

## Long Term Intervention Monitoring Project Murrumbidgee System Selected Area Project Progress Report #20 Report period: 1 April – 30 June 2019



Peron's tree frog, January 2019

Bourke, G., Michael. D., Spencer, J., Amos, C. and Wassens, S. (2019). Long Term Intervention Monitoring Project, Murrumbidgee System Selected Area, Progress Report number 20, June 2019. Charles Sturt University, Institute for Land, Water and Society. Prepared for the Commonwealth Environmental Water Office.

#### 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](mailto:swassens@csu.edu.au)

#### Copyright

© Copyright Commonwealth of Australia, 2018



Long term intervention monitoring project, Murrumbidgee River System Selected Area, Progress Report number 20, June 2019' is licensed by the Commonwealth of Australia for use under a Creative Commons By Attribution 3.0 Australia licence with the exception of the Coat of Arms of the Commonwealth of Australia, the logo of the agency responsible for publishing the report, content supplied by third parties, and any images depicting people. For licence conditions see: <http://creativecommons.org/licenses/by/3.0/au/>

#### Disclaimer

The views and opinions expressed in this publication are those of the authors and do not necessarily reflect those of the Australian Government or the Minister for the Environment. While reasonable efforts have been made to ensure that the contents of this publication are factually correct, the Commonwealth does not accept responsibility for the accuracy or completeness of the contents, and shall not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance on, the contents of this publication.

## **Ecological responses to Commonwealth environmental water in the Murrumbidgee system as of 30 June 2019**

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 April and 30 June 2019. 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](#).

As monitoring activities were largely completed by 1 April 2019 this report presents a summary of key ecological outcomes of watering actions undertaken for the entire 2018-19 water year. More information on ecological outcomes from environmental watering actions undertaken in the Murrumbidgee can be found in the annual evaluation report which will be available to the public later in the year, for more information go to <http://www.environment.gov.au/water/cewo/catchment/murrumbidgee/monitoring>

### **Watering highlights for 2018 - 19**

In 2018-19 the Lowbidgee floodplain received Commonwealth environmental water from two watering actions. Redbank wetlands (Two Bridges and Piggery Lake) received water as part of the Tala and Yanga Lakes flow in September. Nap Nap Swamp held residual water from the 2018 Autumn Refuge Flow and received additional water in November as part of the Nap Nap to Waugorah watering action (NSW environmental water). There was limited environmental watering activity across mid-Murrumbidgee wetlands, and the majority of sites remained dry throughout the 2018-19 water year. Yarradda Lagoon was allowed to dry down to remove large carp before pumping commenced in mid-November 2018. The main objective of this watering action was to maintain important refuge habitat for wetland dependant species, including the southern bell frog, and importantly to maintain vegetation resilience and condition gained through Commonwealth environmental water delivery in 2014-15, 2015-16, natural flooding during winter-spring 2016, and delivery of environmental water again in 2017-18.

Routine wetland monitoring activities targeting water quality, microinvertebrates, fish, turtles, frogs and tadpoles, and waterbirds were completed at the 12 Murrumbidgee LTIM wetland sites (refer Appendix 1 and 2) on four occasions - September 2018, November 2018, January 2019 and March 2019. Indicators were only monitored where there was sufficient water to do so (see Appendix 1).

Monitoring of water quality, stream metabolism, primary productivity, microinvertebrates and larval fish occurred in the mid-reaches of the Murrumbidgee River between Narrandera and Carrathool between October 2018 and January 2019, with loggers measuring dissolved oxygen levels in the river deployed until the end of April 2019.

### *Vegetation Communities*

Five key watering actions in 2018-19 influenced the hydrology of nine of the 12 monitored wetlands. Overall, Commonwealth environmental water contributed to a significant increase in the number of water dependent and native plant species, while contributing to a decrease in species richness of exotic and terrestrial species.

Outcomes varied between individual wetlands. Species richness of water dependant and native species was higher in wetlands receiving Commonwealth environmental water compared to, and following on from, 2017-18 where monitored wetlands in the Nimmie-Caira and Redbank were largely dry during the monitoring period. In the Redbank system, wetlands that had undergone a short dry period quickly re-established water dependent communities following Commonwealth environmental watering with little change in community composition.



