

Edward/Kolety-Wakool system Environmental Flows Newsletter

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Edward/Kolety-Wakool Monitoring, Evaluation and Research Program



Juvenile trout cod caught in Yallakool Creek during the 2020-21 fish recruitment survey (See story on page 3) (Photo: John Trethewie)

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Welcome to the issue 7 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 Monitoring, Evaluation and Research (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 January to March 2021

Poor water quality in the upper Wakool River is a recurring issue each summer due to high temperatures and low flows. The normal operational base flow delivered through the Wakool offtake regulator in summer is usually 30 ML/day, and environmental water has regularly been used to increase the flow to 50 ML/day. However, monitoring results over the past five years suggests that 50 ML/day is not enough flow to prevent low DO conditions. Due to evaporation, infiltration and likelihood of landholders pumping during warm weather, the flow is likely to be considerably less than 50 ML/day by the time the water reaches 'Widgee'. Based on previous results the Edward/Kolety-Wakool monitoring team recommended that base flows be increased in the upper Wakool River to improve water quality.

In early to mid-January 2021 the Edward/Kolety-Wakool monitoring and research team observed dark coloured water (Figure 1, left) at sites in the upper Wakool River, from the Wakool offtake regulator to the Wakool Reserve. The dissolved oxygen (DO) concentration measured at 'Widgee' was 4.84 mg/L. Although no fish were observed struggling on the surface of the water, the DO concentration was of concern because values of DO lower than 4.0 mg/L are known to cause stress in fish, and DO below 2.0 mg/L can cause fish death. When DO concentration is less than 5.0 mg/L it is a trigger to consider hypoxic blackwater event management action.

In response to these observations the Commonwealth Environmental Water Holder approved a new watering action to remediate ongoing water quality issues in the Wakool River over summer and into autumn. The action will provide flows from mid-January until the end of May 2021, cycling from 50 ML/d to 100 ML/d over two-week periods with an autumn pulse up to 120 ML/d. The proposed action seeks to provide a proactive, longer-term approach to prevent a potential hypoxic water event, and improve longitudinal connectivity, flow variability, and provide potential refuge.

Following the increase in base flows the water quality immediately improved (Figure 1, right) and DO concentrations increased. Ongoing monitoring will evaluate if the higher base flow is better at maintaining fish, plants and other aquatic species than the previous flow regime.



Figure 1: Left – Blackwater in upper Wakool River in January 2021 (Photo: Sascha Healy). Right – Water quality improved and dissolved oxygen concentrations increased in the upper Wakool River following the environmental watering action to increase base flows. (Photo: John Trethewie)

Focus on juvenile fish recruitment

Every year during late summer and early autumn we undertake a survey of juvenile Murray cod, silver perch and golden perch at 16 sites in the Wakool-Yallakool system (Figure 2). The aim of this survey is to determine how well these species are surviving from their larval stages and to determine their growth rates for comparison with previous years. The survey is undertaken in two parts starting with electrofishing each site using either a backpack unit or small boat depending on the depth of at the site. Silver perch can be evasive when using electrofishing methods, so to target them we return to each site and use setlines and conventional angling using very small hooks and worms for bait.

The focus of this survey is on fish that hatched in the preceding spring spawning season, referred to as young-of-year (YOY) as well as fish that hatched in the spring the year before that are just over one year old (1+). To accurately determine a fish's age, scientists use bony structures from inside the fish's head called otoliths, sometimes referred to as 'ear bones' (Figure 2, middle). Otoliths are composed calcium carbonate and protein, and as the fish grows this material forms translucent and opaque bands that are akin to the rings inside a tree. Counting these rings gives an estimate of the age in days for YOY fish and in years for older fish. By accurately aging fish their growth rate can be compared to other years or regions to inform management of the system.



