

June 16, 2014

Monitoring Data Analysis for May 6, 2014 – June 2, 2014

### Gills Creek Monitoring Sites

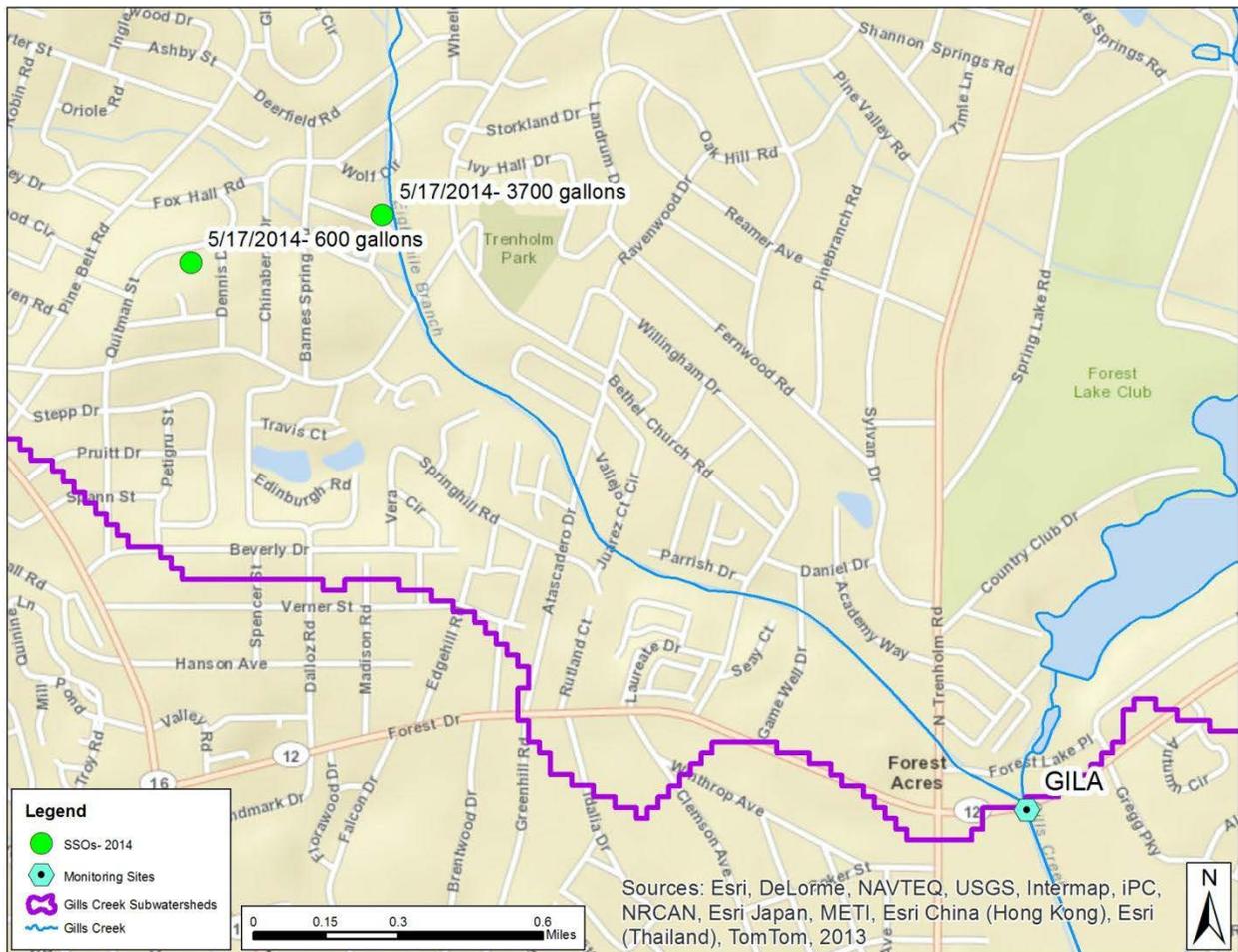
During this monitoring period, the data collected from the Gills Creek stations all displayed typical diurnal patterns with respect to dissolved oxygen (DO), water temperature, and pH. This monitoring period experienced water temperatures that were on average 10 degrees Fahrenheit warmer than in the previous monitoring period, resulting in lower DO levels. The mean DO level at the GILA and GILB sites remained above 7 mg/L; however, the GILC average DO level dropped to 6.3. While the DO levels are decreasing as summer temperatures rise, the concentrations have not dropped below the 5 mg/L SCDHEC daily average standard. The pH standard, however, was violated once during this monitoring period. At the GILA station, the pH dropped below the minimum standard of 6, to a value of 5.9 for a duration of approximately 30 minutes. This occurred following a high intensity rain event (peak intensity of 2.3 in/hr), and was most likely the result of low pH rainwater runoff entering the creek. This trend has been observed historically during high intensity summer thunderstorms. On July 22nd, 2013, a storm with a peak intensity of 2.6"/hr caused the pH at GILA to drop below 6. Similarly, a storm with a peak intensity of 1.9 in/hr occurred on August 29th, 2013, and resulted in a pH below 6.

