Edward/Kolety-Wakool system Environmental Flows Newsletter

Issue Number 6 | 1 October – 31 December 2020

Edward/Kolety-Wakool Monitoring, Evaluation and Research Program

Students from Barham Public School attended one of the School Workshops that were held at the Western Murray Land Improvement Group Centre in Barham in December 2020. Skip to page 4 to read more about this!

What's in issue #6

Welcome to the issue 6 of the Edward/Kolety-Wakool Environmental Flows Newsletter - a quarterly newsletter that provides an update on our progress as we monitor and undertake research on the ecosystem outcomes of Commonwealth environmental watering actions in the Edward/Kolety-Wakool system.

The Edward/Kolety-Wakool MER Program is a collaboration between universities, state government agencies, consultants and local community organisations.
More information on the program can be found at:
https://flow-mer.org.au/selected-area-edward-kolety-wakool/
https://www.csu.edu.au/research/ilws/research/environmental-water

Environmental watering actions October to December 2020

We use data from WaterNSW flow gauges and information from water accounts to determine the contribution of environmental water to flows in the Edward/Kolety-Wakool river system.

Two Commonwealth environmental watering actions were undertaken between October and December 2020 (Figure 1). The first environmental watering action (referred to as a spring flow) commenced in mid-October with environmental water delivered via the Yallakool offtake, Wakool offtake and the Wakool escape from Mulwala Canal to create a combined flow pulse with a peak of approximately 800 ML/day in the Wakool River downstream of Wakool Reserve. The objective of this watering action was to support the recovery of the river system following the low-oxygen blackwater event in 2016, and to contribute to connectivity, water quality, promote growth of in-stream aquatic vegetation, improve the condition of native fish and promote spawning of some species of native fish. The shaded part of the graphs in Figure 1 shows how this flow commenced in Yallakool Creek and progressed down the Wakool River.

A second environmental watering actions commenced in December 2020. The objective of this watering action was to promote silver perch spawning, influence and encourage fish movement, assist with dispersal of larvae and juveniles of a number of fish species, and support instream water plants.

