



Long Term Intervention Monitoring Project Murrumbidgee System Selected Area Project Progress Report #7 Report period: 1 January – 31 March 2016



Yarradda Lagoon, Mid-Murrumbidgee, January 2016

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Further information:

Dr Skye Wassens
School of Environmental Sciences, and Institute for Land, Water and Society
Charles Sturt University, PO Box 789, Albury NSW 2640
Ph: +61 2 6051 9513 Email: swassens@csu.edu.au

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Ecological responses to Commonwealth environmental water in the Murrumbidgee system as of 31 March 2016

This quarterly report outlines key activities undertaken and preliminary outcomes identified during monitoring of ecosystem responses to the use of Commonwealth environmental water in the Murrumbidgee Catchment undertaken as part of the Murrumbidgee Long Term Intervention Monitoring (LTIM) Project between 1 January and 31 March 2016. Monitoring includes assessment of ecological outcomes in the Murrumbidgee River and connected wetlands through the mid-Murrumbidgee and Lowbidgee floodplain wetlands as outlined in [the Murrumbidgee Monitoring and Evaluation Plan](#).

To date in 2015-16 Commonwealth environmental water has been delivered to Yarradda Lagoon, the Yanco Creek system in the mid-Murrumbidgee wetlands, and parts of the Nimmie-Caria, Yanga National Park and Redbank systems and the Junction Wetlands (Appendix 2). The key objectives of these Commonwealth environmental watering actions were to support:

- native riparian, wetland and floodplain vegetation diversity and condition;
- maintain condition and provide reproduction opportunities for fish, waterbirds and other aquatic vertebrate species; and
- hydrological connectivity and water quality.

Preliminary outcomes to 31 March 2016

Routine wetland monitoring activities targeting water quality, microinvertebrates, fish, frogs and tadpoles, and waterbirds were completed at eight of the 12 Murrumbidgee LTIM wetland sites (refer Appendix 1 and 2) that contained water during January and March 2016. Vegetation communities were surveyed at all 12 LTIM wetlands during the same period. Additional monitoring was carried out at Molley's Lagoon in the Yanco Creek system. Sample processing for microinvertebrates, carbon and nutrients and vegetation surveys are underway and many results have now been received. Preliminary observations made during both the January and March 2016 surveys of wetland water quality, fish, frogs and tadpoles and waterbirds are presented here.

Monitoring of riverine fish communities, along with larval fish and ecosystem metabolism commenced in late October 2015. The larval fish component was completed in late December while Category 3 metabolism sampling was completed in March. Category 1 metabolism monitoring will be completed during April 2016.

Water Quality

Many of the core LTIM survey wetlands were drying down in March and as is typical of wetlands during the drying phase, were beginning to show signs of increasing electrical conductivity, higher concentrations of green algae and high turbidity. It is important to note that the algae occurring in the LTIM wetlands is not associated with blue-green algal blooms. High concentrations of algae in the water column may have also contributed to high daytime and low night time dissolved oxygen concentrations. These trends may have been exacerbated by an unusually warm March and are expected to alleviate as temperatures decline and/or additional water is provided in the next water year.

Vegetation

Over 160 plant species have been recorded between September 2015 and March 2016. Frequently recorded species include common spike rush, common sneezeweed, lesser joy weed, nardoo and common watermilfoil. Aquatic vegetation percentage cover was typically higher in January compared to March, but there was a degree of variability between individual wetlands due to difference in wetting and drying regimes. As wetlands dry annual aquatic species typically set seed, while the above ground growth of perennial species such as tall spike rush dies off leaving below ground rhizomes and tubers to persist within the soil until the following year when the wetland refills. The net result of this response is low percentage cover of vegetation and high cover of leaf litter during the wetlands dry phase, as shown in the photos below.



