Tanyard Creek and Lilly Branch

Tanyard Creek and Lilly Branch are tributaries of the North Oconee River and part of the Upper Oconee River Watershed that flows eventually into the Atlantic Ocean (1). Both creeks’ headwaters begin just west of the University of Georgia campus, then flow through UGA campus and finally end in the Oconee River on the Southeast part of campus (2). Most of Tanyard Creek and Lilly Branch are surrounded by urban areas, leading to many anthropogenic influences on the water quality.

Introduction

E. coli as an indicator for fecal coliform

One of the least indicator species for water impairment from fecal matter is Escherichia coli, or E. coli. E. coli are bacteria found in the intestines of mammals and are excreted in animal feces (3). Because of its presence in animal feces, E. coli is used as an indicator for fecal coliforms, that is, other bacteria in animal and human waste that threaten public health (4). High concentrations of E. coli in water streams, rivers, and lakes are indicative of contamination by human and animal feces.

Tanyard Creek impairment

Tanyard Creek is on the EPA list of impaired waterways and the primary cause of its impairment is fecal coliform (1). Our data show that the levels of E. coli bacteria in Tanyard Creek are much higher than the EPA limit for safe recreational use which is 410 coliform forming units (CFU) per 100 mL. The levels of E. coli in Lilly Branch, however, are only slightly higher than the EPA limit.

Methods

Water samples were collected from Tanyard Creek and Lilly Branch.

Samples were brought back to the lab and analyzed immediately.

Procedure:
1. Gather mTEC agar plates.
2. Set up membrane filtration device and place sterile filter on suction funnel.
3. Starting with lowest volume of sample, filter the water by membrane filtration to collect the bacteria.
4. Place filter on mTEC plate and put in incubator for 2 hours at 35°C and then at 44.5°C for 24 +/- 4 hours.

Results

The level of E. coli was significantly higher in Tanyard creek than the EPA limit. The highest E. coli CFU/100 mL in Tanyard Creek was 5100 measured on 4/4/14. The other levels at Tanyard Creek were 2850, 2133, and 3250 CFU/100 mL, all of which were also much higher than the EPA safe recreational use limit (400 CFU/100 mL). The Tanyard Creek “Chew Crew” goats began grazing along the measured portion of stream on 3/25/14. The CFU/100 mL at Lilly Branch were much higher when measured on rainy days than on dry days. The rainy day level reached 217 CFU/100 mL. E. coli while the dry day levels were 483, 398, and 368 CFU/100 mL. After or during a rain it is common to see higher pollutant levels, including E. coli. This is apparent in Lilly Branch where the levels of E. coli were almost five times greater on rainy days.

Figure 4: E. coli levels on dry and rainy days in Tanyard Creek and Lilly Branch. Average coliform forming units (CFU) per 100 mL of water +/- S.D. from at least three samples per day taken on the days indicated.

Figure 5: Comparison of E. coli levels upstream versus downstream. Average +/- S.D. of E. coli CFU/100 mL of water from four days from Tanyard Creek. Samples were taken at three locations, TC 1 is upstream, TC 2 is midstream, and TC 3 is downstream.

Future Research

• Determine the extent to which the sewer leak is contaminating Tanyard Creek by further analysis near and downstream of the leak.
• Work with county officials to find and fix the sewer leak and monitor Tanyard Creek fecal coliform levels after it is fixed.
• Develop strategies to identify fecal coliform sources around waterways on the UGA campus and decrease fecal contamination.
• Implement plans to educate the community about the UGA watershed and ways to keep it clean.
• Continue research on the effectiveness of the “Chew Crew” and the goats’ effects on Tanyard Creek.

Future Research

What’s in the Water? Escherichia coli bacteria in Tanyard Creek and Lilly Branch

Watersheds at the University of Georgia

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