Australian Government
Commonwealth Environmental Water Office

Institute for Land, Water and Society
Charles Sturt University

Long Term Intervention Monitoring Project
Edward-Wakool River System Selected Area
Project Progress Report #17

Reporting period: ***1 July to 30 September 2018 (2018-19 Watering Year)***

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Backwater of Wakool River inundated during 800 ML/day flow trial, Sept 2018
(Photo: R. Watts)

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Summary of progress against monitoring and evaluation activities

This is the 17th progress report for the Edward-Wakool Long-Term Intervention Monitoring (LTIM) and Evaluation Project. This report is a summary of work undertaken between July and September 2018 (Table 1). Other reports since the commencement of the project in July 2014 are available on the project website http://www.csu.edu.au/research/ilws/research/sra-sustainable-water/edward-wakool-research-project

Table 1. Summary of progress on the Edward-Wakool LTIM Project July to September 2018

Activities	Overview of progress from July to September 2018
Monitoring activities	
Hydraulic modelling	• No additional modelling undertaken in this reporting period
River hydrology	• Hydrological data from NSW Office of Water gauges regularly downloaded from the web • Depth loggers at 7 sites were downloaded monthly • Water levels on staff gauges were manually recorded once per week from mid-August to late September during 800 ML/day flow trial • Automated field cameras took photos of gauges and low level crossings twice per day during the 800 ML/day flow trial
Stream metabolism	• Dissolved oxygen loggers were downloaded once per month
Carbon & water quality	• Water monitoring was undertaken once per month
Riverbank and aquatic vegetation	• Monitoring of aquatic and riverbank vegetation was undertaken in August and September at 16 sites in monitoring zones 1 to 4.
Fish larvae	• Fish larval monitoring commenced in week 14 September and will be undertaken fortnightly until March 2019.
Fish recruitment	• No fish recruitment monitoring undertaken in this reporting period
Fish community	• No fish community monitoring undertaken in this reporting period
Fish movement	• Receivers for the assessment of fish movement were downloaded in September 2018.
Evaluation activities	
Annual report	• The draft 2017-18 Edward-Wakool LTIM annual report was submitted to CEWO in September 2018
Progress reports	• Progress reports submitted quarterly are available on the Edward-Wakool LTIM project website
Monitoring data	• The LTIM Monitoring Data Management System Managed by CEWO is undergoing an upgrade. All 2017-18 monitoring data will be uploaded into the CEWO Monitoring Data Management System when the system upgrade has been completed.
Communication and engagement	
Environmental Water Reference Group	• The 7th meeting of the EWEWRG was held on 7 August 2018. Robyn Watts (representing the LTIM team) gave a presentation including i) key findings in 2017-18, ii) update on the monitoring of the 800 ML/day flow trial, and iii) update on proposed fish community monitoring in 2019
E-W Operational Advisory Group	• The EWOAG met approximately fortnightly between July and September. Much of the discussion focussed on the delivery of environmental water for the 800 ML/day flow trial.
Other stakeholder engagement	• Prior to each monitoring trip the LTIM team contacted landholders whose properties are accessed to undertake monitoring • Landholders in the Bookit Island area were regularly contacted during the monitoring of the 800 ML/day flow trial

- An overview of the Long-Term Intervention Monitoring Program is provided in Appendix A.
- A map of sample sites monitored in the Edward-Wakool Selected Area for the LTIM is in Appendix B.
- A summary of monitoring undertaken in the Edward-Wakool system for the Long Term Intervention Monitoring Project from 2014-2019 is provided in Appendix C.
- Update reports on the 800 ML/day flow trial in Wakool-Yallakool system are provided in Appendix D

Field observations and stakeholder engagement - July to September 2018

Reporting of field monitoring and stakeholder engagement undertaken between July and September 2018 is provided in this report. Reporting of work undertaken prior to this are in previous progress reports (see Edward-Wakool LTIM website http://www.csu.edu.au/research/ilws/research/sra-sustainable-water/edward-wakool-research-project).

