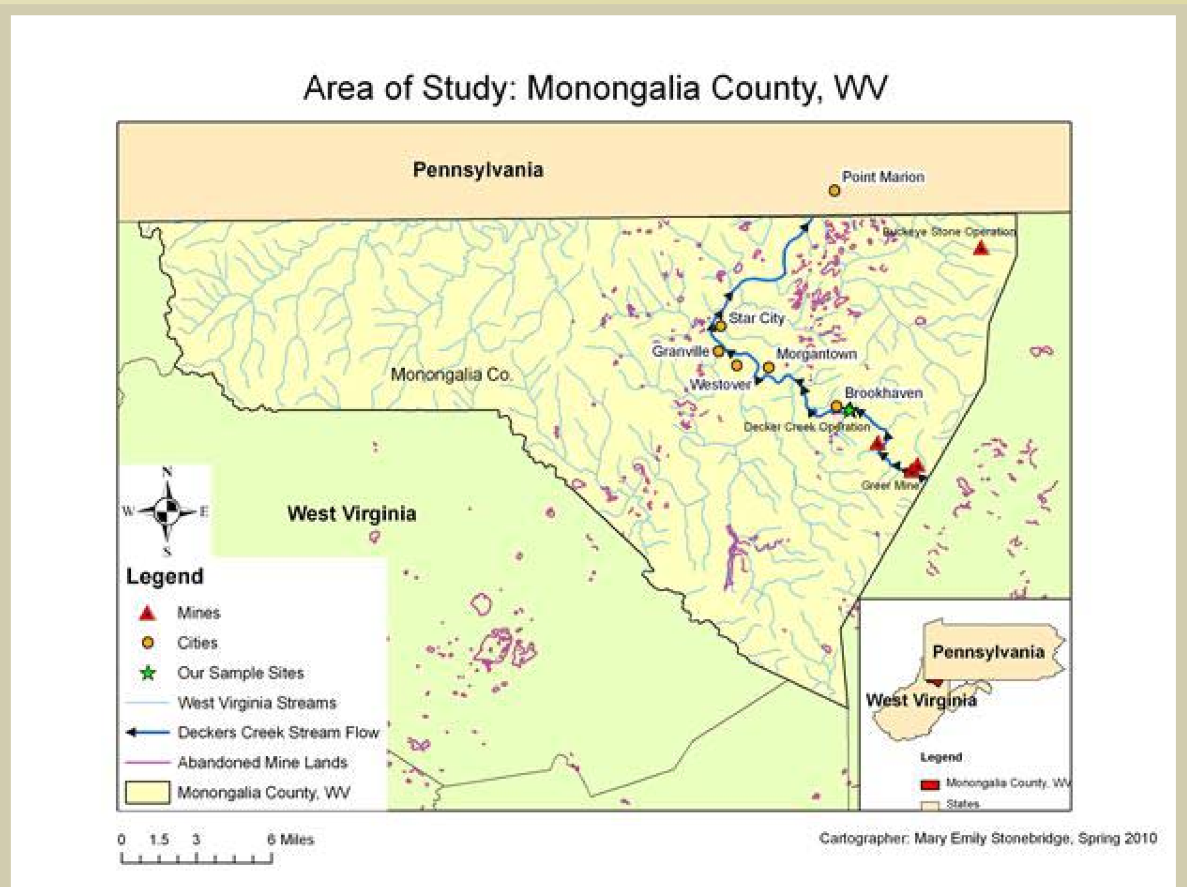
Composition, Origin, and Influences of Soils From Deckers Creek

ABSTRACT

Acid mine drainage (AMD) can be devastating on local ecosystems and human activities. AMD occurs when runoff from mines enters groundwater and eventually finds its way into streams and rivers. Due to the geographical location of the Decker's Creek watershed in relation to a number of active and inactive mines, we would expect to find evidence of acid mine drainage along Decker's Creek and its tributaries. This polluted water will be deposited in the soils that are adjacent to these waterways. In order to determine whether or not acid mine drainage is contaminating the soils, we have chosen a sample site along Decker's Creek near Morgantown WV. We will perform laboratory analysis on our soil samples to determine whether the chemical composition of these soils includes indicators of acid mine drainage.

INTRODUCTION

The underlying lithology of the area includes sedimentary rock which generally contains pyrite. When pyrite is introduced to water it oxidizes lowering the pH and producing ferric iron. The area in which the samples were obtained experiences seasonal flooding during the winter and spring months. The surrounding soils at sample sites are classified as Lobdell-Holly which have moderate to low permeability. The slow drainage of these soils means they trap minerals or precipitants in soil during periods of peak stream discharge. Given the proximity of abandoned mine land and active mining operations to our sample sites, we expect to find indicators of acid mine drainage in our results. Indicators of acid mine drainage would include low pH, high aluminum, and ferric iron content.

