

May 22, 2014

Monitoring Data Analysis for March 27, 2014 – May 5, 2014

### Gills Creek Monitoring Sites

During this monitoring period, the data collected from the Gills Creek stations all displayed typical diurnal patterns with respect to dissolved oxygen (DO), water temperature, and pH. Water temperatures are continuing to increase as we move into summer, and DO levels are decreasing; however, all Gills Creek sites had average DO values above 7 mg/L. The DO values and pH values did not exceed the SCDHEC standards during this monitoring period. During storm events, the instantaneous turbidity readings did occasionally exceed the SCDHEC turbidity standard, but on average, turbidity values during this monitoring period were well below the 50 NTU standard.

Over this monitoring period, 6 storms were observed, where a storm is defined as at least 0.1 inch of precipitation separated from other storm events by at least three hours of dry conditions. The water quality in Gills Creek showed typical responses to these storm events: turbidity increased, pH dropped slightly, and specific conductivity showed slight increases before decreasing as a result of the dilution effect of the stormwater runoff.

During this monitoring period, three interruptions in the continuous dataset were observed. It appears that early in this monitoring period, in the range of March 29th to April 7th, the flow from the Forest Lake control structure was either fully stopped, or significantly decreased, causing the stage at GILA to drop to 0.3 feet. At these extreme low levels, the sonde probes become unsubmerged, and water quality data cannot be recorded at the site. This happened again at the end of the monitoring period, when the conductivity probe was unsubmerged from April 28th through the end of the deployment. The third interruption occurred at the GILB site from April 7th to April 9th. Pollen and other debris in the sonde guard caused the turbidity readings to be artificially elevated, and this data was removed from the dataset.

A couple of interesting observations were made from the data collected during this monitoring period. The impact of the Forest Lake control structure on the stage of all three monitoring stations was clearly noticeable. On March 31st, the control structure was operated to release water from the lake, and the stage increased rapidly at the GILA station. This increase in stage was observed at the GILB and GILC stations as well, to a lesser degree. This incident underscores the impact that Forest Lake's operation has on the flow regimes of Gills Creek. A site visit to Forest Lake following this stage increase showed that the lake had been drained, likely for maintenance of some type. The discharge from the lake may have been increased in the preceding days in order to quickly drain the lake for the needed maintenance. The changes in stage that were observed did not appear to have an impact on most of the monitored water quality parameters. However, the pH readings did fluctuate as the stage at GILA rose and fell rapidly. These fluctuations may have had something to do with the differences in water quality