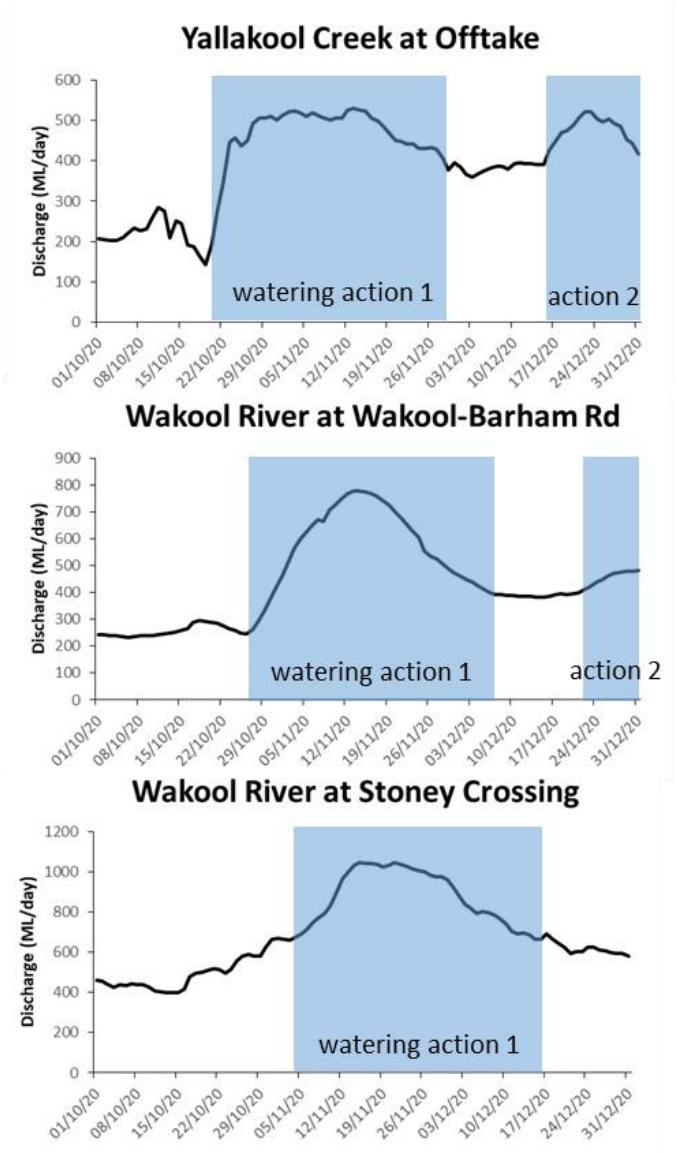

Figure 1: Discharge (ML/day) in the Wakool-Yallakool system from 1 October to 31 December 2020. Blue shaded areas indicate timing of environmental watering actions. Top, Yallakool Creek (gauge 409020); middle, Wakool River at Wakool-Barham Road (gauge 409045); bottom, Wakool River at Stoney Crossing (gauge 409013).

Spring flow in the Wakool-Yallakool river system

Planning for the spring flow in the Wakool-Yallakool system (watering action 1, described on page 1 of this newsletter) was undertaken by staff from the Commonwealth Environmental Water Office and NSW Department of Planning Infrastructure and Environment in collaboration with landholders and members of the Wakool River Association.

The aim was to work with local landholders to implement a short duration environmental flow trial in spring 2020 that would have a peak discharge of 800 ML/day – higher than the current operational limit of 600 ML/d at the Wakool-Yallakool confluence. This would build on findings from a previous flow trial in August-September 2018 (Watts et al. 2019 https://www.environment.gov.au/water/cewo/publications/edward-wakool-ltim-annual-report-2018-19) that showed the flow pulse increased connectivity with backwaters, river productivity, frog calling, waterbird activity and invertebrate activity in inundated areas around Bookit Island, and did not have any detrimental outcomes on water quality.

Water level changes were monitored during the 800 ML/day watering action in spring 2020. The focus of the monitoring was in the area around Bookit Island, Merribit Creek and Black Dog Creek, where there was the potential for low level bridges and crossings to be inundated for a short period of time on the flow peak. Cameras were set up to take twice daily photos of water levels on staff gauges (calibrated gauges that are usually read manually to record water level). The daily water level on the staff gauges will be recorded when we analyse the photos and water level data will be used to document how the flow progressed down the system. Cameras were also installed to take photos of some low level bridges and crossings. Water quality during the spring flow was monitored as part of the ongoing monitoring program (see page 5).

Preliminary observations:

- Water levels at some of the staff gauges were higher during the 2020 flow than during the 2018 flow.
- Two low level crossings over Black Dog Creek were inundated for a short period of time during the 2020 flow event. Black Dog Creek flows from the upper Wakool near 'Widgee' across to Yallakool Creek. Both of these crossings were inundated in the 2018 flow trial, but the water level was slightly higher during the peak of the 2020 flow (Figure 2).
- Bookit Island Bridge #1 was inundated for a short period of time in 2020. This bridge was also inundated in the 2018 flow trial, but the water level was slightly higher during the peak of the 2020 flow (Figure 3).

Figure 2: Black Dog Creek Crossing Number 2. Left, 29 October 2020 prior to spring flow. Middle, 8 November 2020 during peak flow. Right, 13 September 2018 during peak flow

Figure 3: Bookit Island Bridge Number 1. Left, 6 August 2020 prior to spring flow. Middle, 12 November 2020 during peak flow. Right, 19 September 2018 during peak flow

School Workshops

In December 2020 six workshops were held at the Western Murray Land Improvement Group centre in Barham to give primary and secondary students hands-on experience of environmental science and to learn about river monitoring. The workshops were led by Robyn Watts, Nicole McCasker, Shasha Liu and Roseanne Farrant from Charles Sturt University, with wonderful assistance from WMLIG staff.

Approximately 150 students from Barham High School, Barham Primary School, Moulamein Public School, and Wakool Burraboi Public School attended the workshops (Figures 4 to 7). The facilities at WMLIG were ideal for the workshops, as there was plenty of room to have more than one activity set up at the same time.

Each session included some short talks as well as some activities so students could use microscopes from Charles Sturt University to look at aquatic bugs and plants and preserved fish larvae. Students also used water quality meters to test water collected from the Murray River, a local wetland and farm dam.