Over this monitoring period, 7 storms were observed at the GILA station, 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 generally decreased as a result of the dilution effect of the stormwater runoff. An interesting pattern was seen in the specific conductivity levels following storm events. At the GILA station, the conductivity showed marked increases at the beginning of storm events, before displaying the more typical decrease in values. Likely, the first flush of runoff carried contaminants from the roadway into the creek, and as the storm progressed the increased flow of rainwater runoff into the creek causes the ionic concentration to decrease. Similarly, during some of the small storm events at GILB and GILC, such as those on May 11th and May 25th, the conductivity increased slightly and briefly, and never showed the typical decrease in readings. In these cases, it may be that the rainfall amount was enough to cause pollutant runoff into the creek, but not large enough to contribute a dilution effect.

During this monitoring period, several interruptions in the continuous dataset were observed. At the GILA station, the entire sonde was unsubmerged from the time of deployment until May 15th. The specific conductivity probe was also unsubmerged from May 22nd to May 24th. At the GILB site, it appears that leaf debris in the sonde guard caused inaccurate turbidity readings, and as a result the affected data was removed from the dataset. At the GILC site, similar turbidity inaccuracies were observed on 3 occasions: May 10th, May 13th, and May 22nd – May 23rd.

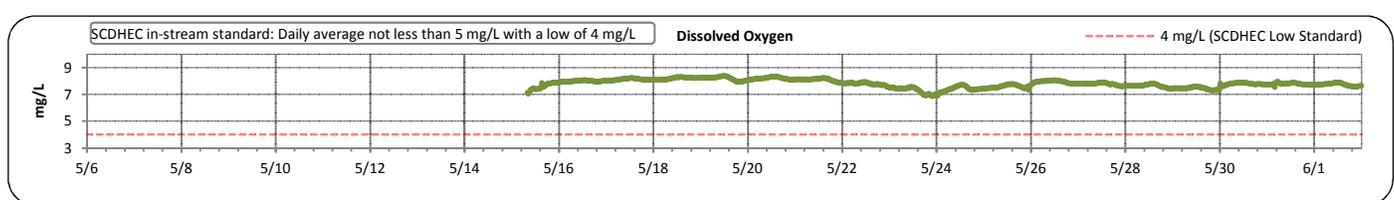
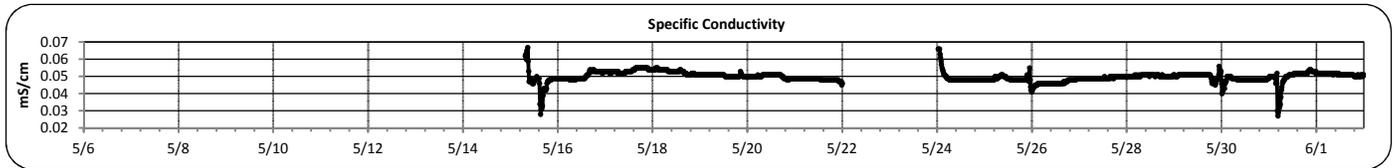
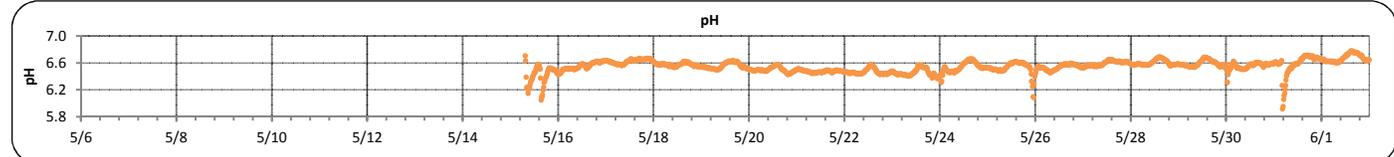
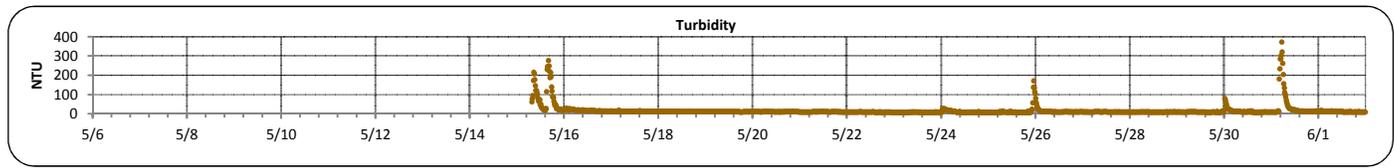
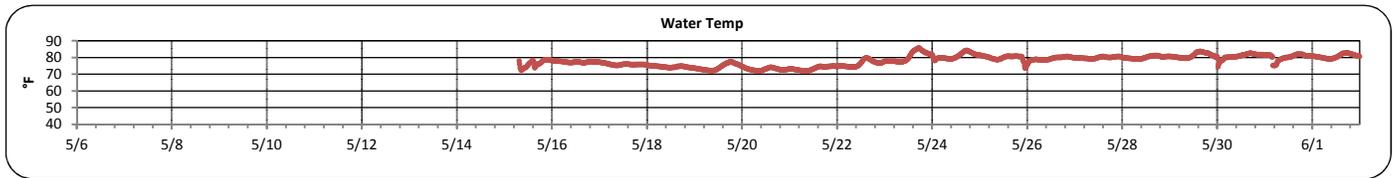
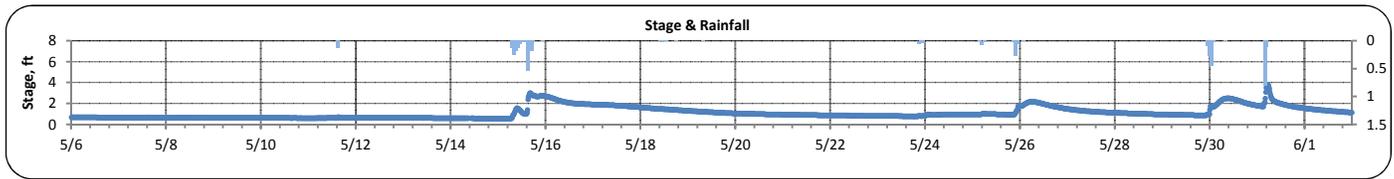
During this monitoring period, a particularly notable observation was made. On May 17th, two sanitary sewer overflows were reported shortly upstream on the GILA station (see figure below.) The datasonde at GILA showed an increase in the ammonium levels from 0.23 to 0.37 mg/L, as well as a very slight increase in specific conductivity levels. These fluctuating levels may very well have resulted from one or both of the sanitary sewer overflows. These events and the quantity of the overflow are self-reported by the sewer utilities, so quantities may not be precise.

