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Long Term Intervention Monitoring Project Murrumbidgee System
Selected Area Project Progress Report 11
Report period: 1 January 2017 – 31 March 2017

Piggery Lake, Lower Murrumbidgee, January 2017

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Ecological responses to Commonwealth environmental water in the Murrumbidgee system as of 31 March 2017

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 1st January and 31st March 2017. 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.

Widespread rain and associated high river flows during September inundated all LTIM monitoring sites in the mid-Murrumbidgee, Nimmie-Caira and south Redbank zones. The delivery of Commonwealth environmental water was paused at this time, recommencing in November and December 2016 after flood waters had receded. Environmental flows have since been delivered to the Balranald reach (downstream of Maude Weir) to mitigate hypoxic blackwater conditions that developed as a result of overbank flows returning to the river and to maintain rookeries in the Nimmie-Caira zone. Normal conditions returned through January and March with the majority of wetlands beginning to draw down.

Preliminary outcomes to 31 March 2017

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) during late January - early February and March 2017. During the March surveys, shallow water levels at four of the 12 sites (Gooragool, Sunshower, Piggery and Mercedes) meant that not all indicators could be monitored during this time.

Additional funding was made available to monitor key waterbird colonies in the Nimmie-Caria and Redbank zones where waterbirds began breeding in response to natural flooding and were later supported by the delivery of environmental water. Monitoring commenced in November 2016 and was completed in mid-March 2017.

Riverine fish

Monitoring of riverine larval fish commenced in October 2016 and was completed at the end of December 2016. Larval fish sample processing was recently completed and was delayed due to the large volumes of organic matter (including food resources for fish) in samples collected during flooding (Plate 1). Preliminary observations indicate capture of eggs from both golden perch and silver perch in the Narrandera zone. Other species captured as either larvae or early-stage juveniles during sampling include native carp gudgeon, Murray cod, Murray-Darling rainbowfish, Australian smelt and flatheaded gudgeon. Alien species captured include common carp, gambusia and redfin perch. River fish monitoring is currently underway and will be completed by early April 2017. Metabolism monitoring, conducted at Carrathool and Narrandera, has been delayed by flooding but commenced in early November 2016 and will be completed in April 2017.

Plate 1 Example of a drift net capture from the Murrumbidgee River (Carrathool zone) during flooding in October 2016.

Frogs and tadpoles

Frog breeding activity, indicated by calling adults and the presence of tadpoles, declined as of late January this year. Reflective of dropping water levels and seasonal transition, the noticeable decline in activity signals the conclusion of the peak breeding season for this water year. During the January/February surveys, frog breeding activity was comparably subdued, apart from large numbers of barking marsh frogs heard calling at Nap Nap Swamp and many (>100) *Limnodynastes* species tadpoles detected at Two Bridges Swamp. By March, very few individuals were calling at isolated sites and no tadpoles were caught at any of the sites retaining water levels deep enough to survey (8 sites). Non-calling adult Southern bell frogs *(Litoria raniformis)* were observed at isolated sites during both surveys with particularly high numbers observed at Nap Nap Swamp (100-200 individuals) on both occasions, Southern bell frogs were also observed at Avalon Swamp (5), Telephone Creek (2) Eulimbah Swamp (2), Yarrada Lagoon (1)(Plate 2) and Waugorah Lagoon (1). Large numbers of marsh frogs *(Limnodynastes tasmaniensis* & *Limnodynastes fletcheri)* and tree frogs *(Litoria peronii)* were common throughout the survey area.

Plate 2 a threatened Southern bell frog *(Litoria raniformis)* observed at Yarradda Lagoon in March 2017

Waterbird diversity

Waterbird surveys of the 12 LTIM sites were completed over late January - early February 2017 and again in late March 2017. A high diversity of waterbird species was observed across the across the mid-Murrumbidgee, Nimmie-Caira and Redbank zones. This included large numbers of dabbling ducks (e.g. Grey Teal *Anas gracilis*, Pink-eared Duck *Malacorhynchus membranaceus* and Australasian Shoveler *Anas rhynchotis*), resident small waders (e.g. Red-kneed Dotterel *Erythrogonys cinctus*, Black-winged Stilt *Himantopus leucocephalus*, Red-necked Avocet *Recurvirostra novaehollandiae* and Black-fronted Dotterel *Elseyornis melanops*) and large waders (spoonbills, egrets and herons) recorded at several sites including Yarradda Lagoon, McKennas Lagoon and Piggery Lake. Piggery Lake also supported large numbers of feeding Black Swans (*Cygnus atratus*). Two Bridges and Nap Nap swamps continues to provide habitat for juvenile Nankeen Night-Herons (*Nycticorax caledonicus*) from breeding events this year. Small numbers of Great Cormorant (*Phalacrocorax carbo*) nests are still active at Yarradda Lagoon. A relatively uncommon species, the Australian Spotted Crake (*Porzana fluminea*) were also seen at Eulimbah Swamp. This species likes to feed in dense vegetation, such as lignum swamps, and can appear in large numbers suddenly after heavy rain. During the waterbird breeding surveys (see below) two pairs of Pied Heron (*Egretta picata*) were also observed with juveniles nesting at Steam Engine Swamp, in North Redbank. This species is typically only observed outside northern Australia during major floods.