Burr-daisy at Piggery Lake, November 2018

### *Frogs and tadpoles*

Overall, watering actions during 2018-19 contributed to the persistence of frog populations across the LTIM wetland monitoring sites, with six frog species recorded. The most commonly recorded species were spotted and barking marsh frogs (*Limnodynastes tasmaniensis* & *Limnodynastes fletcheri*) and tree frogs (*Litoria peronii*), which were heard calling and observed throughout the survey area.

Highlights include the continued presence of southern bell frogs (*Litoria raniformis*) at wetland sites in south Redbank. Last year was the first time southern bell frogs have been recorded in this area since 2013. Adult frogs were recorded calling at both Two Bridges and Piggery Lake in January and March 2019 following the delivery of Commonwealth environmental water from the Tala and Yanga Lakes flow. At Nimmie-Caria, southern bell frogs were observed in particularly high numbers at Nap Nap Swamp during both January and March monitoring. Adult frogs were also heard calling or observed at Eulimbah Swamp and Telephone Creek in Nimmie-Caria.

Tadpoles were captured in moderate numbers during November and January. Spotted and barking marsh tadpoles (*Limnodynastes* species) were the most widely observed tadpole species, recorded at six wetland sites across all three monitoring zones. Notably, 758 early stage *Limnodynastes* tadpoles were captured at Two Bridges in March 2019. Giant banjo (*Limnodynastes interioris*) tadpoles were captured at four sites, mostly at Nap Nap Swamp (143), and Two Bridges (88).



Dark coloured southern bell frog at Nap Nap Swamp, March 2019

### *Waterbird diversity*

There were four watering actions in 2018-19 which provided outcomes for waterbirds in the LTIM monitored wetlands. Three of these watering actions were focused on the Redbank and Nimmie-Caria zones between September 2018 and May 2019. The aim of these watering events was to benefit large bodied native fish species and to support the habitat requirements of other water-dependent species including waterbirds, frogs and turtles. The fourth watering action focused on Yarradda Lagoon in the mid-Murrumbidgee zone from November 2018 to January 2019 which was inundated to support wetland vegetation outcomes.

Bimonthly ground surveys were completed between September 2018 and March 2019 to assess waterbird species richness, maximum abundance and breeding activity at the 12 LTIM wetland survey sites. The number of waterbird species reached a five year peak in the 2016-17 water year (48 species in total) in response to widespread natural flooding in each wetland zone in spring 2016. The number of waterbird species observed in the 2018-19 water year was lower (40 species in total) in response to much less total inundated habitat being available. Seven species of conservation significance were detected during the LTIM and complementary OEH surveys in 2018-19; this included the endangered Australasian Bittern (Commonwealth *Environmental Protection and Biodiversity Act 1999* (EPBC) and NSW *Biodiversity Conservation Act 2016* (BC Act), vulnerable magpie goose, freckled duck and white-bellied sea-eagle (NSW BC Act). Four species listed under international migratory bird agreements Australia has signed with Japan (JAMBA), China (CAMBA) and the Republic of Korea (RoKAMBA) were also detected: Caspian tern (JAMBA only), marsh sandpiper, red-necked stint and sharp-tailed sandpiper (JAMBA, CAMBA and RoKAMBA).

Waterbird breeding activity was limited in the Murrumbidgee Selected Area in 2018-19. Thirteen waterbird species were confirmed breeding during the LTIM quarterly wetland surveys and complementary OEH surveys.

### *Fish and turtles (wetlands)*

Three watering actions with outcomes affecting wetland fish communities in LTIM-monitored wetlands occurred in the 2018-2019 water year. Commonwealth environmental water flows targeting the Tala and Yanga Lake systems delivered water to south Redbank wetlands, and Nap Nap Swamp and Waugorah Lagoon also received water. Watering activity in the mid-Murrumbidgee was limited to the pumping of Yarradda Lagoon in mid-November. As expected in the hot and dry conditions 2018-2019 wetland fish captures remained low, similar to those in 2017-2018. Wetland fish captures were dominated by introduced European carp (*Cyprinus carpio* – 2273 individuals), and native carp gudgeon (*Hypseleotris* spp. – 1536 individuals). The next most common native species were bony bream (*Nematalosa erebi*) and flathead gudgeon (*Philypnodon grandiceps*). One small silver perch (*Bidyanus bidyanus*) was captured at Yarradda Lagoon during the January survey, and two juvenile Murray cod (*Maccullochella peelii*) were captured at Avalon Dam in March 2019.



