Publication 1697 April 2018 **Case study**

Overview

Caring for Waterhole Creek was a project under EPA Victoria's Citizen Science Program. The project combined the knowledge and expertise of both EPA and the community to understand the existing environmental conditions of Waterhole Creek in the Latrobe Valley. The project engaged the community in the scientific work that underpins our decision making and created a two-way working relationship between EPA and the Victorian community, promoting a shared understanding of important environmental issues.

The results from the Waterhole Creek sampling are typical of a waterway surrounded by mixed land uses including an urban area like Morwell. Data collected through this project creates valuable baseline information, which will enable EPA to better understand the scale and potential sources of any water quality issues in the future.

Waterhole Creek

Waterhole Creek is located in the Latrobe Valley within a catchment of mixed land uses, including natural forest, agriculture, industry, plantation forest and urban areas. From its headwaters in Jeeralang, the creek flows north through the township of Morwell before joining Wades Creek and eventually the Latrobe River in Maryvale. Bennetts Creek is a major tributary, draining from Hazelwood North and flowing into Waterhole Creek just upstream of Morwell.

Waterhole Creek is greatly valued by the community. The creek provides recreation areas, cultural sites and habitat for a range of flora and fauna.

Project design

Caring for Waterhole Creek involved water quality monitoring at 10 sites within the Waterhole Creek catchment. Citizen scientists participated in the co-design of the study by contributing local knowledge that identified sampling sites and potential pollutants of interest based on historical land use. Co-monitoring then involved citizen scientists being trained in monitoring techniques before undertaking fortnightly sampling, which was complimented by additional sampling by EPA scientists. Afterwards, EPA and citizen scientists came together to co-interpret data collected.

The fortnightly monitoring included collecting data on water temperature, pH, turbidity, electrical conductivity and ammonia from February 2017 – November 2017.

After this initial monitoring, several one-off sampling events were conducted to gain a more comprehensive understanding of the environmental health of the creek including:

- sediment sampling for metals
- macroinvertebrate (waterbug) sampling and identification
- environmental DNA (e-DNA) testing for the state and federally listed threatened fish species dwarf galaxias, *Galaxiella pusilla*.

Further information and updates

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How EPA assesses water quality

EPA uses several guidelines to assess water quality in Victorian waters. These guidelines assist EPA in identifying if pollution levels are likely to be harmful to the environment or human health. The data in this project was assessed against the 2018 draft State Environment Protection Policy (SEPP) (Waters).

Until the Caring for Waterhole Creek project, there was not enough data collected in Waterhole Creek to asses against the SEPP guideline values. However, the creek has been considered to be in poor condition according to the West Gippsland Catchment Management Authority Waterhole Creek Waterway Management Plan.

Results

The results are also summarised in a map provided at Figure 1.

Water quality

Electrical conductivity, which was used as a measure of salinity, was high at all sites, leading all sites to exceed at least one SEPP guideline value in the water quality results. This is not an unusual observation in many areas across Victoria. In some areas, this is a natural occurrence due to geology or groundwater, however it can also be because of land clearing, water extraction and altered hydrology.

Turbidity is a measure of the cloudiness of water caused by small particles in the water.

As demonstrated in Figure 1, high turbidity was noted at site 3 and site 10.

Site 10 is a new wetland; this result is not unexpected as the bed of the wetland contains significant amounts of clays which can stay in suspension

and cloud the water column for some time.

These high turbidity readings are not unusual in areas with exposed sediment nearby such as at site 3 which is immediately downstream of a railway line. The exposed sediment upstream may enter the creek after rainfall and cause high turbidity.

Macroinvertebrates

Macroinvertebrates, or waterbugs, are a group of diverse animals including worms, leeches, crustaceans and insects. Macroinvertebrates are used as a biological indictor of stream health based on the knowledge that different types of macroinvertebrates are known to have different tolerances to environmental degradation (for example, pollution). By identifying the different macroinvertebrate families at a site, the health of aquatic ecosystems can be assessed.

To do this, we used an index called SIGNAL2 (Chessman, 2003) which provides a site score between 1 and 10, with a higher score indicating a better-quality site.

When this index score was compared to the SEPP guidelines, 7 of 10 sites passed, which is a very positive result for the catchment.

Ammonia

High levels of ammonia are toxic to aquatic life, especially fish and molluscs. In excess, ammonia is difficult for fish to excrete from their bodies, and can build up and cause potential death.

Ammonia concentrations above the SEPP guideline value were found at site 9.

To better understand the issue at site 9, three months of additional sampling was undertaken. The sampling focused on three sites; site 9, upstream at site 8, and downstream at site 6. No further high ammonia results were recorded. The source for this ammonia is currently unknown and can be difficult to trace when it occurs intermittently.

Metals

Metals occur naturally in the environment and sometimes at high levels. However, they are often found in elevated concentrations because of human activity associated with industrial, agricultural and urban land uses.

Table 1 – Site details

Site	Name
1	Waterhole Creek at Government Rd
2	Waterhole Creek at Ti Tree Rd
3	Waterhole Creek at Kernot Hall
4	Waterhole Creek at Hourigan Rd
5	Waterhole Creek at MERA Park
6	Waterhole Creek at Crinigan Rd
7	Wades Creek off Old Melbourne Rd
8	Bennetts Creek at Boldings Rd
9	Bennetts Creek at Commercial Rd
10	Wetland at Firmins Lane

At certain concentrations, metals can impact the ability of aquatic species to behave normally, grow, break down food and chemicals, and reproduce.

The following metals were found at concentrations exceeding SEPP guideline values:

- zinc – found at sites 2, 3, 4, 5, 6, 9 and 10
- lead - found at site 3
- nickel - found at site 1
- mercury - found at site 10.