Waterbird breeding

The ibis colonies in the Nimmie-Caira, at Eulimbah Swamp and Telephone Bank have completed with large numbers of juveniles seen in both colonies during surveys by UNSW field staff in early January. There were significant loss of eggs and abandonment of nests in Eulimbah Swamp between the first (21/11/16) and second surveys (2/12/16). Success rates between surveys 1 and 2 was 19% for offspring (eggs and chicks). The high mortality of marked nests coincided with a rapid drop of water levels in mid-late November and abandonment of nests. Once the site was refilled using environmental water the success rate between surveys 2 and 3 (18/12/16) was much higher (100% of offspring). Further environmental water was delivered in early February to sustain new nesting of Royal Spoonbills (*Platalea regia*). OEH and CEWO staff completed a survey of Eulimbah Swamp in early March and detected small numbers of active Royal Spoonbill and Australian White Ibis (*Threskiornis moluccus*) nests with advanced young (flappers and flyers).

No repeat measures of nesting success were collected for the Telephone Bank colony due to limited access in early stages of the colony and the advanced state of the colony when access was possible on 18 December 2016. The third (and final) survey of Telephone Bank was completed on 4 January 2017 when chicks were at advanced stages with the majority of young fledged.

Additional surveys of a new ibis colony at Tori Lignum Swamp in North Redbank, which established in early December, were completed by UNSW, OEH and CEWO staff fortnightly from early January to mid March. Water levels dropped in the Tori ibis colony between the early January and early February surveys with moderate mortality of ibis and waterfowl observed in the colony. Limited testing of dead birds has indicated that this might have been associated with an outbreak of botulism. Observations from the most recent surveys in March indicate that water quality improved in the colony with no recent dead waterbirds observed. Large numbers of juvenile ibis and spoonbills were observed in the Tori colony and surrounding habitat in early and mid March (Plate 3). Analysis of nesting success for the Tori colony is currently underway.

Plate 3 Large numbers of juvenile ibis and spoonbill were observed feeding on the edge of the Tori Lignum Swamp colony during surveys in early March (Credit: E. Lenon).

A further 24 heron, cormorant and egret colonies are active across the Murrumbidgee Selected Area in the 2016-17 surveys. These sites were assessed where possible at monthly intervals by OEH and CEWO staff. The four largest egret and heron colonies are Steam Engine, Two Bridges, Tarwillie and Nap Nap swamp which were very near completion during surveys in early March. A new pelican colony at Is-y-Coed, Nimmie-Caira also

established over January and repeat surveys were completed in early February and early March. This site has an estimated 5,000-6,000 pelican nests with most containing eggs in the February survey and large chicks were observed during the March survey (Plate 4). On the neighbouring flooded area, either side of the levee bank where the pelicans are nesting, large numbers of non-colonial waterbird species, including dabbling ducks and resident shorebirds have been recorded feeding in the area.

Plate 4 Pelican colony at Kieeta Lake, 1 February 2017 (Credit: J. Spencer)

Fish (wetlands)

Consistent with previous surveys, large numbers of exotic fish were observed across all zones, though fewer fish (overall) were captured during the 2017 (January & March) surveys compared with earlier in the water year. During the late January – early February surveys, juvenile carp (50-100 mm) were most prolific, with the highest abundances recorded at McKennas and Two Bridges. Whereas *Gambusia holbrooki* were the most prolific species recorded during the March surveys with particularly high numbers (thousands) detected at Gooragool (channel), Yarradda Lagoon and Two Bridges Swamp. Oriental weatherloach (*Misgurnus anguillicaudatus*) were again found at multiple sites. Although their numbers remain low they are still comparatively abundant at Two Bridges. Another introduced fish species, Red fin perch (*Perca fluviatilis*), has only recently been observed in the system. This species was recorded at two of the sites in the Mid-

Murrumbidgee this year, with one individual recorded at both McKennas and Yarradda lagoons.

