Supplemental Fecal Coliform Bacteria Monitoring

for the

Warm Springs Watershed Association

Prepared for: Warm Springs Watershed Association

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Participating Agencies and Organizations

Warm Springs Watershed Association
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Introduction and Background

Warm Springs Run (WSR) is located in Morgan County, West Virginia. It flows 10.3 miles north into the Potomac River. Warm Spring Run was listed by WVDEP on the 2012 303(d) list as impaired for fecal coliform bacteria, based on data collected by WVDEP in 2007 and 2009.

At the request of the Warm Springs Watershed Association (WSWA), Cacapon Institute (CI) conducted 'pre-TMDL monitoring' for fecal coliform bacteria that ran from July 2013 until June 2014. The purpose of that study was to augment the 2007/2009 WVDEP data that led to WSR being identified as impaired on the 2012 303(d) list for fecal coliform bacteria' leading to a better understanding of the problem and also to inform the pending TMDL source tracking study. CI submitted the final report for that study to the WSWA in June 2014.

The WSWA asked CI to conduct a limited amount of additional sampling for the purpose of source tracking bacterial "hot spots" upstream of the town park, specifically in a limited area upstream of the Country Inn. This report provides the results of that additional work.

Sampling Design

Sampling locations were based on results of previous sampling and locations with ready public access to Warm Springs Run. They ran upstream from the Country Inn to Widmeyer Elementary School. The first two sampling runs captured low flow dry and moderate flow wet conditions. Based on the results of those two runs, a final sampling visit was conducted in the vicinity and upstream of the site with the highest bacterial count.

Field and Laboratory Methods

Cacapon Institute is a West Virginia Certified Laboratory, and performed field collections and laboratory analyses as laid out in the organization's approved SOPs. Water samples were collected midstream 10-15 cm below the surface. Sampling containers, storage conditions and holding times followed APHA (APHA, 1992). One daily duplicate sample was collected.

Fecal Coliform Bacteria were determined using the Membrane Filtration Method by filtering three known volumes of sample (typically 3 ml, 10 ml, 30 ml) through three separate 0.45 micrometer filters, transferring the filters to petri dishes containing a selective growth medium (PourRite m-FC/Rosalic Acid Broth Ampules -Hach Cat# 24285-20), incubating the petri dish at a selective temperature of 44.5 ^{o}C + 0.2 ^{o}C in a Millepore Dual Chamber Incubator (Cat# XX63 LK1 15), and counting the number of resulting colonies at 24 hours ($\pm$ 2 hours). Results are expressed as number of colony forming units per 100 ml.

Results

The West Virginia standard for fecal coliform bacteria specifies that the maximum allowable level of fecal coliform for primary contact recreation shall not exceed 200 cfu/100 mL as a monthly geometric

mean (based on not less than 5 samples per month). The fecal coliform count also shall not exceed 400 cfu/100 mL in more than 10 percent of all samples taken during any one month. The data collected during this study does not allow a direct comparison to the state standard of 200 cfu/100 mL as a monthly geometric mean because few samples were collected. When fewer than five samples are collected per month, the applicable standard becomes 400 cfu/100 ml. For that reason, the results of this study will be discussed in the context of the 400 cfu/100ml part of the fecal coliform bacteria standard. 200 cfu/100 ml is discussed as a "warning" level.

The results of the sampling are in the table below.

Station	Date	Precip last 24 hrs	USGS Flow (cfs)	Fecal Coliform (cfu/100ml)	Code
WSR above Country Inn	10/27/2014	None	1.9	53	e
WSR Earth Dog Parking lot	10/27/2014	None		50	e
WSR Goal Post Lane	10/27/2014	None		56	e
WSR John Street	10/27/2014	None		56	e
WSR Widmeyer ~ Rm 8.6	10/27/2014	None		3	LT
WSR above Country Inn	10/29/2014	Yes	2.1	200	
WSR Earth Dog Parking lot	10/29/2014	Yes		**833**	
WSR Goal Post Lane	10/29/2014	Yes		133	
WSR John Street	10/29/2014	Yes		170	
WSR Widmeyer ~ Rm 8.6	10/29/2014	Yes		163	
WSR above Country Inn	11/17/2014	Yes, runoff	4	630	k
WSR Earth Dog Parking lot below culvert	11/17/2014	Yes, runoff		800	
WSR Earth Dog Parking lot upstream of parking lot runoff	11/17/2014	Yes, runoff		1033	
WSR 10' below Whisner Ave. Bridge	11/17/2014	Yes, runoff		3500	k
WSR ~75' below Broadway St & below manhole	11/17/2014	Yes, runoff		540	
WSR above Broadway St.	11/17/2014	Yes, runoff		1433	
WSR Goal Post Lane	11/17/2014	Yes, runoff		967	

The weather on the first date (10/27/14) was dry, with no precipitation in the preceding week, and the stream flow was low. No sites on this date exceeded the 400 cfu/100 ml standard. The second sampling run was conducted two days later (10/29/14) to capture the effects of moderate rain since early in the morning. The stream was notably higher than 2 days previously, but surface runoff was not observed. Only the site at the Earth Dog Restaurant parking lot exceeded the 400 cfu/100 ml standard on this date, with a count of 833. The site downstream of this one had a 200 count, which fell in the "warning" level.

The third sampling run (11/17/14) was conducted after a night of significant precipitation, and was localized in the area and upstream of the Earth Dog Restaurant parking lot. Samplers (Gillies and Lehman) walked the stream between Earth Dog and Goal Post Lane in order to have full access to try to isolate the source of high bacteria counts observed during the 10/29/14 sampling. With continuous rain since about midnight, the stream was notably higher and murkier than the 10/29 event, runoff was apparent in many locations. All seven samples on this date exceeded the 400 cfu/100 ml standard. The highest level (3500 cfu/100 ml) by nearly a factor of three, was just below Whisner Avenue, approximately 180 feet upstream of the Earth Dog parking lot.

Conclusions

It seems clear that elevated fecal coliform counts in this section of Warm Springs Run are associated with precipitation. Additional sampling would be necessary to further isolate and identify the source of the contamination in this section of Warm Springs Run.

The results of this study support the continued listing of this stream as impaired for fecal coliform bacteria. The drivers for elevated fecal coliform bacteria counts at the sampled sites remain unclear.

Acknowledgments

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Citations

APHA, 1992. Standard Methods for the Examination of Water and Wastewater, 18th edition. American Public Health Association, Washington, DC Various pagination.

TMDL, 2007. Total Maximum Daily Loads for Selected Streams in the Potomac Direct Drains Watershed, West Virginia. TETRA Tech, for WVDEP. February 2007, Draft Report.