Session H7: Pathogen Source Identification and Management

Room C124
8:00 – 9:30 am

0055
H7-1

The Poop Stops Here: E. coli Sampling for Volunteer Water Quality Monitors

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The Colorado River Watch Network is the largest volunteer water quality monitoring program in Texas. One hundred and twenty volunteers monitor over 100 sites in the 600-mile watershed of the Lower Colorado River. The explosion of the population in Austin since the late 1980s and failing infrastructure led to high levels of bacteria in the Colorado River below Austin. The river became so contaminated that the Boy Scouts stopped canoeing the river.

Concerned citizens formed the Colorado River Watch Network to protect water quality. The City of Austin upgraded its wastewater facilities, and water quality has improved dramatically over the years. The Boy Scouts are back on the river, and volunteer monitors continue to sample and ensure that the water quality is clean enough for swimming and contact recreation.

Our volunteer monitors use the Coliscan Easygel method from Micrology Labs and a GHQ chicken egg incubator to test for E. coli at sites on the river that are used for swimming and contact recreation. The Coliscan Easygel method is easy to use. Learning to interpret the results takes a little time, but once the volunteers become comfortable and more confident, the results have proven to be accurate. When high results are found by volunteers, samples are taken to a certified lab, to show that the results are accurate.

Volunteers have used Coliscan Easygel to sample for E. coli for the Gilleland Creek Total Maximum Daily Load project which has been listed for bacteria. Pflugerville, Texas, where Gilleland Creek is located, has experienced a tremendous amount of growth in the last several years. Data from six sites indicate that high bacteria counts come from pet waste along a park greenbelt near the creek. Mud mitt stations have been installed, and the E. coli counts seem to be diminishing after implementation of an education campaign to encourage picking up pet waste. Volunteers have also detected high E. coli counts in two urban creeks in Austin, Texas. The City of Austin has been alerted and is currently working to determine the source of the pollution in order to put a stop to it.

0413
H7-2

Detecting and Eliminating an Illicit Source of Bacteria in an Urban Watershed in Minnesota

Matthew Loyas, Melissa Baker and Britta Suppes

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The Capitol Region Watershed District (CRWD), in St. Paul, Minnesota, is a special purpose unit of government that was established in 1998 to protect, manage, and improve the water resources within the watershed. In 2005, CRWD initiated a Stormwater Monitoring Program to achieve several goals including identifying water quality problem areas and quantifying the extent of subwatershed pollutant loadings.

A case study involving illicit discharge detection will be presented which outlines the steps, challenges and successes of monitoring an illicit discharge in storm sewer infrastructure. In 2006, elevated bacteria levels were detected in the storm sewer of a large 1,100-acre subwatershed which directly drains into the Mississippi River. The illicit discharge was characterized by high *Escherichia coli* (*E. coli*) bacteria concentrations during dry weather, infrequent surges in dry weather flow, and presence of fungal/bacteria growths within the storm sewer.

Monitoring efforts were enhanced to include more frequent sampling, additional analysis of other water quality parameters (potassium, fluoride, and surfactants), and stormwater monitoring through the winter months. CRWD's enhanced illicit discharge monitoring efforts prompted an investigation into the source of the discharge by the City of Saint Paul. In May of 2010, the source of the discharge was found and remediation actions were taken to eliminate the discharge.

0492

H7-3

Implementation of a Wildlife Scat Monitoring Program to Determine *Giardia* and *Cryptosporidium* Prevalence and Concentrations from Fecal Deposits in the Protected Bull Run Watershed, Oregon

Zoe Rodriguez del Rey[1], Ryon Edwards[1], Phil Rickus[2], Yone Akagi[1], Logan Bourdon[1], Scott Bradway[1]and Doug Bloem[1]

[1]*City of Portland Water Bureau, Portland, Oreg., USA,*[2]*David Evans and Associates, Portland, Oreg., USA*

The Portland Water Bureau (PWB) implemented a wildlife scat monitoring program in the Bull Run watershed, Oregon, to quantify *Cryptosporidium* and *Giardia* loading to the drinking water supply. In the Bull Run, a protected watershed with limited access, wildlife are the only potentially significant sources of pathogens and reliable estimates of their contribution are necessary to quantify microbial risk. For most local wildlife species no infection reports were available. Even when available, few studies quantify prevalence or fecal concentrations of pathogens. PWB's scat monitoring program is among the most comprehensive of its kind, providing an examination of *Cryptosporidium* and *Giardia* infection from a broad range of wildlife species.

PWB worked with local wildlife biologists to identify Bull Run wildlife that are 1) most abundant, 2) produce the largest amount of fecal material, 3) use riparian zones, streams, or reservoirs, or 4) are reported to carry human infectious *Cryptosporidium* strains. The program targeted bear, beaver, bobcat, cougar, coyote, deer, elk, goose, hare, otter, and several rodent species. Scat samples were opportunistically collected from roads and small meadows. A trapping and baiting program was implemented for rodents and hare. Beaver habitat was identified through GIS analysis, field verified, and sampled by snorkeling. Sampling effort was increased during birthing seasons because high infection prevalence has been reported for domesticated animal herds, although seasonal infection prevalence is unknown for wildlife.

Scat was analyzed using immunomagnetic separation and immunofluorescence staining and microscopy to isolate and enumerate pathogens. Samples were spiked with ColorSeed™ to monitor assay performance. Dispersant and de- fatting agents were used to optimize pathogen recovery. AgriLife El Paso was contracted to genotype *Cryptosporidium* isolates to understand the public health significance of *Cryptosporidium* strains if present in wildlife.

Scat sampling began in August 2009 and continues through 2011. As of July 28, 2011, 428 samples have been analyzed, showing a very low prevalence of *Cryptosporidium* infection in Bull Run wildlife. *Giardia* prevalence, although higher, is also low in wildlife. An evaluation of PWB's scat monitoring program, *Cryptosporidium* and *Giardia* prevalence and fecal concentrations, and any genotyping results will be presented in April 2012.

0293
H7-4

Bacteria Contamination in Urban Water Monitoring using Multiple Analytical Tools

Laura Webb and Regina Klepikow

US Environmental Protection Agency Region 7, Kansas City, Kans., USA

The EPA Region 7 Water Monitoring Team has, since 2007, been monitoring bacterial contamination in urban streams in the Kansas City Metropolitan area. The team used a membrane filtration technique for the first 2 years for *E. coli* and Total Coliforms and later, after comparison sampling, switched to Colilert®. Several tools were added in the 2011 sampling season which will enable the team to investigate sources of the contamination.

An Enzyme-Linked Immunosorbant Assay (ELISA) test kit was added to analyze for caffeine in water. The test kit allows a small sample size to be analyzed down to 0.175 µg/L (ppb) in a few hours, and caffeine was detected in many of the study streams. A new analysis was used to analyze for several estrogen compounds and 3-β-corprostanol, a carnivore fecal indicator. The corprostanol was detected in many of the 12 urban streams in this study. And finally, PCR was used to verify the *E. coli* results and further investigate the source of the bacteria using human and bovine markers.

The use of multiple tools, both chemical and bacteriological, will enable the monitoring team to trace the source and perhaps decrease the contamination. A real-time monitoring system was installed at the conclusion of the 2011 season which will strengthen the monitoring network and provide opportunities over the next sampling season to do further tracing work with these multiple tools.