Figure: SSO Events in the GILA Watershed



**Gills Creek A (May 6, 2014 -- June 2, 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):	0.5	3.8	1.0	1.1	0.5
LOCATION:	Forest Drive Bridge	TEMPERATURE (°F):	72	86	79	78	3
ADDRESS:	4840 Forest Drive, Columbia, SC 29206	TURBIDITY (NTU):	7	372	11	16	29
COORDINATES:	34.019826, -80.963566	pH:	5.9	6.8	6.6	6.6	0.1
TMDL/IMPAIRMENT:	Fecal & Dissolved Oxygen	SPECIFIC CONDUCTIVITY (mS/cm):	0.027	0.067	0.050	0.050	0.003
NEIGHBORING LANDUSE:	Residential and commercial	DISSOLVED OXYGEN (mg/L):	6.9	8.4	7.8	7.8	0.3
APPROX. DRAINAGE AREA:	48 square miles						
SPATIAL LOCATION:	Most upstream site						
TOTAL NO. STORMS OVER 0.1 INCH:	7						
MAX. DAILY RAINFALL:	1.7 inches						
TOTAL RAINFALL (FOR PERIOD):	4.2 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 (May 6, 2014 -- June 2, 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.

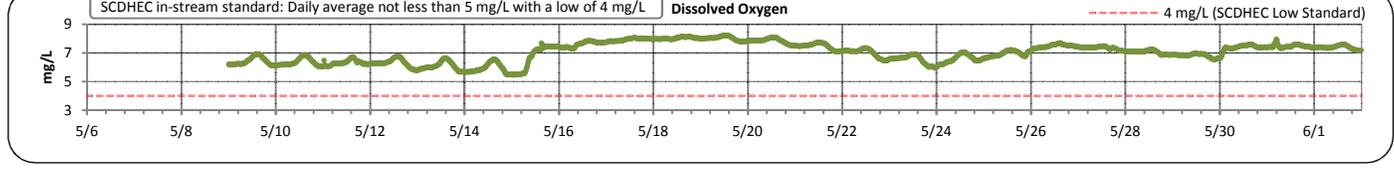
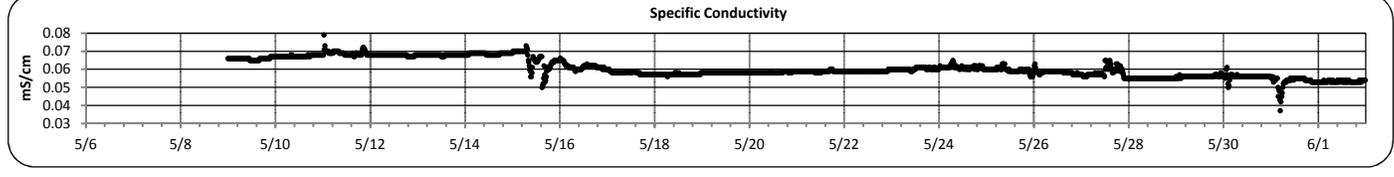
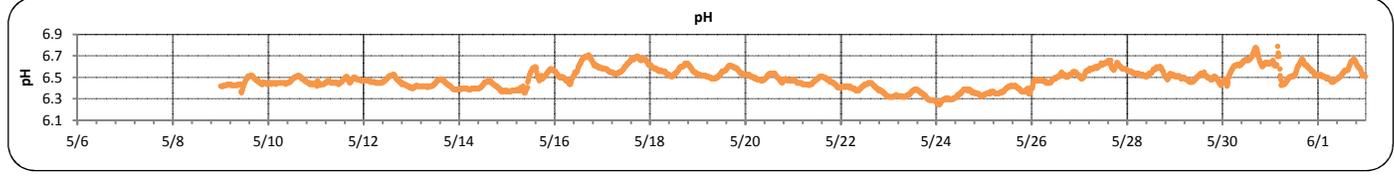
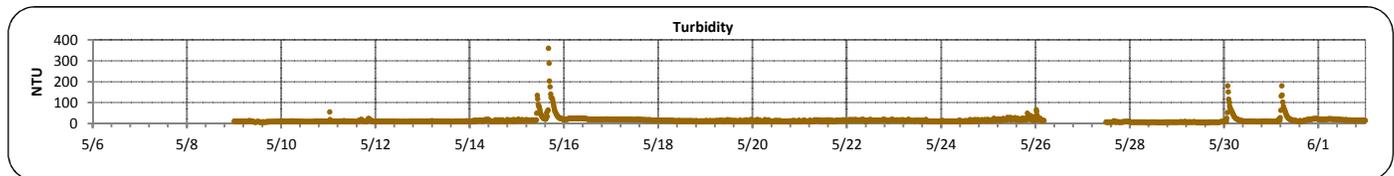
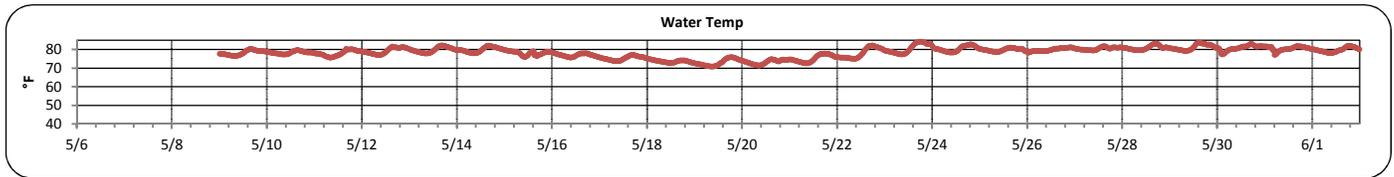
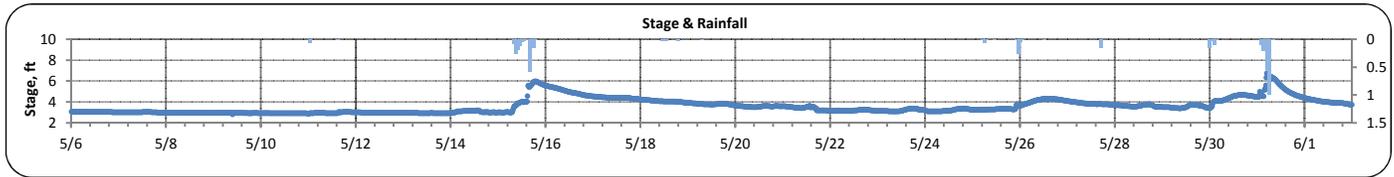
**Sampled Data:**

