Gilleland Creek Intensive Bacteria Survey Addendum

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Introduction

Gilleland Creek finds its natural origin at Ward Spring northwest of Pflugerville, but runoff has caused the beginning of Gilleland Creek to be upstream near the intersection of I-35 and TX 45 Toll. It flows southeast for approximately 32 miles, draining about 76 mi² (197 km²). The majority of the 6.5 million gallons per day that flow into the Colorado River come from six wastewater treatments plants that pipe treated wastewater into the creek. The land use in the watershed is primarily undeveloped and agricultural with increasing residential development.¹

In 2004, Gilleland Creek was placed on the Texas Commission on Environmental Quality (TCEQ) 303(d) List of Impaired Water Bodies because of repeated high bacteria levels. As a result, the TCEQ contracted the Lower Colorado River Authority (LCRA) to develop a Total Maximum Daily Load (TMDL) program, which determines the extent to which a pollutant load can be reduced, and an Implementation Plan, which describes how that can be carried out. On December 3rd, 2008 the Texas Stream Team along with LCRA, TCEQ, the City of Austin, the City of Pflugerville, and the Texas Department of Transportation conducted an intensive bacteria survey.

This document is an addendum to that survey, which is available at http://txstreamteam.rivers.txstate.edu/Data/Data-Reports.html. It is intended to assist with the carrying out of the Implementation Plan. The following data was collected by volunteer monitors for the Texas Stream Team and the LCRA. The standard established by the EPA for a single sample of E. coli bacteria in surface water is 394 cfu / 100 mL. The standard for a geometric mean is 126 cfu / 100mL. A cfu is a colony forming unit. This is a measure of how many bacteria there are in every 100 mL that could multiply into a colony. At this level, 1 in 125 people might get sick if the water is ingested. At least ten samples from the last seven years with approximately the same interval between sample times are required for a water body to be listed on the 303(d) list.² The assessment period for Gilleland Creek bacteria spans from 10/29/05 to 2/15/2010, and the data covered in this report shows the geometric mean for this period is 143.97 cfu / 100mL.

In alignment with Texas Stream Team’s core mission, monitors attempt to collect quality-assured data that can be used by government agencies and other decision-making entities to promote a healthier and safer environment for people and aquatic inhabitants. Information collected by Texas Stream Team volunteers utilizes a TCEQ and EPA approved quality assurance project plan (QAPP) to ensure data are correct and accurately reflects the environmental conditions being monitored. All data are screened for completeness, precision and accuracy where applicable, and scrutinized with data quality objective and data validation techniques. Sample results are intended to be used for education and research, baseline, local decision making, problem identification, and others uses deemed appropriate by the data user. The data for this assessment came from the Colorado River Watch Network and the Texas Stream Team database. The graphs are displayed in order from upstream to
downstream, with the exception of Swenson Farms which is located on a tributary. TCEQ standards are marked in red. The conductivity standard is a maximum mean. The temperature standard is a maximum. The dissolved oxygen standard is a minimum. The pH standard is a range.

Gilleland Creek
Monitoring Locations

1. Gilleland Creek at Edgemere
2. Gilleland Creek at Grand Avenue Parkway
3. Gilleland Creek at Picadilly Lane
4. Gilleland Creek at Railroad Ave
5. Gilleland Creek at Swenson Farms
6. Gilleland Creek below Bohl Park
7. Gilleland Creek near Pflugerville High School

Legend

- Volunteer Monitoring Locations

- Gilleland Creek
- Cities
- Subwatershed
- Gilleland Watershed

This map was generated by Texas Stream Team using publicly available GIS layers. The data was manipulated for this particular use. No claims are made to the accuracy of completeness of the data or to its suitability for a particular use. 09/09/2009
Summary of Colorado River Watch Network and Texas Stream Team E. coli Data

<table>
<thead>
<tr>
<th>Site Name</th>
<th>Min.</th>
<th>Avg.</th>
<th>Max.</th>
<th>Std. Dev.</th>
<th>% Exceedence</th>
<th># Exceedence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Picadilly Ln.</td>
<td>20</td>
<td>151</td>
<td>430</td>
<td>174.13</td>
<td>20</td>
<td>2/10</td>
</tr>
<tr>
<td>Grand Ave. Parkway</td>
<td>50</td>
<td>171.11</td>
<td>550</td>
<td>127.69</td>
<td>6.67</td>
<td>1/15</td>
</tr>
<tr>
<td>Edgemere</td>
<td>17</td>
<td>103.58</td>
<td>199.8</td>
<td>61.03</td>
<td>0</td>
<td>0/18</td>
</tr>
<tr>
<td>Pflugerville High School</td>
<td>120</td>
<td>1564.67</td>
<td>4111</td>
<td>2211.85</td>
<td>66.67</td>
<td>2/3</td>
</tr>
<tr>
<td>Railroad Ave.</td>
<td>30</td>
<td>262.18</td>
<td>666</td>
<td>199.87</td>
<td>25</td>
<td>5/20</td>
</tr>
<tr>
<td>Bohl Park</td>
<td>183.2</td>
<td>241.38</td>
<td>299.7</td>
<td>45.57</td>
<td>0</td>
<td>0/6</td>
</tr>
<tr>
<td>Swenson Farms</td>
<td>83.2</td>
<td>202.57</td>
<td>399.6</td>
<td>123.45</td>
<td>17</td>
<td>1/6</td>
</tr>
<tr>
<td>All (avg.)</td>
<td>71.91</td>
<td>385.21</td>
<td>950.87</td>
<td>420.51</td>
<td>19.33</td>
<td>11/78</td>
</tr>
</tbody>
</table>