Figure 2: Juvenile young-of-year Murray cod (left), an otolith with daily growth rings (middle) and a 1+ silver perch (right). (Photos: John Trethewie)

During these surveys we often encounter fish that are not the target species or adults of the target species. This year we caught juvenile trout cod (*Maccullochella macquariensis*) (Figure 3, left) in Yallakool Creek for only the second time since this project began. Other captures of note were river blackfish (*Gadopsis marmoratus*) (Figure 3, middle) in both the Wakool River and Yallakool Creek, and large silver perch (Figure 3, right) in Yallakool Creek.

Results from this year's survey are currently being analysed and will be made available in full in the final technical report for 2020/21.



Figure 3: Juvenile trout cod (left), juvenile river blackfish (middle) and large adult silver perch (right). (Photos: John Trethewie)

Edward/Kolety-Wakool Environmental Water Reference Group – Field visit to Pollack Swamp

In March 2021 a meeting of the Edward/Kolety-Wakool Environmental Water Reference Group was held at the Western Murray Land Improvement Group centre in Barham. The members of the Reference Group include local community members and representatives of local organisations with an interest in the delivery of Commonwealth environmental water in the Edward/Kolety-Wakool River system. The Reference Group is a forum for local knowledge and perspectives to be heard and taken into consideration when planning and implementing Commonwealth environmental watering actions. The group provides an opportunity for community representatives, staff of the Commonwealth Environmental Water Office (CEWO) and NSW Department of Planning, Industry and Environment (DPIE), and scientists to work collaboratively towards the implementation of environmental watering actions and related monitoring and evaluation activities that will benefit the Edward/Kolety-Wakool River system.

At the meeting the group discussed the environmental watering action to increase flows in the upper Wakool River (see story page 2), and preliminary plans for the environmental watering actions in the system from July 2021-June 2022. The group also received an update on the Monitoring, Evaluation and Research (MER) project from Robyn Watts, and updates on other projects planned for the system.

A highlight of the meeting was a field trip to Pollack Swamp (Figure 4, 5) led by Dan Hutton, Roger Knight, Anthony Jones and Tyrone Jones who have been monitoring outcomes of environmental watering in the swamp. The Reference Group visited several sites and heard how water levels have been managed to provide a slow recession to support bird breeding and wetland plants. Commonwealth environmental water has been delivered to the swamp every year since 2018, and 17 to 18 species of bird have been observed breeding in the swamp each year. The group also visited several aboriginal heritage sites and discussed future plans to deliver environmental water to the swamp to improve the ecosystem.



Figure 4: Members of the Edward/Kolety-Wakool Environmental Water Reference Group visiting Pollack Swamp (Photo: Robyn Watts)



Figure 5: Pollack Swamp (Photo: Robyn Watts)

Edward-Wakool Angling Association Citizen Science Project

For the second spring/summer season running the Edward-Wakool Angling Association (EWAA) has undertaken larval fish surveys in partnership with Charles Sturt University (CSU) in the Edward/Kolety River. This community engagement and citizen science project is investigating what species of fish are spawning downstream of Steven's Weir, with a particular interest in improving understanding of golden perch and silver perch spawning in the Edward/Kolety River.

The surveys have been undertaken by EWAA members following training by CSU staff, and have been conducted between the start of October and the end of February during 2019/20 and 2020/21. Each week the EWAA team set nine larval driftnets (Figure 6) in groups of three at three sites around the Eastman Bridge area, preserving samples that are later analysed in CSU's Albury laboratory.



Figure 6: Michael Clarke retrieving drift nets and preserving samples on the Edward/Kolety River. (Photos: Anthony Jones)

Undertaking the work has been a great success for engaging the community in thinking about fish spawning and the health of the Edward/Kolety River.

All the guys that have done the fieldwork on this project have found the experience extremely enjoyable. Being able to visually observe the changes in the river throughout the season has made them think about how the system works and think about other sites that would be interesting to sample. Having the project run over multiple years has been an important factor in getting the community engaged in what is happening in the river over time, and everyone involved can't wait to hear what the results are once they're available. Dan Hutton, EWAA.

