

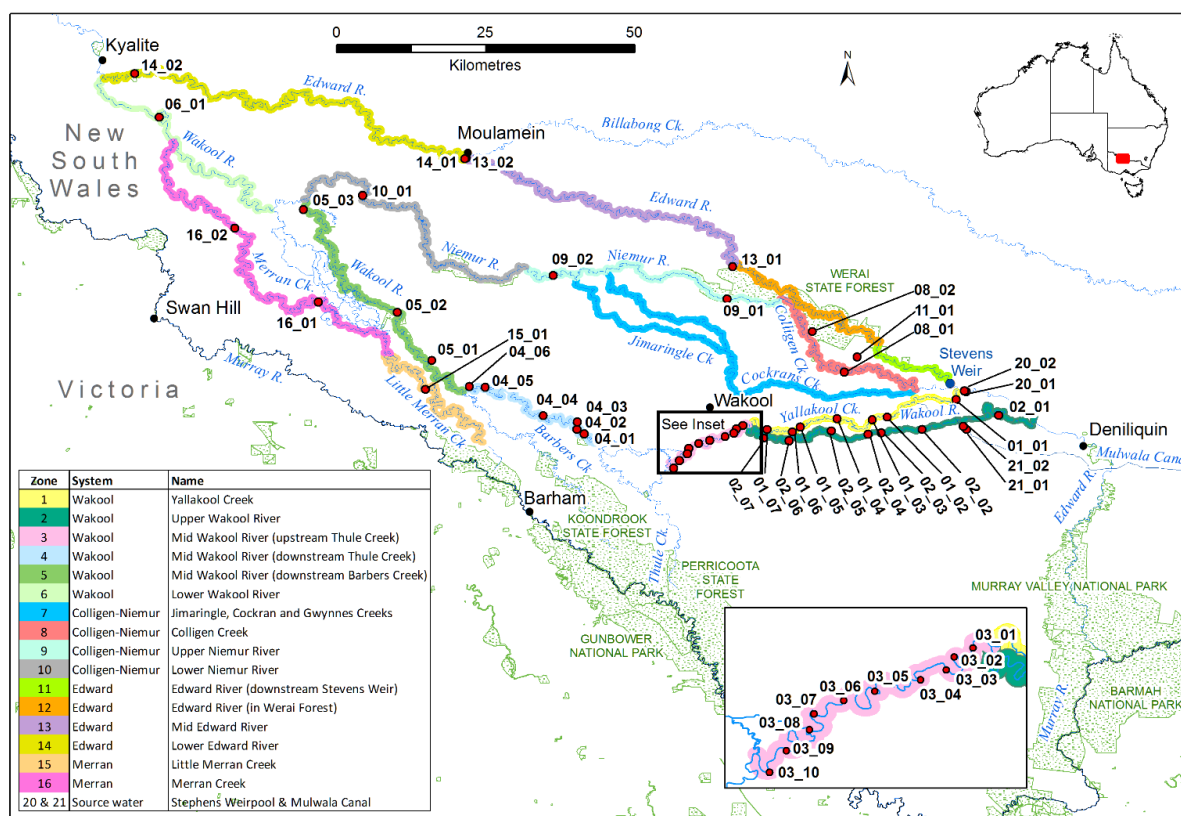
Update #2 on water quality monitoring in the Edward-Wakool system

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Charles Sturt University, 16/3/2016

Sites monitored 14th to 15th March 2016

Fourteen sites were monitored on 14th-15th March. This week an additional site on Niemur River at Nancurrie Rd Bridge (north-east of Gee Gee bridge) was added to the sample sites.

1. Yallakool Creek, LTIM zone 1 site 2 (Hopwood)
2. Yallakool Creek, LTIM zone 1 site 7 (Windra Vale)
3. Upper Wakool River, LTIM zone 2 site 2 (Yaloke)
4. Upper Wakool River, LTIM zone 2 site 6 (Widgee 1)
5. Mid Wakool River, LTIM zone 3 site 2 (Tralee)
6. Mid Wakool River, LTIM zone 3 site 10 (Llanos Park)
7. Mid Wakool River, LTIM zone 4 site 1 (Barham Bridge)
8. Mid Wakool River, LTIM zone 4 site 6, (Noorong 2)
9. Mid Wakool River, LTIM zone 5 site 2 (Gee Gee Bridge)
10. Colligen Creek, Murray LLS aquatic veg sample site 1 (Bowen Park, just upstream of site 08_01)
11. Colligen Creek, Murray LLS aquatic veg project sample site 4 (near Weraí station site 08_02)
12. Mulwala canal, LTIM zone 21 site 1 (Canal 1)
13. Edward River, LTIM zone 20 site 2 (Stevens Weir)
14. Niemur River, at Nancurrie Rd Bridge (not shown in Figure 1, but is approximately midway between of zone 10 site 1 and zone 9 site 2)