Bringing in fyke nets at Waugorah Lagoon, November 2018

Although conditions were drier than in previous LTIM monitoring years, watering actions in 2018-2019 contributed to areas of persistent water at Two Bridges, Piggery Lake, Telephone Creek and Waugorah Lagoon. Eighty five turtles were recorded at eight monitoring sites across all three zones during the 2018-2019 surveys. Eastern long-necked turtles (*Chelodina longicollis*) were the most frequently recorded species (73), captured on all four monitoring occasions. Macquarie River turtles (*Emydura macquarii*) were recorded

at Yarradda Lagoon and Waugorah Lagoon and broad-shelled turtles (*Chelodina expansa*) were the least commonly detected species, recorded only at Waugorah Lagoon. As in previous years species diversity was highest at Waugorah Lagoon where all three species were detected. A notably high number of eastern long-necked turtles were recorded from Two Bridges during the March 2019 surveys when 40 individuals were captured from two large fyke nets. The highest number previously captured at Two Bridges was ten long-necked turtles in November 2015.

### **Water quality**

Water quality measurements collected from wetland sites in 2018-19 were largely consistent with data collected during the previous five years and remained within the upper and lower ranges of pre-2014 measurements. Sampling included measurements of temperature (°C), electrical conductivity (EC,  $\mu\text{S}/\text{cm}$ ), turbidity (NTU), pH and dissolved oxygen (mg/L) at three randomly-chosen locations at each wetland site. Duplicate water samples were also collected and later analysed for dissolved organic carbon (DOC), chlorophyll-a, total nitrogen (TN) and total phosphorus (TP). Overall, watering actions in 2018-19 contributed to maintaining natural fluctuations in water quality and nutrients at all monitored wetlands in the Murrumbidgee catchment.



Monitoring water quality near Maude

## Appendix 1

Summary of monitoring activities undertaken during January (J) and March (M) 2019 as part of the Monitoring and evaluating ecological responses to Commonwealth environmental water use in the Murrumbidgee River Valley

Zone	Site name	Estimated Status (March)	Water Quality	Microinvertebrates Chlorophyll A	Carbon Nutrients	Ecosystem metabolism	Larval fish	Riverine fish	Tadpoles, fish and turtles	Frogs	Waterbirds	Vegetation
mid-Murrumbidgee	Gooragool	Dry	-	-	-				-	-	J/M	J/M
	Mckennas	Dry	-	-	-				-	-	J/M	J/M
	Sunshower	Dry	-	-	-				-	-	J/M	J/M
	Yarradda	½ full	J/M	J/M	J/M				J/M	J/M	J/M	
South Redbank	Mercedes	Dry	-	-	-				-	J/M	J/M	J/M
	Two Bridges	¾ full	J/M	J/M	J/M				J/M	J/M	J/M	
	Piggery Lake	¾ full	J/M	J/M	J/M				J/M	J/M	J/M	
	Waugorah Lagoon	Channel only	J/M	J/M	J/M				J/M	J/M	J/M	
Nimmie-Caira	Nap Nap	Low	J	J	J				J	J/M	J/M	
	Avalon	Dam-only	J/M	J/M	J/M				M	J/M	J/M	
	Telephone	Low	J/M	J/M	J/M				J/M	J/M	J/M	
	Eulimbah	Dry	M	-	-				-	J/M	J/M	
River sites	Mckennas (Carrathool zone)	Complete: October-December 2018							Compl. (Apr19)	Complete: October-December 2018	Mar/Apr	
	Bringagee (Carrathool zone)											
	Yarradda (Carrathool zone)											
	Narrandera ( Narrandera zone)					Compl. (Dec18)						
	Euroley ( Narrandera zone)											
	Dairy ( Narrandera zone)											



