Water Quality Monitoring of the Chedoke Creek Watershed

Analytical Chemistry, Fall 2014, Redeemer University College

REDEEMER UNIVERSITY COLLEGE

What we did and why:

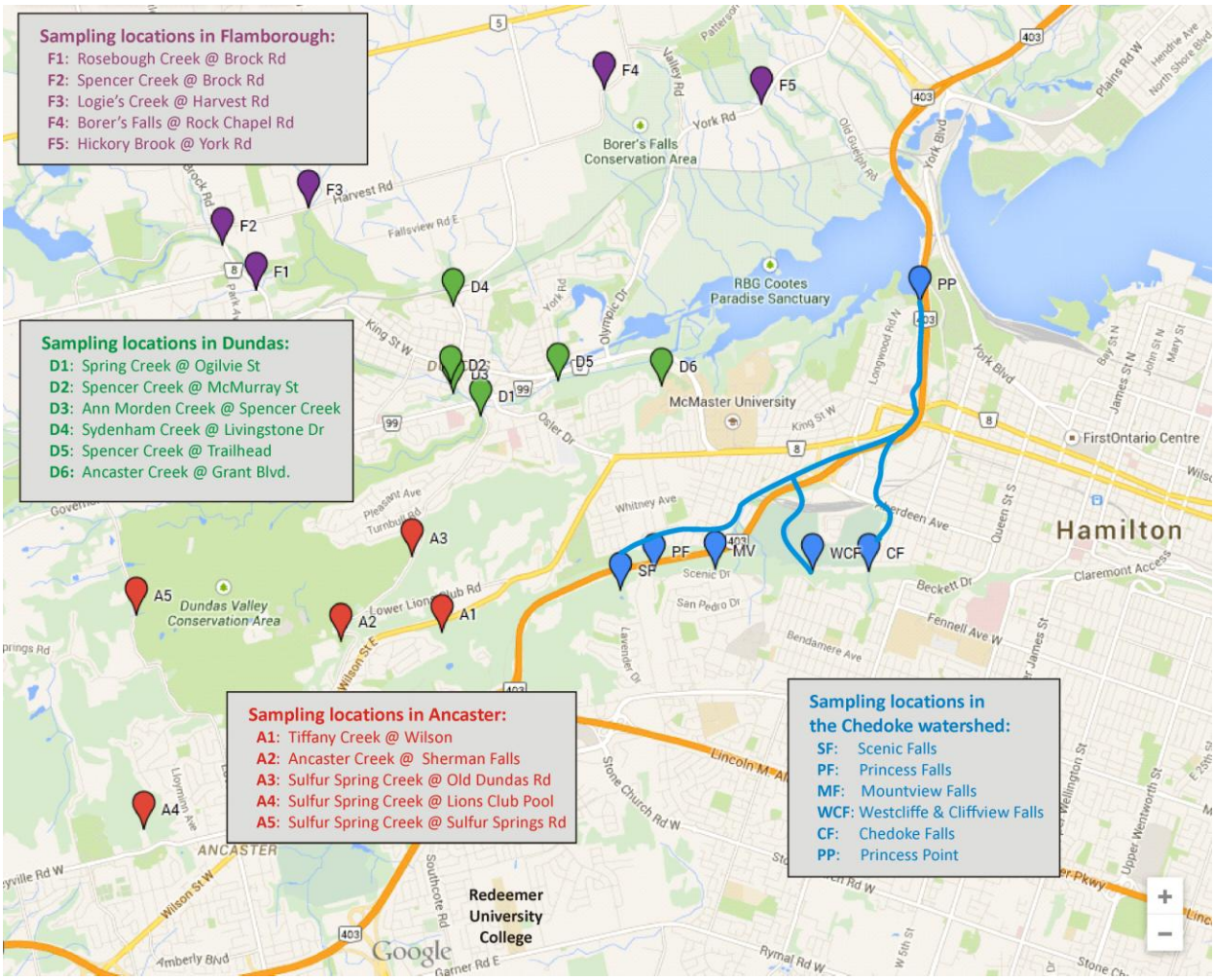
The lab portion of our analytical chemistry course focused on monitoring the quality of water at different locations throughout the Chedoke Creek watershed which drains into Cootes Paradise (highlighted in blue in the map below). Over the past decades, significant efforts have gone into restoring Cootes Paradise to its original wetland, in hopes that plants, fish, birds, and other wildlife may thrive and flourish. However, Cootes Paradise suffers from a number of environmental stressors, including sewage contamination and excess nutrients coming from the wider watershed which can cause *eutrophication*, a condition in which there is undesirable algae growth and depletion of dissolved oxygen in the water. The Chedoke Creek and its tributaries run through a highly urbanized area of Hamilton and are known to be contaminated with sewage likely caused by cross-connections between sanitary and storm sewers in homes on Hamilton Mountain. By monitoring the water quality at specific locations within the watershed, we hope to raise awareness of this issue as well as to provide further information to quantify the problem and identify particular problem areas so that the City of Hamilton can continue to address this complex issue.

