

THE BIDGEE BULLETIN

Quarterly Newsletter of the Murrumbidgee Monitoring Program



OVERWINTERING

The waders are hanging out to dry, the spotlights are recharging and all fingernails are clean: it must be winter. The monitoring surveys are focused on spring and summer, when wetland vegetation is growing and animals are most active, so there's not much action going on for us outdoors over the winter months. However, we are by no means sitting around and twiddling our thumbs because this is data season. Now is the time when all of the information collected over the water year is collated, analysed and used to figure out the specific responses of target taxa to environmental watering actions and broader patterns that arise when findings are compared to those from previous years. The results are then published in reports and papers, discussed in scientific and community presentations and used to inform and improve future water management. When spring rolls around again we will dust off our equipment, print new datasheets and prepare ourselves for the first monitoring trip in September.

Welcome to Issue 8 of The Bidgee Bulletin. Within these pages we explore the factors that catalysed the spectacular waterbird breeding event in Eulimbah Swamp, talk about all things fyke net, focus on the secretive rakali, find out what the golden perch in Tala Creek are up to and chat with Dr Jason Thiem, fish ecologist with the NSW Department of Primary Industries.

The Bidgee Bulletin is a quarterly newsletter designed to provide updates on our progress as we monitor the ecological outcomes of Commonwealth environmental water flows in the Murrumbidgee Selected Area. The 2019-2022 program builds on the previous five year monitoring period (2014-2019) and uses many of the same methods.

THE KIT AND CABOODLE: FYKE NETS

Our survey work relies on the efficient functioning of many pieces of technical equipment. For example, acoustic recorders for monitoring calling frogs, birds and bats; water quality meters for quantifying hydrological variables; spotlights for finding and identifying frogs; as well as lots of other bits and pieces, like callipers, waders, binoculars, stakes, buckets and batteries to keep things running smoothly. One of the most important and frequently used pieces of kit is the fyke net. We deploy these in lagoons and swamps to survey fish, tadpoles, turtles and invertebrates like yabbies, prawns and shrimp. They are simple to set up, work passively without any bait and do an excellent job of sampling the critters that we need to keep an eye on. This is good to know, but how exactly do they work?

A fyke net is a cylinder of mesh strung over several metal hoops with a mesh cone at the closed end and two mesh wings at the open end (Photo 1, left). We deploy smaller nets with a finer mesh to target tadpoles and small-bodied species like carp gudgeon and Australian smelt, whereas we use larger-diameter nets to target bigger fish such as bony bream, Murray cod and golden and silver perch, as well as turtles (Photo 2). The wings guide fish into the open end of the cylinder (Photo 3). These are attached to stakes and kept upright with floats on the top edge and lead weights on the lower edge. The fish enter the trap and swim through two small mesh cones, from the large end to the small end, suspended between the hoops (Photo 4). The fish then reach the closed mesh cone (called the cod-end) and become trapped; a fyke net is not impossible to exit but the internal cones make it difficult (Photo 5). The cod-end is tied to a stake and raised out of the water slightly to allow any trapped mammals, reptiles or frogs to breathe. Once deployed, we measure the depth of a net below water, the width of the wings, the direction it's facing and the time it is set in the evening and the time we haul it in the following morning. This data lets us include sampling effort into our analyses. We set the nets pointing in opposing directions to maximise our chances of catching critters, which is important if there is a current running through the water body. After the nets are retrieved the animals are quickly transferred to big tubs of water to minimise stress. We're able to identify the catch to species, count the numbers of individuals, measure fish and turtle size and determine metamorphic stage of tadpoles. Handling times are short to make sure that fish and tadpoles are only out of the water for a matter of seconds. After processing, everybody is released back into the wetland alive and well.

A small fyke net with 2 mm mesh, 50 cm hoops and 5 m wings designed to catch small-bodied fish and tadpoles (left); deploying the same fyke net in Piggery Lake (below)



2020-21 WATERBIRD BREEDING EVENT: WHY DID IT HAPPEN?



