Tullaroop Catchment

Citizen Science Project
River Health Snapshot Report 2021

WATERWATCH
North Central
Communities Caring for Catchments

North Central Waterwatch and the Tullaroop Catchment Restoration Project team have been monitoring the health of waterways in the Tullaroop catchment.

Citizen scientists are playing an important role in helping natural resource managers make better decisions about the management of our region's waterways.

Although the COVID-19 pandemic made it difficult for citizen science volunteers to collect regular water quality monitoring data during 2021, environmental DNA (e-DNA) and waterbug monitoring were able to be undertaken, with some positive results.

The Tullaroop catchment is part of the Loddon River Basin featuring highly productive agricultural land, significant wetlands, terrestrial habitats, and sites of significance to Traditional Owners, the Djaara people. It also supports the elusive platypus and regionally significant populations of river blackfish and is an important drinking water and irrigation supply.

Historical land management practices have resulted in extensive loss of riverside vegetation, which impacts both water quality and ecosystem health. The North Central Catchment Management Authority's Tullaroop Catchment Restoration Project is working together with the community to improve this through fencing and off-stream stock watering, revegetation, weed control and reinstatement of instream woody habitat (snags).

The project seeks to create a healthy, continuous riparian corridor along Birch's and Tullaroop creeks. We aim to improve waterway health and habitat for river blackfish and platypus, among other species.

We also aim to improve water quality in the Tullaroop Reservoir, which supplies drinking water to the township of Maryborough and irrigation water for downstream users. Improved water quality will also result in reduced incidence of blue-green algae blooms.

Citizen science data helps us to understand and report on the condition of our waterways. It's an important step for guiding waterway management decisions and demonstrating management outcomes.

Environmental DNA monitoring

All animals naturally shed genetic material in the form of skin cells, hair, and faeces. Environmental DNA (eDNA) sampling is the process of collecting this genetic material (DNA) from a waterway to determine which species exist there.

Compared to traditional capture and release methods, eDNA sampling provides an easy, cost-effective, accurate, and non-invasive method of confirming the presence or absence of a species.

With basic training and the right equipment, the sampling method is easy and a great way for volunteer citizen scientists to become involved. A small sample of water from the waterway is forced through a superfine filter where the DNA is collected. The filter is then sent to a laboratory where technicians detect the DNA of specific species, in this case platypus and river blackfish.

Platypus have recently been listed as Vulnerable in Victoria due to loss of quality habitat, which can be attributed to river regulation, native vegetation clearing, eroded banks and infestation of weeds, including willow. Poor water quality can also lead to a loss of their food source; waterbugs.

Once common throughout most of Victoria, river blackfish populations have declined over the past few decades. Their numbers are impacted by siltation, loss of fringing vegetation, removal of instream woody habitat, competition and predation from introduced fish species, altered flows and poor water quality.

Because of the requirements of platypus and river blackfish, they are great indicator species, meaning if they are present, the conditions will be good enough for many other species, too.

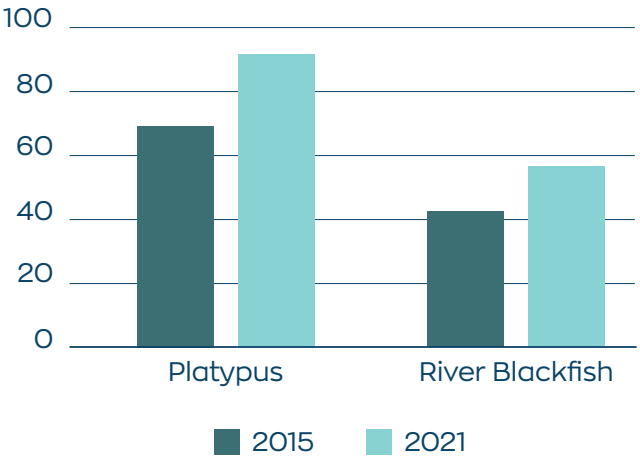
Repeat sampling for eDNA occurred at 25 sites across Tullaroop, Birch's, and Creswick creeks in 2015 and 2021. The aim was to detect population change on the back of extensive creek rehabilitation efforts undertaken by the North Central CMA. EnviroDNA undertook the sampling in September 2021, with support from North Central CMA and Djandak staff.