E. coli Bacteria
Maximum Values from Upstream to Downstream

E. coli Bacteria
Gilleland Creek at Picadilly Ln.
E. coli Bacteria
Gilleland Creek at Grande Avenue Parkway

E. coli Bacteria
Gilleland Creek at Edgemere

E. coli Bacteria
Gilleland Creek near Pflugerville High School
Follow-up Volunteer Monitor Results

The December 2008 Intensive Bacteria Survey found one site at the headwaters of Gilleland Creek which exhibited 1615 cfu / 100 mL of *E. coli* bacteria. In order to learn more about the source of this contamination, a volunteer monitor, Russell Seguin, has tested for *E. coli* monthly since February 2009 at the Gilleland Creek headwaters 50 m upstream from the green drainage pipe suspected to be a source of bacteria and 50 m downstream from the green drainage pipe. In December 2009, Nick Maulding, a Texas Stream Team intern, conducted additional bacteria tests at seven locations approximately 500 feet apart in the Gilleland Creek headwaters (See pg. 11).

The data appears to show this green pipe as a source of flow during dry periods but not necessarily as a contributor of bacteria. Three of the nine monthly monitoring events since the intensive survey have shown there to be no flow upstream of the green pipe and adequate flow downstream. According to the National Oceanic and Atmospheric Administration, there was no significant rainfall prior to these three events. The flow in this area is all runoff due to the fact the Gilleland Creek finds its natural origin at Ward Spring, downstream of this area. The lack of runoff upstream of this pipe during dry periods implicates it as a possible source of continual flow.

There is no correlation between high precipitation values and high bacteria values. On February 24th, 2009 and November 16th, 2009 there was 0.11 in. of rain in the preceding five days. However, there was 350 cfu / 100 mL in February and 867 cfu / 100 mL in November. Furthermore, the highest rainfall amount of 1.22 in. yielded the lowest *E. coli* value (See Figures 2 & 3). The rainfall amounts marked in blue are based on the preceding five days of precipitation from the Austin Great Hills Weather Station operated by the National Oceanic and Atmospheric Administration.

Bacterial concentrations mostly decrease downstream of the green pipe. Three out of four of the monitoring events during which there was adequate flow upstream of the green pipe for monitoring showed the *E. coli* values decreased significantly downstream of the green pipe (See Figure 1). The December 2009 monitoring events shows an average of 107.5 cfu / 100mL upstream of the pipe and 73.33 cfu / 100mL downstream of the pipe and 97.2 cfu / 100mL upstream and 100 cfu / 100mL downstream (See Figures 4 & 5). Furthermore, LCRA Lab tests show an average of 360 cfu / 100 mL upstream and 218.5 cfu / 100mL downstream (See pg. 13).
The following map shows the area of interest. The proceeding map references the map on page three.
LCRA Lab Results

<table>
<thead>
<tr>
<th>Date</th>
<th>Site</th>
<th>Location</th>
<th>E. coli cfu / 100 mL</th>
</tr>
</thead>
<tbody>
<tr>
<td>4/22/2009</td>
<td>G1A</td>
<td>Several hundred yards upstream of the green pipe by Lammes Candy’s office, where water is coming out of a 2-3 ft diameter cement pipe that seems to be draining the parking lot; this was where the very first water enter the creek (dry before the pipe)</td>
<td>548</td>
</tr>
<tr>
<td>4/22/2009</td>
<td>G1</td>
<td>50 m upstream from the green pipe, a meter upstream from where the concrete sluice begins in small pool</td>
<td>172</td>
</tr>
<tr>
<td>4/22/2009</td>
<td>G2</td>
<td>Gilleland headwaters just below green pipe</td>
<td>199</td>
</tr>
<tr>
<td>4/22/2009</td>
<td>G3</td>
<td>Gilleland headwaters 15m below green pipe after concrete lined channel</td>
<td>238</td>
</tr>
</tbody>
</table>
