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Commonwealth Environmental Water Office

Institute for Land, Water and Society
Charles Sturt University

Long Term Intervention Monitoring Project Murrumbidgee System
Selected Area Project Progress Report #16
Report period: 1 April – 30 June 2018

Checking nets for fish, January 2018

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Ecological responses to Commonwealth environmental water in the Murrumbidgee system as of 30 June 2018

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 2018. 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 2018 this report presents a summary of key ecological outcomes of watering actions undertaken for the entire 2017-18 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 2017 - 2018

In 2017-18 the largest volume of Commonwealth environmental water was delivered to produce a peak water level capable of connecting low lying wetlands in the mid-Murrumbidgee. There was limited environmental watering activity across Lowbidgee floodplain, and the majority of sites either contained residual water from unregulated flows and watering actions undertaken in 2016-17, or were dry. There was a small unregulated flow into Mercedes Swamp in the Redbank zone due to high water levels in the adjacent weir pool.

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 2017, November 2017, January 2018 and March 2018. 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 2017 and January 2018, with loggers measuring dissolved oxygen levels in the river deployed until the end of April 2018.

Vegetation Communities

Key watering actions in 2017-18 connected wetlands in the mid-Murrumbidgee to the main river channel, contributing to increases in the number of aquatic species identified at three of the four wetlands monitored in the mid-Murrumbidgee. Environmental watering contributed to the establishment of spiny mud grass (*Pseudoraphis spinescens*) and common spike rush (*Eleocharis acuta*) at Yarradda and Gooragool lagoons and two fringing species lesser joyweed (*Alternanthera denticulata*) and the culturally significant old man weed (*Centipeda cunninghamii*) which were identified at all four of the monitored wetlands in the mid-Murrumbidgee. Wetland connectivity may also have contributed to the dispersal and subsequent establishment of two new aquatic species (common water milfoil *Myriophyllum papillosum* and floating pondweed *Potamogeton tricarinatus*) at McKenna's and Sunshower Lagoons. Curly pondweed *(P. crispus*) was also identified at Sunshower for the first time. Aside from inundation by unregulated flows in 2016-17, this is the first delivery of Commonwealth environmental water to these two wetlands since 2012.

While the wetlands in the mid-Murrumbidgee received Commonwealth environmental water, in the Nimmie-Caria and Redbank 2017-18 was the driest year since monitoring began in 2014, with only one wetland receiving water during the monitoring period (September – March), which occurred due to an unregulated weir flow. Allowing for an occasional short drying period can have a positive impact on vegetation communities in some seasonally inundated wetlands, and may contribute to greater diversity and improved water quality in 2018-19.

McKennas Lagoon, November 2017

Sunshower Lagoon, January 2018

Frogs and tadpoles

Overall, watering actions during 2017-2018 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 continuing presence of southern bell frogs at Yarradda Lagoon, adults were heard calling from September 2017 and both adults and tadpoles were subsequently captured during November and January monitoring. Southern bell frogs were also recorded from all Nimmie-Caria wetland monitoring sites, and were heard calling at Mercedes Swamp in January 2018. This is the first detection of southern bell frogs in south Redbank, outside of Wagourah Lagoon, since 2013, possibly in response to the inadvertent inundation of Mercedes Swamp by high water levels in Redbank Weir during December 2017.

Tadpoles were captured in fairly low numbers during November (607 individuals- six sites) and had dropped away by January 2018. Notably, 226 giant banjo (*Limnodynastes interioris*) tadpoles were captured at Mercedes Swamp, the only wetland monitoring site where this tadpole species was recorded. Peron's tree (*Litoria peroni*) tadpoles were the most abundant species (259 individuals from three sites), particularly at McKenna;s Lagoon (202). Spotted and barking marsh tadpoles (*Limnodynastes* species) were also recorded at five wetland sites across all three monitoring zones.