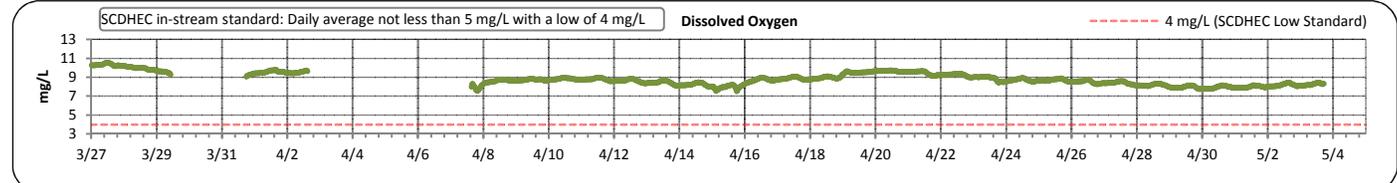
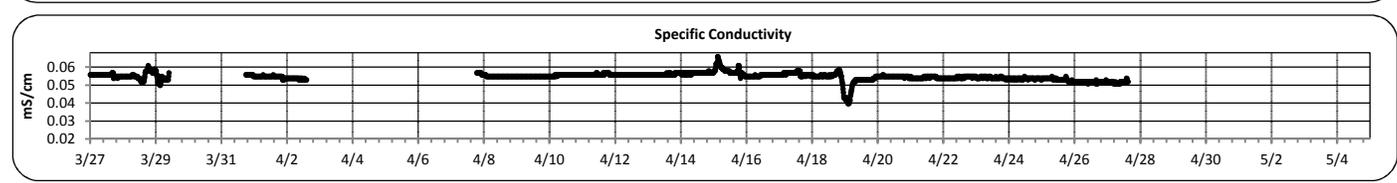
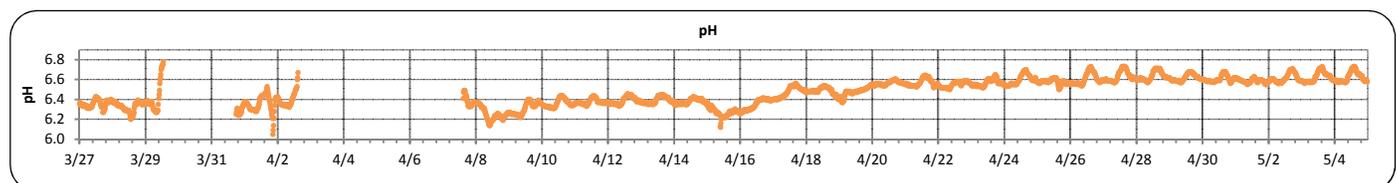
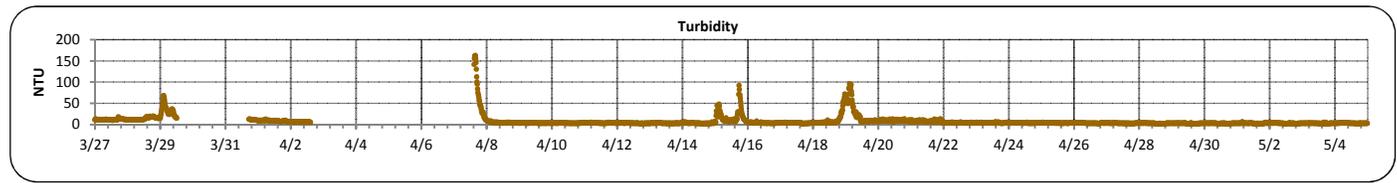
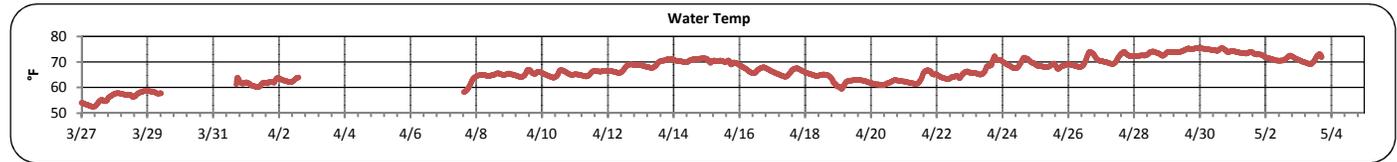
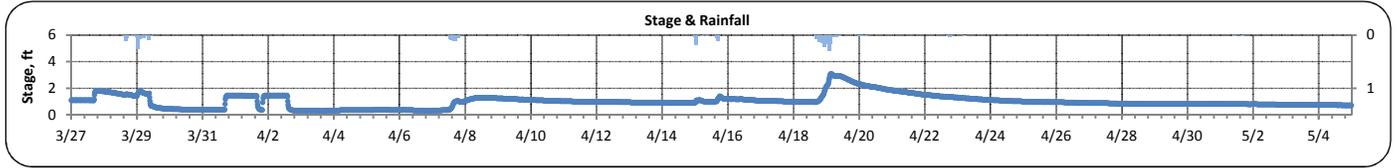
between the Gills Creek flow and the Eightmile Creek tributary flow, which enters Gills Creek just upstream from GILA.

