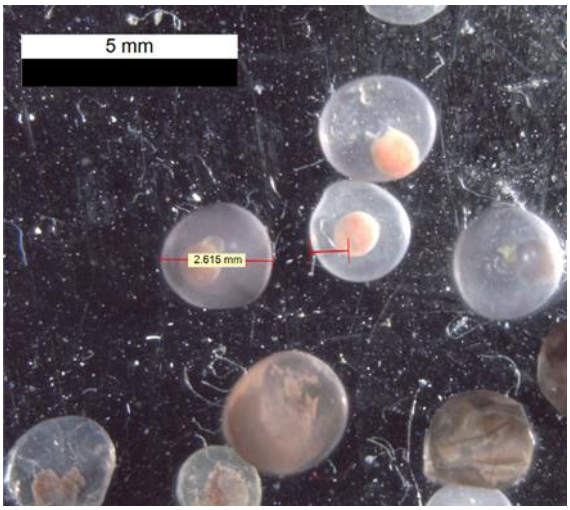
Australian Government
Commonwealth Environmental Water Office

Institute for Land, Water and Society
Charles Sturt University

Long Term Intervention Monitoring Project
Edward-Wakool River System Selected Area
Project Progress Report #16

Reporting period: ***1 April to 30 June 2018 (2017-18 Watering Year)***

Watts R.J., McCasker N., Thiem J.D, Trethewie J., Healy S., McGrath N., Liu X. (2018). Long Term Intervention Monitoring project, Edward-Wakool River System Selected Area, Progress Report number 16, June 2018. Charles Sturt University, Institute for Land, Water and Society. Prepared for the Commonwealth Environmental Water Office.



Silver perch eggs collected from Yallakool Creek (Photo: N. McCasker)

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Summary of progress against monitoring and evaluation activities

This is the 16th progress report for the Edward-Wakool Long-Term Intervention Monitoring (LTIM) and Evaluation Project. This report is a summary of work undertaken between April and June 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 April to June 2018

Activities	Overview of progress from April to June 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 • The water levels on staff gauges were manually recorded once per month where possible
Stream metabolism	• Dissolved oxygen loggers were downloaded in April and May 2018
Carbon & water quality	• Water monitoring was undertaken in April and May 2018. No water quality monitoring is scheduled for June during the winter shutdown
Riverbank and aquatic vegetation	• Monitoring of aquatic and riverbank vegetation was undertaken each month at fixed transects at 16 sites in monitoring zones 1 to 4.
Fish larvae	• No fish larval monitoring undertaken between April and June. Laboratory processing of samples collected between September 2017 and March 2018 has been completed.
Fish recruitment	• Processing of otoliths from young-of-year fish recruits of Murray cod and silver perch has been completed.
Fish community	• Fish community monitoring was undertaken in April and May 2018 in zone 3 only. (Note: Monitoring at sites across the whole Edward-Wakool system will be undertaken in 2019)
Fish movement	• Receivers for the assessment of golden perch and silver perch movement are downloaded four times per year. The final download of data for the 2017-18 water year was undertaken in June 2018.
Evaluation activities	
Annual report	• The draft 2017-18 Edward-Wakool LTIM annual report is due for submission to CEWO on 31st August 2018
Progress reports	• Progress reports submitted quarterly are available on the Edward-Wakool LTIM project website
Monitoring data	• All 2017-18 monitoring data will be uploaded into the CEWO Monitoring Data Management System by October 2018
Communication and engagement	
Environmental Water Reference Group	• No meeting of the EWEWRG was held between April and June 2018.
E-W Operational Advisory Group	• The EWOAG met approximately fortnightly between April and the end of May 2018 prior to system shutdown
Other stakeholder engagement	• Prior to each monitoring trip the LTIM team contacted landholders whose properties are accessed to undertake monitoring • Stakeholder engagement to plan monitoring of the 800 ML/day flow trial was undertaken • April media release on catfish larvae found in the Wakool River http://www.environment.gov.au/water/cewo/media-release/catfish-on-the-prowl • May media release on blackfish found in Yallakool Creek https://www.csu.edu.au/research/ilws/research/sra-sustainable-water/edward-wakool-research-project#horizontalTab9

- 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.

