E. coli Monitoring in Sausal Creek

Urban creeks tend to be highly impacted by humans, and one of the effects of our presence is sewage contamination. Sewage leaks are not uncommon during the rainy season when rain can infiltrate the pipes that carry our waste and overload the system, causing some amount of pipe overflow. Other causes of contamination in the creeks include stormwater runoff, leaky septic systems, farm animals, and waste from pets.

In some watersheds, fecal bacterial loads are actually higher in the summer, which may be the result of water evaporation and low or no water input to the creek. If bacteria are growing as usual in the creek but water is evaporating at a high rate and not being replaced, the bacteria may take over. Different creek systems have different factors driving bacteria levels; sometimes it seems to be storm-related, and sometimes not.

To investigate this weather dynamic, Friends of Sausal Creek samples the creek twice a year, once in the dry season and once in the wet season. Our motive is to inform the community on the health of the creek, as well as catch a leaky sewage pipe, an overloaded septic system, or an agricultural problem. Ideally the problem can be addressed before bacterial loads affect the creek's inhabitants, including children playing in the creek.

The bacterium *Escherichia coli* is commonly found in the digestive tracts of warm-blooded mammals, such as humans, and is therefore a specific indicator of fecal contamination in water. While *E. coli* is not necessarily pathogenic (most strains are harmless to humans), its presence is highly correlated to other pathogenic bacteria that are likely to cause illness.

The Environmental Protection Agency and the State of California have water quality criteria for different kinds of water bodies. For example, a water body where you might engage in "water-contact recreation," such as a swimming hole or a lake, has very strict limits for *E. coli*. Small creeks have less stringent limits, because they are considered "non-contact water recreation" sites. The main difference between the categories is whether people will have their heads under water at a particular site ("yes" for a swimming hole; "no" for a small urban stream). As infection typically occurs through the mouth, this is an important distinction. The *E. coli* limit for creeks like ours is 2,000 MPN/100mL.*

Friends of Sausal Creek monitors at the following sites, listed from upstream to downstream in the watershed:

1. Joaquin Miller site (Palo Seco Creek at Joaquin Miller Court)
2. Palo Seco site (Palo Seco Creek west of Monterey Blvd.)
3. Cobbledick site (Cobbledick Creek west of Monterey Blvd.)
4. Leimert Bridge site (Sausal Creek at Leimert Bridge)
5. El Centro site (Sausal Creek at El Centro Ave.)
6. Barry Place site (Sausal Creek at Barry Pl.)

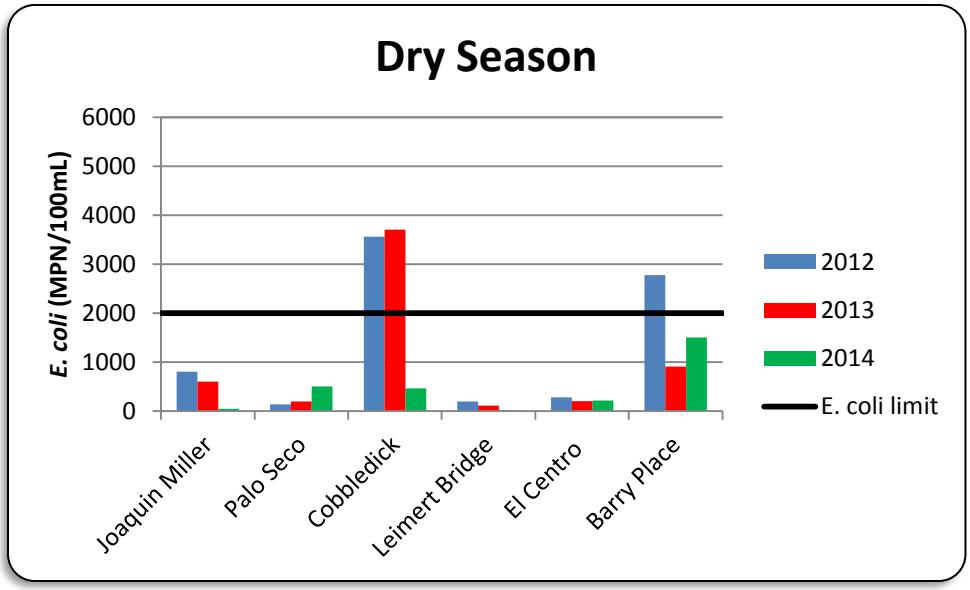

Figure 1. *E. coli* levels at all six FOSC sites during the dry seasons of 2012-2014

In the graph above, we can see that Cobbledick and Barry Place tend to have higher *E. coli* levels than nearby sites. This is likely because they both drain highly urbanized areas: Cobbledick drains Montclair, while Barry Place drains Fruitvale. Comparing both the dry season and wet season graphs, one of the constants we see is that Joaquin Miller routinely has cleaner water than the other sites. This makes sense as it is highest in the watershed and least impacted by urbanization. *E. coli* levels at Leimert Bridge and El Centro are likely low thanks to Palo Seco Creek diluting Cobbledick Creek.