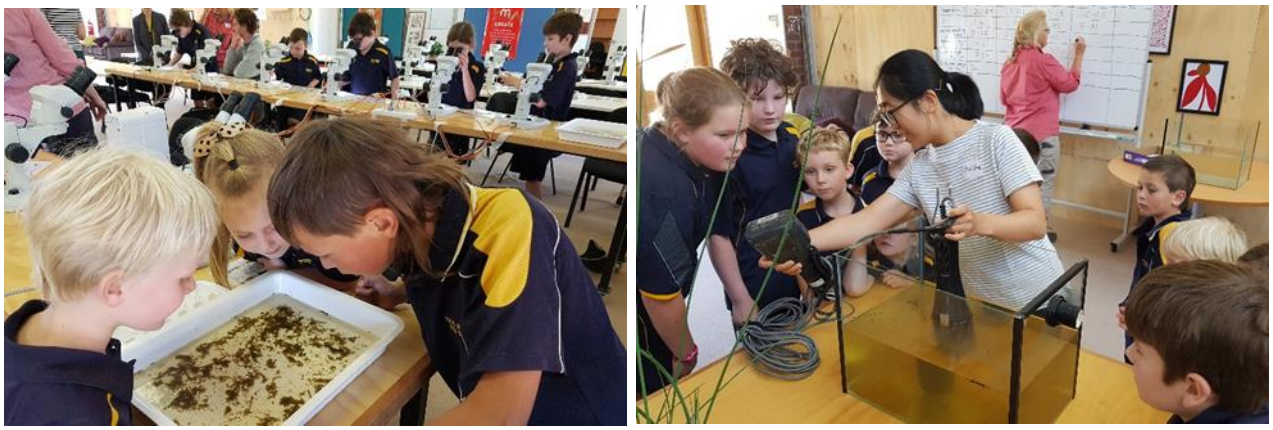

Figure 4: Students from Wakool Burraboi Public School looking at aquatic bugs and learning about water quality with Shasha Liu

The workshops were a great success and the students were really engaged and enjoyed the experience.

> *"I loved everything about the workshop – especially learning about the bug and plants that live in our local area".* Year 9 student, Barham High School
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> *"Our Year 9 students really enjoyed using the microscopes and as a Science teacher I really appreciated the opportunity to expose students to real life science in our local context. Some of them even said they could picture themselves doing that as a career".* Raelene Farrant, Science teacher, Barham High School
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> *"Collaborating with CSU for this project has given Western Murray Land Improvement Group a wonderful opportunity to bring specialists and state of the art equipment to Barham, sharing amazing knowledge and allowing our local school children to take part in some very important learnings. It is vital to be able to provide these events to engage local youth. It sparks curiosity in younger minds and can pave the way for our future environmental scientists and carers, highlighting the fantastic work Universities play and showcasing what students can strive to achieve in their studies whilst nurturing our environment."* Stacey Waylen, WMLIG

Figure 5: Students from Moulamein Public School learning about riverbank plants with Roseanne Farrant (left)

Figure 6: Year 9 students from Barham High School used microscopes to look at aquatic bugs, plants and preserved fish larvae

Figure 7: Students from Barham Public School really enjoyed learning about aquatic bugs and using the microscopes

Update on 2020-21 monitoring

Water quality and ecosystem metabolism

We monitor 18 sites throughout the Edward/Kolety-Wakool river system to inform us about water quality under different flows. Dissolved oxygen and water temperature are monitored continuously at 10 sites by automated loggers. Once per month we also collect water samples (Figure 8) to monitor a range of parameters including nutrients (such as nitrogen and phosphorus that can influence algal growth), dissolved organic carbon (important food source for microscopic animals), turbidity (cloudiness), and electrical

conductivity (saltiness) of the water. Through continuous monitoring of dissolved oxygen at 10 sites we estimate daily ecosystem metabolism, the production of oxygen (photosynthesis) by plants and algae, and consumption of oxygen (respiration) by bacteria and other organisms.

During the environmental watering action in October and November 2020 we recorded a reduction in electrical conductivity (reduced saltiness of the water) and high dissolved oxygen concentrations, which means the water quality was good for fish and other aquatic animals. A small increase in dissolved carbon and nutrients was recorded during the spring flow, providing food for microscopic organisms and a boost for the riverine food web.

Figure 8: Left, Shasha Liu filtering water for analysis. Right, Sam Brouwer measuring water quality

Riverbank and aquatic vegetation monitoring

We monitor riverbank and aquatic vegetation in the Wakool River, Yallakool Creek and Colligen Creek each month. The spring watering action inundated the lower part of the banks of these rivers in December 2020 (Figure 9) and after the water receded we observed seedlings emerging on the recently inundated banks (Figure 10). River red gum and black box trees were in bud and flower and riverbank plants such as *Eleocharis acuta* (common spike rush) were also in flower.

