

Analysis of Water Quality in Parkerson Mill Creek

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The headwaters of Parkerson Mill Creek are on the Auburn University campus, near Beard-Eaves Coliseum and Donahue Street in Auburn, Alabama. Parkerson Mill Creek flows south through Auburn until it reaches a confluence with Chewacla Creek, south of the Chewacla State Park. Parkerson Mill Creek is on the Alabama Department of Environmental Management 303 (d) list of impaired water bodies, meaning the creek does not meet water quality standards. Poor water quality in Parkerson Mill Creek could lead to poor water quality in downstream waterbodies as well. Our goal was to measure the spatial distribution of water quality and pesticide/herbicide concentrations along the creek to determine sources of contamination.

Sample sites were selected north and south of the Chewacla Creek –Parkerson Mill Creek confluence to compare variation in water quality (Figure 1). One of the sample sites was also selected in close proximity to Auburn's wastewater treatment plant outfall into Parkerson Mill Creek. Samples were collected on 03/06/2021 and 04/09/2021.

A YSI Multiprobe™ was used to collect *in situ* water quality data, such as pH, temperature, conductivity, and dissolved oxygen (DO). At each site 500 milliliters of water were collected and sent to the Pesticide Residue Laboratory and screened for atrazine, acetochlor, bifenthrin, diazinon, ethalfuralin, fipronil, and alathion. These compounds were selected due to their prevalence in nearby areas conducted in a similar study (Glinski et al., 2018) and for their potential dangers to the environment and public health when above Environmental Protection Agency (EPA) standards. One to two milliliters were taken from each sample bottle for *E. coli* enumeration using Coliscan Easygel™.

The results of our study are summarized in Table 1. No pesticides were detected throughout the course of this study by either our contaminants laboratory or the Pesticide Residue Laboratory. Water at all sample sites was well oxygenated, with dissolved oxygen concentrations ranging from 10.2 to 13.21 mg/L. However, the *E. coli* concentration in the water at site 1 was well above the

maximum limit of 235 colony forming units/100 mL. This result could be due to areas of construction or agricultural runoff that we observed are upstream of site 1. Sample sites 3,6,4 and 5 have lower *E. coli* concentrations that meet the water quality criteria. All of these sites are located after the wastewater treatment outfall, which suggests the stream water is diluted by the treated effluent from the plant. The effects of the effluent are also reflected in other data collected. For example, we observed an increase in temperature and conductivity immediately after the outfall (site 3), then a slow decrease in those parameters further downstream (sites 6, 4 and 5). Together, these data suggest that the wastewater treatment plan does impact water quality, but it is not a source of *E. coli* in this stream segment. Our results suggest that future studies should focus on upstream sources of *E. coli* to pinpoint areas of poor water quality along Parkerson Mill Creek.

Statement of Research Advisor

Kerstin's project took a couple of unforeseen twists and turns because of travel restrictions associated with the COVID-19 pandemic. She persevered and was able to readjust her project to focus on Parkerson Mill Creek, here in Auburn. Throughout her fellowship term, she learned skills in geographic information systems, water quality measurements, contamination dynamics. She also practiced her presentation skills by sharing her work in our lab group meetings. Overall, her study helps us understand the impact of the wastewater treatment effluent on water quality in Parkerson Mill Creek, and it has helped us narrow the focus of future research to upstream sources of *E. coli* contamination.

–Ann Ojeda, Geosciences

References

Glinski, D.A., Purucker, S.T., Van Meter, R.J., Black, M.C., Henderson, W.M., 2018. Analysis of pesticides in surface water, stemflow, and throughfall in an agricultural area in South Georgia, USA. *Chemosphere* 209, 496–507. <https://doi.org/10.1016/j.chemosphere.2018.06.116>



Figure 1: Sample sites for Parkerson Mill Creek. Streams are represented in blue; Sample sites are shown in red. The background layer was taken from Google Earth™.

Table 1. Sample results from the Parkerson Mill Creek Study. The sample sites are arranged in order from upstream to downstream.

Sample Site		pH	Temperature (°C)	DO (mg/L)	Conductivity (µs/cm)	<i>E. coli</i> Concentration (cfu/100ml)
Upstream of the outfall	1	5.97	12.17	13.21	130	400
	2	6.45	12.23	11.33	130	-
At the outfall	3	6.41	15.09	11.73	213	100
Downstream of the outfall	6	6.99	15.21	11.07	202	150
	4	6.88	13.56	10.2	94	200
	5	7.07	13.6	11.03	96	250