Peron's tree frog, January 2018

Waterbird diversity

There were five watering actions in targeted waterbird habitat in the Murrumbidgee Selected Area in 2017-18. Bimonthly ground surveys were completed between September 2017 and March 2018 to assess waterbird species richness, maximum abundance and breeding activity at the 12 LTIM wetland survey sites. Over the four years of surveys from 2014-18, the total number of waterbird species peaked 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 2017-18 water year was comparatively low (33 species in total) in response to reduced habitat availability. The total number of waterbird species in each wetland zone declined between survey periods with sites drawing down in each of the wetland zones over the 2017-18 water year. Four species of conservation significance were detected in 2017-18; this included the vulnerable White-bellied Sea-Eagle and freckled duck *Stictonetta naevosa* (NSW Biodiversity Conservation (BC) Act 2016), the endangered Australasian Bittern (Commonwealth Environmental Protection and Biodiversity (EPBC) Act 1999 and NSW BC Act), and the migratory Latham's Snipe (listed under international migratory bird agreements Australia has signed with Japan (JAMBA) and the Republic of Korea (RoKAMBA). Nine waterbird species were confirmed breeding during the LTIM and complementary OEH surveys in 2017-18. This included small numbers of nesting Great Cormorant, Australasian Darter, Little Black Cormorant, Little Pied Cormorant, Yellow-billed Spoonbill, Pacific Black Duck, Grey Teal, Black-tailed Native Hen and Black Swan. A pair of White-bellied Sea-Eagle were also suspected to be nesting in Nap Nap swamp in September 2017.

Latham's Snipe were detected at McKenna's Lagoon in the September 2017 surveys. This species breeds in Japan and the East Asian mainland, and spends its non-breeding season in freshwater wetlands in south-eastern Australia.

Fish and turtles (wetlands)

Four watering actions with outcomes affecting wetland fish communities in LTIM-monitored wetlands occurred in the 2017-2018 water year. Commonwealth environmental water flows targeted the mid-Murrumbidgee wetlands, with limited watering activity in the Redbank and Nimmie-Caria zones. As expected in the relatively dry conditions 2017-2018 wetland fish captures were lower than in previous monitoring years. Wetland fish captures were dominated by native carp gudgeon (*Hypseleotris spp.*) and introduced European carp (*Cyprinus carpio*). Although fewer native carp gudgeon were captured in 2017-2018 relative to the three previous LTIM monitoring years, fewer introduced European carp and eastern gambusia were also recorded. The next most common native species were bony herring and smelt. One large golden perch (*Macquaria ambigua*) was captured at Gooragool Lagoon during the September survey, and one redfin perch (*Perca fluviatilis*) was captured (also at Gooragool Lagoon) during January 2018.

Although conditions were drier than in previous LTIM monitoring years, watering actions in 2017-2018 contributed to areas of persistent water at Yarradda Lagoon, Telephone Creek and Wagourah Lagoon. Adult turtles were recorded at ten monitoring sites across all three zones during the 2017-2018 surveys. Eastern long-necked turtles *(Chelodina longicollis)* were the most frequently recorded species, captured on all four monitoring occasions. Broad-shelled turtles *(Chelodina expansa)* were recorded at Gooragool, Yarradda and Wagourah Lagoons. Macquarie River turtles *(Emydura macquarii)* were the least commonly detected species, occurring at only two sites Yarradda Lagoon and Wagourah Lagoon. Species diversity was highest at Yarradda and Wagourah Lagoons, where all three species were detected.

Juvenile Macquarie River turtle at Yarradda Lagoon, January 2018.

Appendix 1 Summary of monitoring activities undertaken during January (J) and March (M) 2018 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	J	J				J	J	J/M	J/M
	Mckennas	Dry	J							J	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	J/M
South Redbank	Mercedes	Dry	J	J	J				J	J	J/M	J/M
	Two Bridges	Dry								J	J/M	J/M
	Piggery Lake	Dry									J/M	J/M
	Waugorah Lagoon	Channel only (low)	J/M	J/M	J/M				J/M	J/M	J/M	J/M
Nimmie-Caira	Nap Nap	Dry								J	J/M	J/M
	Avalon	Dam-only	J/M	J/M	J/M				J/M	J/M	J/M	J/M
	Telephone	¼ full	J/M	J/M	J/M				J/M	J/M	J/M	J/M
	Eulimbah	Dry							✓	✓	J/M	J/M
River sites	McKennas (Carrathool zone)		Complete: October-December 2017			Compl. (Apr18)	Complete: October-December 2017	Mar/Apr				
	Bringagee (Carrathool zone)											
	Yarradda (Carrathool zone)											
	Narrandera (Narrandera zone)					Compl. (Dec17)						
	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