Another interesting observation in this monitoring data was made at the GILC station. When the turbidity dataset was closely examined, a slight diurnal fluctuation was noted. The turbidity was approximately 3 NTU higher in the early morning than in the late evening. This pattern is slight, and is overshadowed by turbidity fluctuations occurring after storm events, but during low flow periods, it is very clear. One explanation for this pattern may be biological activity such as fish feeding or invertebrate foraging.<sup>1</sup>

1 Gillain, Stephanie. Diel Turbidity Fluctuations in Streams in Gwinnett County, Georgia. USGS.  
<[http://ga.water.usgs.gov/publications/other/gwrc2005/pdf/GWRC05\\_Gillain.pdf](http://ga.water.usgs.gov/publications/other/gwrc2005/pdf/GWRC05_Gillain.pdf)>

Gills Creek A (Mar 27 -- May 5, 2014)

PARAMETER	DESCRIPTION	CONTINUOUS WATER QUALITY PARAMETERS:	SUMMARY STATISTICS				
			MINIMUM OBSERVED	MAXIMUM OBSERVED	MEDIAN OBSERVED	MEAN OBSERVED	STANDARD DEVIATION
STREAM NAME:	Gills Creek	STAGE (FT):	0.3	3.1	1.0	1.0	0.5
LOCATION:	Forest Drive Bridge	TEMPERATURE (°F):	52	75	67	67	5
ADDRESS:	4840 Forest Drive, Columbia, SC 29206	TURBIDITY (NTU):	2	163	4	7	12
COORDINATES:	34.019826, -80.963566	pH:	6.1	6.8	6.5	6.5	0.1
TMDL/IMPAIRMENT:	Fecal & Dissolved Oxygen	SPECIFIC CONDUCTIVITY (mS/cm):	0.04	0.066	0.055	0.055	0.002
NEIGHBORING LANDUSE:	Residential and commercial	DISSOLVED OXYGEN (mg/L):	7.5	10.6	8.7	8.8	0.6
APPROX. DRAINAGE AREA:	48 square miles						
SPATIAL LOCATION:	Most upstream site						
TOTAL NO. STORMS OVER 0.1 INCH:	6						
MAX. DAILY RAINFALL:	1.1 inches						
TOTAL RAINFALL (FOR PERIOD):	3.6 inches						



Note: Data gaps appear when the sonde is removed for calibration or when the flow depth is below the sensors

**Continuous Water Quality  
Monitoring Periodic Report**

**Gills Creek A (Mar 27 -- May 5, 2014)**

**Explanation of Statistics:**

<b>MINIMUM OBSERVED</b>	The minimum of the values recorded by the datasonde in 15 minute intervals.
<b>MAXIMUM OBSERVED</b>	The maximum of the values recorded by the datasonde in 15 minute intervals.
<b>MEDIAN OBSERVED</b>	The median of all the values recorded by the datasonde in 15 minute intervals.
<b>MEAN OBSERVED</b>	The average of all the values recorded by the datasonde in 15 minute intervals.
<b>STANDARD DEVIATION</b>	The standard deviation of all the values recorded by the datasonde in 15 minute intervals.