Results show an increase of both platypus and river blackfish from 2015 to 2021. Platypuses were detected at 92 per cent of sites in 2021 compared with 69 per cent in 2015. River blackfish were detected at 56 per cent of sites, compared with 42 per cent in 2015.

Their range has increased too; in 2015, neither platypus or river blackfish were detected in Creswick or Tullaroop creeks (only in Birch's Creek), however they were detected in all three creeks in the 2021 surveys.

On-ground works completed under the Tullaroop Catchment Restoration Project have improved the quality of habitat throughout Birch's and Tullaroop creeks, and it is possible these works have led to an increase in the occurrence of platypus and river blackfish in the catchment.

eDNA results



Macroinvertebrate monitoring

Aquatic macroinvertebrates (waterbugs) are small creatures that have no backbone and can be seen with the naked eye. They live all or part of their life in the water, providing a source of food for larger animals such as fish, frogs, birds and platypus and are a vital part of a healthy waterway.

Waterbug monitoring is a valuable tool and can help to build an important picture about the health of a waterway and track changes over time.

Waterbugs are excellent indicators of ecosystem health as they can be affected by physical, chemical, and biological conditions of a waterway. Increased sediment, nutrients or temperature and loss of habitat such as instream woody habitat (snags) and plants can all have an impact.

Some waterbugs are more tolerant - of pollution or unfavourable conditions - than others, so by taking a sample from a given waterway and then understanding their sensitivity levels, we can learn a lot about the state of the waterway. If we find only very tolerant waterbugs then the waterway is likely to be polluted or otherwise uninhabitable to the sensitive waterbugs. If we have a good range of waterbugs, including the sensitive ones, then we are likely to be looking at a healthy waterway. In this report, sensitivity is indicated by the EPT score.

The Agreed Level Taxonomy (ALT) method is used to classify and identify waterbugs. The method uses features visible to the naked eye to identify live waterbugs, without the need for microscopes, laboratories, and scientific jargon.

Sampling is done with a fine weave net following a defined methodology. Identification can be completed in the field and can provide a snapshot assessment of the health of a site in around two hours.

Overall summary of results

The 2021 waterbug monitoring results may reflect an ecosystem still in a recovering phase following several years of disturbance from on-ground works. Waterbug monitoring alone cannot tell a full story. The absence of water quality monitoring in the project area has seen a recent push to recruit additional Waterwatch volunteers, to add to the data set.

The addition of eDNA monitoring, indicating relatively healthy platypus and river blackfish populations, provides further insight. Being good indicator species, their presence provides a more positive picture than that of the macroinvertebrate monitoring data alone. Seeing an increase in platypus and river blackfish numbers from 2015 to 2021 is a good indication the catchment is in a recovery phase. Ongoing and increased monitoring will help to demonstrate this.

To Loddon River

Tullaroop Creek

Birchs Creek

Creswick Creek

Clunes

Smeaton

Kingston

Hepburn Lagoon

Newlyn North

Newlyn Reservoir

NC_BIR050

NC_BIR400

NC_BIR115

NC_BIR110

Birch's Creek, Daylesford Clunes Road

Site Code: NC_BIR050

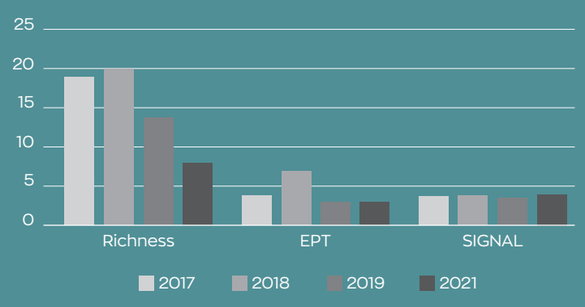
Compared with previous years, data collected in spring 2021 sees a decline in macroinvertebrate richness objectives, while EPT and SIGNAL scores remain fairly stable, both being close to meeting Agreed Level Taxonomy (ALT) objectives (see 'Interpreting Results' for more information).