Two Bridges Swamp January 2016



Two Bridges Swamp March 2016

Frogs and tadpoles

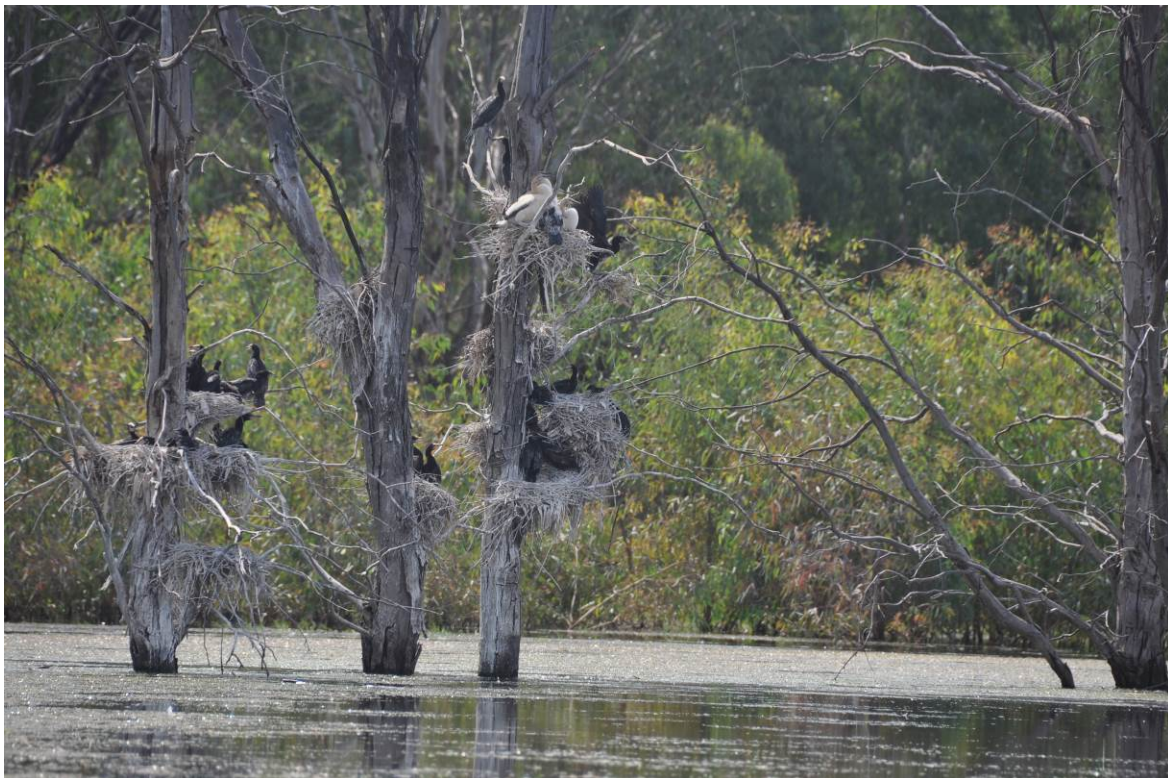
Large numbers of southern bell frogs (*Litoria raniformis*) were heard calling, and observed at Eulimbah Swamp during January and March. During January one adult bell frog was also observed at Waugorah Lagoon, confirming southern bell frogs are present but in low numbers in the Redbank system. Overall, few individuals of other species were heard calling during January or March 2016 surveys reflecting the end of the breeding season for most resident species. Tadpoles were observed across most sites during January but none were observed during March. Adult frogs were found at all sites including several banjo frog (*Limnodynastes interioris*) metamorphs at Molley's Lagoon during January.



An adult southern bell frog (*Litoria raniformis*) at Eulimbah Swamp, March 2016.

Waterbird diversity

As expected with many of the LTIM survey sites drying down over autumn, waterbird diversity and abundance was lower than in previous surveys. Numerous birds were observed at Yarradda during January, including many ducks and fledgling fish-eating waterbirds. Australasian darter (*Anhinga novaehollandiae*) nests were still active at Yarradda Lagoon during March. Complementary OEH and CEWO monitoring of waterbird breeding at Tarwillie Swamp (Yanga National Park) on 23 March has also confirmed successful breeding of eastern great egrets (*Ardea modesta*) in this colony site as a result of Commonwealth and NSW environmental water (this species is listed on the Japan-Australia Migratory Bird Agreement). The nationally endangered Australasian bittern (*Botaurus poiciloptilus*) was heard calling at Eulimbah Swamp (January) and Telephone Creek (March).