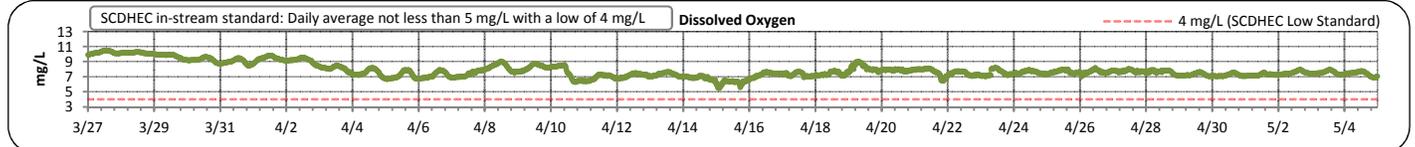
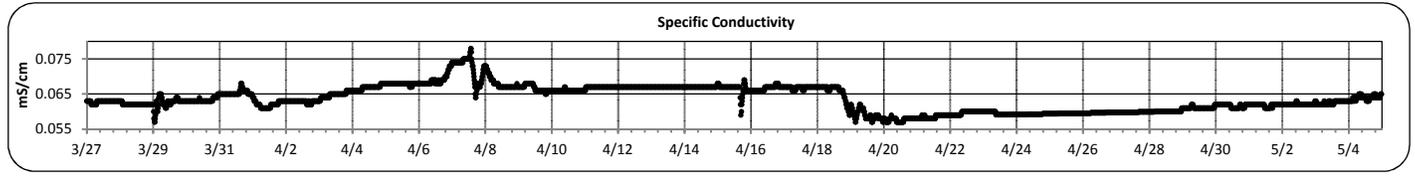
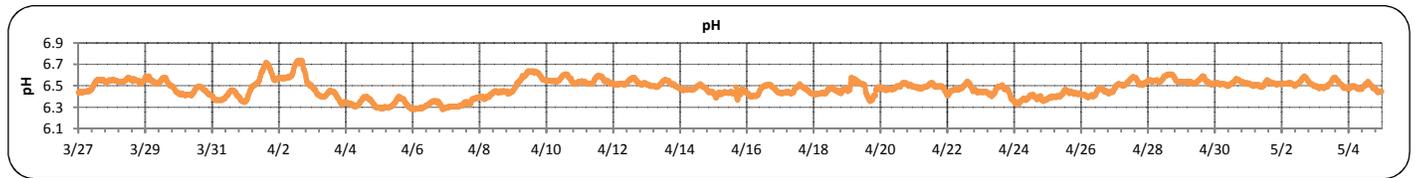
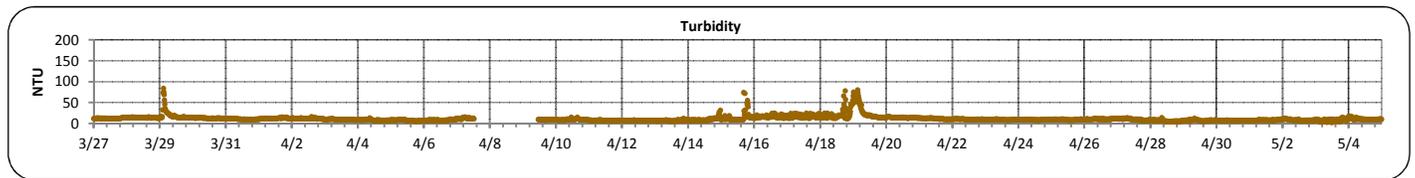
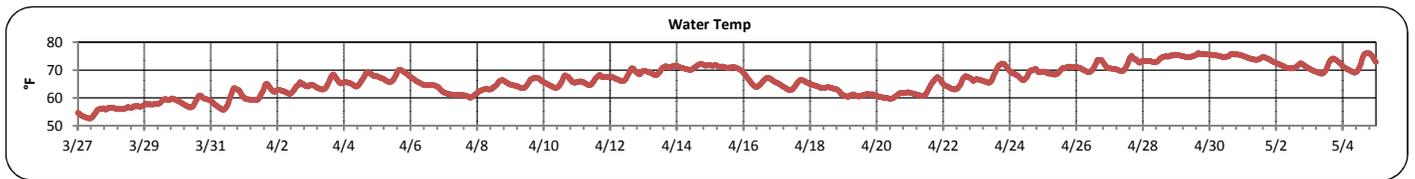
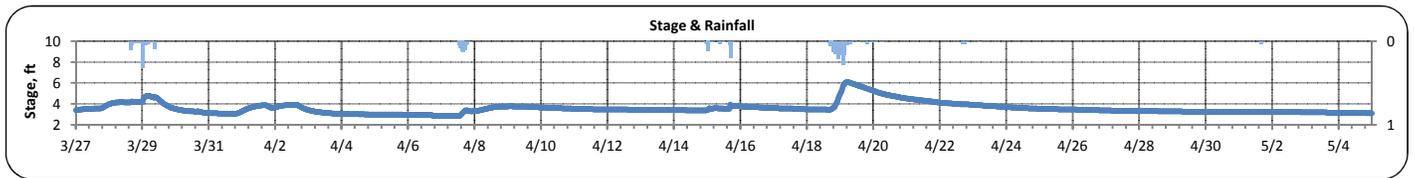
**Sampled Data:**