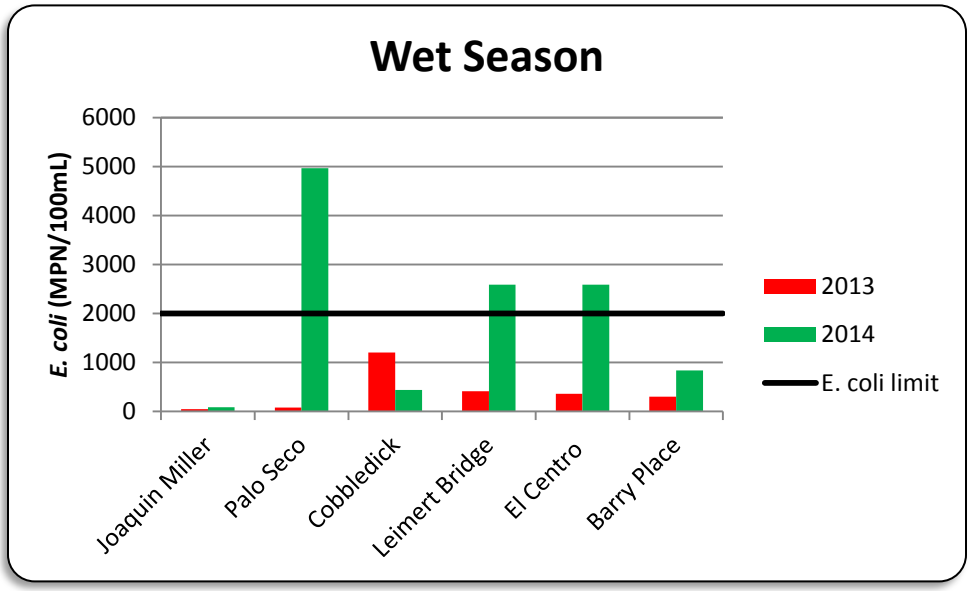

Figure 2. *E. coli* levels at all six FOSC sites during the wet seasons of 2013-2014.

In the wet season graph, we can see that something happened in 2014 (green). *E. coli* levels rose significantly, pushing three sites (Palo Seco, Leimert Bridge, and El Centro) over the EPA limit. However, other sites (Joaquin Miller and Cobbledick) seem untouched. What happened?

The answer was obvious if you were down at the creek that day–there was an overflowing drain pouring stinky water into Palo Seco Creek not far above the Palo Seco site. The Joaquin Miller site, above the drain, was unaffected. Cobbledick Creek, which joins Palo Seco to create Sausal Creek, was also

unaffected as it drains a separate area, but the sites immediately downstream of the leak (Leimert Bridge and El Centro) were impacted.

It is hard to draw large-scale conclusions from our results to date; we can't definitively say whether *E. coli* levels in the Sausal Creek Watershed are higher in the wet or dry season. We do see differences based on urbanization, and we will continue to collect data in the months to come.

What can you do about fecal bacteria in our creek? Please pick up after your dog! Also, if you have a septic tank, be sure to maintain it properly to avoid leaks.

Big thanks go to Andy Lincoff and Richard Bauer at the Region 9 EPA Lab, who analyze small numbers of samples free of charge in the name of citizen science.

--Helen Dickson

*Note on units: the EPA reports their results in the unit of "Most Probable Number of bacteria per 100 milliliters of sample" (or MPN/100mL). This is because the method that they use to test samples involves dilution and a probability calculation to determine the approximate number of viable bacterial cells in a given volume of sample. The EPA can't report a number because their method doesn't involve counting every bacterium in a sample, but they can report a "most probable number."

Further Reading:

Water Quality Testing in Sausal Creek. Kathleen Harris. 2013. http://www.documents.sausalcreek.org/Sausal_Creek_Water_Quality.pdf

USEPA. Fecal Bacteria. http://water.epa.gov/type/rsl/monitoring/vms511.cfm

USEPA Region 9 Laboratory, Richmond, CA. Standard Operating Procedure for Volunteer Monitoring of Surface Waters for Bacteria. Revision 5. Effective date 7/1/2009. http://documents.sausalcreek.org/SOPforVolunteerMonitoringBacteriaSurfaceWaters.pdf