Nesting waterbirds, darters and little black cormorants at Yarradda Lagoon, February 2016. Photo J.Dyer (NSW OEH).

Fish (wetlands)

Overall, fewer wetland fish were recaptured than during previous surveys. Native carp gudgeon (*Hypseleotris* spp.) dominated fish abundances. Oriental weatherloach (*Misgurnus anguillicaudatus*) were again found at multiple sites with greater numbers at Two Bridges Swamp, although numbers have fallen since November 2015. Juvenile large-bodied native fish were again seen at Eulimbah Swamp with a golden perch (*Macquaria ambigua*, 75mm) caught during January and a Murray cod (*Maccullochella peelii*, 105mm) caught during March. Murray rainbowfish (*Melanotaenia fluviatilis*) were seen in increasing numbers at Waugorah and Yarradda Lagoons, but were particularly abundant at Molley's Lagoon during January.



Murray cod (*Maccullochella peelii*) at Eulimbah Swamp, March 2016.

Fish (River)

Category 1 and 3 larval fish sample processing is complete. A total of nine species of larvae or eggs were captured comprising eight native species (Australian smelt, bony herring, carp gudgeon, flatheaded gudgeon, golden perch, Murray cod, Murray-Darling rainbowfish and silver perch) and one alien species (common carp). Data entry is currently being finalised and data analysis will begin shortly.



Six day old silver perch (top) and golden perch (bottom) larvae hatched from eggs collected at Yarradda on the Murrumbidgee River in late October 2015.

Category 1 fish community sampling was undertaken in March and April 2016 comprising boat-electrofishing and small fyke nets at each of the 10 sites. A total of 10 species of fish were captured including seven native species (Australian smelt, bony herring, carp gudgeon, golden perch, Murray cod, Murray-Darling rainbowfish and un-specked hardyhead) and three alien species (common carp, goldfish and eastern gambusia). One hundred bony herring were retained for annual age determination as a replacement for small bodied fish as per modifications to the standard methods. Data entry is currently underway.



Examples of native fish captured in 2016 on the Murrumbidgee River including a) Murray-Darling rainbowfish and, b) a young-of year Murray cod.

Appendix 1 Summary of monitoring activities undertaken during January and March 2016 as part of the Monitoring and evaluating ecological responses to Commonwealth environmental water use in the Murrumbidgee River Valley. J = sampled in January, M = sampled in March.

Zone	Site name	Status (March)	Water Quality	Microinvertebrates Chlorophyll A	Carbon Nutrients	Ecosystem metabolism	Larval fish	Tadpoles, fish and turtles	Frogs	Waterbirds	Vegetation	Depth logger	Temperature logger	
mid-Murrumbidgee	Gooragool	Almost dry	J/M	J/M	J/M			J	J/M	J/M	J/M	J/M	J/M	
	Mckennas	Dry										J/M	J/M	
	Sunshower	Dry										J/M	J/M	
	Yarradda	1.8m	J/M	J/M	J/M			J/M	J/M	J/M	J/M	J/M	J/M	J/M
	Molley's	Almost dry	J/M	J/M	J/M			J	J	J	J/M	N/A	N/A	
	Yellow Clay Creek	Dry												
South Redbank	Mercedes	Dry										J/M	J/M	J
	Two Bridges	Low	J/M	J/M	J/M			J/M	J/M	J/M	J/M	J/M	J/M	J/M
	Piggery Lake	Dry							J	J	J/M	J/M	J/M	J/M
	Waugorah Lagoon	Low	J/M	J/M	J/M			J/M	J/M	J/M	J/M	J/M	J/M	J/M
Nimmie-Caira	Nap Nap	Dry										J/M	J/M	
	Avalon	Low	J/M	J/M	J/M			J/M	J/M	J/M	J/M	J/M	J/M	J/M
	Telephone	Moderate	J/M	J/M	J/M			J/M	J/M	J/M	J/M	J/M	J/M	J/M
	Eulimbah	Moderate	J/M	J/M	J/M			J/M	J/M	J/M	J/M	J/M	J/M	J/M
River sites	Mckennas (Carrathool zone)		Commenced October 2015			✓	Completed December 2015							
	Bringagee (Carrathool zone)													
	Yarradda (Carrathool zone)													
	Narrandera (Narrandera zone)					*								
	Euroley (Narrandera zone)													
	Dairy (Narrandera zone)													