A straw-necked ibis

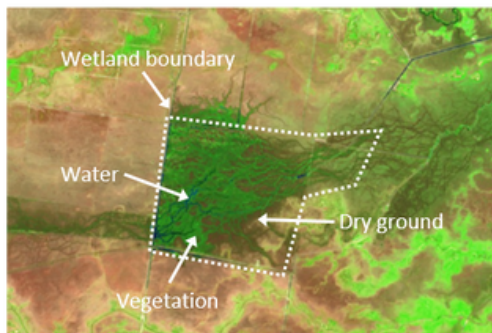
Over spring and summer, Eulimbah Swamp in Gayini Nimmie-Caira was host to an impressive breeding event. More than 18,000 pairs of straw-necked and glossy ibis, among other species, nested in the lignum and enjoyed the wet conditions. The birds began arriving in large numbers in spring, with nesting underway in November. By our March monitoring surveys, the adults and thousands of their successfully fledged young were departing and the swamp was quiet once again, save for some birds that stayed to overwinter. Breeding events are critical for large waders, with numbers declining across the basin, so supporting successful breeding events is critical to ensure the long term survival of waterbirds in the Murrumbidgee.

What caused this huge pulse in activity? Breeding by colonial nesting waterbirds is dependent on the inundation of rookery sites and large areas of floodplain that provide ample foraging opportunities to support growing chicks. In 2019-20 wet conditions through the catchment meant close to full water allocations, enabling large volumes of water to be delivered across the Gayini and Lowbidgee floodplains. This created ideal habitat for nesting; the birds were able to trample down patches of green lignum and build nests on the stable platforms. The water also generated abundant food resources, as populations of dinner favourites including aquatic invertebrates, tadpoles, frogs and fish all responded positively to increased available water in the environment. After the birds arrived, strategic water delivery continued and was carefully maintained at a level hoped to maximise breeding success. This delivery was informed by regular colony waterbird counts made by kayak and drone. Happily, it resulted in a win for birds and environmental water alike.

The breeding event in pictures. Below are five satellite images centred on Eulimbah Swamp, taken between late July 2020 and late March 2021 (images from Sentinel Hub), showing the change in water and vegetation over the course of the breeding event.

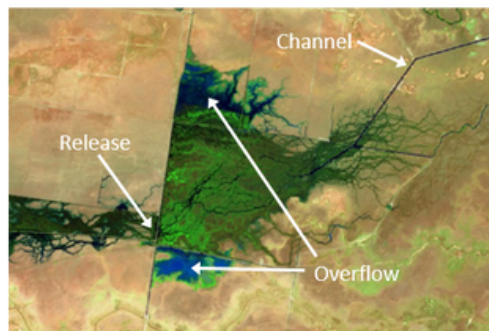
July: There is some residual water in the swamp (blue) and fingers of new lignum growth (green in centre) stretching through dry (brown) areas.

1. July 2020



October: Water delivery is well underway via the channel. Water is spilling out into neighbouring areas (top and bottom of image) and is being released through a regulator (left). Most birds have arrived to lay eggs.

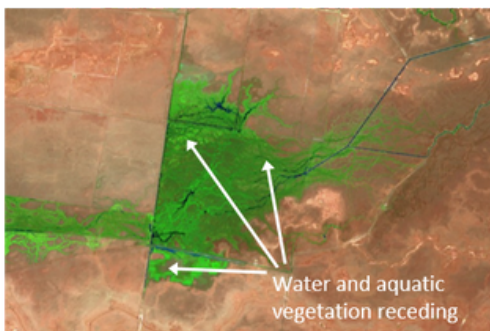
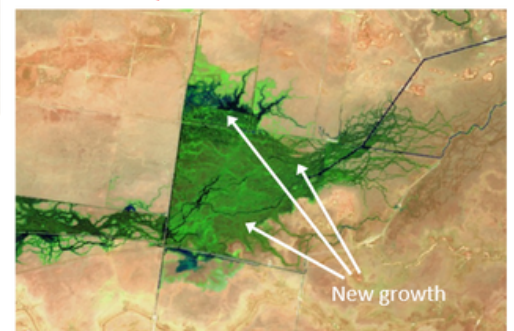
2. October 2020



December: The water level in the swamp is being finely balanced via targeted delivery and release.