Zinc is a very common signature of urban run-off, most often because of storm water entering waterways following run-off from roads and corrugated iron roofing which can contain zinc. The sites with elevated zinc in this study were located predominately around the township of Morwell, the area of the catchment with the greatest urban development.

The elevated lead, nickel and mercury results found are most likely due to local geology or modified land uses around the sampling sites.

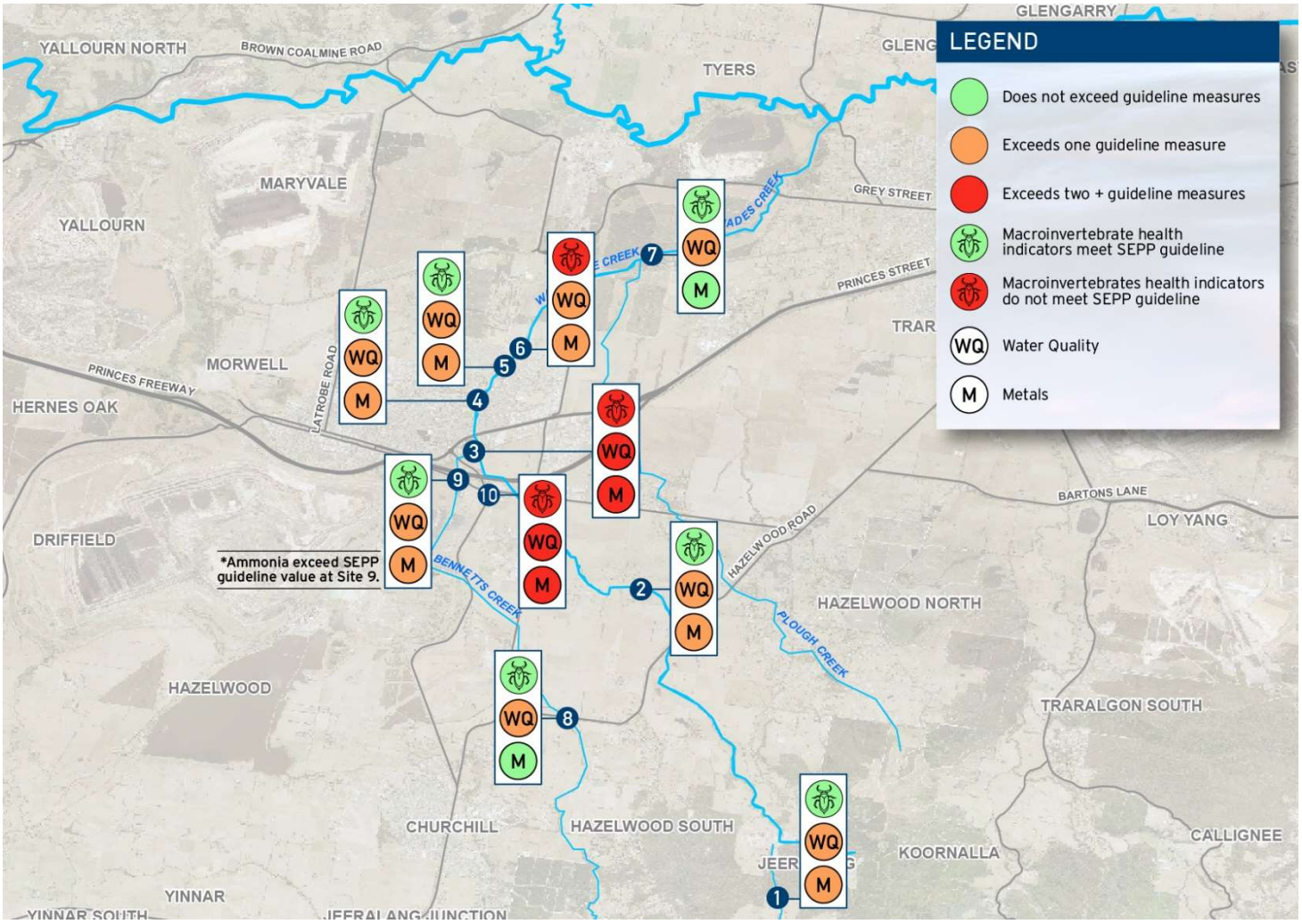

Figure 1 – Map of Waterhole Creek water quality results

Identification of dwarf galaxias

Dwarf galaxias is listed in the Waterhole Creek Waterway Management Plan as a species of significance in the region. Dwarf galaxias favour stagnant, swampy environments. Drains, backwaters of creeks and slow-flowing streams provide ideal habitat in the mid to lower reaches of Waterhole Creek.

e-DNA sampling is a technique that analyses DNA in a filtered water sample. e-DNA sampling revealed a partial result for dwarf galaxias at site 7. Small amounts of DNA can be transported by birds, so this result was determined inconclusive.

Although no conclusive DNA was found, a dwarf galaxias larva (newly hatched fish) was identified during macroinvertebrate analysis from a sample taken at site 7.

Conclusions

The results from the Waterhole Creek sampling are typical of a waterway surrounded by mixed land uses, including urban areas like Morwell. The sites with a greater number of metal and water quality exceedances were found closest to the town center. With this baseline information, EPA will be able to better understand the scale and potential causes of water quality issues in the future.

We will continue to work with the community and the West Gippsland Catchment Management Authority to ensure the waterway is managed appropriately and highlight the interest in forming a community group to ensure protection and management.

Acknowledgements

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References

Chessman BC 2003 ‘New sensitivity grades for Australian river macroinvertebrates’ *Marine and Freshwater Research* Volume 54, 95-103.