Figure 9: Damp soil on the lower part of the riverbank following inundation from the spring flow (environmental watering action 1) in the Wakool River in October and November 2020. (Photos: Sascha Healy)

Figure 10: Seedlings emerging on recently inundated banks following the spring flow (environmental watering action 1).

Fish monitoring

The life cycle of a fish includes egg, larval, recruitment and adult stages (Figure 11). Fish are most vulnerable and have the highest mortality during the egg and larval stages. Some fish species produce a lot of eggs (between 1000's to millions) that maximises the chance that some individuals will survive to adulthood. Different stages in the lifecycle have different habitat and food requirements. Environmental water is used to support these different stages of the fish life cycle.

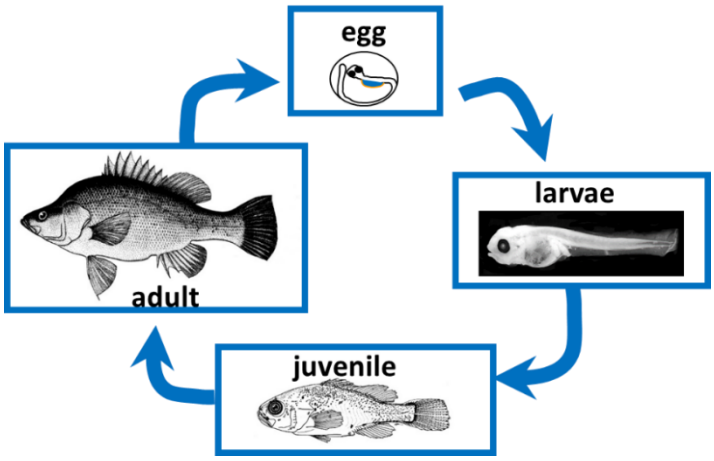

Figure 11: The life cycle of fish

We monitor fish spawning, fish recruitment and adult fish populations in the Edward/Kolety-Wakool system:

- Fish spawning - The presence of eggs or fish larvae are used to evaluate fish spawning. We set light traps (containing glow sticks to attract fish larvae) and drift nets at twenty sites each fortnight during spring and summer to monitor fish spawning. Traps and nets are set at dusk and retrieved in the early morning.
- Recruitment – The presence of young-of-year fish (fish hatched that year) or those hatched in the previous year (1+ fish) are used to evaluate fish recruitment. Boat electrofishing and angling are undertaken at 20 sites once per year in February to monitor recruitment. The growth rings in fish ear bones (otoliths) from a small number of fish are used to evaluate growth rates of Murray cod, silver perch and golden perch. ***The March 2021 newsletter will feature a story on fish recruitment.***
- Adult populations – An annual fish population survey is undertaken at 10 sites in the mid-Wakool River to evaluate the long-term trends in the fish population. All native fish caught by boat electrofishing or fyke netting during the survey are measured, weighed and returned to the water. In 2022 we will undertake a survey at 20 sites throughout the system. These sites have been monitored 7 times since 2009 and this survey will contribute to the long-term dataset.

- A project on fish spawning in the Edward/Kolety River downstream of Stevens Weir is being undertaken in collaboration with the Edward-Wakool Angling Association. These results will be integrated with information on river productivity, vegetation and riverbank condition in the Edward/Kolety River.

More information

To join the newsletter mailing list please subscribe here or contact Professor Robyn Watts, Institute for Land, Water and Society, Charles Sturt University, Albury NSW. rwatts@csu.edu.au

We respectfully acknowledge the Wamba Wamba or Wemba Wemba, and Perrepa Perrepa or Barapa Barapa peoples, traditional owners of the land on which the Edward/Kolety-Wakool program is focussed. We recognise their unique ability to care for Country and their deep spiritual connection to it. We honour Elders past, present and emerging whose knowledge and wisdom has ensured the continuation of culture and traditional practices. The Edward/Kolety-Wakool team would also like to acknowledge the local landholders with whom we work and thank them for their contribution to the monitoring and research.

Watts R.J., Liu X., Healy S., McCasker N., Trethewie J. (2020) Edward/Kolety-Wakool System Environmental Flows Newsletter, Issue 6. Charles Sturt University.