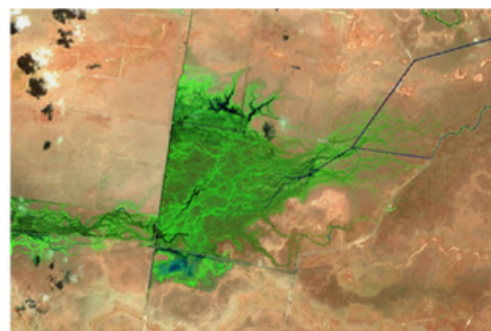
If the water level drops too quickly, there is a chance that birds will abandon their nests.

3. December 2020



5. March 2021

March: The swamp and surrounding areas are drying down. The vast majority of feathered families have departed.



4. January 2021

January: Water regulation continues to maintain water level; by now most eggs have hatched and parents are busy feeding their chicks.

On the menu: a balanced rakali diet can include mussels (photo Nicole McCasker), prawns, fish, insect nymphs and turtle eggs, with the end result (below); a rakali (bottom).



SPECIES SPOTLIGHT: THE RAKALI

The rakali (water rat; *Hydromys chrysogaster*) is a charismatic but elusive semi-aquatic mammal that lives near permanent water sources such as rivers, streams, channels, lakes and dams in the Murrumbidgee catchment. It's relatively easy to tell apart from other rats by its large size, golden belly and white tail tip—which looks very similar to a ringtail possum tail—and its love of swimming. They are most likely to be seen diving for mussels, yabbies, insects and fish at sunrise or sunset, but they can be active around the clock. Rakali are highly specialised to their semi-aquatic lifestyle and have adaptations like partially webbed hind feet for foraging in the aquatic environment, but they rely on the terrestrial landscape for nesting, feeding and reproduction.

Rakali are considered bioindicators of ecosystem health because they are sensitive to drought and their occurrence is often associated with bank stability and in-stream vegetation. They likely play an important role in freshwater ecosystems because they are known to control crayfish numbers, they seem to find invasive carp particularly delicious and their burrowing assists nutrient turnover. In northern Australia, they have even figured out how to carefully dissect and eat cane toads! While rakali can be quite resilient, only three years of poor breeding, and extreme weather events such as bushfires, droughts or floods, can cause a local population to collapse. Maintaining healthy populations of rakali by looking after their aquatic and terrestrial habitats is great not only for the species, but the ecosystems they live in.

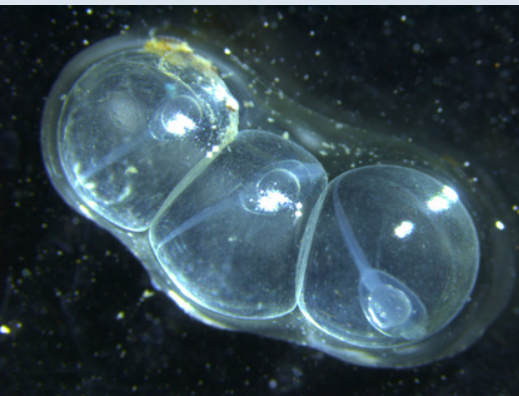
Rakali biology remains relatively understudied. Additionally, there is a lack of occurrence records throughout the Murrumbidgee catchment, where populations are fragmented and poorly known, despite regular sightings by local community groups. Charles Sturt University PhD student Emmalie Sanders recently joined the Bidgee team and her project aims to quantify environmental variables associated with rakali occurrence along the Murrumbidgee River and unravel some of the mysteries of the rakali's ecology. Stay tuned for her results in upcoming issues. In the meantime, if you see a rakali please get in touch!



