

# Ecosystem responses to Commonwealth environmental watering in the Edward-Wakool system

## Funding

'Long Term Intervention Monitoring Project: Edward-Wakool river system 2014-2019'

Department of the Environment, Commonwealth Environmental Water Holder (\$3.36M)

## Partners

NSW DPI (Fisheries), Murray Local Land Services, NSW Office of Environment and Heritage, Monash University, Griffith University.

## Community Partners

Wakool Rivers Association, Edward-Wakool Angling Association, Colligen and Niemur Alliance Landholder Group, Edward-Wakool Stakeholder Committee

The Edward-Wakool community, including local anglers, landowners, irrigators, and agencies such as the Local Land Services have an essential ongoing role in ensuring the success of Commonwealth environmental water delivery.

## Long Term Intervention Monitoring Project (LTIM Project)

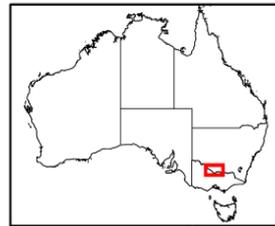
The LTIM Project is the primary means by which the Commonwealth Environmental Water Holder will undertake monitoring and evaluation of the ecological outcomes of Commonwealth environmental watering.

The LTIM Project will be implemented at seven Selected Areas to deliver five high-level outcomes:

1. Evaluate the contribution of Commonwealth environmental watering to the objectives of the MDBA's Environmental Watering Plan
2. Evaluate the ecological outcomes of Commonwealth environmental watering
3. Infer ecological outcomes of Commonwealth environmental watering in areas of the Murray-Darling Basin not monitored
4. Support the adaptive management of Commonwealth environmental water
5. Monitor the ecological response to Commonwealth environmental watering.

## Edward-Wakool system

The Edward-Wakool system one of the seven areas that are the focus of the LTIM Project. It is a large anabranch system of the Murray River and is a complex network of interconnected streams, ephemeral creeks, flood runners and wetlands.



The system has a high native species richness and diversity including threatened and endangered fish, frogs, mammals, and riparian plants.

It is listed as an endangered ecosystem, as part of the aquatic ecological community in the natural drainage system of the lower Murray River catchment' in New South Wales. The area supports a productive agricultural community, has a rich and diverse Indigenous history, and supports recreational uses such as fishing, bird-watching and bush-walking.



The system has been affected by river regulation, migration barriers and degradation of water quality. Water regimes have been significantly altered by river regulation, with changes to the timing and volume of flows affecting water velocities, the availability of in-channel habitat, and ecosystem processes and functions.

Environmental water delivery in the Edward-Wakool system has been used to develop and test concepts for application across the Murray-Darling Basin.

## Environmental watering

Commonwealth environmental watering has been undertaken in this system since 2010.

Environmental water will contribute to baseflows, instream freshes and the recession of natural flows to achieve the following expected outcomes:

1. Increase movement, condition, reproduction and recruitment of native fish
2. Provide end of system flows and increase hydrological connectivity
3. Maintain/improve condition of fringing and emergent/submerged aquatic plants
4. Maintain/improve water quality, particularly dissolved oxygen, salinity and pH
5. Support breeding, recruitment and habitat of other native animals (e.g. frogs).



## Monitoring

A number of related ecosystem components will be monitored as part of the LTIM Project. See website for details on the location of sample sites.

Component	Monitoring
River hydrology	Discharge data from NSW Office of Water website, depth loggers, staff gauges
Hydraulic modelling	Modelling the extent of within channel inundation of geomorphic features under different discharges
Fish reproduction (larvae)	The abundance and diversity of larval fish
Fish recruitment (young of year)	Abundance of young fish (1+ and 2+ fish) and assessment of growth rate using otolith analysis
Fish population survey	Long-term change in the community
Fish movement	Acoustic tracking of tagged fish
Stream metabolism, primary productivity and water quality	Dissolved oxygen and light will be logged. Nutrients and carbon will be monitored.
Riverbank and aquatic vegetation	The composition and cover of riverbank and aquatic vegetation

## Evaluation of responses to watering

Three approaches will be used to evaluate the responses to environmental watering:

1. Comparison of responses between sites receiving environmental water and those not receiving environmental water.
2. A gradient analysis, in which variation in the hydrologic conditions at individual sites are included in a regression model. This model will be used to predict the outcomes of alternative watering scenarios and what would have been expected in the absence of watering.
3. A multiple lines of evidence approach to evaluate competing hypotheses about underlying mechanisms driving or limiting the outcomes from environmental watering.

## Outputs

Outputs from the project will include quarterly progress reports, annual reports, information sheets and a final report. Outputs will be available on the Edward-Wakool LTIM Project website. <http://www.csu.edu.au/research/ilws/research/sra-sustainable-water/edward-wakool-research-project>

## Outcomes

The results from this project will be used to engage the local community in the management of environmental water delivery and will underpin management decisions, including the adaptive management of environmental water.

Reports from previous projects undertaken in the Edward-Wakool system are available on the ILWS Edward-Wakool LTIM Project website. The findings from these projects have already been incorporated into environmental water planning and have improved delivery of environmental water.

## Investigators

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