Of the native fish species observed, Carp gudgeon *(Hypseleotris spp.)* were the most common throughout the zones. Murray-Darling rainbowfish (*Melanotaenia fluviatilis*) were recorded at seven of the sites (Mercedes Swamp, Eulimbah Swamp, Yarradda Lagoon, McKenna's Lagoon, Sunshower Lagoon, Telephone Creek and Two Bridges Swamp) and their distribution appears to have increased again this year. Yet again, a single golden perch (*Macquaria ambigua*) was captured at Yarradda Lagoon. Comparably higher numbers of Bony breams *(Nematalosa erebi)* were detected at Two Bridges Swamp (146 fish), Telephone Creek (52 fish) and Eulimbah Swamp (29 fish) this March. Very few Australian smelt *(Retropinna semoni)* were detected at isolated sites.

Turtles

2016-17 has been a very good year for turtles, with juvenile and adult turtles found at nine of the 12 sites surveyed. Eastern long-necked turtles *(Chelodina longicollis)* were found in all sites, except for Avalon Swamp (dam), Eulimbah Swamp and Piggery Lake. Broad-shelled turtles *(Chelodina expansa)* were detected at four of the sites: Yarradda Lagoon, Waugorah Lagoon, Sunshower Lagoon and Telephone Creek. Macquarie River turtles *(Emydura macquarii)* were the least commonly detected species, occurring at only two of the sites Yarradda Lagoon and Two Bridges Swamp. Hatchling Macquarie River turtles were also recorded at Two Bridges Swamp (Plate 5). Yarradda Lagoon now supports all three turtle species known to occur in the Lower Murrumbidgee floodplain.

Plate 5 Juvenile Macquarie River turtles captured in the fyke nets set at Two Bridges Swamp. (Credit: J Ocock)

Appendix 1 Summary of monitoring activities undertaken between January and March 2017 as part of the Monitoring and evaluating ecological responses to Commonwealth environmental water use in the Murrumbidgee River Valley

Zone	Site name	Status	Water Quality	Microinvertebrates Chlorophyll A	Carbon Nutrients	Ecosystem metabolism	Larval fish	Riverine fish	Tadpoles, fish and turtles	Frogs	Waterbirds	Vegetation
mid-Murrumbidgee	Gooragool	¾ full	✓	✓	✓				✓	✓	✓	✓
	Mckennas	¼ full	✓	✓	✓				✓	✓	✓	✓
	Sunshower	¼ full	✓	✓	✓				✓	✓	✓	✓
	Yarradda	½ full	✓	✓	✓				✓	✓	✓	✓
South Redbank	Mercedes	¼ full	✓	✓	✓				✓	✓	✓	✓
	Two Bridges	½ full	✓	✓	✓				✓	✓	✓	✓
	Piggery Lake	¼ full	✓	✓	✓				✓	✓	✓	✓
	Waugorah Lagoon	Channel only	✓	✓	✓				✓	✓	✓	✓
Nimmie-Caira	Nap Nap	¾ full	✓	✓	✓				✓	✓	✓	✓
	Avalon	Dam-only	✓	✓	✓				✓	✓	✓	✓
	Telephone	¾ full	✓	✓	✓				✓	✓	✓	✓
	Eulimbah	½ full	✓	✓	✓				✓	✓	✓	✓
River sites	McKennas (Carrathool zone)		Complete 31 March 2017			Mar 17	Complete 31 December 2016	Mar/Apr 2017				
	Bringagee (Carrathool zone)											
	Yarradda (Carrathool zone)											
	Narrandera (Narrandera zone)					Mar 17						
	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 (Figure 1 and 2). 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

