



Tullaroop Catchment

Citizen Science Project

River Health Snapshot Report 2022



WaterWatch
Victoria

North Central WaterWatch supports people to actively care for their environment by participating in Citizen Science programs that monitor and report on the health of the region's land, water, and biodiversity resources.

The Tullaroop catchment is a tributary of the Loddon River supplying potable water to the township of Maryborough and irrigation water to properties downstream. Past land management practices in the catchment have resulted in extensive loss of riverside vegetation and instream habitat, impacting on water quality and overall river health.

The Tullaroop Catchment Restoration Project aims to create a healthy, continuous riparian corridor along Birch's, Creswick, and Tullaroop Creeks to improve the quality of water entering Tullaroop Reservoir and enhance local populations of river blackfish and platypus.

North Central CMA is partnering with public and private land managers, Dja Dja Wurrung Traditional Owners, Water Authorities, and the broader community to remove invasive woody weeds including willows, install fencing to prevent stock access to riverbanks, and carry out revegetation using native plant species to create habitat and aid bank stability.

The project also promotes community engagement through citizen science activities, including WaterWatch, to regularly monitor water quality and sample for environmental DNA (eDNA) to support research into local platypus and river blackfish populations.

COVID-19 restrictions continued to impact regular monitoring activities into 2022, however participation in citizen science activities increased towards the end of the year. In the absence of sufficient water quality data for thorough analysis from several sites during 2022, water quality from these sites can instead be interpreted from the spring waterbug surveys which are a great way of gauging the overall ecological health of a waterway.



Summary of 2022 Results

Waterbug Indicators

Richness	EPT	Signal
13	4	3.7

Waterbug surveys made up the majority of available data for the Tullaroop catchment during 2022 and can be used to help determine the overall health of the waterways. Generally, waterbug survey results from spring 2022 indicated a moderate, but improving, population. This is to be expected as the initial impacts of woody weed removal will lower available habitat and impact on soil stability in the short-term before revegetation establishes to a point where increases in macroinvertebrate abundance and diversity are observed.

Great Australian Platypus Search

WaterWatch volunteers in the Tullaroop catchment took part in the Great Australian Platypus Search (GAPS) in 2021. GAPS was a citizen science project that aimed to map platypus populations across Victoria from the presence of eDNA in water samples collected by volunteers.

Results from the study were released in 2022 and have been included in this report. Restricted detections of platypus eDNA were recorded in the Tullaroop catchment with positive detections at three sites and possible detections at a further four sites (Griffiths et al, 2022). The Loddon River itself has a low occupancy of platypus, raising concerns for isolation of this population in the upper reaches.

The GAPS results correlate to previous platypus eDNA studies at 25 sites across Tullaroop Creek, Birch's Creek and Creswick Creek conducted by citizen scientists and EnviroDNA in 2015/16 and again in late 2021. In 2015/16 platypus were detected at 69 per cent of the sites sampled, and this increased to 92 per cent in the 2021 survey. It's encouraging site occupancy for platypus has increased in the project area since extensive rehabilitation works undertaken by the North Central CMA in partnership with public land managers and private landholders.

Pesticide Watch

North Central citizen scientists have been supporting a Deakin University study into the presence of pesticides in Australian waterways. A pilot study for Pesticide Watch was conducted at several locations along Birch's Creek in November 2022. Notably, pesticide residues were detected at each of the five sites where samples were taken. Pesticide Watch is being rolled-out across Australia throughout 2023 with findings due later in the year. Results will give an indication of which kinds of pesticides are present in this catchment and will be reported on in the 2023 snapshot report.



Deakin Uni student Brady takes a water sample to test as part of the Pesticide Watch pilot study with help from Britt

Tullaroop Citizen Science Project - 2022 Activities

- Four WaterWatch volunteers regularly monitoring water quality at four sites.
- Macroinvertebrate workshop, Pesticide Watch demonstration and water quality refresher training attended by eight volunteers, project staff and Djandak staff at Andersons Mill on 17 November
- Macroinvertebrate surveys conducted at four sites during spring
- Pesticide Watch samples taken from four sites as part of pilot study
- eDNA sampled at six sites as part of the Great Australian Platypus Search



