to cause a low dissolved oxygen event downstream.

Table 3: Dissolved oxygen and electrical conductivity results for the Darling River at Pooncarie Weir.

Sampling time	Sample depth (m)	Dissolved oxygen (mg/L)	Electrical conductivity (µS/cm)
7 April 2020 8:00	0.5	8.03	2570
7 April 2020 8:00	1.0	6.07	2560
7 April 2020 8:00	2.0 (bottom)	7.74	
7 April 2020 8:15	0.5	5.17	2600
7 April 2020 8:30	0.5	8.16	2270
7 April 2020 8:45	0.5	8.03	2250
7 April 2020 8:55	2.0 (bottom)	6.54	2320
7 April 2020 9:00	0.5	2.01	2250
7 April 2020 9:15	0.5	6.02	2220
7 April 2020 9:30	0.5	7.69	2120
7 April 2020 9:35	2.0	6.46	2250
7 April 2020 9:40	3.0 (bottom)	1.14	2460

Water flowing over Pooncarie Weir (Photo courtesy of Wentworth Shire Council).

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, DPI Fisheries 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.