*Narrandera zone Category 3 metabolism completed during January 2016

Appendix 2

About the Murrumbidgee Long-Term Intervention Monitoring Project (LTIM Project)

The Long Term Intervention Monitoring (LTIM) Project for the Murrumbidgee River system is funded by the Commonwealth Environmental Water Holder (\$3.7M 2014-2019) and is being delivered as a collaborative partnership led by Charles Sturt University (Institute for Land, Water and Society) with NSW Department of Primary Industries (Fisheries), University of NSW, NSW Office of Environment and Heritage, and Riverina Local Land Services.

The Murrumbidgee LTIM Project is designed to provide a robust framework to evaluate the ecological outcomes of Commonwealth environmental water within wetland and river systems downstream of Narrandera, NSW. Monitoring activities target multiple taxonomic groups and ecological processes with a focus on indicators of high ecological and community significance, such as large bodied native fish, waterbirds, and endangered species.

Monitoring activities within wetlands are focused on the responses of fish, frogs, tadpoles, turtles, microcrustacea (a component of the zooplankton), waterbirds, vegetation, along with the changes in water quality, carbon and nutrients associated with black water and algal bloom risks, and hydrology measured before, during and after environmental watering. The riverine component includes intensive monitoring of native fish breeding and fish community responses to environmental watering actions, along with microcrustacea, stream metabolism (stream productivity) and water quality associated with black water and algal bloom risks, and hydrology.

The Murrumbidgee LTIM Project is being undertaken across three key ecological regions within the Murrumbidgee, the mid and lower Murrumbidgee River channel and adjacent mid-Murrumbidgee wetlands between Narrandera and Hay, and the Lowbidgee floodplain downstream of Maude, that is further divided into separate monitoring “zones” representing areas with common ecological and hydrological attributes.

The framework includes 12 fixed monitoring sites across three key wetland types, oxbow lagoons of the Mid-Murrumbidgee, lignum-black box wetlands through the Nimmie-Caira system and river red Gum-spike rush wetlands through the Redbank systems and six fixed sites across the mid and lower the Murrumbidgee River channel. Copies of the Murrumbidgee Monitoring and Evaluation plan are available at:

<http://www.environment.gov.au/system/files/resources/bc51ee00-ac5f-4e65-910d38f23416823e/files/murrumbidgee-me-plan.pdf>