How often and where:

Throughout the semester, samples were collected on six occasions from five sites throughout the Chedoke Creek watershed, all along the Niagara Escarpment and easily accessible from the Chedoke Radial Trail (Bruce Trail). These sites included Scenic Falls, Princess Falls, Mountview Falls, Westcliffe & Cliffview Falls, and Chedoke Falls (see map below). The samples were brought back to our lab, where we performed a variety of quantitative analyses. Only the results of the amount of *E.coli* and total coliform, concentrations of nitrate and phosphate, and biological oxygen demand (indirect measure of organic matter) are presented here.

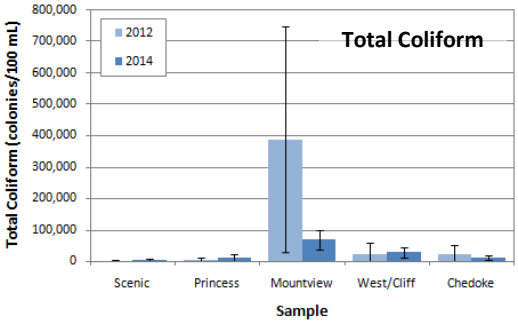
In comparison:

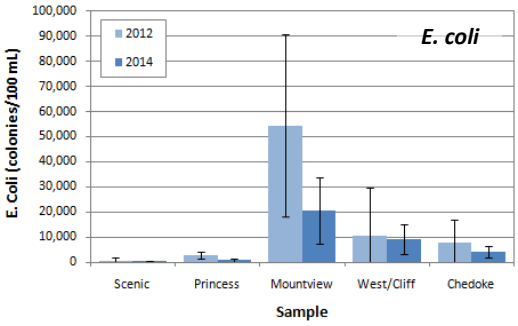
A comparison of the average results found this year to the results from the class of 2012 can be found on the backside of this handout. To put the results from the Chedoke Creek watershed into context, we collected additional water samples from other creeks in the Spencer Creek watershed that also flow into Cootes Paradise (see map below). A comparison of the results of these additional samples to the Chedoke Creek watershed samples can also be found on the backside of this handout.

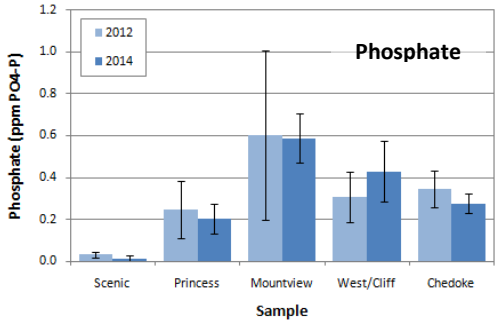


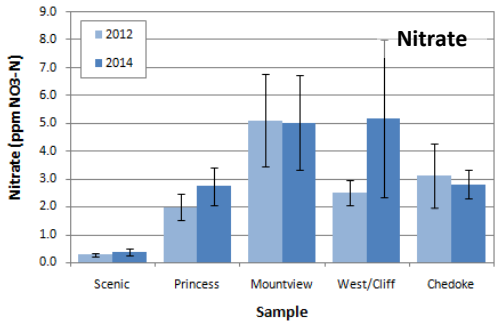
Comparison of 2014 to 2012

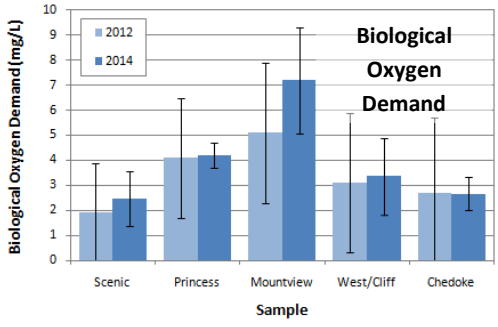
The mean and standard deviations of bi-weekly measurements from 2014 and 2012 are compared