Analyte (units)	Sample 1		Sample 2		Sample 3		Sample 4	
	Time	Results	Time	Results	Time	Results	Time	Results
<i>Escherichia coli</i> (MPN/100mL)								
Total Suspended Solids (mg/L)								
Total Phosphorus (mg/L)								
Total Nitrogen (mg/L)								

Note: Data gaps appear when the sonde is removed for calibration or when the flow depth is below the sensors

**Gills Creek B (Mar 27 -- May 5, 2014)**

PARAMETER	DESCRIPTION	CONTINUOUS WATER QUALITY PARAMETERS:	SUMMARY STATISTICS				
			MINIMUM OBSERVED	MAXIMUM OBSERVED	MEDIAN OBSERVED	MEAN OBSERVED	STANDARD DEVIATION
STREAM NAME:	Gills Creek	STAGE (FT):	2.8	6.1	3.5	3.6	0.5
LOCATION:	Devine Street bridge	TEMPERATURE (°F):	53	78	66	67	5
ADDRESS:	4716 Devine Street Columbia, SC 29209	TURBIDITY (NTU):	2	84	10	11	7
COORDINATES:	33.989656, -80.97433	pH:	6.3	6.7	6.5	6.5	0.1
TMDL/IMPAIRMENT:	Fecal & Dissolved Oxygen	SPECIFIC CONDUCTIVITY (mS/cm):	0.057	0.078	0.063	0.064	0.004
NEIGHBORING LANDUSE:	Residential and commercial	DISSOLVED OXYGEN (mg/L):	5.5	10.5	7.6	7.9	1.0
APPROX. DRAINAGE AREA:	59 square miles						
SPATIAL LOCATION:	Middle site						
TOTAL NO. STORMS OVER 0.1 INCH:	6						
MAX. DAILY RAINFALL:	1.0 inches						
TOTAL RAINFALL (FOR PERIOD):	3.7 inches						



Note: Data gaps appear when the sonde is removed for calibration or when the flow depth is below the sensors

**Continuous Water Quality  
Monitoring Periodic Report**

**Gills Creek B (Mar 27 -- May 5, 2014)**

**Explanation of Statistics:**

<b>MINIMUM OBSERVED</b>	The minimum of the values recorded by the datasonde in 15 minute intervals.
<b>MAXIMUM OBSERVED</b>	The maximum of the values recorded by the datasonde in 15 minute intervals.
<b>MEDIAN OBSERVED</b>	The median of all the values recorded by the datasonde in 15 minute intervals.
<b>MEAN OBSERVED</b>	The average of all the values recorded by the datasonde in 15 minute intervals.
<b>STANDARD DEVIATION</b>	The standard deviation of all the values recorded by the datasonde in 15 minute intervals.