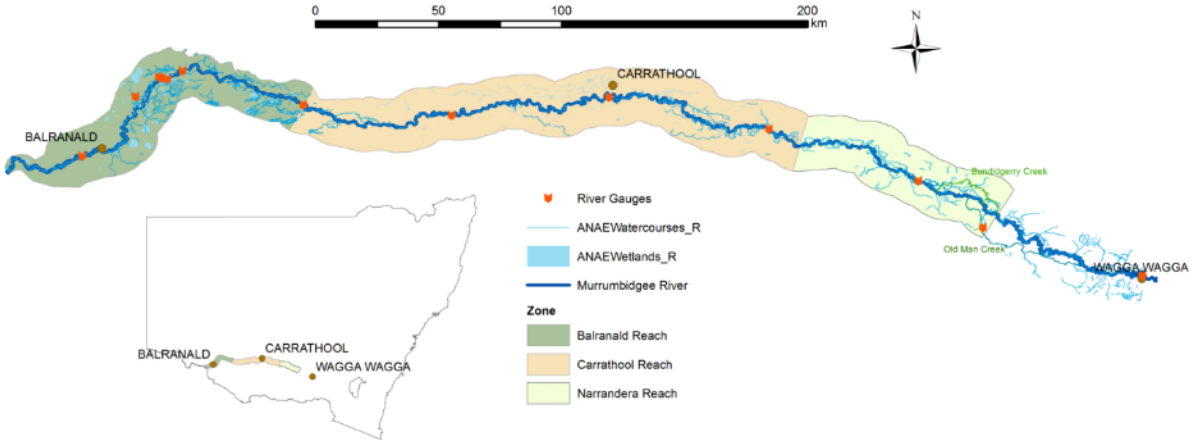

Figure 1 Distribution of riverine zones in the Murrumbidgee Selected Area.

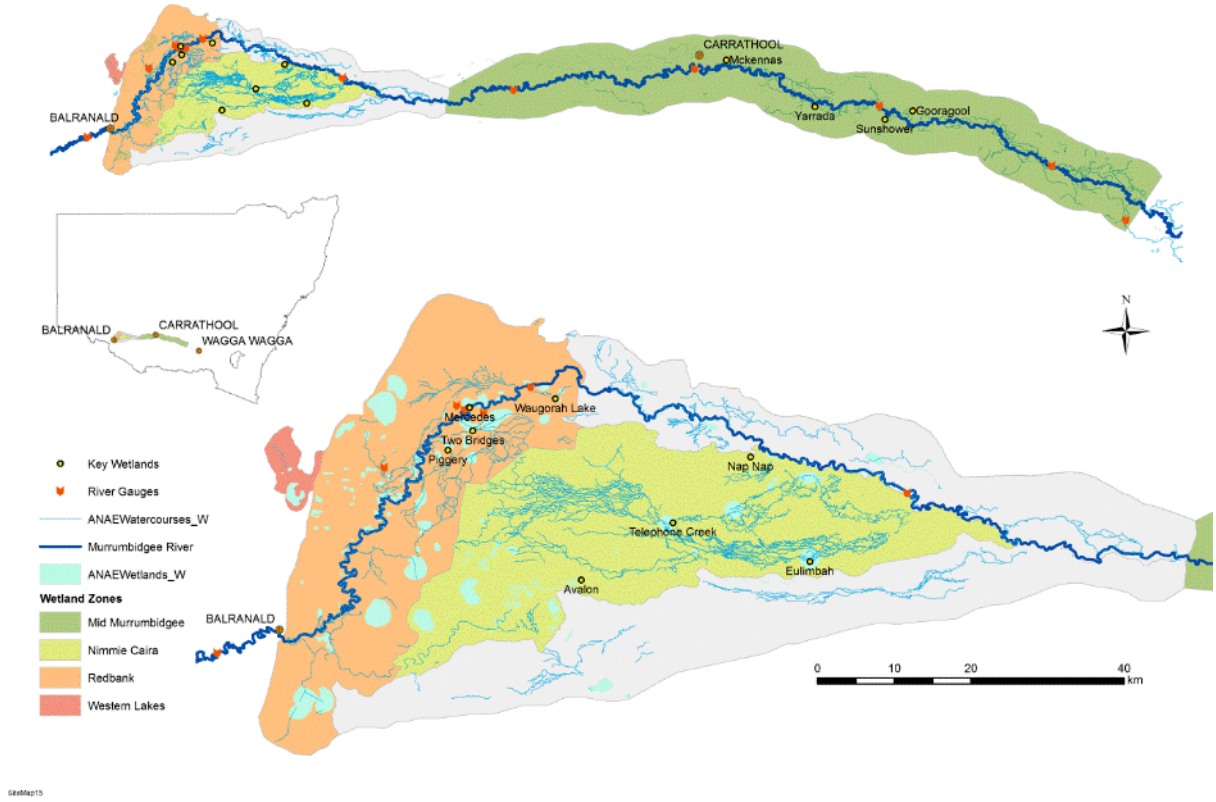

Figure 2 Distribution of wetland zones in the Murrumbidgee Selected Area and locations of key wetlands.