1. Winter Cease to flow

A watering action could not be delivered in winter 2018 due to maintenance of Steven's weir. The offtake regulators at Yallakool Creek and Wakool River were shut down on 2 May 2018 resulting in a cease to flow throughout the system. Yallakool Creek commenced flow on 28 July and Wakool River regulator commenced flow on 5 August 2018. The cease to flow in winter 2018 is in contrast to the connectivity created by the 2017 environmental watering action in Yallakool Creek between 1 May and 23 August 2017.

2. 800 ML/day flow trial in the Wakool River

The 800 ML/day flow trial in the Wakool River was originally planned to commence in early August but was delayed due low water demand affecting the system start-up after the winter shutdown. The environmental watering commenced on 21 August. Due to low demand for water in the Wakool Main Canal the height of Stevens Weir pool was lower than anticipated so it was not possible to deliver the environmental water from Yallakool Creek at the planned rate. To achieve a discharge of 800 ML/day at the confluence of Yallakool Creek and the Wakool River (Wakool reserve), environmental water was delivered via a combination of the Yallakool Creek offtake, Wakool River offtake, and the Wakool escape from Mulwala canal.

The higher flow inundated low lying features such as river banks and benches in the river channel (Figure 1). The combined flow from Wakool offtake and the Wakool escape enabled Black Dog Creek to commence to flow (Figure 2) with water flow from the upper Wakool River via Black Dog Creek across to Yallakool Creek. Some backwaters and edge habitats were also inundated during the trial (see photo on front page of report).

Daily photos taken of six low level crossings showed that only one crossing in the Bookit Island area was inundated by the 800 ML/day flow. The crossing was inundated to approximately 10 cm deep for 1 week at the peak of the flow trial. Update reports on the spring 2018 flow trial are provided in Appendix D.

Figure 1. Wakool River (Zone 3 site 1) just downstream of Wakool reserve showing inundation during the 800 ML/day environmental flow trial in September. Left August 2018 Right: September 2018 (Photos: Nathan McGrath)

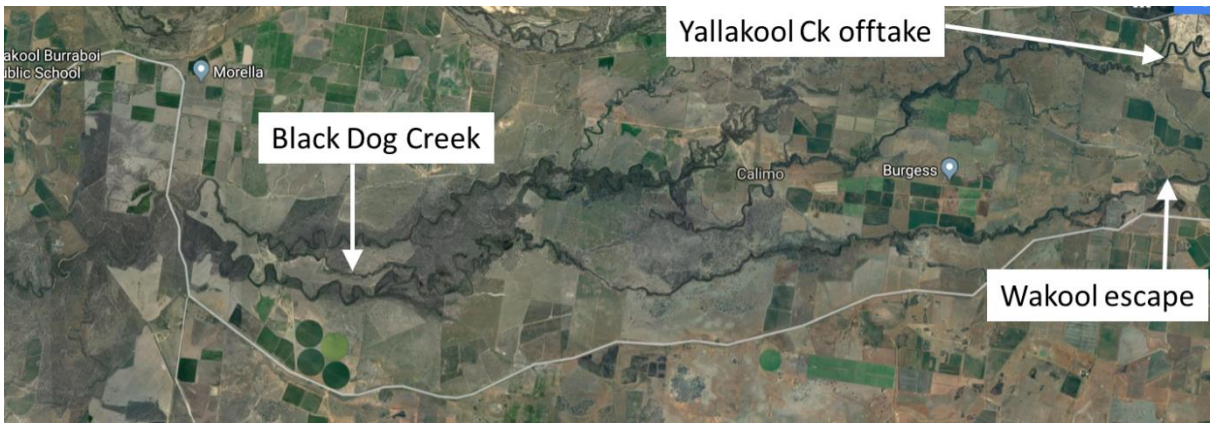

Figure 2. Satellite image showing the location of Yallakool Creek Offtake, Wakool escape from Mulwala canal, and Black Dog Creek.

3. Riverbank and aquatic vegetation

Monitoring of riverbank and aquatic vegetation continued in August and September 2018. The river banks were dry due to low rainfall in August and September. There was very little evidence of germination of plants in August and September.