Created by Spatial Data Analysis Network,
Charles Sturt University, May, 2015

Data Source: NSW "Place Point" & "Hydroline" spatial data: Digital Cadastral Database (CD-ROM). LPMA, 2008, New South Wales; Australian Reserves GEODATA TOPO 250K Series 3, 2006, OEH NSW National Parks 2012

Figure 1. Edward-Wakool Long term Intervention Monitoring sites

Observations from monitoring undertaken 14 -15 March 2016

The blue-green algal bloom was evident at 12 of the 14 monitoring sites. The bloom was not yet evident at Gee Gee Bridge on the Wakool River (Figure 2a) or Nancurrie Road Bridge on the Niemur River (Figures 2b).

Similar to observations on 7/3/16, the algae appeared to be in lower concentration in the higher discharge faster flowing water in Yallakool Creek compared to other sites where the water was flowing slowly. No scum was present in Yallakool Creek (Figure 3a).

The bloom was particularly bad in the upper Wakool River, LTIM zone 2 site 6 (Widgee 1) where there was a large area of red coloured scum in the slower flowing pools (Figure 3b). A reddish coloured scum was also evident at mid Wakool River, LTIM zone 3 site 2 (Tralee) and LTIM zone 3 site 10 (Llanos Park)(Figure 4a).

The algal bloom was a thick green colour in Colligen Creek (Figure 4b) and Wakool River zone 4 at 'Noorong'. The bloom was evident in Stevens Weir on the Edward River, but no scum was present (Figure 5a). The Mulwala canal at the Denilquin-Wakool Road (Figure 5b) was banked up against the regulator and was not flowing, however no scum was evident.

Observations from John Lolicato, Wakool landholder, was that when his irrigation channel was flowing at 10 ML/day there was no scum, but the next day after he had stopped pumping a red scum appeared in the standing water and parts of the scum were iridescent blue (Figure 6).



Figure 2. a) No blue green algae was evident at Gee Gee bridge on the Wakool River 14/3/16. b) No blue green algae evident at Nancurrie Road bridge on the Niemur River 14/3/16 (Photos R. Watts)



Figure 3. a) No scum present at Yallakool Creek 'Windra Vale' 15/3/16 b) Red scum forming in slower flowing sections of the Wakool River zone 2 at 'Widgee' 14/3/16 (Photos: R. Watts)



Figure 4. a) Red scum forming in slower flowing sections of the Wakool River zone 3 at Llanos Park. 15/3/16 b) no scum present at Colligen Creek 15/3/16 (Photos: R. Watts)



Figure 5. The bloom was evident in a) Stevens Weir on the Edward River 15/3/16 and b) Mulwala Canal at the Wakool Road 14/3/16, but no scum was present at either of these sites. (Photos: R. Watts)



Figure 6. Iridescent blue algal scum forming in irrigation channel after water was turned off and water was standing for one day (Photo: John Lolicato)

Spot water quality data from 14 -15 March 2016

Spot water results are shown in Table 1. Note that the time of day will greatly influence the temperature, dissolved oxygen and pH. So it is not reliable to compare results that are taken at different times of the day.

Key points:

- The water temperatures ranged between 24.8 and 28.7. This was slightly lower than the temperatures measured last week. Maximum air temperatures were lower this week.
- The turbidity of the water was considerably lower at the sites where there was no algal bloom evident. It was 42.7 NTU in the Wakool River at Gee Gee bridge and 74.4 NTU in the Niemur River at Nancurrie Bridge.
- The water in the canal at the Deniliquin-Wakool Road crossing was banked up against the gate and was not flowing. I also took spot measures in the canal near Berrigan where it was flowing strongly. The turbidity was considerably lower in the canal at Berrigan.
- The percent concentration of dissolved oxygen was highest in zone 4, however these two measured were taken late afternoon so cannot be compared directly with other sites that were monitored in the morning.
- In general, the percent dissolved oxygen was not as high this week compared to last week during the very hot weather. However sampling times were different so the values are not directly comparable to the data collected last week.

