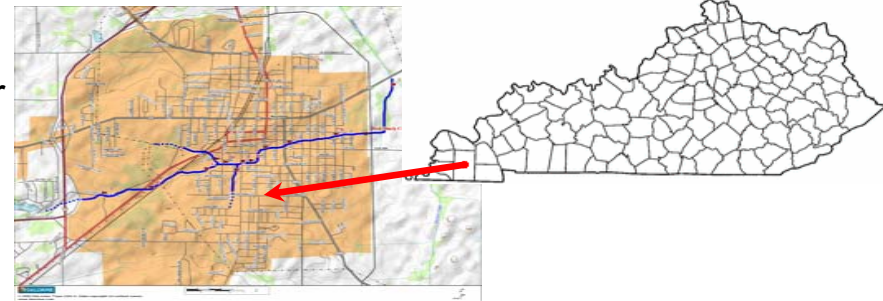


IDENTIFICATION OF POTENTIAL BACTERIAL SOURCES AND LEVELS, RED DUCK CREEK, MAYFIELD, KENTUCKY

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Objective: Our objective was to find possible point sources for fecal contamination of Red Duck Creek in Mayfield, Kentucky. Watershed Watch data showed high levels of fecal coliforms within the city.



Site Map: We chose 12 sampling locations along the creek to isolate potential point sources and to separate sewer line crossings and storm drain outlets. A site map and representative site photographs are shown below.

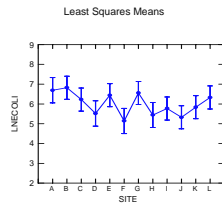


Sampling and Data Collecting: Water samples were collected six times between early September and early December. Field analyses included dissolved oxygen, temperature, pH, turbidity, and conductivity. Total coliforms and E. coli were measured in the lab using the IDEXX method. Quality assurance included running duplicates for each sampling episode.

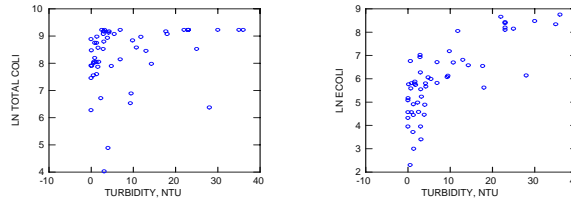


Low Flow Conditions: Due to lack of Fall precipitation, flow in Red Duck Creek was oftentimes low to non-existent. Samples were collected from pools if no flowing water was present. Water samples could not be collected from all sites at all times. Usually, flow was too low for accurate measurement.

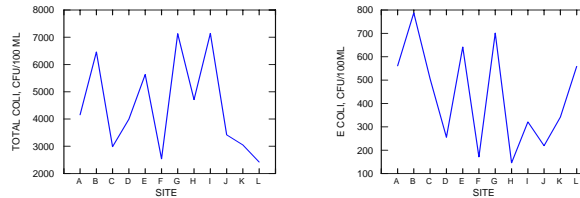




This chart shows the log of e-coli for each site. We used the log transform to get a normal distribution for the data. Since all of the error bars overlap, no significant differences ($p = 0.025$) exist among the sites.



These graphs are interesting. Normally turbidity and coliforms are related. The above graphs indicate that no relationship exists between turbidity and the log of total coliforms or turbidity and the log of e-coli.



These graphs show the geometric mean of total coliforms versus site and the geometric mean of e-coli versus site. Geometric means were used to dampen the high variability. The graphs show that the coliform levels vary throughout the entire reach, and no clear patterns are discernable.

Conclusion

The results were inconclusive as to potential point sources. We can infer, however, that the contamination came from various non-point sources along the creek. Contamination sources could have included animal feces since domestic pets are numerous, feces from birds that fly over and rest in nearby trees and in the water, and agricultural activities upstream of Mayfield.

Recommendations

We recommend that testing be conducted during the Spring wet season. Due to a delay in funding, sampling was only conducted during the fall which is the low flow season. Therefore, we do not have high flow or warm weather results. Also, some potential point sources around the area are seasonal with limited or no activity in the Fall. To reflect the significance of these potential sources, samples should be taken during periods of high activity. We also recommend that DNA or other genetic testing be conducted to better isolate potential coliform sources.

We would like to show our gratitude to the USGS for the funding for this project.