The lower part of the riverbank that had been inundated during the flow trial was evident after the recession of the water at the end of the flow trial. During the recession there was deposition of substrate, nutrients and seeds that can support growth and germination of vegetation on riverbanks. There is a high potential for germination of riverbank plants in the area of riverbank that was wetted during the flow trial. The response to this inundation will be reported in the December 2018 progress report.

4. Stakeholder engagement

The 7th meeting of the EWEWRG was held on 7 August 2018. Robyn Watts (representing the LTIM team) gave a presentation including i) key findings in 2017-18, ii) update on the monitoring of the 800 ML/day flow trial, and iii) update on proposed fish community monitoring in 2019.

During this reporting period the Edward-Wakool team had several phone and email discussions with CEWO and John Lolicato, President of the Wakool River Association, to progress the planning for the 800 ML/day flow trial in the Yallakool-Wakool system. John Trethewie and Xiaoying Liu met with landholders in the Bookit Island area prior to the trial to organise the installation of the remote cameras and seek permission for access to monitor the flow trial.

Planned LTIM activities – October to December 2018

Monitoring: Between October and December 2018 the team will undertake fortnightly monitoring of fish larvae and monthly monitoring of aquatic and riverbank vegetation. The movement of tagged silver perch and golden perch will continue through this period, and data will be downloaded from the acoustic array in December. Dissolved oxygen loggers and depth loggers will be downloaded monthly and water quality will be monitored.

Engagement: A presentation on the 800 ML/day flow trial will be given to the Wakool River Association in October 2018. A survey of community and water manager perceptions of the 800 ML/day flow trial and winter 2017 flow trial will be undertaken by Charles Sturt University. Although it is related to the flow trial, this survey is a separate activity and is not part of the LTIM monitoring program. The interviews will commence in December and will continue through into January and February 2019. For more information on this survey please contact Robyn Watts.

Acknowledgements

We respectfully acknowledge the Traditional Owners, their Elders past and present, their Nations of the Murray–Darling Basin, and their cultural, social, environmental, spiritual and economic connection to their lands and waters. We extend our thanks to the Wakool River Association, the Edward-Wakool Anglers Association and landholders in the Edward-Wakool river system for allowing access to their properties and for their keen interest in this project. This project was funded by the Commonwealth Environmental Water Office and is a collaboration between Charles Sturt University, Murray Local Land Services, NSW Department of Primary Industries, Monash University, NSW Office of Environment and Heritage and La Trobe University. Members of the Edward-Wakool Long-term Intervention Monitoring Project Team are listed on the Edward-Wakool LTIM website http://www.csu.edu.au/research/ilws/research/sra-sustainable-water/edward-wakool-research-project.

Appendix A: The Long-Term Intervention Monitoring Project for the Edward-Wakool system and its context in terms of ecological monitoring and evaluation within the Murray-Darling Basin.

The Long Term Intervention Monitoring (LTIM) Project for the Edward-Wakool river system Selected Area is funded by the Commonwealth Environmental Water Office. The project is being delivered by a consortium of service providers lead by Charles Sturt University (Institute for Land, Water and Society) and includes, NSW Department of Primary Industries (Fisheries), Monash University (Water Studies Centre), La Trobe University, NSW Office of Environment and Heritage, and Murray Local Land Services.

The LTIM project is based on a clear and robust program logic, as detailed in the Long-Term Intervention Monitoring Project Logic and Rationale Document. That document sets out the scientific and technical foundations of long-term intervention monitoring and is being applied to areas where LTIM projects are being undertaken. It also provides links between Basin Plan objectives and targets to the monitoring of outcomes from Commonwealth environmental watering actions. For more information, see Monitoring and evaluation for the use of Commonwealth environmental water.

Many different agencies play a role in the reporting on environmental outcomes, consistent with the Basin Plan (see Figure A1 below). The Murray Darling Basin Authority is responsible for reporting on achievements against the environmental objectives of the Basin Plan at a basin-scale, which are broadly focussed on flows and water quality, fish, vegetation and birds across the whole of the Basin. State Governments are responsible for reporting on achievements against the environmental objectives of the Basin Plan at an asset-scale i.e. rivers, wetlands, floodplains. The Commonwealth Environmental Water Holder is responsible for reporting on the contribution of Commonwealth environmental water to the environmental objectives of the Basin Plan (at multiple-scales).