Field monitoring, laboratory work and stakeholder engagement - April to June 2018

Reporting of field monitoring, laboratory work and stakeholder engagement undertaken between April and June 2018 are 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. Hydrology

A winter watering action could not be delivered in winter 2018 due to maintenance being undertaken at Stevens weir. The regulator at Yallakool Creek was closed between 15 May and 28 July 2018, and the offtake regulator at Wakool River was closed between 11 May and 5 August 2018 resulting in a cease to flow throughout the system (Figure 1). The cease to flow in winter 2018 is in contrast to the connectivity created by the 2017 winter environmental watering action in Yallakool Creek between 1 May and 23 August 2017.

Figure 1. Left - Yallakool Creek zone 1 site 1 on 24 May 2018 during cease to flow (Photo: N McGrath).
Right - The same site during the 2017 winter environmental watering action on 8 June 2017 (Photo Sascha Healy).

2. Fish movement

Downloads of the acoustic receivers that are deployed throughout the Edward-Wakool system were completed in February and June 2018. Examination of February data indicated that 24 of the 32 silver perch and 21 of the 27 golden perch fitted with acoustic tags were detected, with a total of 1,221,119 detections from November 2017 to February 2018.

3. Fish spawning

Preliminary results describing the abundance of fish larvae from light traps were presented in progress report 14 and 15. We reported that in 2017 Murray cod spawned in all four LTIM monitoring zones and that larval eel-tailed catfish (*Tandanus tandanus*) were caught in late November and early December 2017 in the Wakool River downstream of the Moulamein road bridge.

In this reporting period we completed laboratory identification of larvae caught in drift nets during monitoring undertaken between September 2017 and March 2018.

Silver perch eggs (Figure 2) were collected for the first time in the Edward-Wakool Selected Area since the LTIM monitoring program commenced in 2014. Silver perch eggs were collected in drift nets deployed in Yallakool Creek on 6 December 2017, providing evidence of a successful silver perch spawning event taking place during a CEWO environmental water action that was ongoing at that time. The presence of silver perch eggs was associated with a rise in discharge from 400 - 500 ML/day during the preceding week in Yallakool Creek, and water temperatures greater than 20°C. The successful spawning of silver perch in the Yallakool Creek under these conditions supports current life history models of silver perch which propose spawning is associated with spring-summer increases in flow coupled water temperatures >18°C.

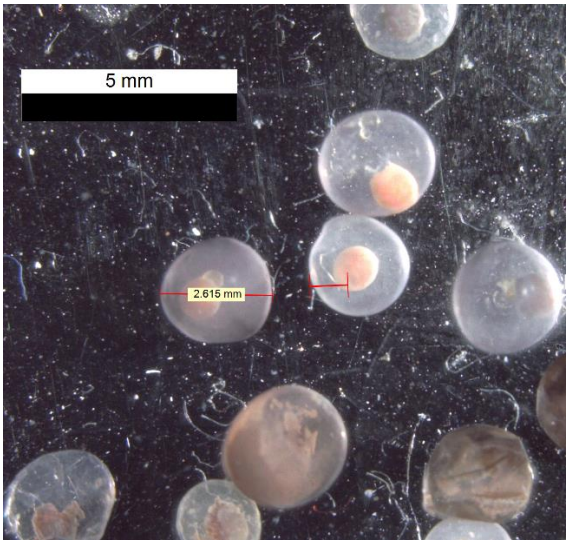

Figure 2: Silver perch eggs collected from drift nets deployed in the Yallakool Creek, 6 December 2017. (Photo: N McCasker)

4. Fish Recruitment

Otoliths were extracted from nine Murray cod and eighteen silver perch and sent to Fish Aging Services for analysis. Initial results show silver perch in either 2+, 3+ or 4+ cohorts. Young of the year Murray cod were between 91 and 114 days old, and one cod was 1+ years. The otoliths have been returned and will be analysed by two independent otolith readers before the results are combined and reported in the 2017-18 annual report.