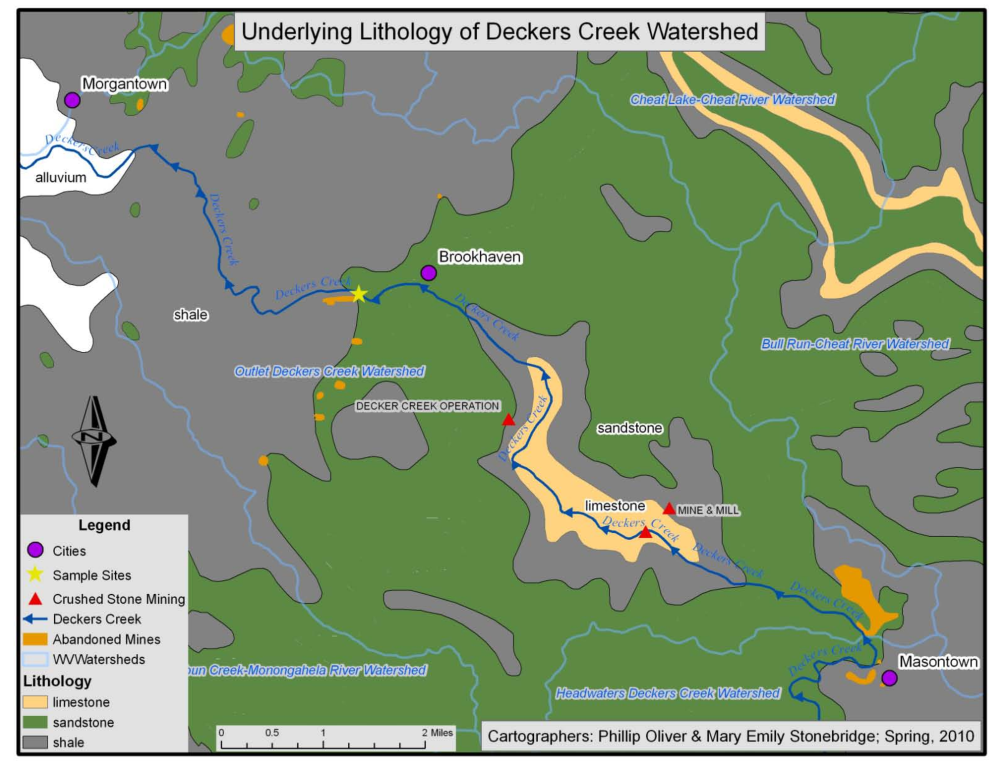


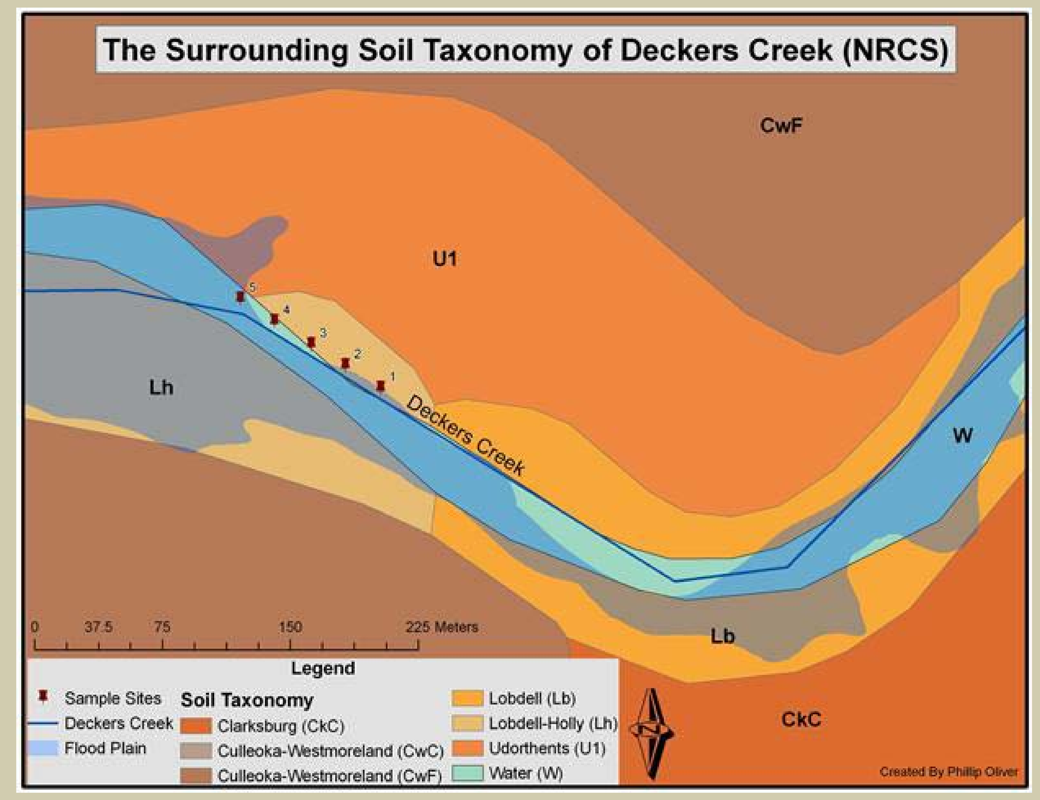
METHODS

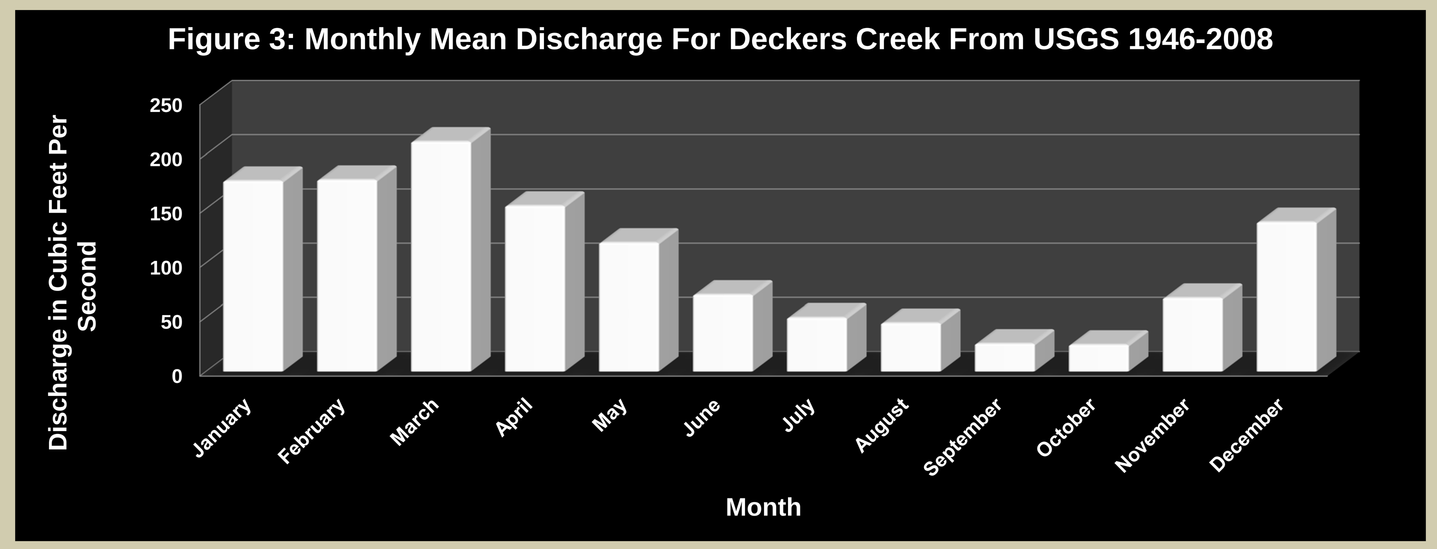
Five soil samples were taken in 25 m increments at the sample site along Decker's Creek. On site, LaMotte Soil pH Field Tests were performed and the soil color using the Munsell color scale was recorded to identify the soil type. The samples were bagged individually and brought back for analysis in the lab at KSU. The soil samples were put into a 2mm sieve and sifted to separate any organic particles and anything larger than 2mm. Test were performed with a LaMotte Soil Test Kit to determine levels of Aluminum, Ferric Iron, and pH.