Analyte (units)	Sample 1		Sample 2		Sample 3		Sample 4	
	5/15/2014		5/15/2014		5/15/2014			
	Time	Results	Time	Results	Time	Results	Time	Results
<i>Escherichia coli</i> (MPN/100mL)	9:04	8,630	10:58	6,440	13:45	1,987		
Total Suspended Solids (mg/L)	9:07	210	11:01	52	13:48	14		
Total Phosphorus (mg/L)	9:05	0.44	10:59	0.15	13:47	0.058		
Total Nitrogen (mg/L)	9:05	2.759	10:59	1.069	13:47	0.714		

Note: Only 3 samples were collected during this storm event due to the spacing on the hydrograph.

**Gills Creek B (May 6, 2014 -- June 2, 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	6.7	3.4	3.6	0.7
LOCATION:	Devine Street bridge	TEMPERATURE (°F):	71	84	79	78	3
ADDRESS:	4716 Devine Street Columbia, SC 29209	TURBIDITY (NTU):	6	359	13	16	17
COORDINATES:	33.989656, -80.97433	pH:	6.3	6.8	6.5	6.5	0.1
TMDL/IMPAIRMENT:	Fecal & Dissolved Oxygen	SPECIFIC CONDUCTIVITY (mS/cm):	0.037	0.079	0.059	0.060	0.005
NEIGHBORING LANDUSE:	Residential and commercial	DISSOLVED OXYGEN (mg/L):	5.5	8.3	7.2	7.1	0.7
APPROX. DRAINAGE AREA:	59 square miles						
SPATIAL LOCATION:	Middle site						
TOTAL NO. STORMS OVER 0.1 INCH:	5						
MAX. DAILY RAINFALL:	1.8 inches						
TOTAL RAINFALL (FOR PERIOD):	4.4 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 (May 6, 2014 -- June 2, 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:**

