

WARREGO FLOWS



Welcome to Issue 5 of Warrego Flows where we share the outcomes from the third year of environmental water monitoring at Toorale National Park in the Warrego-Darling river system, undertaken as part of the Commonwealth Environmental Water Office's Long Term Intervention Monitoring (LTIM) Project.

2016-17 was a good year at Toorale, with high upstream winter rainfall producing good river flows and flooding on the Western Floodplain. This provided favourable conditions for plants and animals at the site.

Environmental Flows

Water is essential for the ecological health of rivers and for maintaining stream channels and sediment loads. In the Warrego and Darling systems, environmental water is left in the rivers rather than being extracted, to maintain their function and health.



Pelicans on the Darling river



Collecting invertebrate samples in waterholes of the Warrego River and Western Floodplain

During the 2016-17 year, a large flooding event driven by rainfall across the northern basin in October/November 2016 dominated flows in both the Darling and Warrego Rivers at Toorale. Initial inflows to Boera Dam down the Warrego River during August 2016 were diverted to the Western Floodplain in response to very high water demand on the floodplain. Water continued to flow onto the floodplain for over 6 months with around 1/3 (9,720 ML) of this water being Commonwealth environmental water. This supported wetland and aquatic vegetation on the floodplain, with 3,836 ha of the Western Floodplain being inundated in October 2016, including over 3,000 ha of Lignum Shrubland wetland and Chenopod low open shrubland.

A release of Commonwealth environmental water from Boera Dam connected the lower Warrego River for 25 days which supported fish spawning, recruitment and movement.

Commonwealth environmental water contributed to four separate instream flow events in the Barwon-Darling River enhancing downstream connectivity in the Darling River, inundating all mapped in-channel habitat features (benches, snags, anabranch channels) during 2016-17. This provided additional habitat, and allowed for the exchange of organic matter and nutrients between these features and the river channel to stimulate food webs. The proportion of Commonwealth environmental water in each event ranged from 2-37%.

Commonwealth environmental water increased the connectivity of the Darling River zone, and contributed to connections in the Warrego River zone during the 2016-17 year. This connection not only provided water to the floodplain, but also allowed the movement of material and animals between the river and floodplain. Maintaining connection is important to allow animals to travel up and down the river and to maintain water quality. Increased connection provided links between isolated pools that in turn helped to sustain native fish, invertebrate and other aquatic animal communities. We also saw improvements in water quality with increased primary production through flow events and carbon/nutrient cycling processes.



White-plumed Honeyeater at Toorale

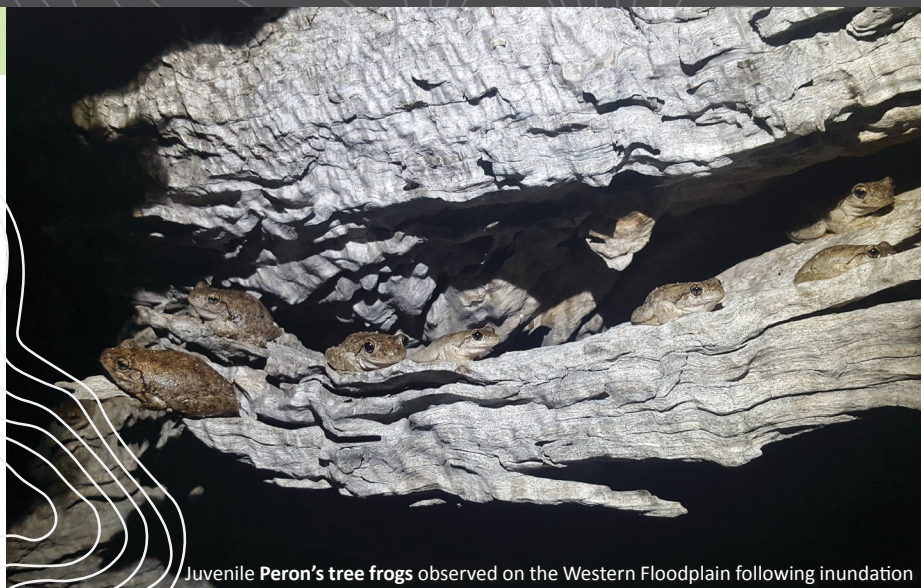
Water Quality

Increased flows down the Darling River through Toorale improved water quality such as pH and conductivity through dilution during higher flows. Thresholds of change were detected for pH, turbidity and dissolved oxygen, likely driven by interactions between water depth, turbulence and algal growth at higher flow levels above 10,000 ML/d. This may be useful for the management of environmental flows to maintain water quality.