RESULTS

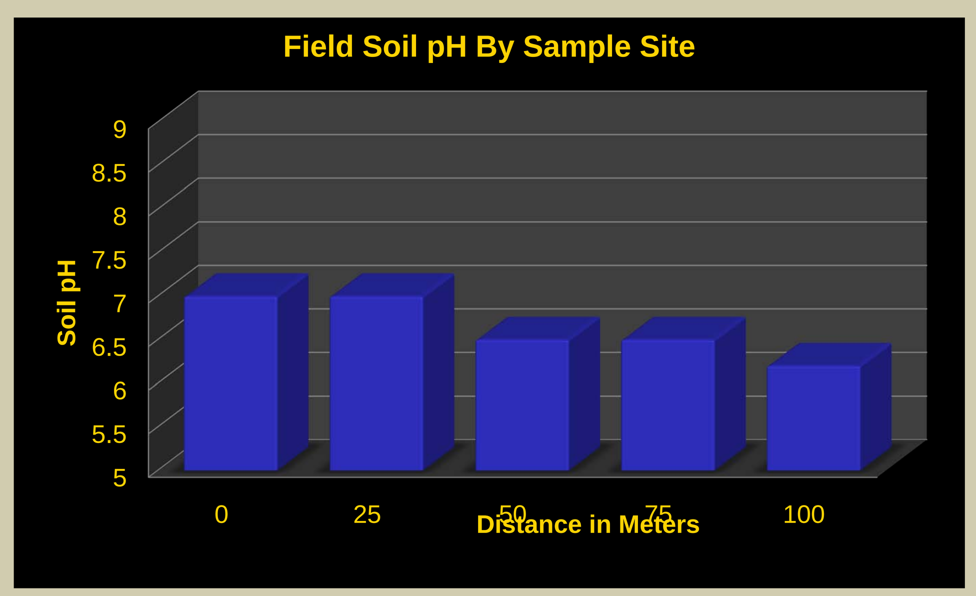
FIELD DATA

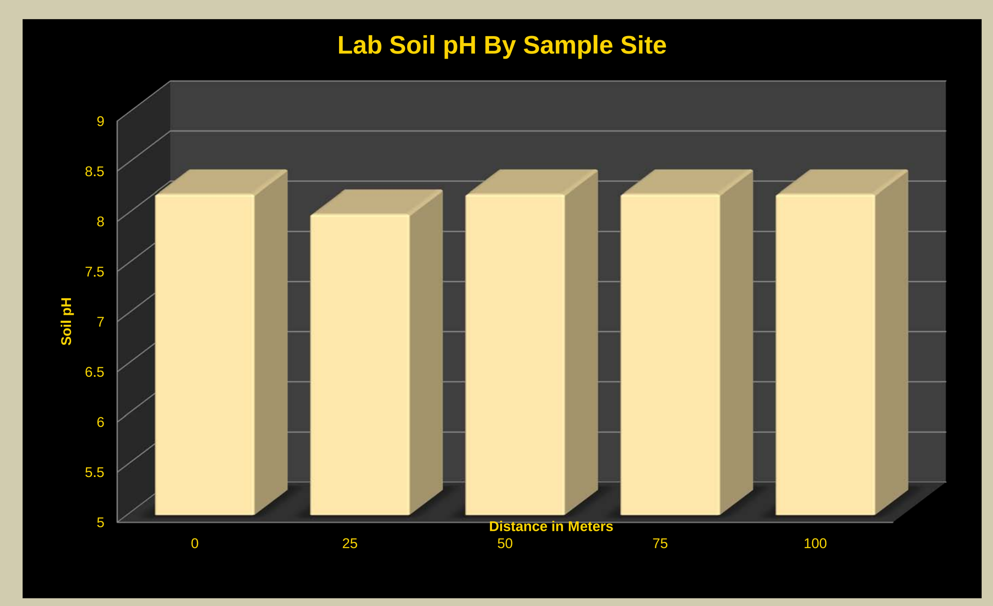


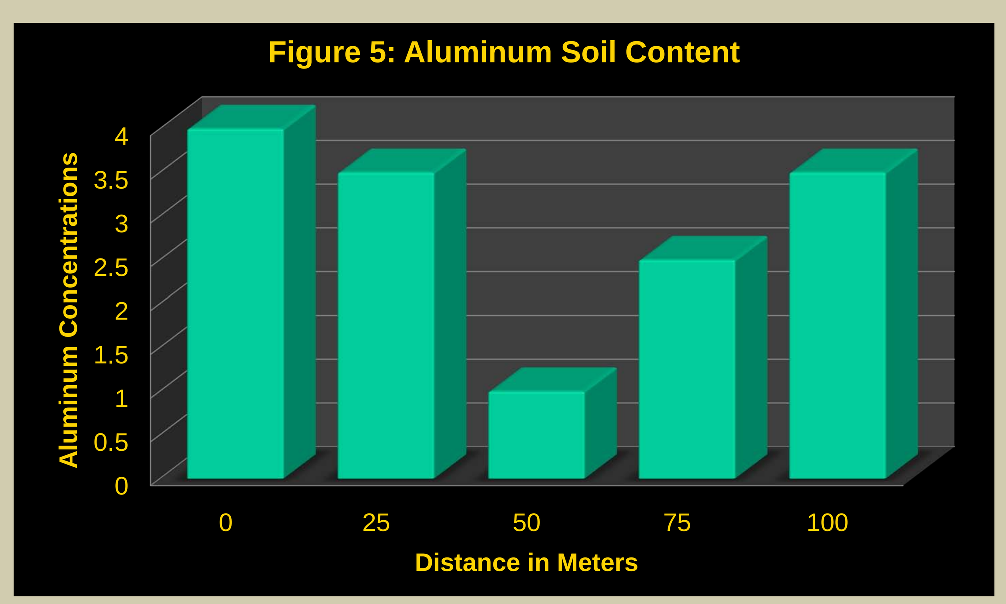


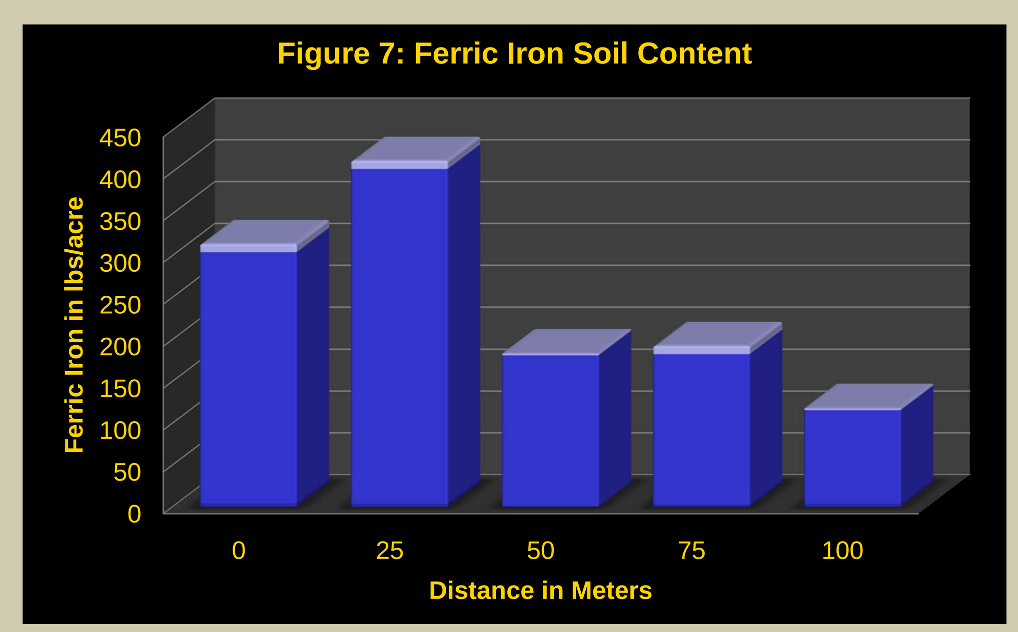


LAB RESULTS









CONCLUSIONS

Indicators of AMD would include low pH levels, high aluminum, and ferric iron content. The high ferric iron levels at the sites support the presence of AMD. Field pH ranged from 6.2 to 7, slightly acidic to neutral, which was consistent with the pH of the water samples taken on site. Laboratory analysis of dry soil samples showed pH ranging from 8 to 8.2, which is slightly alkaline. Although the lack of acidity in the dry soil samples does not lend support to the theory that this site would be exposed to AMD, there are several alternative explanations that may have altered soil pH. Low pH and high aluminum content are a known correlation suggesting AMD. Since the raised pH readings and high aluminum content of the dry soil samples are contrary to the expected results of low pH and high aluminum indicating AMD, we can infer that these results must be attributed to another source. The underlying presence of limestone upstream from the sample sites, as shown in Map 2, acts as a buffer, raising the pH level to slightly alkaline. Aluminum and ferric iron would remain at the same level of toxicity, regardless of the water and soil showing alkalinity. Flood plains shown in Map 3 can be directly related with Figure 1; these show the area and time the stream bed floods. During this time aluminum, ferric iron, and potassium are deposited into the slow draining soil. Because the samples were taken at a time of low discharge, the indicators of AMD may not be as visible as those taken in times of high discharge. Because high aluminum and ferric support iron findings are associated with , these results the theory that AMD is present at the sample site.

REFERENCES

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Acknowledgements

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