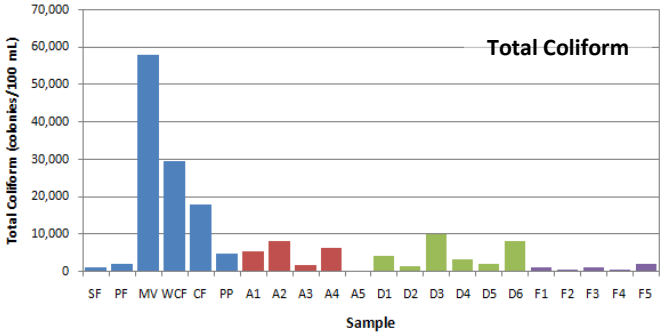


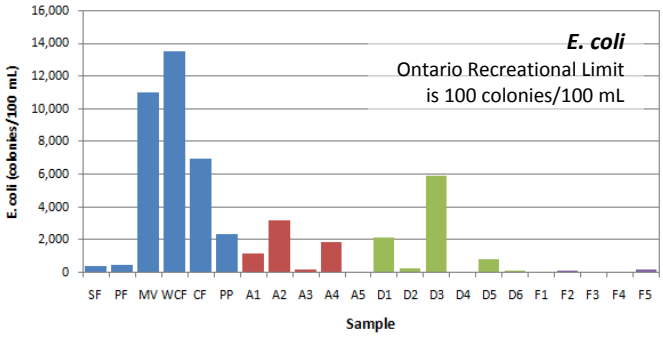


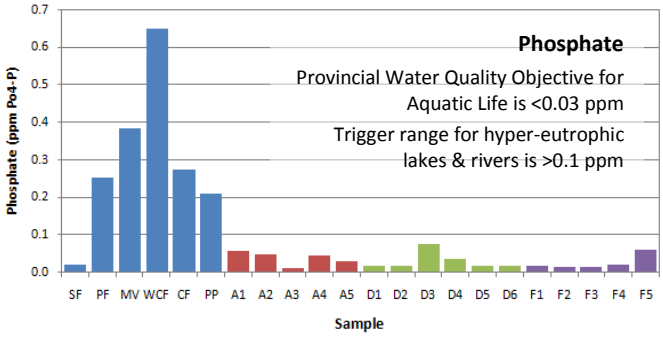


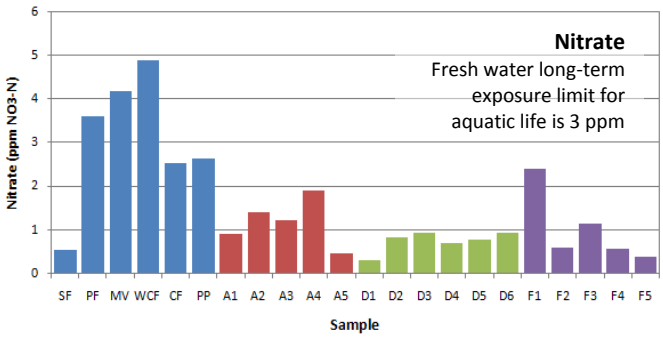
Comparison to Spencer Creek Watershed

On Nov 17, additional samples were collected in Ancaster, Dundas, and Flamborough from other streams that also flow into Cootes Paradise









Conclusions

- Our results are similar to 2012, indicating that sewage contamination in the Chedoke Creek watershed remains a problem: Mountview Falls is particularly bad, while Chedoke and Westcliffe & Cliffview Falls are contaminated to a lesser extent; Scenic Falls seems fine while Princess Falls has low levels of bacteria but somewhat high levels of nutrients.
- Our data ***may*** suggest that there has been some improvement in bacterial levels since 2012, although the high degree of week-to-week variability does not allow us to be conclusive.
- The streams in the broader Spencer Creek watershed are noticeably better in terms of the indicators of sewage contamination compared to these sites in the Chedoke Creek watershed.