When the Warrego and Darling rivers were connected, the Warrego river water improved water quality in the Darling River through dilution. This suggests that flows out of the Warrego may be used to manage and improve water quality in the Darling River.



Central Nettle Dragon at Toorale



Juvenile **Peron's tree frogs** observed on the Western Floodplain following inundation

Biodiversity

Commonwealth environmental water inundated sites within the Warrego River and Darling River channels which maintained a diversity of habitats. Western Floodplain inundation increased the richness and diversity of vegetation communities and resulted in the highest average vegetation cover observed in the first three years of the LTIM project. We also detected the herb tiny teeth (*Dentella Minutissima*) for the first time in our survey sites, which is considered endangered under the NSW Biodiversity Conservation Act.

Prolonged connection between Boera Dam and the Western Floodplain (>6 months) provided breeding opportunities for many native fish, frog and turtle species. The varied habitats available on the floodplain also resulted in more diverse invertebrate, frog and waterbird populations, than the Warrego River channel.

The managed environmental flow event from Boera Dam stimulated the breeding of many species of fish in the lower Warrego River. This promoted improved population structure in species such as Hyrtl's catfish, and also in exotic species (carp and goldfish) between surveys across years 2 and 3 of the project.

Waterholes in the Warrego River continue to provide vital refuge for invertebrate, frog, fish and waterbird populations, during periods of hydrological disconnection.



The herb **tiny teeth** (*Dentella Minutissima*) found for the first time in our survey sites, which is endangered under the NSW Biodiversity Conservation Act

Resilience

Commonwealth environmental water in 2016 inundated areas of the Western Floodplain that hadn't been inundated in five years. This inundation is required to keep many floodplain vegetation communities in good condition. These flows sustained large areas of diverse floodplain vegetation habitats and encouraged recruitment in some species.

Commonwealth environmental water refreshed both refuge waterholes in the Warrego River as well as a diversity of habitat types on the Western Floodplain. Maintaining a mosaic of habitats is important for regional scale biodiversity. Commonwealth environmental water contributed to flows in the Warrego and Darling Rivers which reconnected previously isolated refuge pools and maintained water quality within levels suitable for aquatic life.

WHAT'S NEXT?

IMPLICATIONS FOR COMMONWEALTH ENVIRONMENTAL WATER MANAGEMENT

Monitoring in 2016-17 reinforced observations over the first two years of the LTIM project – that the Western Floodplain constitutes good quality, diverse habitat for a range of biota and should remain a target for Commonwealth environmental water.

The successfully managed environmental flow pulse down the Warrego River zone increased connectivity, stimulated fish species to breed and recruit, and prolonged the persistence and improved the condition of critical refugial waterholes in this system. Further managed environmental flows of this type should be considered in future years. Wetter conditions later in 2016 enabled Commonwealth environmental water to be directed to the Western Floodplain between July and September. This provided the broadest scale inundation of the middle and lower sections of the floodplain since 2012. This also improved water quality in the Darling River downstream of the junction, which suggests that flows released down the Warrego River such as this should be considered in future to manage poor water quality in the Darling River.

We will continue to monitor the environmental outcomes of these environmental flows for the Warrego-Darling system. Don't forget to look out for our findings in upcoming newsletters.



Pied Cormorant at Ross Billabong, Toorale



Green tree frog at Ross Billabong, Toorale

Casa Dalton

**ENVIRONMENTAL WATER
DELIVERY OFFICER**



Describe your role:

I plan, organise delivery and report on the way environmental water is provided to rivers across the northern part of the Murray-Darling Basin. In particular, I work on delivering environmental water in the Warrego River at Toorale. I use information from the LTIM project, stakeholders including National Park rangers, field trips and satellite imagery, to inform decisions on where and when environmental water is provided to support the plants and animals at Toorale.

What does a regular day on the LTIM Project look like?

Reading monitoring reports, receiving photos and updates from Eco Logical Australia staff, and teleconferences with stakeholders from the area.

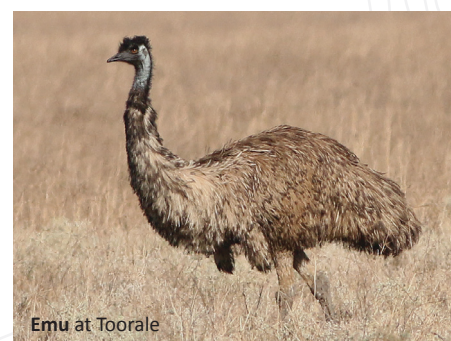
What's your most memorable LTIM Project moment so far?