## *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>

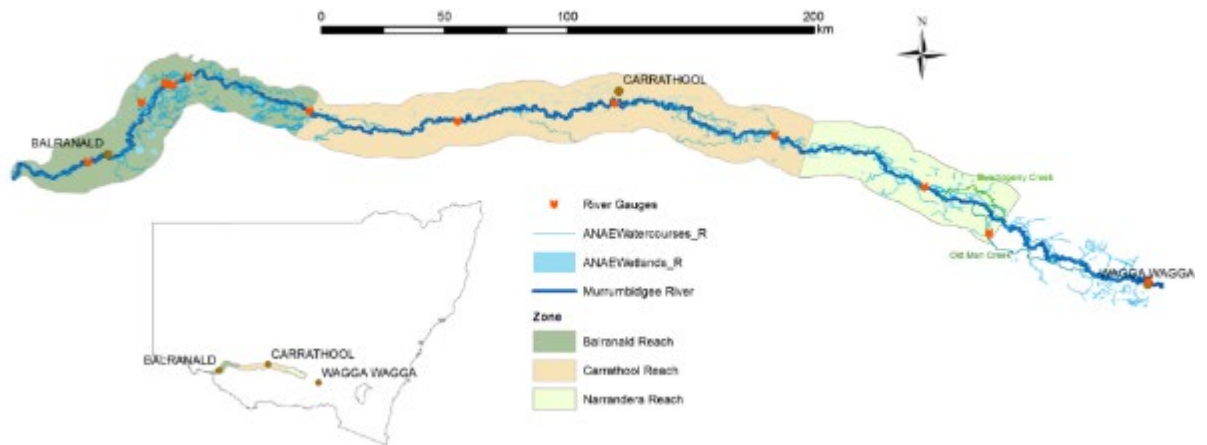


Figure 2 Distribution of riverine zones in the Murrumbidgee Selected Area.

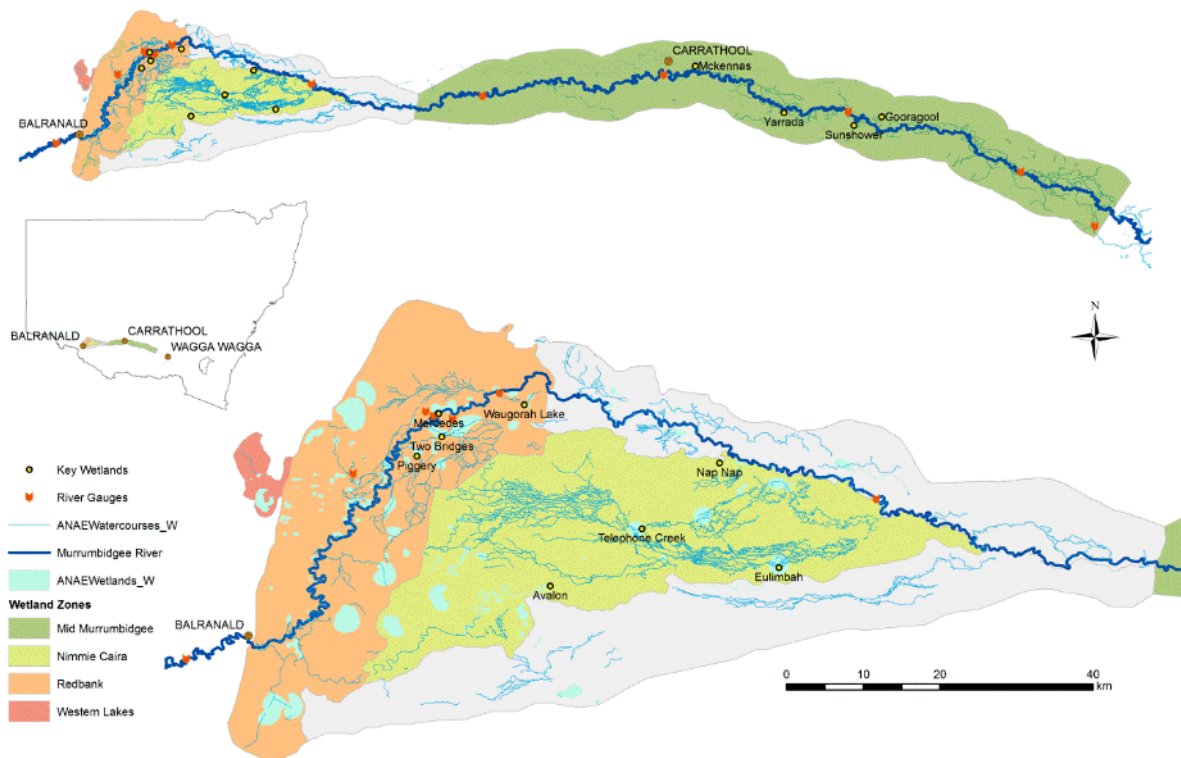


Figure 3 Distribution of wetland zones in the Murrumbidgee Selected Area and locations of key wetlands.