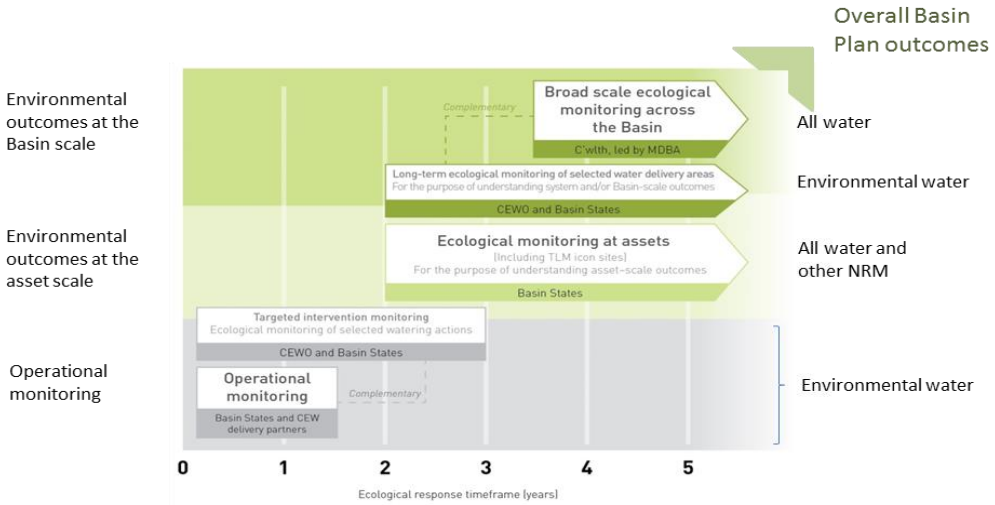

Figure A1. A summary of roles various agencies play a in the reporting on environmental outcomes, consistent with the Basin Plan.

Appendix B: Map showing location of sample sites monitored in the Edward-Wakool Selected Area for the Long-Term Intervention Monitoring Project.

The monitoring for the Edward-Wakool LTIM Selected Area Evaluation is focussed on Yallakool Creek (zone 1), the upper Wakool River (zone 2) and mid reaches of the Wakool River (zones 3 and 4)(Figure B1). Fish population surveys are undertaken annually in the focal zone, and a further 20 sites throughout the Edward-Wakool system will be surveyed for fish populations in years 1 and 5. In addition to water quality sampling in the focal area, water quality is also monitored in Stevens Weir and the Mulwala canal as these sites are the potential source of Commonwealth environmental water in this system.