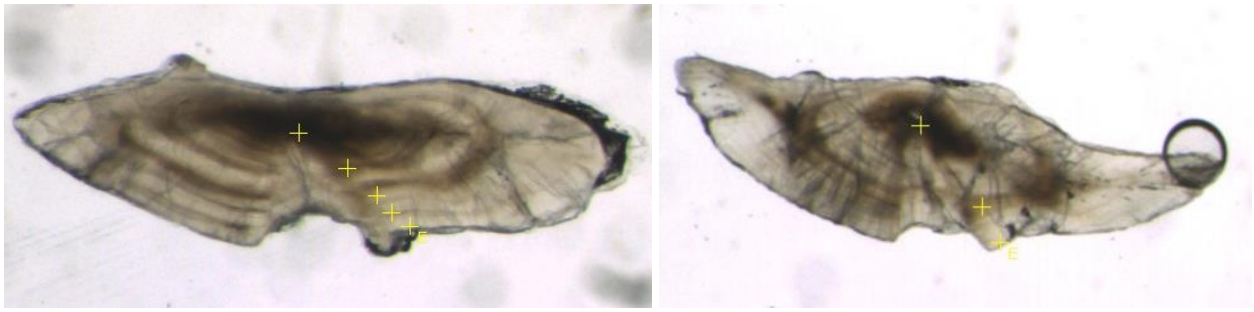

Figure 3. Otoliths of silver perch (left) and Murray cod (right) used for ageing of recruits

5. Fish community sampling

Electrofishing and fyke netting was undertaken in April and May 2018 at ten sites in Zone 3 of the Wakool River. Over 9,000 fish were captured using the combined methods, comprising eight native and 3 alien species (Table 1; Figure 4). Data entry is underway and data analysis will be completed in July 2018 and reported in the 2017-18 Edward-Wakool LTIM annual report. Monitoring in 2017-18 was undertaken in only zone 3 according to the LTIM schedule. Monitoring at sites across the whole Edward-Wakool system will be undertaken in 2019.

Table 1. Summary of fish captured during Category 1 sampling in the Wakool River in 2018.

Common name	Sum of catch
Australian smelt	305
bony herring	151
carp gudgeon	7959
common carp	254
golden perch	38
goldfish	15
mosquitofish	55
Murray cod	21
Murray-Darling rainbowfish	537
silver perch	2
unspecked hardyhead	87
Total	**9424**

Figure 4. Clockwise from top left: golden perch, bony herring, silver perch and Murray cod captured in the Edward-Wakool system in 2018.

6. Riverbank and aquatic vegetation

Monitoring of riverbank and aquatic vegetation continued in April and May 2018. There continued to be very low percent cover of aquatic vegetation, as it is slowly recovering following the flood of 2016.

In April 2018 the water level was receding leaving organic litter on the high water line. This deposition provides substrate, nutrients and seeds to support growth and germination of vegetation on riverbanks. There was some germination of small plants along the water's edge. In May 2018 the water level had receded significantly exposing a lot of the river and creek beds. There was evidence of pig damage in the damp riverbed (Figure 5) as the water level was receding. There were very few emerging herbs on the water's edge and grasses and water couch were browning off at most sites.

Figure 5: Pig damage to a riverbank on private property in zone 3 in May 2018.

7. Stakeholder engagement

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 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 to plan for remote camera setup to monitor the flow trial.

April media release on catfish larvae found in the Wakool River
http://www.environment.gov.au/water/cewo/media-release/catfish-on-the-prowl

May media release on blackfish found in Yallakool Creek
https://www.csu.edu.au/research/ilws/research/sra-sustainable-water/edward-wakool-research-project#horizontalTab9

Planned LTIM activities – July to September 2018

Between July and September 2018 data from the 2017-18 monitoring will be analysed for inclusion in the 2017-18 Edward-Wakool LTIM annual report (draft to be submitted by 31st August 2018).

During July and August the team will finalise preparation for the 800 ML/day flow trial. This will include installation of remote cameras that will take photos at 9am and 3pm each day to document water level on staff gauges and check water levels on low level crossings. Weekly readings of staff gauges and download of the photos will occur during August and September.

Between July and September 2018 the team will continue to monitor aquatic and riverbank vegetation and movement of tagged silver perch and golden perch. Dissolved oxygen loggers will be reinstalled after the operational shutdown period. Fish larval monitoring for 2018-19 will commence in mid-September 2018.

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).

