

Edward/Kolety-Wakool system Environmental Flows Newsletter

Issue Number 2 | December 2019
Edward/Kolety-Wakool Monitoring, Evaluation and Research Program



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Welcome to the issue 2 of the Edward/Kolety-Wakool Environmental Flows Newsletter - a quarterly newsletter that will provide updates 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>



Update on monitoring

Hydrology

We use data from flow gauges and information from water accounts to determine the contribution of environmental water to changes in flow and water level in the river system.

The environmental watering actions in the Edward/Kolety-Wakool system in spring and early summer 2019 coincided with the Southern Spring Flow in the Murray River. Environmental water from the Southern Spring Flow was used multiple times along the River Murray all the way from Yarrowonga to the Coorong (see <https://www.environment.gov.au/water/cewo/catchment/southern-spring-flow-2019>). Environmental water returning from Millewa Forest resulted in a flow peak in the Edward/Kolety-Wakool system in late August and a second pulse in late September 2019.



Confluence of Yallakool-Wakool during e-flows on 27 August 2019. Photo by Damian McRae, CEWO.

Water quality

We monitor water quality once per month at 19 sites throughout the river system to inform us about water quality under different flows. We measure nutrients and dissolved organic carbon and use absorbance and fluorescence spectroscopy to characterise the type of organic carbon present in the water. We compare the water quality during environmental watering actions with results from operational flows.

Results from the Long-Term Intervention Monitoring project (2014-2019) showed that none of the environmental watering actions undertaken between 2014 and 2019 had adverse outcomes on water quality. Some of the freshes reconnected river banks and low lying areas and resulted in small increases in organic carbon that had positive outcomes on river productivity (see Edward/Kolety-Wakool 2018-19 LTIM report). Water samples collected between October and December 2019 are being processed to evaluate the outcomes of the Southern Spring Flow in 2019 on the Edward/Kolety-Wakool system.

Ecosystem metabolism

Through continuous monitoring of dissolved oxygen by data loggers installed at 10 sites, we calculate daily production of oxygen (photosynthesis) by plants and algae, and consumption of oxygen (respiration) by bacteria and other organisms.

Results from the Long-Term Intervention Monitoring project (2014-2019) showed that that environmental watering actions had a beneficial effect on the total organic carbon ('fish food') produced per day (see Edward/Kolety-Wakool 2018-19 LTIM report). Across ten environmental watering actions from 2014 to 2019 there was 52% more carbon produced due to the delivery of environmental water compared to operational flows. The results from 2019-20 monitoring are being analysed to determine the effect of the Southern Spring Flow on ecosystem metabolism in the Edward/Kolety-Wakool system.

Riverbank and aquatic vegetation

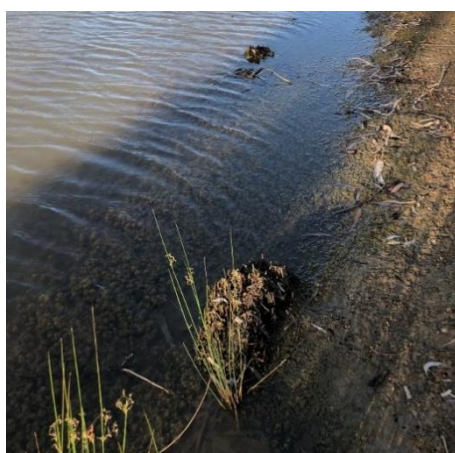
We monitor the cover and species richness of riverbank and aquatic vegetation, which provides food and habitat for aquatic animals and can help to stabilise riverbanks and reduce erosion.

In August and September 2019 during the environmental watering action there was increased flow and increased riverbank inundation. The flows inundated some riverbank vegetation and there was a lot of vegetation emerging in the channel and on the riverbank.

Between October and December 2019 there was little change in water level following the recession of the environmental watering action. Macroalgae (*Chara*) started to appear along the water's edge, water couch was greening up, spike rush (*Eleocharis sp.*) was starting to emerge and milfoil (*Myriophyllum sp*) 'cuttings' were seen taking root along the water's edge at some sites. In November and December 2019 there were only a small number of herbs emerging on the water's edge, possibly due to prolonged periods of no rain.



Macroalgae (*Chara*) emerging along the water's edge after the spring flow
(Photos: Sascha Healy)



Chara partially dried on the bank and thriving in water near Wakool Reserve



Milfoil (*Myriophyllum*) 'cuttings' taking root at the water's edge

Fish

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

- Fish spawning is monitored at twenty sites using light traps and drift nets that are deployed once a fortnight during spring and summer.
- Recruitment of Murray cod, silver perch and golden perch is monitored in February each year to assess the survival of larvae hatched that year (young-of-year) or in the previous year (1+ individuals).
- We monitor fish populations through an annual survey in the mid-Wakool River. We will monitor fish at 20 sites throughout the system in year 3 (2022) of the project. These sites have been monitored 7 times since 2009 and the project will contribute to this long-term dataset.

Between October and December 2019 fish spawning was monitored fortnightly. In late October a small number of Murray cod larvae were detected and numbers of this species increased during November and then reduced in December. This pattern of occurrence was similar to observations during the LTIM (2014-2019) project. In October one river blackfish larva was caught in the upper Wakool River. In September and October several obscure galaxias larvae were caught in Yallakool Creek.