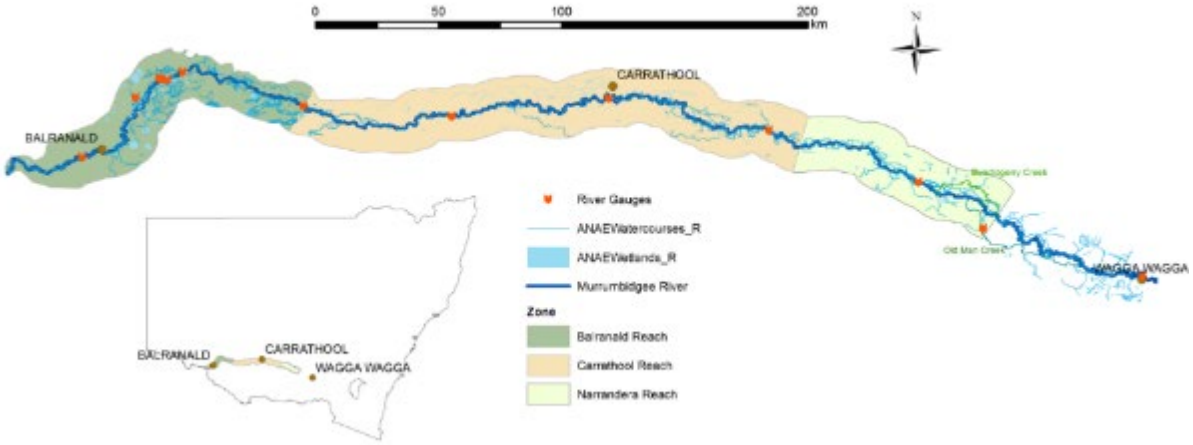

Figure 2 Distribution of riverine zones in the Murrumbidgee Selected Area.

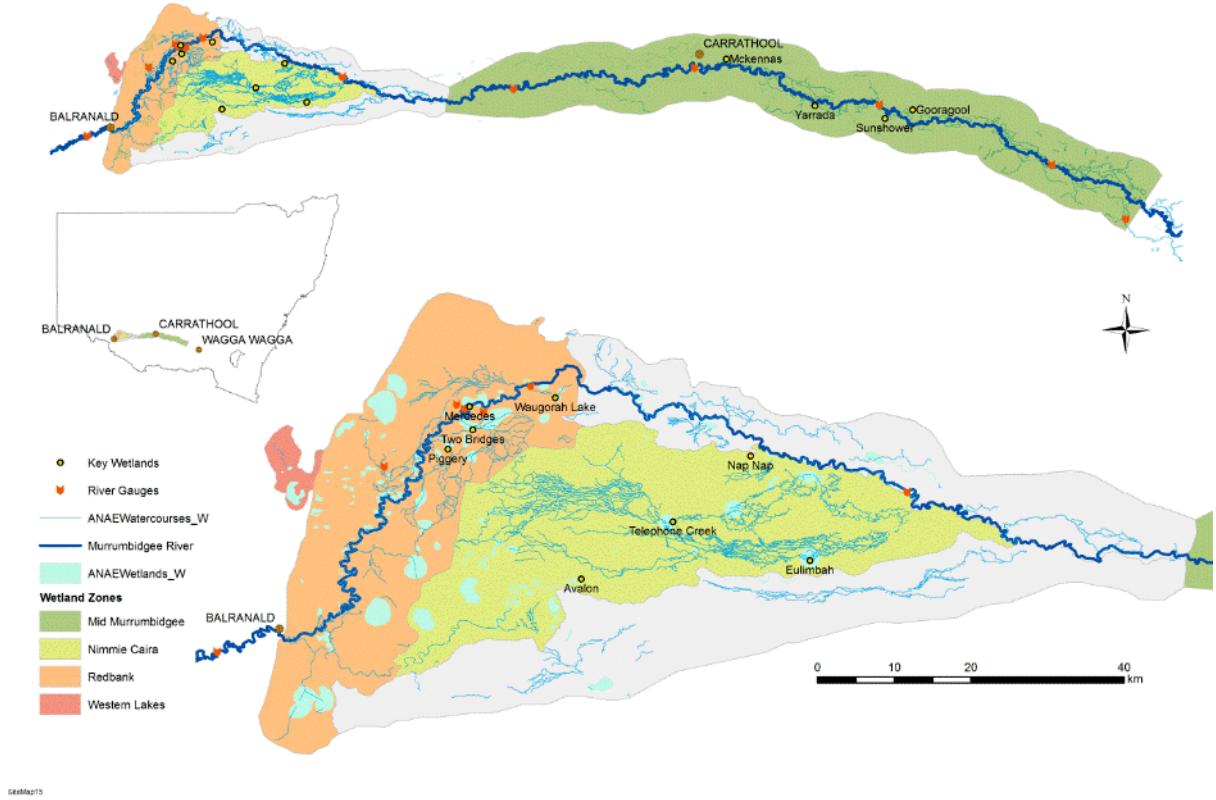

Figure 3 Distribution of wetland zones in the Murrumbidgee Selected Area and locations of key wetlands.