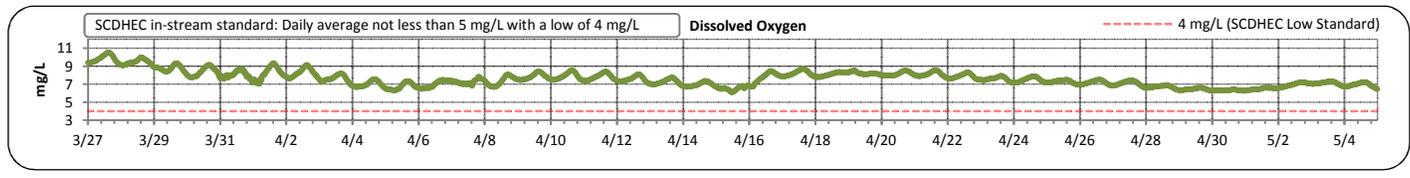
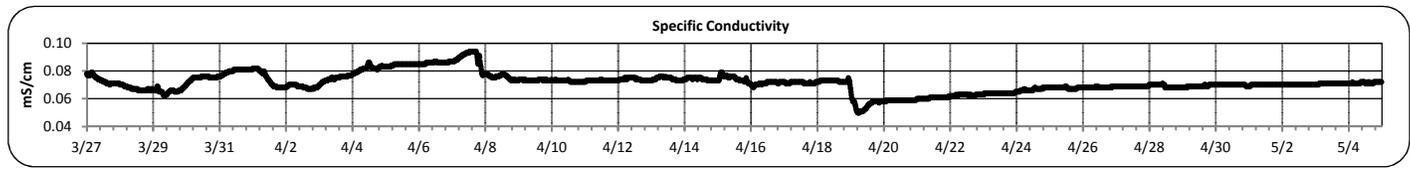
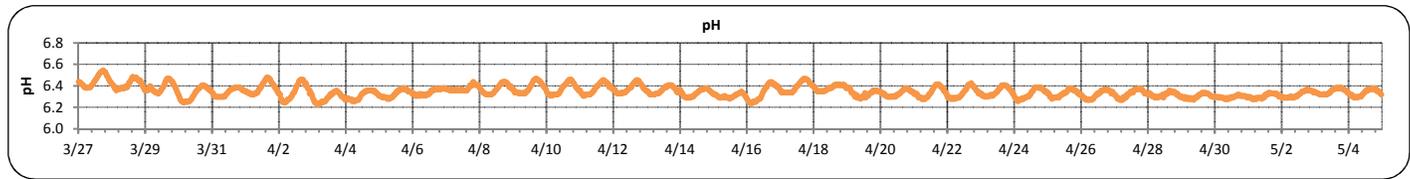
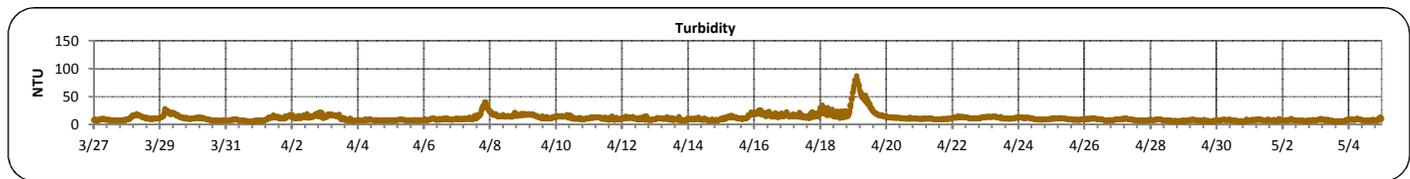
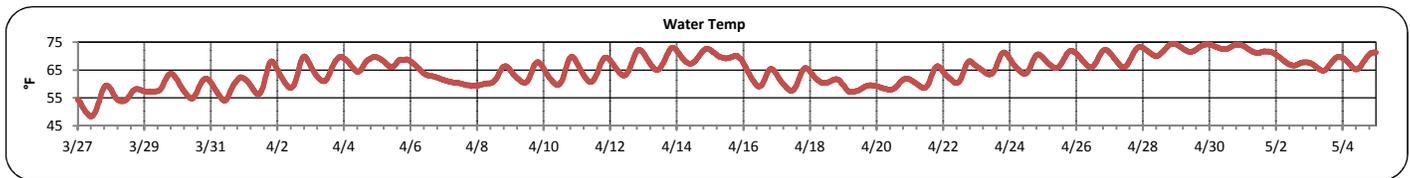
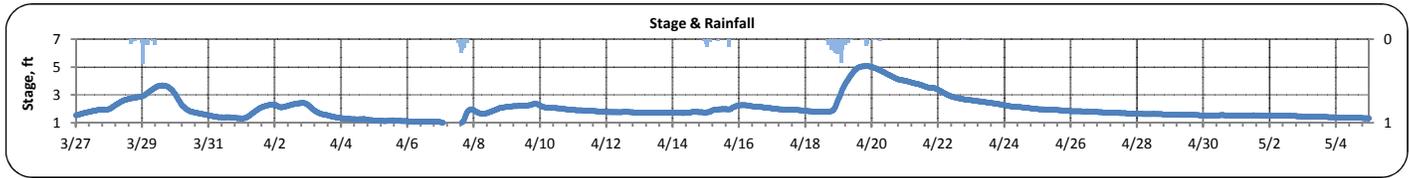
**Sampled Data:**