In 2019-20 a total of 353 Murray cod larvae, 2 Murray cod eggs and 1 Australian smelt egg were collected from the three study sites during the October to March sampling period. Unfortunately, there was no indication of golden or silver perch spawning in the study reach during the sampling period, as evidenced by the lack of eggs or larvae recorded for these two species. Murray cod larvae appeared in drift nets from 1 Nov 2019 through to 6 Dec 2019.

Golden perch and silver perch are long-lived, large bodied native fish species which are dependent on the presence of suitable hydrological conditions to initiate spawning. Although there were no golden or silver perch eggs or larvae detected in the Edward/Kolety River in 2019-20, further monitoring over a longer period is warranted. Ongoing monitoring and analysis of the pattern of flow delivery and water velocities across multiple years will be able to better inform a discussion about spawning of silver perch and golden perch in the Edward/Kolety River.

The larval samples collected in the 2020/21 season are currently being analysed in the CSU laboratory and the results of the project will be shared once they have been finalised.

Update on aquatic and riverbank vegetation monitoring

Riverbank and aquatic vegetation provide habitat and food for many animals, support river productivity and stabilise riverbanks. We monitor riverbank and aquatic vegetation in the Wakool River, Yallakool Creek and Colligen Creek each month throughout the year.

In the previous newsletter (Issue #6, December 2020) we described how the spring environmental watering action in the Wakool-Yallakool system inundated the lower part of river banks, and after the water receded we observed seedlings emerging on the recently inundated banks. Ongoing monitoring over the summer months showed there was strong growth and survival of riverbank plants in the zone that had been inundated with environmental water in spring (Figure 7). The increased flows and variability provided by environmental water has supported the germination, growth, and survival of riverbank plants in this system.



Figure 7: Left: Plants germinating in damp soil on the riverbank in December 2020. Right: Response of riverbank vegetation following recession of the environmental watering action (Photos: Sascha Healy)

Riverbank vegetation is important to maintain healthy river ecosystems. There are a number of threats that limit the survival and growth of aquatic riverbank vegetation. We regularly see evidence that feral pigs have uprooted aquatic plants to eat the rhizomes (fleshy underground stems of plants) (Figure 8, left). Riverbank vegetation can also be decimated by stock when fencing along riverbanks is not maintained, allowing stock permanent access to the riverbank (Figure 8, right). Complementary programs undertaken by private landholders and Murray Local Land Services will help manage feral animals and protect riparian vegetation.



Figure 8: Examples of some of the risks to riverbank vegetation. Left – pigs uproot plants and consume roots. Right – Grazing of the riverbank by stock that gained access after fences were damaged (Photos: Sascha Healy)

Community Survey

When we are deeply involved with something- rivers, fishing, plants, farming, or whatever- we tend to talk to people who share our passion, and we understand that group well. To know how other people understand or feel about our area of interest we need to go outside of our own group, ask questions, and listen to the answers. One way of reaching and listening to a large number of people is through surveys.

A short, anonymous survey (questionnaire) will be available in May/ June 2021, and it will be open to anyone who lives near or has a connection with the Edward/Kolety-Wakool river system. Catherine Allan and Wendy Minato from Charles Sturt University have developed the survey in consultation with representatives from local community groups to ensure it is useful and doesn't waste anyone's time. The survey will be available online via a link that will be widely available, including through this newsletter, with paper copies available on request.

The survey asks questions about people's understanding of water and how it is managed in the Edward/Kolety-Wakool system, what people value in relation to water, and their opinions on water planning. The results will be made available to water managers, community groups and individuals, to help inform their activities and communication.

For an accurate picture of what the broad community knows and cares about in relation to environmental water we need a lot of people to complete the survey. When the link is available please consider completing the survey yourself and passing the link on to others.

If you want to know more about the survey please contact Catherine Allan at Charles Sturt University, callan@csu.edu.au 02 6051 9781



Figure 9: Riverbank vegetation in Colligen Creek, a distributary of the Edward/Kolety River (Photo: Sascha Healy)

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.

Trethewie J., Watts R.J., Healy S., Allan C. (2021) Edward/Kolety-Wakool System Environmental Flows Newsletter, Issue 7. Charles Sturt University.