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Seasonal Variation of *E. coli* Abundance and Antibiotic Resistance Patterns in Water and Sediment Samples From Two Creeks With Different Potential Fecal Contamination Sources.

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Abstract

Escherichia *coli* has served as the primary indicator for fecal contamination for the past 30 years, but more recent studies suggest that this bacteria may survive the cold weather in the soil making it difficult to tell whether it is new contamination or old contamination. Studies have found that exposure to various contaminants such as heavy metals, water treatment chemicals, agricultural runoff, fecal contamination, and antibiotics, creates an increase in the resistance of the microbes exposed to it. Wastewater treatment facilities, animal hospitals and wastewater sites increase the bacterial load and the prevalence of antibiotic resistance of bacteria residing bacteria in these watersheds. This research analyzed the prevalence, the antibiotic resistance, and the seasonal distribution of E. *coli* found in liquid and sediment samples from Thorn Creek and Deer Creek. It was hypothesized that where the highest potential for fecal contamination and nutrient loading exist would show increases in *E. coli* and changes to and increases in resistance to a variety of antibiotics. Thorn Creek and Deer Creek water and sediment were sampled and tested accordingly in late summer and mid-autumn. Both *E. coli* and coliform bacteria were enumerated. E. coli was then isolated and tested for antibiotic resistance patterns. The results found that there were spikes in E. *coli* counts at various intervals along the stream, with both expected results and some that did not support the original hypothesis. Differences in antibiotic resistance patterns among isolated *E. coli* were not significant, although some changes were apparent. The seasonal distribution of the E. *coli* was higher the liquid samples from those collected in summer having significantly more than those in autumn and spikes occurred at sites predicted to be higher based on potential fecal contamination. The sediment samples were still found to be contaminated with E. *coli* even after freezing. The data analysis revealed that resistance patterns were not heavily influenced by the potential fecal contamination as predicted. However, this research does suggest that *E. coli* may not be the most accurate indicator of fecal contamination as it is retained in the sediment well after it likely entered the ecosystem and if the resident E. coli are disturbed could falsely indicate novel fecal point source contamination.