Waterbug picking at Andersons Mill

Birch's Creek, Daylesford Clunes Road

Site Code: BIR050 Monitor: Warren Family

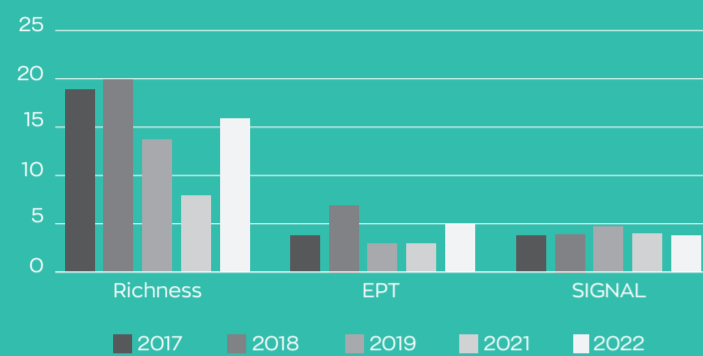
Near the confluence of Birch's Creek with Tullaroop Creek and surrounded by agricultural land, there have been several on-ground works nearby including fencing, weed control, and revegetation. All waterbug indicators have remained steady in the moderate range in recent years, and, as revegetation continues to establish, the increase in instream and flanking vegetation is expected to result in increased diversity in macroinvertebrate species in future years.

This site tested positive for two insecticides; six herbicides, one of which is controlled; three fungicides and one miticide no longer registered with the APVMA.

Platypus eDNA was detected at this site during the 2021 GAPS project, verifying the positive detection by EnviroDNA at this site during the same year.

Waterbug Indicators		
Richness	EPT	Signal
16	5	3.8

Daylesford Clunes Road waterbug time series



TUL300

Tullaroop Creek, Mt Cameron-Glengower Road

Site Code: TUL300

GAPS Result: Possible

CRE700

BIR050

Creswick Creek, Purcell Road

Site Code: CRE700

GAPS Result: Possible

Birch's Creek at Werona-Kingston Road

Site Code: BIR115 Monitor: Michelle Matthews

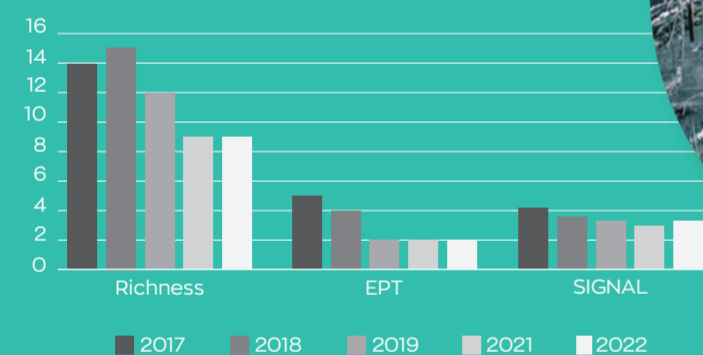
This site is downstream of the Hepburn Lagoon, which regularly tops up this section of the creek. This site continues to be affected by the mass removal of willows in 2017 with the loss of habitat, shade and exposed soil having a temporary negative impact on water quality and invertebrate population. Waterbug indicators in 2022 did not meet ALT objectives for a healthy ecosystem, in part due to heavy rainfall in the catchment in the month before the survey was conducted. Historically, these scores have been higher, and it is anticipated these indicators will begin to improve as revegetation continues to establish.

This site tested positive for three insecticides, one banned legacy insecticide and two of its breakdown products; five herbicides; three fungicides and one miticide no longer registered with the APVMA.

Platypus eDNA was detected at this site as part of the GAPS project in 2021.

Waterbug Indicators		
Richness	EPT	Signal
9	2	3.2

Werona-Kingston Road waterbug time series



Birch's Creek, Newlyn Reservoir

Site Code: BIR110 Monitor: Janet Wheatley

The most upstream monitoring site on Birch's Creek and immediately downstream of Newlyn Reservoir, water quality results here are largely influenced by the reservoir itself.

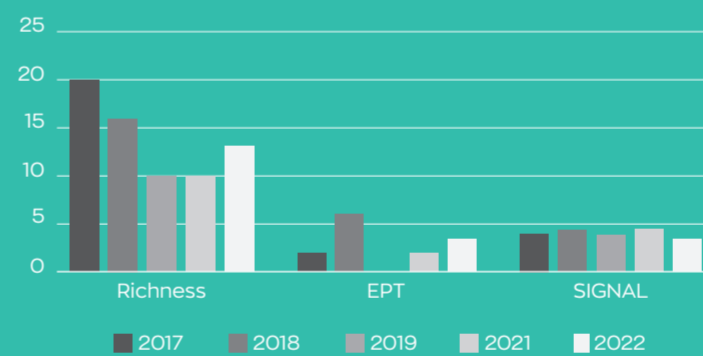
High turbidity can be attributed to a particularly muddy flow during July, possibly due to rainfall stirring up loose sediment, as noted by the monitor. A particularly high recording of reactive phosphorus was also recorded during this time which may be due to runoff from surrounding land, where fertilisers may be in use.

Platypus eDNA was detected at this site through the GAPS project in 2021, verifying the positive detection by EnviroDNA at this site in the same year.