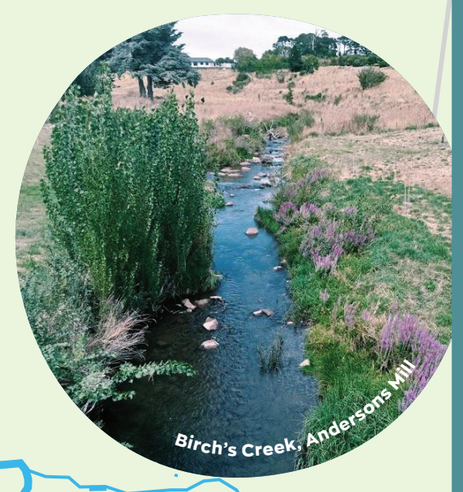
As with much of Birch's Creek, the surrounding and upstream land use is primarily agriculture and minimal riparian widths occur along most of its length. Extensive works have occurred in recent years to improve this, with fencing and off-stream water troughs installed to keep stock out of the creek, weed control and revegetation with native species. Annual waterbug sampling will continue to monitor the longer-term change.

Interestingly, both platypus and river blackfish were positively detected at this location in 2021.

Richness	EPT	SIGNAL
8	3	4.1

Daylesford Clunes Road waterbug time series





Birch's Creek, Andersons Mill

Site Code: NC_BIR400 **Monitor:** Michelle Matthews

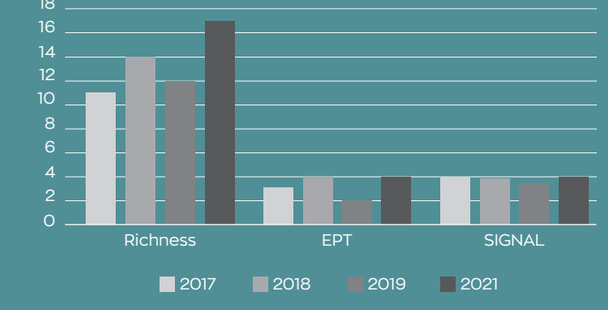
The site is directly west of the township of Smeaton, surrounded by agricultural land. Willows at the site were removed between the 2018 and 2019 waterbug sampling events, likely contributing to the sharp decline in the macroinvertebrate scores over this time.

In 2021 we begin to see a gradual improve in overall results. The removal of willows has provided the opportunity to revegetate with native plants, which will stabilise banks and create habitat. In future years we anticipate a return to at least the 2017 results as native vegetation continues to establish.

eDNA from both platypus and river blackfish were positively detected at this location in 2021.

Richness	EPT	SIGNAL
17	4	4.1

Andersons Mill waterbug time series



Birch's Creek at Werona-Kingston Road

Site Code: NC_BIR115 **Monitor:** Michelle Matthews

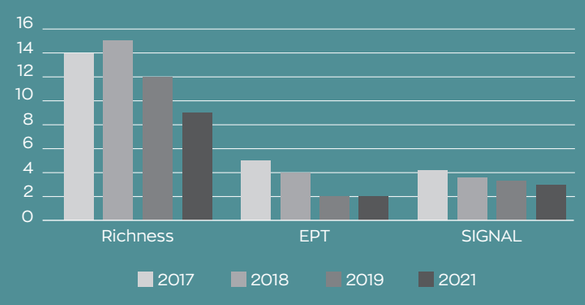
The site, located below the junction of Birch's Creek and Langon's Creek, receives regular overflows from Hepburn Lagoon. Macroinvertebrate monitoring in 2021 shows the site falling short of meeting ALT objectives. It is worth remembering however, that water quality monitoring was unable to be undertaken regularly during the pandemic and, as such, we are unable to get a complete picture of ecosystem health.

Following extensive willow removal in 2017, it is anticipated that water quality at the site will improve as vegetation matures and habitat is rehabilitated, leading to improvements in macroinvertebrate scores in future years.

River blackfish was positively detected at this location in 2021.