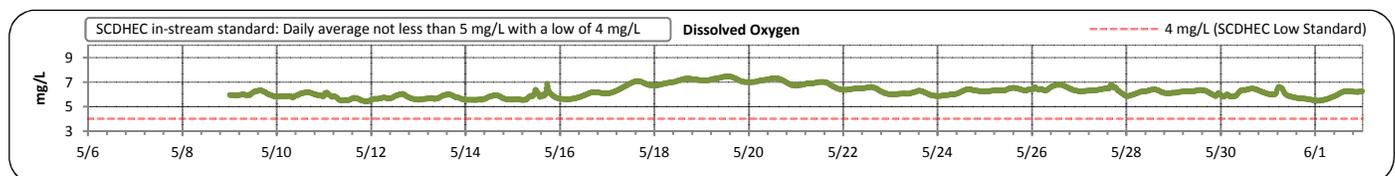
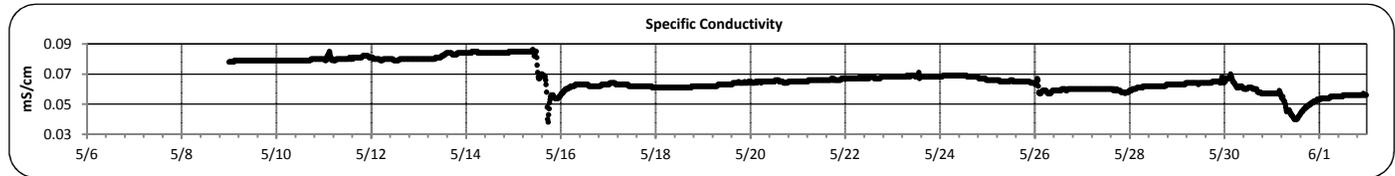
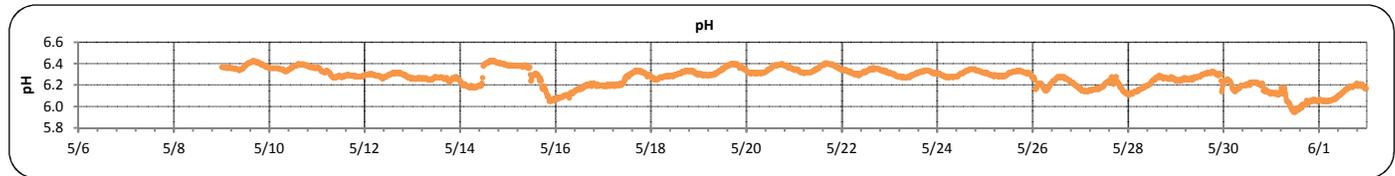
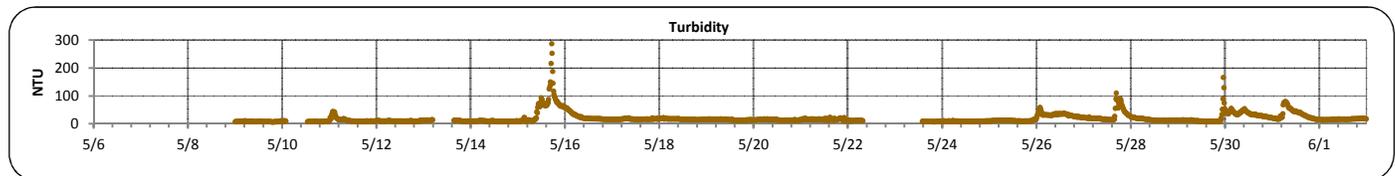
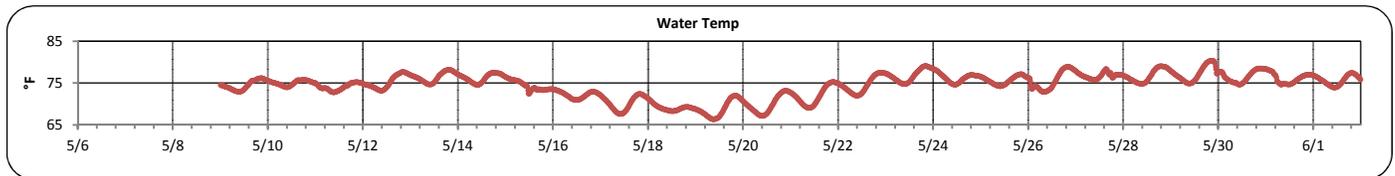
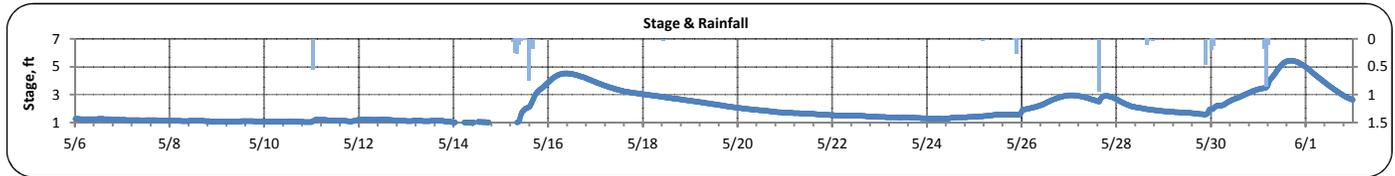
Analyte (units)	Sample 1		Sample 2		Sample 3		Sample 4	
	5/15/2014		5/15/2014		5/15/2014			
	Time	Results	Time	Results	Time	Results	Time	Results
<i>Escherichia coli</i> (MPN/100mL)	9:24	34,480	11:18	5,210	14:06	1,414		
Total Suspended Solids (mg/L)	9:29	21	11:21	49	14:09	11		
Total Phosphorus (mg/L)	9:27	0.094	11:19	0.1	14:07	0.056		
Total Nitrogen (mg/L)	9:27	0.906	11:19	0.969	14:07	0.79		