This site tested positive for two insecticides, four herbicides, one of which is controlled, two fungicides, and one miticide, which is no longer registered with the APVMA.

Water Quality Indicators					Waterbug Indicators		
EC	pH (lower)	pH (upper)	Turbidity	PO4 (Mg/L)	Richness	EPT	Signal
181	7.1	7.2	35	0.025	13	3	3.5

Newlyn Reservoir waterbug time series



Birch's Creek, Andersons Mill

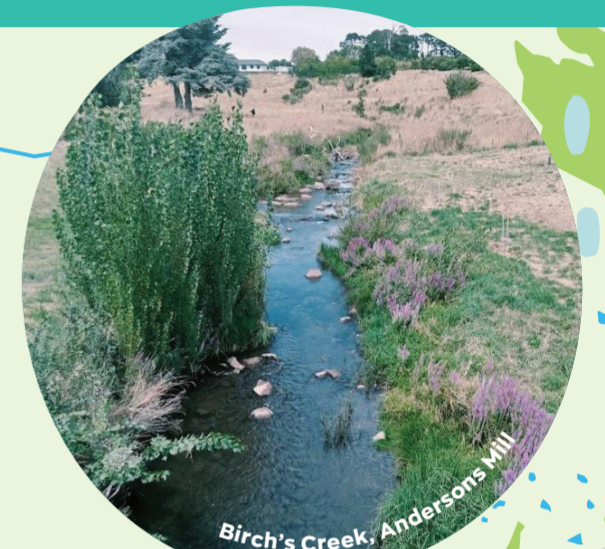
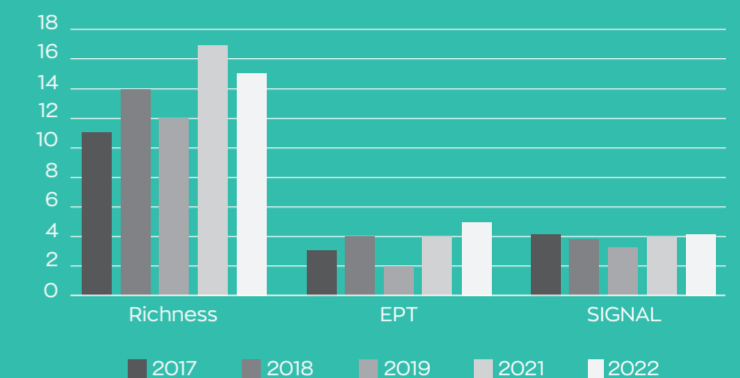
Site Code: BIR400 Monitor: Michelle Matthews

Near the township of Smeaton, the land use surrounding this area is primarily agricultural. Although waterbug species richness does not quite meet ALT objectives, EPT is close, and the SIGNAL score successfully meets that of a healthy ecosystem. EPT results have increased annually since 2019 and correlates with willow removal in 2018-19 and subsequent revegetation.

This site tested positive for four herbicides, one of which is controlled; one insecticide; one fungicide and one miticide no longer registered with the APVMA.

Waterbug Indicators		
Richness	EPT	Signal
15	5	4.2

Andersons Mill waterbug time series



BIR400

BIR115

Newlyn North

BIR110

Newlyn Reservoir



Interpreting results

The results in this report are based on citizen science data collected for the Tullaroop Catchment Restoration Project during 2022. Water Quality data was collected by WaterWatch monitors year-round and macroinvertebrate surveys were completed in late spring.

Water Quality parameters in this report have been analysed using new indicator levels for the North Central CMA region developed in 2022 by Leon Metzeling and David Tiller. These indicators advance upon the State Environment Protection Policy (SEPP) guidelines, used in previous snapshot reports, to determine the ecological health of a waterway. This project lies within the Central Foothills - Campaspe, Loddon, and Avoca sub-segment of the surface water geographic region of the new Environmental Reference Standard (formerly Cleared Hills Bioregion).

Four water quality parameters were monitored by WaterWatch volunteers: pH, electrical conductivity, reactive phosphorus, and turbidity. Site data was analysed for monitoring sites where there were five or more data entries and water quality results are the 75th percentile of all data entries at each site during 2022. For pH, the 25th percentile was also analysed to give an indication of the range of pH and diversion from neutral. The 25th percentile denotes the lower end of the range and the 75th percentile the upper end of the range of pH results during the 2022 calendar year.

Macroinvertebrate data was analysed at four sites in the project areas using Agreed Level Taxonomy (ALT) indexes for reference values of freshwater streams.

Samples were taken and analysed from four sites in the project area in November 2022 for the presence of pesticides as part of the pilot Pesticide Watch study. Results from the initial study are included in this report. Unless exempt from the registration requirement through the Australian Pesticides and Veterinary Medicines Authority (APVMA), unregistered chemical products are illegal and can be dangerous.