Richness	EPT	SIGNAL
9	2	3.0

Werona-Kingston Road waterbug time series



Birch's Creek, Newlyn Reservoir

Site Code: NC_BIR110

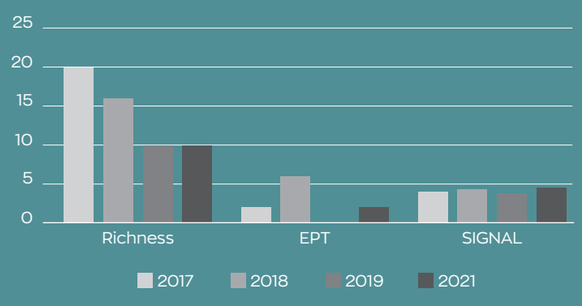
This site along Birch's Creek is immediately downstream of Newlyn Reservoir.

The 2021 macroinvertebrate sampling indicates the richness and EPT scores do not meet ALT objectives. The signal score continues to remain steady throughout the 5-year period of monitoring, meeting the objectives with a score of 4.5, the highest score of all sites in 2021.

Platypus was positively detected at this location in 2021.

Richness	EPT	SIGNAL
10	2	4.5

Newlyn Reservoir waterbug time series



Interpreting results

The results in this report are based on the analysis of macroinvertebrate monitoring data collected in spring 2017, 2018, 2019 and 2021. The report provides a baseline assessment of the current condition of Birch's Creek using citizen science data.

The Victorian Government has a set of guidelines that provides limits to acceptable water quality levels and macroinvertebrate indices for healthy ecosystems. These levels are based on biological characteristics assigned to parts of the catchment which is determined by its position in the region.

In this program, the catchments lie within the Cleared Hills Bioregion.

Three indices are calculated using macroinvertebrate data, assessed against Agreed Level Taxonomy (ALT) reference condition values.

Each site was assessed against these reference condition values and are calculated based on information known for the area, as if it was in the best available condition for that region.

Waterbugs Colour Coding

Sites have been colour coded and interpreted as follows:

Meets or exceeds ALT objectives for a healthy ecosystem (>30th percentile of index values for reference sites). Key processes and/or water quality may be slightly impacted however most habitats are intact.

Close to meeting ALT objectives for a healthy ecosystem (5th—30th percentile of index values for reference sites). Many key processes are not functional; water quality and/or habitat are moderately impacted.

Does not meet ALT objectives for a healthy ecosystem (<5th percentile of index values for reference sites). Most key processes are not functional and water quality and/or habitat is severely impacted.

Symbols

Richness is the number of different types of macroinvertebrates at a site; sites with higher taxa richness are generally in better ecological condition.

EPT is the number of different types of stoneflies, mayflies and caddisflies at a site; low diversity of these sensitive macroinvertebrates may indicate ecological disturbance at a site.

SIGNAL indicates the pollution tolerance of the macroinvertebrate community at a site. Each type of macroinvertebrate is assigned a value between one (tolerant) and 10 (sensitive) based on pollution tolerance or intolerance. The ALT Signal Index is the average of these values.

A site in good ecological condition, based on the ALT objectives, meets the following targets:

Richness	EPT	SIGNAL
21	6	4.2

Want to get involved?

If you're passionate about your local environment, then we need your help!

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

If you live in the project area (see map) and would like to become a volunteer citizen scientist, please register your interest with our Citizen Science project officer at citizenscienceteam@nccma.vic.gov.au or (03) 5448 7124

Acknowledgments

North Central Waterwatch, together with the Tullaroop Catchment Restoration Project, acknowledges our dedicated citizen science volunteers and Traditional Owners, First Nations People and Djandak staff involved in the monitoring programs. Your contribution, commitment and support have contributed greatly to our understanding of the catchment and towards developing this report.

Acknowledgment of Country

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

Birch's Creek

Birch's Creek Waterbugs

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 Water for Victoria investment to improve catchment and waterway health across regional Victoria.

VICTORIA State Government | Environment, Land, Water and Planning
North Central CMA
WATERWATCH North Central Communities Caring for Catchments
CENTRAL HIGHLANDS WATER
Dja Dja Wurrung Clans Aboriginal Corporation
GOULBURN-MURRAY WATER