GOLDEN PERCH IN TALA CREEK



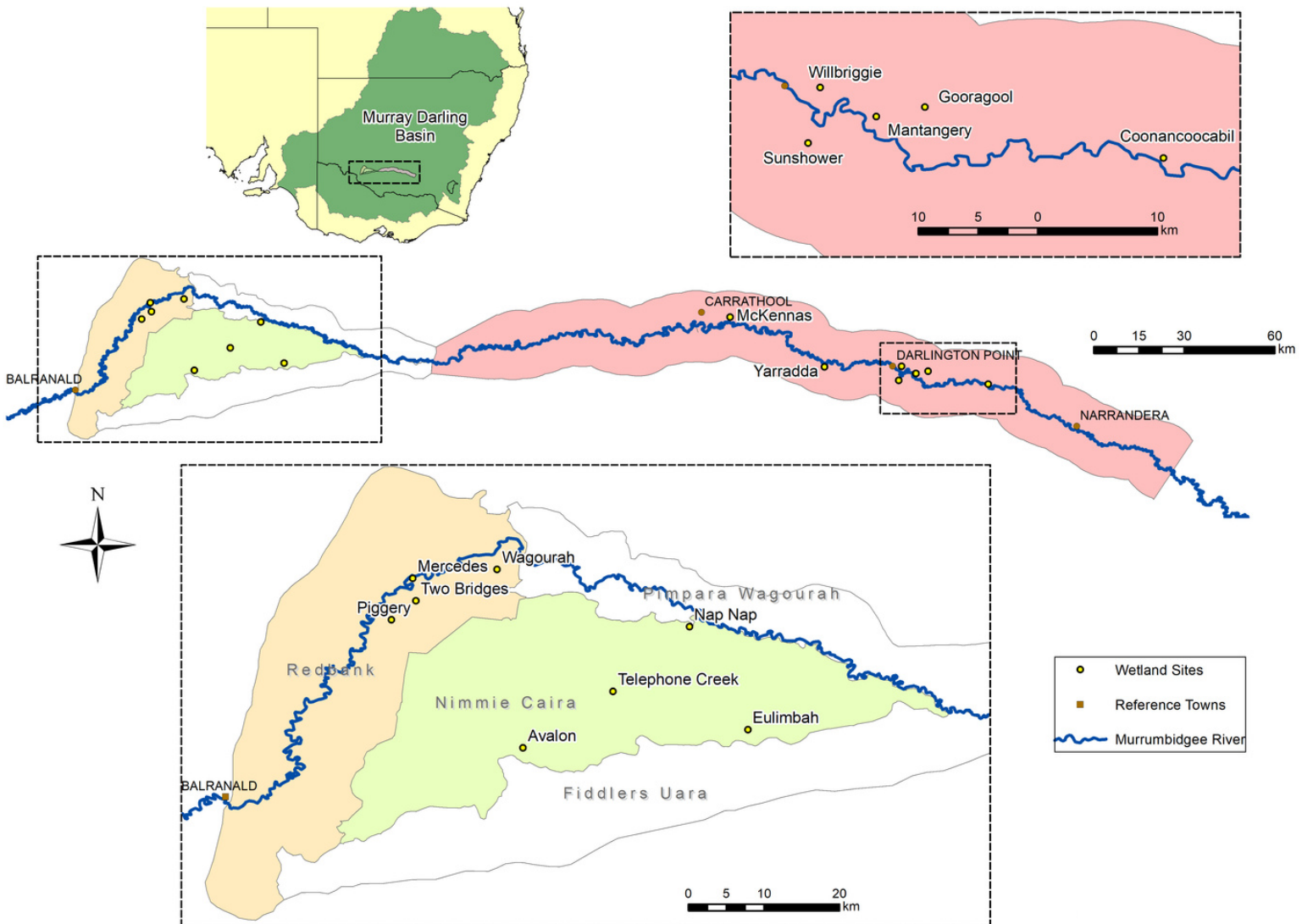
Young-of-the-year golden perch from Yarradda West Lagoon (above); golden perch eggs (below).