Table 1. Spot water quality results from week three (14/3/16 to 15/3/16)

Zone	Zone name	Site	Name	Date	Time	Temp	pH	EC	Turb (NTU)	DO (mg/L)	DO %
1	Yallakool Ck	2	Hopwood	15/3/16	10:40	28.8	8.38	0.031	148.0	7.35	90.3
1	Yallakool Ck	7	Windra Vale	15/3/16	10:00	24.5	8.40	.032	157.0	8.18	100.0
2	Upper Wakool	2	Yaloke	14/3/16	12:00	25.9	8.01	0.455	167.0	9.42	117.7
2	Wakool R	6	Widgee1	14/3/16	12:40	25.7	8.50	0.435	188.0	9.71	121.2
3	Mid Wakool R	2	Tralee	15/3/16	9:15	25.3	8.39	0.071	169.0	7.35	90.9
3	Mid Wakool R	5	Llanos Park	15/3/16	8:25	24.6	8.35	0.066	166.0	7.02	85.8
4	Mid Wakool R	1	Barham Bridge	14/3/16	16:55	28.2	9.46	0.078	96.9	9.39	121.5
4	Mid Wakool R	5	Noorong 2	14/3/16	16:00	28.7	9.49	0.077	218.0	10.56	137.6
5	Mid Wakool R	2	Gee Gee	14/3/16	14:20	28.1	8.14	0.074	42.7	7.86	101.6
10	Niemur River		Nancurrie Rd	14/3/16	15:00	27.6	8.03	0.041	73.4	7.42	95.1
8	Colligen Creek	1	Bowen Park	15/3/16	11:50	24.8	8.52	0.033	111.0	7.47	91.9
8	Colligen Creek	4	Wera Station	15/3/16	12:20	25.8	9.24	0.032	139.0	9.00	112.2
20	Edward River	2	Stevens Weir	15/3/16	11:20	27.0	9.30	0.033	136.0	8.67	110.1
21	Mulwala Canal	1	Canal - Wakool Rd	14/3/16	11:20	25.0	9.51	0.040	262.0	8.61	106.2
21	Mulwala Canal		Canal - Berrigan	15/3/16	14:10	26.5	9.96	0.040	89.2	9.14	115.4

Algal concentration

Water samples collected on 14th and 15th March are currently being processed for total algal counts, dissolved organic carbon, ammonia (NH₄⁺), filtered reactive phosphorus, dissolved nitrate + nitrite (NO_x), total nitrogen, total phosphorus, absorbance and fluorescence spectroscopy for organic matter characterisation, and chlorophyll-a. None of these results are available at this stage.

Visual assessment of water confirms the observations earlier in this report that the algae was not evident in the Wakool River at Gee Gee bridge and the Niemur River at Nancurrie Road bridge (Figure 7). The Mulwala canal at Berrigan that was flowing strongly appeared to have less algae than the canal the Deniliquin-Wakool Rd crossing where it was not flowing (Figure 7).

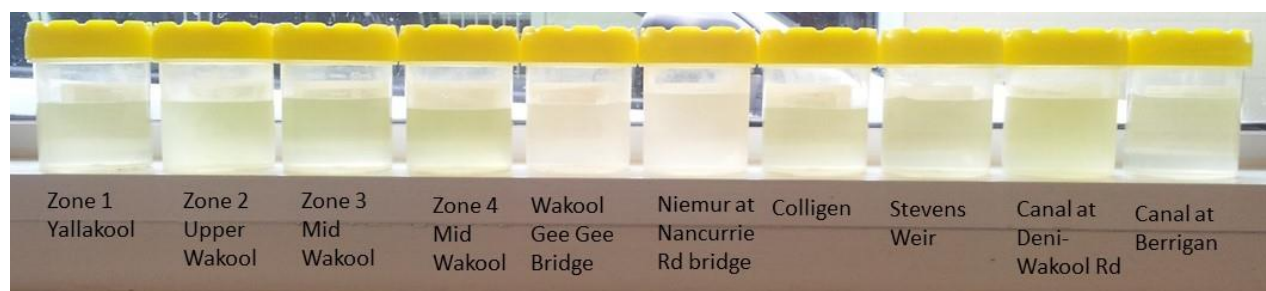


Figure 7. Water samples from sites in the Edward-Wakool system collected on 14/3/16 and 15/3/16

Comments

There are several points that need to be taken into account when considering the delivery of additional flows to these rivers:

- The algal bloom has not yet reached Gee Gee Bridge on the Wakool River or Nancurrie Rd bridge in the Niemur River. So the areas of the Wakool River and Niemur River downstream of these two sites presumably have good water quality and are currently providing refuge for biota from the bloom. So delivery of additional flow from Stevens Weir could potentially push the bloom downstream at a faster rate.
- At sites where the water was flowing faster (e.g. Yallakool Creek and the Mulwala Canal at Berrigan) there was no scum present and the water quality appeared to be slightly better than at sites where the water was flowing very slowly or was still. This could be due to the algae not being able to maintain their position at the top of the water column. Also the turbulence of the faster flowing water may prevent the establishment of a very thin warm layer of surface water – the cyanobacteria can reproduce faster in warmer water. However, given that the source water in Stevens and the canal is affected by the algal bloom, it is difficult to predict whether delivery of water would significantly improve water quality downstream.
- The red scum could be an indication that the algal bloom is starting to break down. However, it is unclear if this is the case because there is very little available information on how *Aphanizomenon* blooms develop and decay.

Acknowledgements

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