Lower Darling release – Water quality monitoring update

This update provides an assessment of water quality data collected up to 23 April 2020.

Key information

- Releases from Lake Wetherell are continuing to taper down to the target flow of 300 megalitres (ML)/day at Weir 32. The initial pulsed release has passed Burtundy with the flow rate now decreasing to about 1,200 ML/day.
- The head of the flow reached the upper Darling River arm of the Lock 10 weir pool on 13 April and has now reached the Murray River.
- Water quality monitoring shows the water in the weir pool is well mixed with electrical conductivity upstream of the Darling/Murray River junction less than 600 µS/cm.
- Dissolved oxygen is slightly lower at the head of the flow, but remains above the critical ecological thresholds to maintain fish health. No fish deaths have been reported following the flow from the Darling River entering the Wentworth weir pool.
- Turbidity in the Darling River is remaining high and will continue to deliver high sediment loads to the Murray River.

Resumption of flow to the Lower Darling River

The flow at the Weir 32 gauging station is continuing to slowly taper down towards the final flow target of 300 ML/day. The current flow rate at Weir 32 is around 360 ML/day. The initial pulsed flow has passed the Burtundy gauging station and the water level has decreased down to about 1,200 ML/day. Figure 1 shows a comparison of the flow rates at Weir 32, the Anabranch offtake and Burtundy gauging stations during the release.

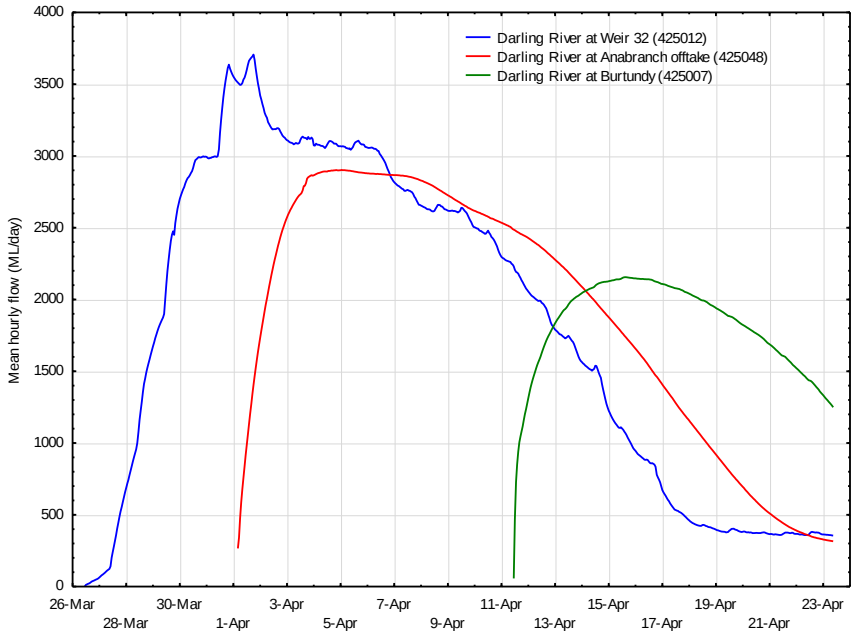

Figure 1: Flow (ML/day) at the Darling River at Weir 32, Anabranch offtake and Burtundy gauging stations

The head of the flow commenced flowing into the upper reaches of the Darling River arm of the Lock 10 weir pool on 13 April, reconnecting the Darling and Murray Rivers. The turbid water entering the weir pool from the Darling River was near Tapio (approximately 50 km by river upstream of the Darling/Murray River junction) on 15 April. Water quality monitoring showed the turbid water had reached the 28 km point upstream of the junction on the 17 April and progressed to 6 km from the junction on 20 April. The turbid water at the head of the flow is now merging into the Murray River.

Water quality monitoring in the Darling River arm of the Lock 10 Weir pool

Water quality monitoring has been undertaken by WaterNSW in the Darling River arm of the Lock 10 weir pool to identify potential environmental and water use impacts as the flow progresses through the system.

Initial electrical conductivity readings were undertaken in the weir pool upstream from the Pomona boat ramp on 15, 16 and 17 April to locate the progression of the head of the flow. The results in Figure 2 show on 15 April the electrical conductivity started to increase 30 km upstream of the Murray/Darling River junction, reaching a peak of 1,015 µS/cm at the 56 km mark and then declining again. The next day the peak in electrical conductivity was at the 42 km mark, and at the 31 km mark on 17 April. Each day the peak in electrical conductivity was slowly decreasing due to dilution from the less saline water in the weir pool. The flow is progressing through the weir pool much quicker during this release (over 10 km per day) than in 2016. In 2016, the highly saline water was progressing at approximately 2 km per day.