The golden perch (*Macquaria ambigua*) is a medium-sized fish found across the Murray-Darling Basin but like many riverine species, it has declined due to river regulation. One of the objectives of environmental water deliveries in the Murrumbidgee River system is to promote native fish breeding, particularly in flow-dependent species such as the golden perch, and provide safe habitat for larva development and recruitment to the wider population. Understanding the relationships between river pulses and wetland connections is therefore important for managing environmental water to enhance conservation outcomes.

Over the past three years, aquatic researcher Dr Nick Whiterod, in partnership with the Murrumbidgee MER team, has been sampling golden perch in Tala Creek on the lowbidgee floodplain using a combination of fyke nets and electrofishing. In March 2019, following an environmental watering event that enabled flows to return from Tala Lake to the Murrumbidgee River, 44 young-of-the-year (fish hatched within the previous 12 months) were recorded in Tala Creek. Ongoing monitoring has revealed that golden perch successfully spawned and recruited into the population during this (2018-2019) and a second environmental watering event (2020-21). Analysis of their ear-bones (otoliths) found that the fish grew faster during years the creek experienced environmental water compared to when the creek was disconnected from the river in 2019-20. The most recent round of sampling confirmed this two-year-old+ cohort of golden perch are now dispersing into the Murrumbidgee River via the Tala Escape. This work highlights the importance of deep floodplain channels in supporting breeding habitat for this species.

Map showing monitored wetlands within the three Murrumbidgee zones: Redbank (cream), Gayini Nimmie-Caira (light green) and the mid-Murrumbidgee (pink)



The next issue of The Bidgee Bulletin is out in late September 2021.

For more information or to join the newsletter mailing list please visit:
<https://www.csu.edu.au/research/ilws/research/environmental-water/murrumbidgee-mer>

We're on social media too!
Stay up to date with our adventures on Instagram and Twitter:

@BidgeeMER



We've just published our new calendar for the 2021-2022 water year. If you'd like a free copy, contact us and we'll send one out!



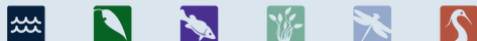
The Murrumbidgee MER team would like to acknowledge the consortium partners and local landholders with whom we work.



Australian Government

Commonwealth Environmental Water Office

FLOW | Monitoring
Evaluation
Research



Charles Sturt
University

We respectfully acknowledge the Wiradjuri,
Nari Nari and Muthi Muthi peoples,
traditional owners of the lands on which this
publication is focused

WHO'S WHO IN THE ZOO?

This issue we discover a bit more about Jason Thiem, the MER team's resident fish ecologist...

Name: *Jason Thiem*

Organisation: *DPI Fisheries*

Position: *Research Scientist*

I studied at: *Uni of Canberra (Undergrad) and Carleton University, Canada (PhD)*

In my previous job I: *Worked on fish...hmmm sensing a theme here*

Food attitude: *More is better, hold the sweets*

Beverage of choice: *Coffee (AM), Beer (PM)*

How would you describe your work to a child? *Looking after the fish*

What's the best thing about your work? *Variety. I get to be in the field, the office or talking about my work with interested and interesting people. Each day is different.*

Your work in three words? *Fish. Rivers. Science.*

Is your career your parents fault? *Absolutely. My dad got me into fishing (I've been obsessive about it since) and we always had aquariums at home. It's now 2030, where are you? Somewhere warm with not many people and great fishing – take me back to the Bahamas please!*

Flashback to 1999 – where were you then? *Bogged on Fraser Island trying to dodge a plane that was landing on the beach*

Given the chance, who would you like to be for a day? *The Rock*

What's your favourite sign off? *Cheers (can also be a greeting 😊)*