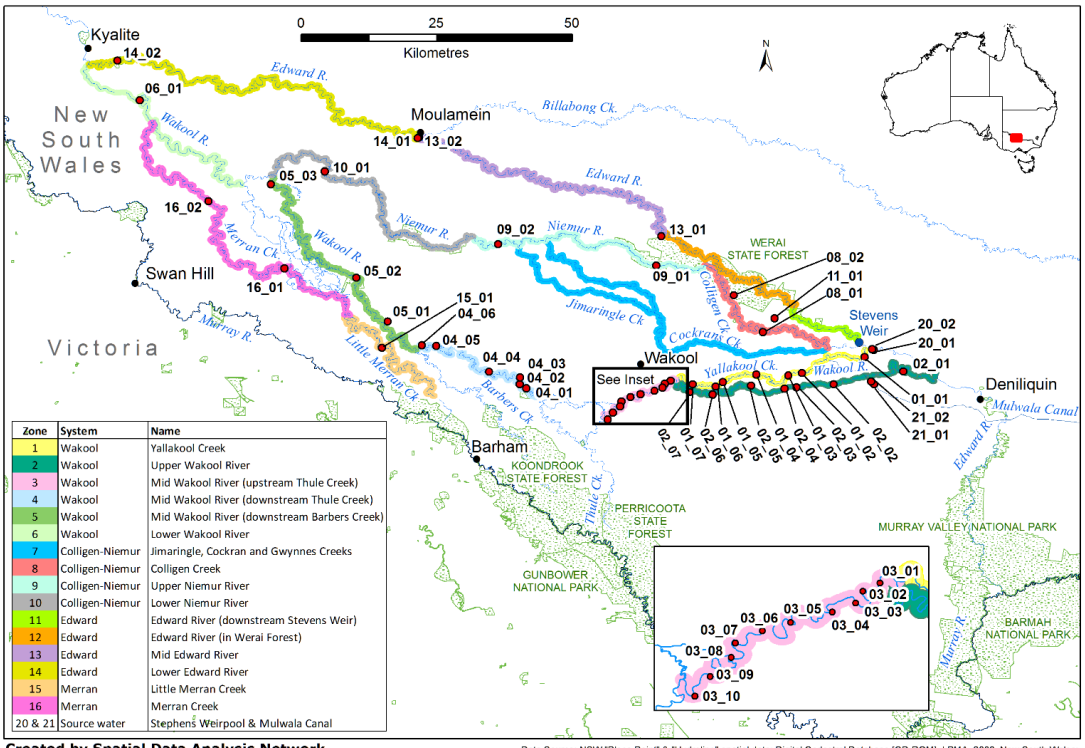

Figure B1. Monitoring sites for the Edward-Wakool Selected Area for the Long-Term Intervention Monitoring (LTIM) Project.

Appendix C: Summary of monitoring undertaken in the Edward-Wakool system for the Long Term Intervention Monitoring Project from 2014-2019.

Indicator	Cat	Zones	Schedule of activities											
			J	A	S	O	N	D	J	F	M	A	M	J
River hydrology	1	1,2,3,4	Continuous data from automated gauging stations											
Hydraulic modelling	3	1,2,3,4	Modelling undertaken in 2014-15											
Stream metabolism and primary productivity	1	1,2,3,4		Continuous data from loggers										
Nutrients and carbon	1	1,2,3,4		Monthly sampling										
Carbon characterisation	3	1,2,3,4		Monthly sampling										
Riverbank and aquatic vegetation	3	1,2,3,4		Monthly monitoring										
Fish reproduction (larvae)	1	3					Fortnightly							
Fish reproduction (larvae)	3	1,2,3,4			Fortnightly sampling									
Fish recruitment	3	1,2,3,4												
Fish community (Cat 1)	1	3												
Fish community survey	3	20 sites	Undertaken in 2014-15 and 2018-19 only											
Fish movement	2	1,2,3,4 (plus sites funded Murray LLS)		Continuous data from acoustic receivers										

Appendix D Update reports on the 800 ML/day flow trial in Yallakool-Wakool system 2018

UPDATE ON FLOW TRIAL IN WAKOOL-YALLAKOOL CREEK SYSTEM

20 September 2018

Robyn Watts, John Trethewie, Xiaoying Liu

Charles Sturt University

The water levels on all staff gauge boards in the flow trial area have risen over the past week. A table of manual readings of key gauge board is included at the end of this report (Table 1). In addition to these weekly manual readings, photos of gauge boards are taken by installed cameras at 9am and 3pm each day during the flow trial. Water height data from these photos will be collated for the final report.

On Monday 17th September a visual assessment of the escape from the Wakool escape from Mulwala canal was made and confirmed the release had ceased. Discharge data for the Wakool escape will be obtained from WaterNSW as it is not available on the WaterNSW website.

On Monday 17th September the pulse appeared to have peaked in zones 1, 2 and 3 (upstream of Bookit Island), with areas of recently wet bank becoming exposed.

Black Dog Creek

On 17th September the flow in Black Dog Creek was continuing, but the water level was slightly lower than on 13th September (Figure 1). This creek/runner exits the upper Wakool River near 'Widgee' (Zone 2 site 4) and flows across to Yallakool Creek to 'Windra Vale' near zone 1 site 5.