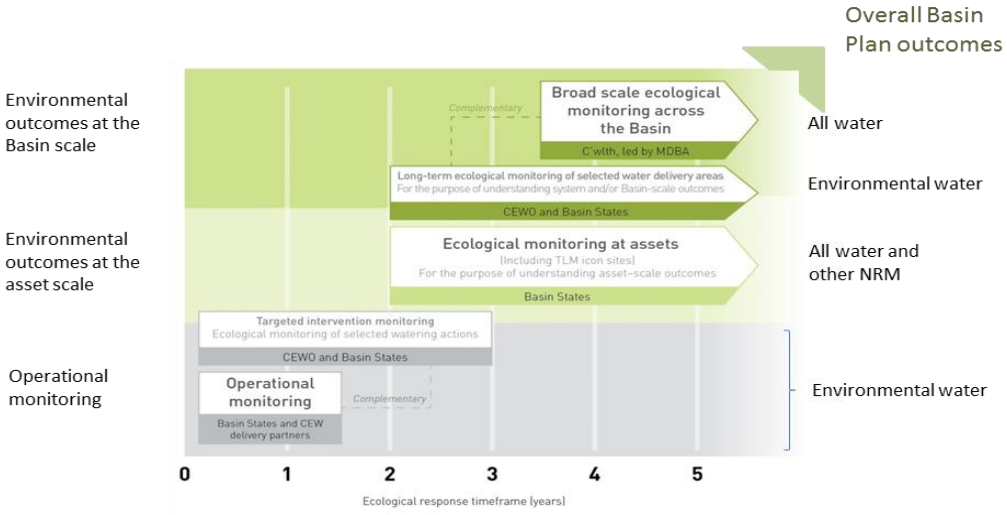

Figure A1. A summary of roles various agencies play a in the reporting on environmental outcomes, consistent with the Basin Plan.

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.

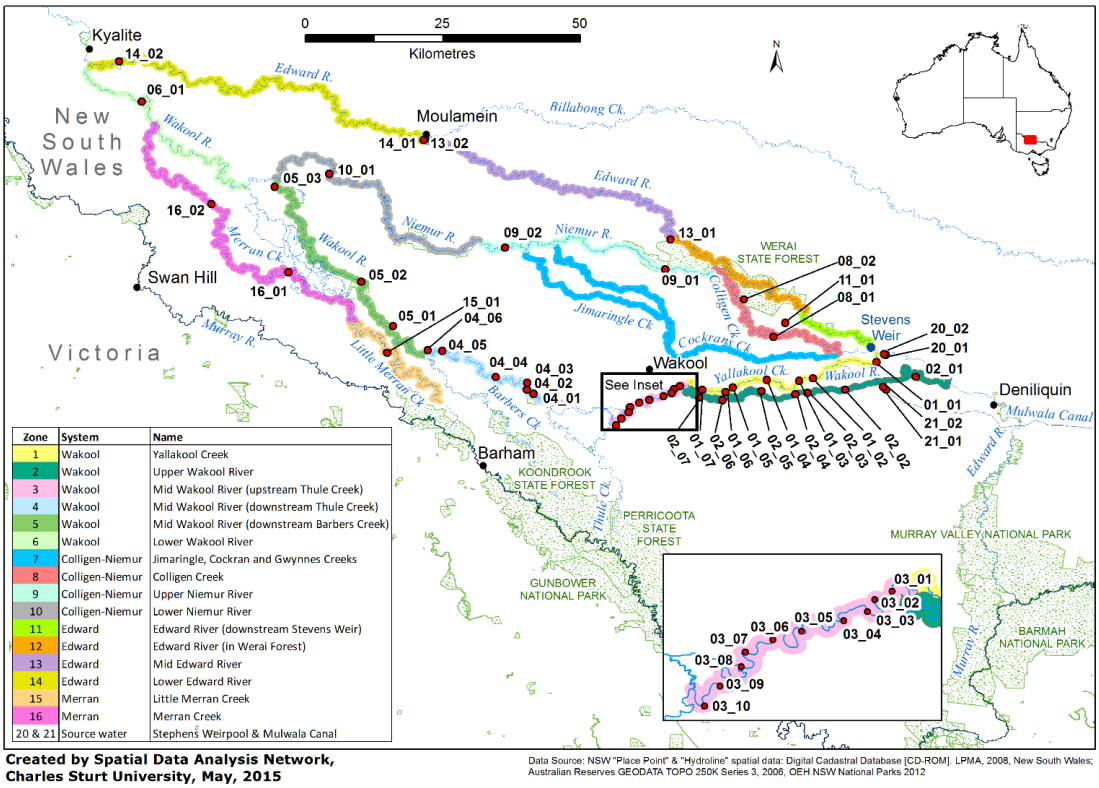

Figure B1. Monitoring sites for the Edward-Wakool Selected Area for the Long-Term Intervention Monitoring (LTIM) Project.

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										