Note: Only 3 samples were collected during this storm event due to the spacing on the hydrograph.

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

**Gills Creek C (May 6, 2014 -- June 2, 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):	1.0	5.4	1.6	2.0	1.0
LOCATION:	Bluff Road bridge	TEMPERATURE (°F):	66	80	75	74	3
ADDRESS:	3009 Bluff Rd. Columbia, SC 29209	TURBIDITY (NTU):	7	287	15	19	18
COORDINATES:	33.948043, -80.9889	pH:	6.0	6.4	6.3	6.3	0.1
TMD/IMPAIRMENT:	Fecal & Dissolved Oxygen	SPECIFIC CONDUCTIVITY (mS/cm):	0.038	0.086	0.065	0.067	0.010
NEIGHBORING LANDUSE:	Residential and commercial	DISSOLVED OXYGEN (mg/L):	5.5	7.5	6.2	6.3	0.5
APPROX. DRAINAGE AREA:	64 square miles						
SPATIAL LOCATION:	Most downstream site						
TOTAL NO. STORMS OVER 0.1 INCH:	7						
MAX. DAILY RAINFALL:	1.75 inches						
TOTAL RAINFALL (FOR PERIOD):	5.8 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 (May 6, 2014 -- June 2, 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	
	5/15/2014		5/15/2014		5/15/2014			
	Time	Results	Time	Results	Time	Results	Time	Results
<i>Escherichia coli</i> (MPN/100mL)	9:45	1,987	11:42	>241,960	14:26	7,170		
Total Suspended Solids (mg/L)	9:48	31	11:45	65	14:29	39		
Total Phosphorus (mg/L)	9:46	0.11	11:44	0.34	14:28	0.16		
Total Nitrogen (mg/L)	9:46	0.965	11:44	2.2	14:28	0.949		

Note: Only 3 samples were collected during this storm event due to the spacing on the hydrograph.

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