A field trip to Toorale in 2017. This was a great opportunity to see the country and hear the numerous birds and frogs

in the area. Highlights included seeing how healthy the vegetation was, the large numbers of Emus with their young and mapping the spill level of Boera Dam.

What do you wish other people knew about the LTIM Project?

The information from the monitoring is used every day to improve the way environmental water is managed. For example, the fish monitoring at Toorale informed the release of water from Boera Dam to successfully increase fish movement, breeding and survival.



Emu at Toorale

Tim Henderson

GRADUATE ECOLOGIST



Describe your role:

Myself and other ecologists use a spotting scope, binoculars or our keen eyes and ears to spot waterbirds in the various dams along the Warrego River. In addition, we also survey for frogs and assist our water scientist colleague Iris, who joins us on our trips to sample water quality.

What does a regular day on the LTIM Project look like?

Up at the crack of sparrows to begin documenting bird species and their abundance at the various sites. When the birds go quiet as the day heats up, we assist with the collection of water and macro-invertebrate samples along the Darling River. In the arvo we have spare time for a rest or an explore, then we head back out for evening frog surveys.

What's your most memorable LTIM Project moment so far?

There were ample opportunities to take in the sceneries and wildlife out at Toorale. The richness of various reptile species I hadn't seen before was certainly a memorable part. Spotlighting from the car after our final evening frog survey produced the goods with two stunning

gecko species (Box-patterned and Eastern-beaked) discovered amongst the red sand. It was also a pleasure to see all three of the big Kangaroo species (Eastern Grey, Western Grey and Reds) in the one location.

What do you wish other people knew about the LTIM Project?

It is such an amazing and positive project that provides great opportunities for people like myself to get amongst it and learn skills and gain new experiences. The fieldwork is so much fun, you can't help but spend the whole day chasing herptiles and looking at every bird - and it's all for the important management of the Murray-Darling Basin!



Red kangaroo (female) at Toorale

Jason Wilson

LOCAL ENGAGEMENT OFFICER (LEO)



Top: Jason Wilson & Neal Foster

Bottom: Northern LEO's, Gary 'Red' Trindall, chair of the Mungindi fishing club with Jason

Describe your role:

I engage with a range of stakeholders to share information about Commonwealth environmental water use and outcomes in the Warrego, Barwon-Darling, Intersecting Streams, Moonie, Weir and Condamine-Balonne rivers. I work closely with Shires, National Parks, Aboriginal Organisations, Fishing Clubs, Irrigators and the general public to seek local advice that informs decisions on where and when environmental water is provided to support vegetation, fish, birds and river connectivity outcomes.

What does a regular day on the LTIM Project look like?

I spend a lot of my time meeting with stakeholders in the northern Basin. I also contribute to technical reports on environmental water management and generate reports on catchment condition for the Commonwealth Environmental Water Office (CEWO) – I am essentially the ears and eyes on the ground for the CEWO over a vast region of the northern Basin.

What's your most memorable LTIM Project moment so far?

My first field trip to Toorale was in October

2017. I was impressed at the wonderful opportunity to use the infrastructure that remained from the purchase of Toorale to generate great environmental outcomes in the extreme conditions of the semi-arid Western landscapes. There were many highlights, such as, seeing the CEWO and the LTIM project engage with the Aboriginal Traditional Owners through Toorale National Park's Joint Management Committee.

What do you wish other people knew about the LTIM Project?

Engaging with the broader community, getting them involved with the ownership and generation of information from the monitoring to improve their understanding of how environmental water is being managed, recorded and reported. For example, the Brewarrina and Bourke Schools want to do some monitoring at Toorale this 2018 year, as they indicated "they want to get their hands dirty". It is hoped that this will successfully increase the kids learning, What better way than practical application.



Taking water samples on a drying Western Floodplain waterhole



Department of Primary Industries



Commonwealth Environmental Water Office

This project is part of the Commonwealth Environmental Water Office's \$30m Long Term Intervention Monitoring (LTIM) Project. The LTIM Project aims to monitor the ecological outcomes of Commonwealth environmental water use at seven areas across the Murray-Darling Basin, to evaluate the contribution of environmental water to achieving the objectives of the Murray Darling Basin Plan. Further information about the LTIM Project is available at: <https://www.environment.gov.au/water/cewo>