River blackfish larvae (Photo: John Trethewie)



Obscure galaxias larvae (Photo: John Trethewie)

Focus on turtle research

Freshwater turtles have declined by up to 90% in some parts of the Murray-Darling Basin. The decline is largely due to foxes destroying turtle nests. Biologist Dr James Van Dyke, from La Trobe University, says the risk for turtles of wetland drying in winter is dire. "If a hibernating turtle, which is cold-blooded, finds itself in a dried wetland, it is much more vulnerable to predators, especially foxes. The cold turtle simply can't move fast enough to escape". Environmental watering of wetlands in winter may be important to keep turtle habitat flooded while they hibernate.

The research on turtle populations in the Edward/Kolety-Wakool River system commenced in October 2019. The research is a collaboration between La Trobe University, Yarkuwa Indigenous Knowledge Centre, Charles Sturt University and NSW Department of Primary Industries (Fisheries). The project aims to see whether connectivity of wetlands affects turtle distribution, movement, and body condition.

In the first few months of the project the team have caught, measured, and individually marked over 200 of the three local turtle species (*Chelodina expansa*, *Chelodina longicollis*, and *Emydura macquarii*). There were good numbers of turtles caught at wetlands that are almost always flooded, and smaller numbers caught at wetlands that dry out more frequently.

As part of the research an acoustic receiver network has been established in six wetlands and along the Edward/Kolety River. We have put acoustic tags on some turtles to remotely track where they go in different seasons throughout the year, and see if they avoid wetlands that are likely to dry during winter. This summer we have already tracked some turtles leaving a wetland that was drying, so we will be interested to see whether they come back to it again before winter.

Joseph Briggs, Leticia Ross, Tracey Hamilton, and Brandon Cooper from Yarkuwa Indigenous Knowledge Centre in Deniliquin have done most of the fieldwork for the project. Their local knowledge and experience has been fundamental to the project's success. It has also provided them an opportunity to learn some new skills about how to trap, handle and monitor turtle populations and is a great example of how local people can make a significant contribution to research and environmental management projects.



The turtle research team at work (Photo: Leticia Ross)



Measuring the length of a turtle shell (Photo: Graham Stockfeld)

Focus on riverbank and aquatic vegetation monitoring

Riverbank and aquatic vegetation provides food and habitat for aquatic animals and can help to stabilise riverbanks and reduce erosion. Riverbank plant survival and growth is affected by the frequency and duration of inundation. Frequent inundation can delay reproduction, whilst long periods of inundation can reduce growth or survival. Favourable soil moisture and nutrient conditions created on a receding flow can encourage rapid recovery and root and shoot development and many riverbank plants germinate on flood recession.

We have been monitoring riverbank and aquatic vegetation at sixteen sites in the Edward/Kooley-Wakool system since 2014. The monitoring is a collaboration between NSW Department of Planning, Industry and Environment and Charles Sturt University.

The results show that vegetation responds positively to environmental water. Between 2014 and 2019 there was consistently higher species richness at sites that received environmental water compared to sites that received minimal or no environmental water. However, a large unregulated flood in 2016 killed off most of the aquatic vegetation and the system is still recovering from this event.

Environmental water can play an important role in supporting the recovery of riverbank plant communities:

- Using environmental water to slow the rate of recession at the end of a flow pulse helps native water plants to avoid being stranded and drying out.
- The delivery of environmental water in winter can maintain aquatic vegetation and can protect plants from frost damage. This will improve their rate of recovery in spring, but the recovery will be over multiple years.



*Monitoring aquatic vegetation in the Wakool River
(Photos: Robyn Watts)*



*Riverbank vegetation response after an environmental watering action
in Yallakool Creek inundated the riverbank (Photo: Robyn Watts)*

Edward/Kolety community field day, December 2019

As part of the MER program we will organise events and activities to communicate the findings and provide local people an opportunity to be involved in the monitoring and research.

A field day was held on Saturday 14th December 2019 at Werai Forest to give the local community an opportunity to see how monitoring is done, learn about the findings and share their experiences and knowledge. It was a beautiful sunny day and 40 people attended including Indigenous Elders and their families, members of the Edward-Wakool Angling Association and their families, local landholders, and staff from Charles Sturt University, La Trobe University, NSW DPIE, and the Commonwealth Environmental Water Office.

The day went very well and it was great to see everyone enjoying themselves. The turtle research team set a turtle net but unfortunately didn't catch a turtle. The Edward/Kolety fish research team set some drift nets and caught a few fish larvae, and microscopes were available for viewing a selection of fish larvae and bugs. There was lots of great conversations and sharing of ideas and knowledge.

In 2020 other community events are planned for Barham, Wakool and Moulamein, and these will be organised in collaboration with Western Murray Land Improvement Group and other community organisations.



More information

To join the newsletter mailing list please contact Professor Robyn Watts, Institute for Land, Water and Society, Charles Sturt University, Albury NSW. rwatts@csu.edu.au or ilws@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., Van Dyke J., and Healy S. (2019) Edward/Kolety-Wakool System Environmental Flows Newsletter, Issue 2. Charles Sturt University.