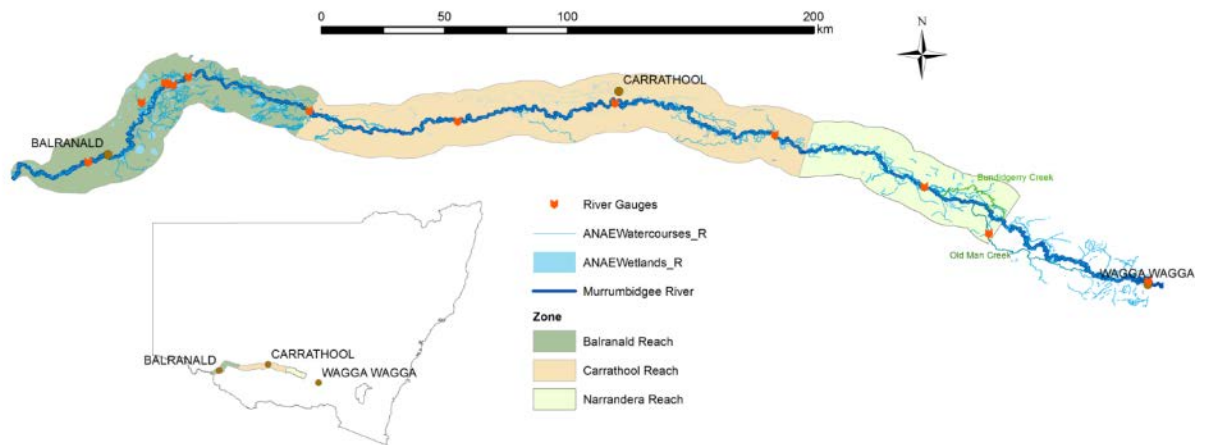


Figure 2 Distribution of riverine zones in the Murrumbidgee Selected Area.

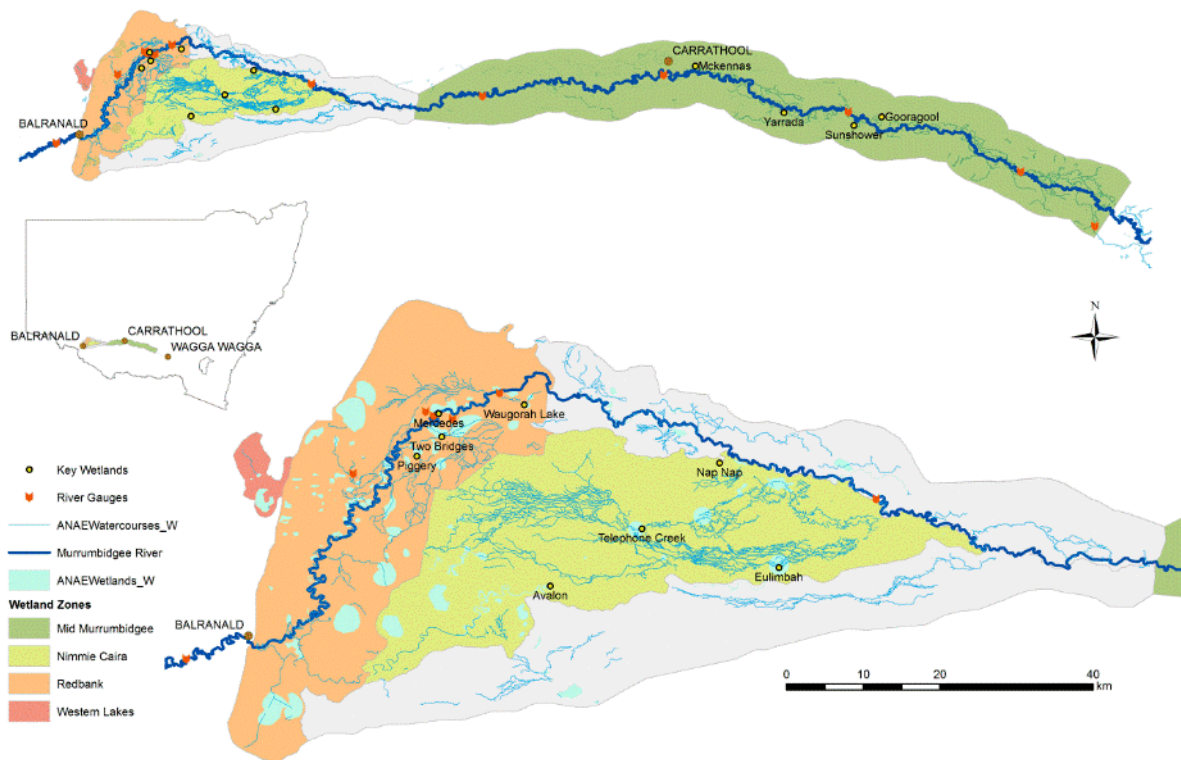


Figure 3 Distribution of wetland zones in the Murrumbidgee Selected Area and locations of key wetlands.