Figure 1. Black Dog Creek crossings

Bookit Island Area

On Monday 17th and Tuesday 18th September 2018 water levels appeared to be rising in the Bookit Island area and in zone 4 downstream of the Barham to Wakool Bridge.

There was evidence that the watering action had inundated low lying benches or edge habitats throughout zones 1 to 4 and in the Bookit Island area. For example, Figure 2 shows the water level increase in a backwater on Bookit Island. Throughout the system, including at this site, there were a lot of frogs calling during the day from these recently inundated habitats.

Figure 2. Inundated backwater on Bookit Island

Low level bridges

On 17th and 18th September we visited low lying bridges on Merrabit Creek, Bookit Creek and Yallakool Creek.

Bookit Island Bridge #1 was underwater on Tuesday 18th (Figure 3). Based on gauge heights at upstream sites, water levels appeared to be rising and had not yet reached the peak at this site. John Trethewie spoke to Anthony Hillman and he said he had another access crossing that he can use while this flow pulse moves through.

None of the other bridges on Yallakool Creek, Bookit Creek, Merrabit Creek or the Wakool River that we visited were inundated on 17th or 18th September.

Figure 3. Series of photos of water levels on Bookit Island Bridge #1, taken between 4/9/18 and 18/9/18

Table 1. Staff gauge board data from manual readings

Site name	GB	height cm (date)	height cm (date)	height cm (date)	height cm (date)	height cm (date)
Zone3 site3	23	310 (27 Aug)	321 (3 Sep)		341 (12 Sep)	350 (17 Sep)
Zone3 site5	25	150 (27 Aug)			172 (12 Sep)	181 (17 Sep)
Griminal Creek	08/65	80 (27 Aug)	92 (3 Sep)	110 (10 Sep)	106 (12 Sep)	113 (17 Sep)
Merribit Creek	10/64	132 (27 Aug)	141 (3 Sep)	152 (10 Sep)	159 (12 Sep)	166 (17 Sep)
Merribit Ck Lolicato bridge	37	60 (28 Aug)	70 (4 Sep)	80 (10 Sep)	89 (12 Sep)	100 (18 Sep)
Bookit Creek Weir DS	31	56 (28 Aug)	62 (4 Sep)	65 (10 Sep)	68 (12 Sep)	72 (18 Sep)
Bookit Island Main bridge	38	94 (28 Aug)	102 (4 Sep)	110 (10 Sep)	115 (12 Sep)	126 (18 Sep)
Zone 4 site 1	63	141 (28 Aug)	154 (4 Sep)	168 (11 Sep)		186 (17 Sep)