Analyte (units)	Sample 1		Sample 2		Sample 3		Sample 4	
	Time	Results	Time	Results	Time	Results	Time	Results
<i>Escherichia coli</i> (MPN/100mL)								
Total Suspended Solids (mg/L)								
Total Phosphorus (mg/L)								
Total Nitrogen (mg/L)								

Note: Data gaps appear when the sonde is removed for calibration or when the flow depth is below the sensors

**Gills Creek C (Mar 27 -- May 5, 2014)**

PARAMETER	DESCRIPTION	CONTINUOUS WATER QUALITY PARAMETERS:	SUMMARY STATISTICS				
			MINIMUM OBSERVED	MAXIMUM OBSERVED	MEDIAN OBSERVED	MEAN OBSERVED	STANDARD DEVIATION
STREAM NAME:	Gills Creek	STAGE (FT):	0.9	5.1	1.8	2.0	0.8
LOCATION:	Bluff Road bridge	TEMPERATURE (°F):	48	74	66	65	5
ADDRESS:	3009 Bluff Rd. Columbia, SC 29209	TURBIDITY (NTU):	5	87	10	12	7
COORDINATES:	33.948043, -80.9889	pH:	6.2	6.6	6.3	6.3	0.1
TMDL/IMPAIRMENT:	Fecal & Dissolved Oxygen	SPECIFIC CONDUCTIVITY (mS/cm):	0.05	0.094	0.071	0.072	0.007
NEIGHBORING LANDUSE:	Residential and commercial	DISSOLVED OXYGEN (mg/L):	6.1	10.6	7.5	7.6	0.8
APPROX. DRAINAGE AREA:	64 square miles						
SPATIAL LOCATION:	Most downstream site						
TOTAL NO. STORMS OVER 0.1 INCH:	6						
MAX. DAILY RAINFALL:	0.96 inches						
TOTAL RAINFALL (FOR PERIOD):	3.5 inches						



Note: Data gaps appear when the sonde is removed for calibration or when the flow depth is below the sensors

**Continuous Water Quality  
Monitoring Periodic Report**

**Gills Creek C (Mar 27 -- May 5, 2014)**

**Explanation of Statistics:**

<b>MINIMUM OBSERVED</b>	The minimum of the values recorded by the datasonde in 15 minute intervals.
<b>MAXIMUM OBSERVED</b>	The maximum of the values recorded by the datasonde in 15 minute intervals.
<b>MEDIAN OBSERVED</b>	The median of all the values recorded by the datasonde in 15 minute intervals.
<b>MEAN OBSERVED</b>	The average of all the values recorded by the datasonde in 15 minute intervals.
<b>STANDARD DEVIATION</b>	The standard deviation of all the values recorded by the datasonde in 15 minute intervals.

**Sampled Data:**

Analyte (units)	Sample 1		Sample 2		Sample 3		Sample 4	
	Time	Results	Time	Results	Time	Results	Time	Results
<i>Escherichia coli</i> (MPN/100mL)								
Total Suspended Solids (mg/L)								
Total Phosphorus (mg/L)								
Total Nitrogen (mg/L)								

Note: Data gaps appear when the sonde is removed for calibration or when the flow depth is below the sensors