Water Quality Colour Coding

Sites have been colour coded and interpreted as follows:

- Good:** Water quality is acceptable and has minimal impacts on aquatic ecosystem health.
- Moderate:** Water quality and aquatic ecosystem health are moderately impacted.
- Poor:** Water quality and aquatic ecosystem health are largely impacted.
- Very Poor:** Water Quality and aquatic ecosystems are severely impacted.

Water quality indicator levels

Central Foothills - Campaspe, Loddon, and Avoca sub-segment

Indicator	Electrical conductivity (EC)	pH lower (25th percentile)	pH upper (75th percentile)	Turbidity	Reactive Phosphorus
Units	(µS/cm)	pH	pH	NTU	(mg/L)
Good	≤1,500	≥7.0	≤8.0	≤20	<0.025
Moderate	>1,500 ≤2,000	<7.0 ≥6.0	>8.0 ≤8.5	>20 ≤30	>0.025 ≤0.055
Poor	>2,000 ≤3,000	<6.0 ≥5.0	>8.5 ≤9.0	>30 ≤40	>0.055 ≤0.110
Very Poor	>3,000	<5.0	>9.0	>40	>0.110

Waterbugs Colour Coding

Sites have been colour coded and interpreted as follows:

	Percentile of index values	ALT Richness	ALT EPT	ALT SIGNAL
Meets or exceeds ALT objectives for a healthy ecosystem Key processes and/or water quality may be slightly impacted, however, most habitats are intact.	30th	≥21	≥6	≥4.2
Close to meeting ALT objectives for a healthy ecosystem Many key processes are not functional; water quality and/or habitat are moderately impacted.	5th - 30th	>16 to <21	>3 to <6	>3.5 to <4.2
Does not meet ALT objectives for a healthy ecosystem Most key processes are not functional and water quality and/or habitat is severely impacted.	5th	≤16	≤3	≤3.5

Glossary

ALT Agreed Level Taxonomy, is the current methodology implemented in Citizen Scientist macroinvertebrate surveying, to aid in the assessment of river and wetland health. The method involves identifying the features and movements of living organisms and means invertebrates can be returned to their waterway after data is collected.

Richness Refers to each unique genus identified using the ALT method. Generally, higher diversity of invertebrates reflects a healthier ecology.

EPT Ephemeroptera, Plecoptera and Trichoptera, refers to three orders of highly sensitive invertebrates, respectively; mayflies, stoneflies, and caddisflies (identified in their aquatic larval stages) found within Victorian waterways, with a particularly low sensitivity to pollution. Identification of a high count and richness of these invertebrates typically represents a healthy, unpolluted waterway.

SIGNAL Stream Invertebrate Grade Number - Average Level, is a simple index which determines each macroinvertebrate's tolerance of pollution. An abundance of macroinvertebrates with both high and low SIGNAL scores is indicative of a healthy waterway ecosystem.

North Central CMA

Tullaroop Project Area

Want to get involved?

We're calling on the local community to help keep a watchful eye on the health of waterways in the Tullaroop catchment.

Citizen scientists are supported to help build people's knowledge of waterway health and contribute vital data to the project team.

If you'd like to get involved and become a volunteer citizen scientist, please register your interest with one of our Citizen Science project officers at:

Email: citizenscienceteam@nccma.vic.gov.au

Ph.: (03) 5448 7124

Office: 628-634 Midland Hwy, Huntly Victoria 3551

Acknowledgement of Country

The North Central Catchment Management Authority acknowledges Traditional Owners and Aboriginal and Torres Strait Islander peoples within the region, including their rich culture and enduring spiritual connection to Country. We also recognise and acknowledge the contributions and interests of Aboriginal peoples and organisations in land and natural resource management.

Acknowledgments

The project builds on previous Victorian Government investment into waterway health by working with Central Highlands Water and other partner agencies, Traditional Owners and the community by delivering recommendations outlined in the Tullaroop Integrated Catchment Management Plan (ICMP).

North Central CMA would like to acknowledge the outstanding contributions made by WaterWatch volunteers, Traditional Owners and project staff involved within the Tullaroop Catchment.

References:

Griffith, J. et al., 2022, Platypus Results Report – The Great Australian Platypus Search Victoria 2021, EnviroDNA, downloaded from <https://www.thegreataustralianplatypussearch.org/results-2021>



The Victorian Government is supporting community partnerships over the next four years through WaterWatch and other citizen science initiatives to address local waterway priorities. These priorities are being addressed as part of the Victorian Government's \$222 million Water for Victoria investment over the next four years to improve catchment and waterway health across regional Victoria.



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