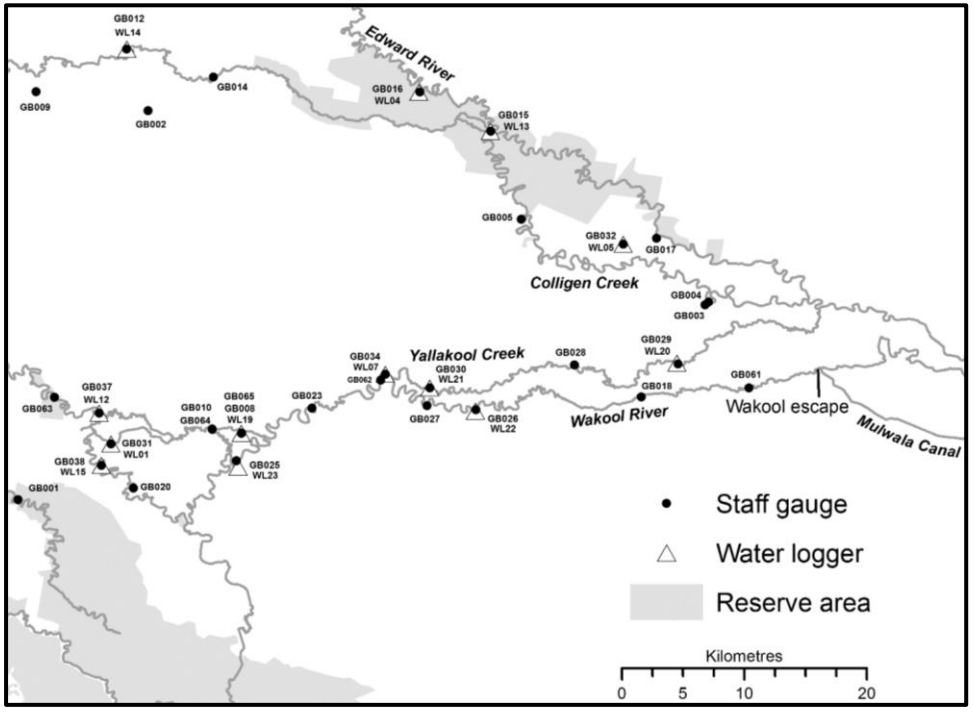

Figure 1: Location of sites with gauge boards. Location of bridges, weirs and crossing are not shown in this figure.

UPDATE ON FLOW TRIAL IN WAKOOL-YALLAKOOL CREEK SYSTEM

4 October 2018

Robyn Watts, John Trethewie, Xiaoying Liu

Charles Sturt University

Visual assessment of water levels on staff gauge boards in the flow trial area in the last week in October 2018 indicate that the flow action had peaked at all sites and is now receding.

The event peaked at 651 ML/d on 19/9/2018 at the Wakool-Barham Rd gauge (Figure 1). The delivery of environmental water from the Wakool escape from Mulwala canal commenced on 5/9/2018 and a visual assessment of the escape on 17th September confirmed the release had ceased. The discharge data for the Wakool escape for this action will be obtained from WaterNSW.

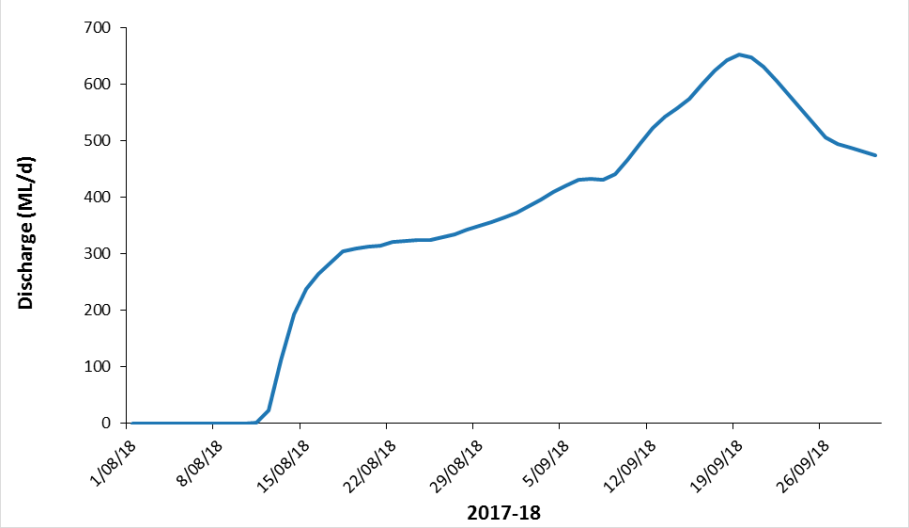

Figure 1. Hydrograph at Wakool River @Wakool-Barham Rd from 4 Sept to 4 Oct 2018

Based on the photos from installed cameras, Bookit Island Bridge #1 was the only bridge that was inundated during the watering action. No other bridges where we had cameras installed were inundated during the action.

A series of photos of Bookit Island Bridge #1 shows the water level rising and receding (Figure 2). At the peak of the watering action the level of water over the bridge was quite shallow and rose up to approximately the bottom rail of the gate.

John Trethewie spoke to Noel from Bookit Island. Noel said “the bridge only went a little bit under, and we could use it anyway”. John also observed some tyre tracks suggesting it has been used at some time during the watering action.

Figure 2. Photos of Bookit Island Bridge #1 from 12 to 23 September 2018 taken at 3pm each day.