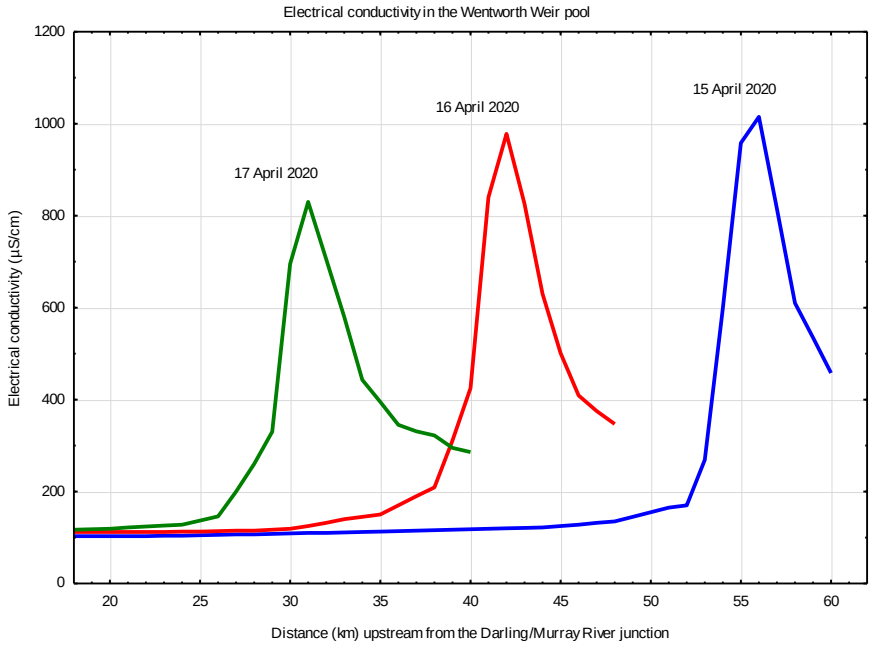

Figure 3: Progression of saline water down the Wentworth weir pool on the 15, 16 and 17 April 2020

To identify if highly saline water from the Darling River was progressing along the bottom of the weir pool where it could become an issue for water users, water quality profiles were collected upstream and downstream of the head of the flow on 17 and 20 April. Tables 1 and 2 show the results for various locations on both sampling occasions. Results 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 3. Orange indicates a medium risk and red a high risk. For the approximate location of monitoring points, see Figure 3.

The monitoring results show that on both occasions the water column was well mixed with minimal variation from the surface to the bottom. There is no evidence of denser, highly saline water sitting on the bottom of the channel. All but one of the dissolved oxygen results are above the 2 mg/L critical thresholds for aquatic ecosystem health. There are slightly lower dissolved oxygen readings at the head of the flow, in front of the highly turbid water, possibly due to the breakdown of organic matter picked up by the flow as it progressed down the Darling River. Lower water temperatures at this time of the year has further reduced the risks to fish health. There have been no reports of fish deaths associated with the release arriving in the Wentworth weir pool.

Electrical conductivity at the Darling River at Wentworth gauging station (located 3 km upstream of the junction) increased from 130 µS/cm on the morning of 20 April to a peak of 600 µS/cm early on 21 April. By 22 April, electrical conductivity had decreased to less than 300 µS/cm. The electrical conductivity in the Murray River upstream of Lock 10 is around 110 µS/cm. The less saline water in the Murray River will quickly dilute the salts entering from the Darling River. There are not expected to be any major impacts to Murray River water users further downstream.

As the results show, the water in the Darling River arm of the weir pool is well mixed, dissolved oxygen is above the critical ecological threshold of 2 mg/L, electrical conductivity is below the irrigation guideline level of 1,000 µS/cm and pH is between 7 and 8. Given this, no further water quality profile monitoring will be undertaken in the Wentworth weir pool. WaterNSW will continue to monitor water quality in the region through existing long term monitoring programs.

Table 1: Electrical conductivity (µS/cm) and dissolved oxygen (mg/L) profile data from the Wentworth Weir pool – 17 April 2020

Depth (m)	Darling River at junction		28km upstream of junction		36km upstream of junction		39km upstream of junction		48km upstream of junction	
	EC	DO	EC	DO	EC	DO	EC	DO	EC	DO
0.5	97	6.81	825	2.90	319	5.12	277	5.59	264	6.43
1.0	97	6.68	826	2.78	315	5.03	277	5.51	264	6.39
1.5	97	6.63	826	2.77	308	4.99	277	5.49	264	6.37
2.0	97	6.60	826	2.77	305	4.96	277	5.46	264	6.36
3.0	97	6.62	825	2.43	306	4.94	277	5.45	264	6.35
4.0	97	6.62	824	2.36			277	4.62	264	6.34
5.0	97	6.63	822	2.31						
6.0	101	4.04	825	2.26						
Surface turbidity (NTU)	24		421		>1,000		>1,000		>1,000	

Table 2: Electrical conductivity (µS/cm) and dissolved oxygen (mg/L) profile data from the Wentworth Weir pool – 20 April 2020

Depth (m)	6km upstream of junction		8km upstream of junction		10km upstream of junction		15km upstream of junction		18km upstream of junction	
	EC	DO	EC	DO	EC	DO	EC	DO	EC	DO
0.5	551	4.25	416	3.42	324	4.07	279	5.06	266	5.69
1.0	571	3.68	420	3.10	324	3.81	279	5.00	265	5.55
1.5	602	3.14	424	2.90	324	3.84	278	4.90	265	5.37
2.0	608	3.02	426	2.74	325	3.72	278	4.79	265	5.31
3.0	622	2.72	427	2.67			278	4.69	265	5.25
4.0	576	3.61	424	2.64	328	3.59	278	4.63	266	5.14
5.0	602	3.10	432	2.55	331	3.46	278	4.56	278	1.55
6.0	615	2.85	432	2.39			279	4.44		
Surface turbidity (NTU)	204		725		898		>1,000		>1,000	

Figure 3: Location of the head of the flow and monitoring sites in the Wentworth Weir pool

Table 3: Key to water quality risk ratings during the lower Darling resumption of flow

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

Further information

Previous water quality updates and Lower Darling resumption of flow fact sheets can be found on the department's web site - www.industry.nsw.gov.au/water/allocations-availability/droughts-floods/drought-update/drought-recovery/menindee-lakes-lower-darling-river

Additional flow and water quality information from the WaterNSW real time data web site is available at - realtimedata.waternsw.com.au/water.stm

The Water Quality Australia website (www.waterquality.gov.au/about) 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. 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 - www.dpi.nsw.gov.au/agriculture/water