

2010 Spring E-coli Sampling
August and September 2010
Murfreesboro Water and Sewer Department



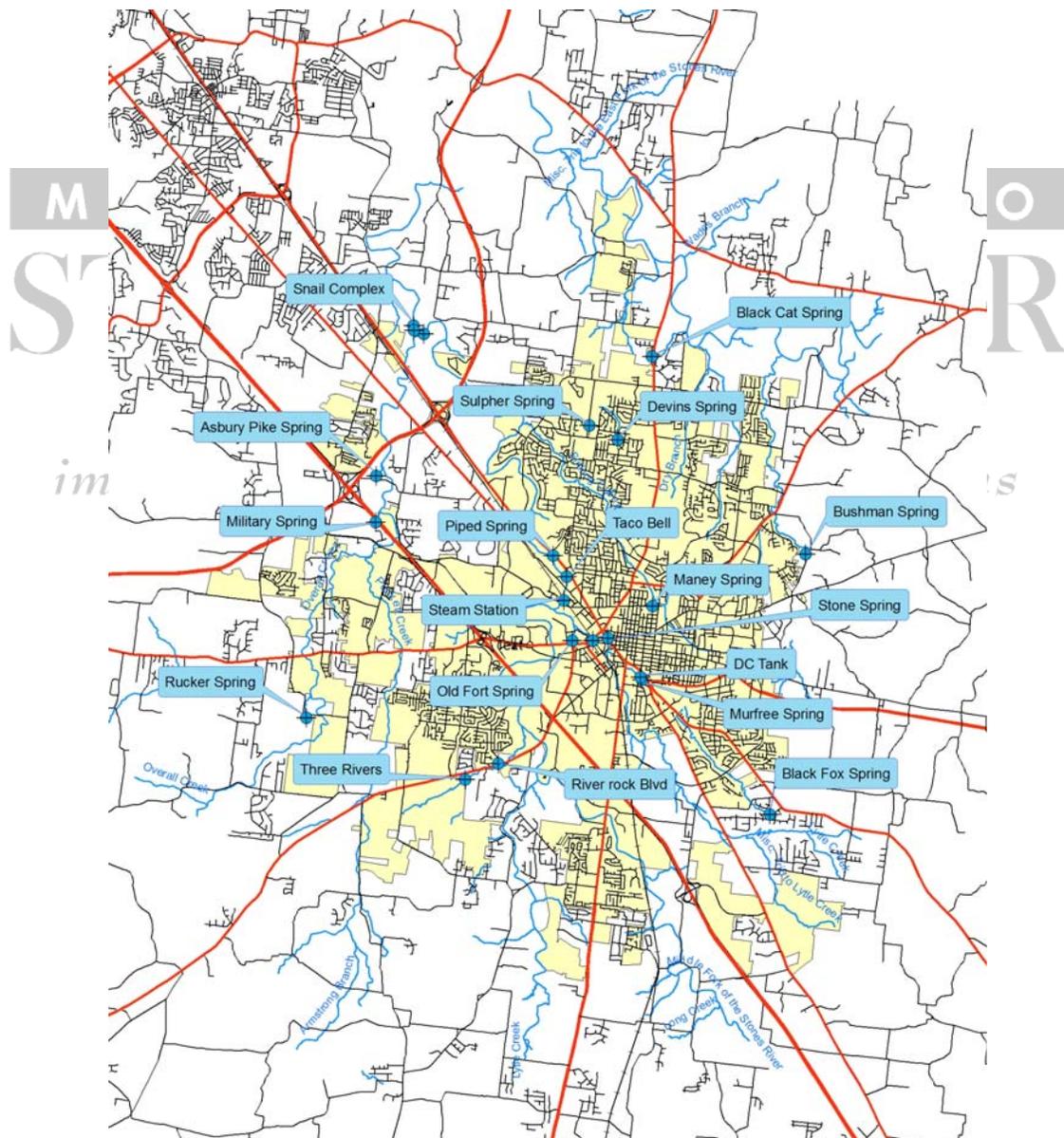
Military Spring

MURFREESBORO
STORMWATER
PROGRAM
improving the quality of local streams



2010 Dry Weather E-Coli Spring Testing

The Murfreesboro area is made up of a karst topography which many perennial springs are found. All of the springs in the Murfreesboro urban growth boundary are formed in the Ridley limestone. Black Fox spring is considered an “overflow spring” while all of the other springs in the Murfreesboro area sampled in this report are “contact springs.” Two streams in the Murfreesboro city limits are on the 303d list for e-coli. Both of these streams have springs that have had high readings of e-coli in past sampling. In attempt to gain better understanding of groundwater containing high levels of e-coli, MWSD is proposing more dye tracing and sampling. This report lists sample results from 22 major springs that contribute a majority of the surface waterway’s base flow in the dry time of the year. Samples were from late August to early September when the West Fork of the Stones River had a flow around 35 cfs.





Bruce Ross taking sample at Three Rivers Spring



Black Fox Spring



Military Spring next to I-24



Discovery Center Tank

August 2010 Spring Sample Results

Spring Name	Date	Results
Murfree Spring	8-16-2010	82
Discovery Center Seep	8-16-2010	292
Discovery Center Tank	8-16-2010	150
Black Fox Spring	8-16-2010	104 – 20 with solution
Military Spring	8-18-2010	2,374
Devins Creek Head	8-17-2010	40
Three Rivers Springs	8-17-2010	40
River Rock Spring	8-17-2010	264
Old Fort Spring	8-18-2010	524
Bushman Spring (at 96)	9-2-2010	618
TB Spring	8-31-2010	2,472
Steam Station	8-31-2010	20
Dairy Karst Window	9-3-2010	2,086
Rucker Spring	8-31-2010	918
WFSR Cave Spring	9-2-2010	82
Wallace Karst Window	9-2-2010	62
Alexander Spring	8-18-2010	370
First Spring	8-17-2010	<20
Maney Spring	8-18-2010	402
Bear Head Spring	8-18-2010	2,900
VA Spring	8-17-2010	58.4
Rosebank Spring	8-31-2010	62

improving the quality of local streams
Summary

The 2010 spring sampling allowed for a baseline of spring quality to be formed in the dry time of the year but also contrasted some springs with previous readings for certain locations. Although no conclusions can be made but several trends were noted that can be used for future analysis. Three levels of e-coli were noted very low (< 100), moderate (200 – 700), and high (> 900). A goal of the department is to further analyze the possible sources of contamination in these springs in attempt to keep and remove streams from the 303d list.

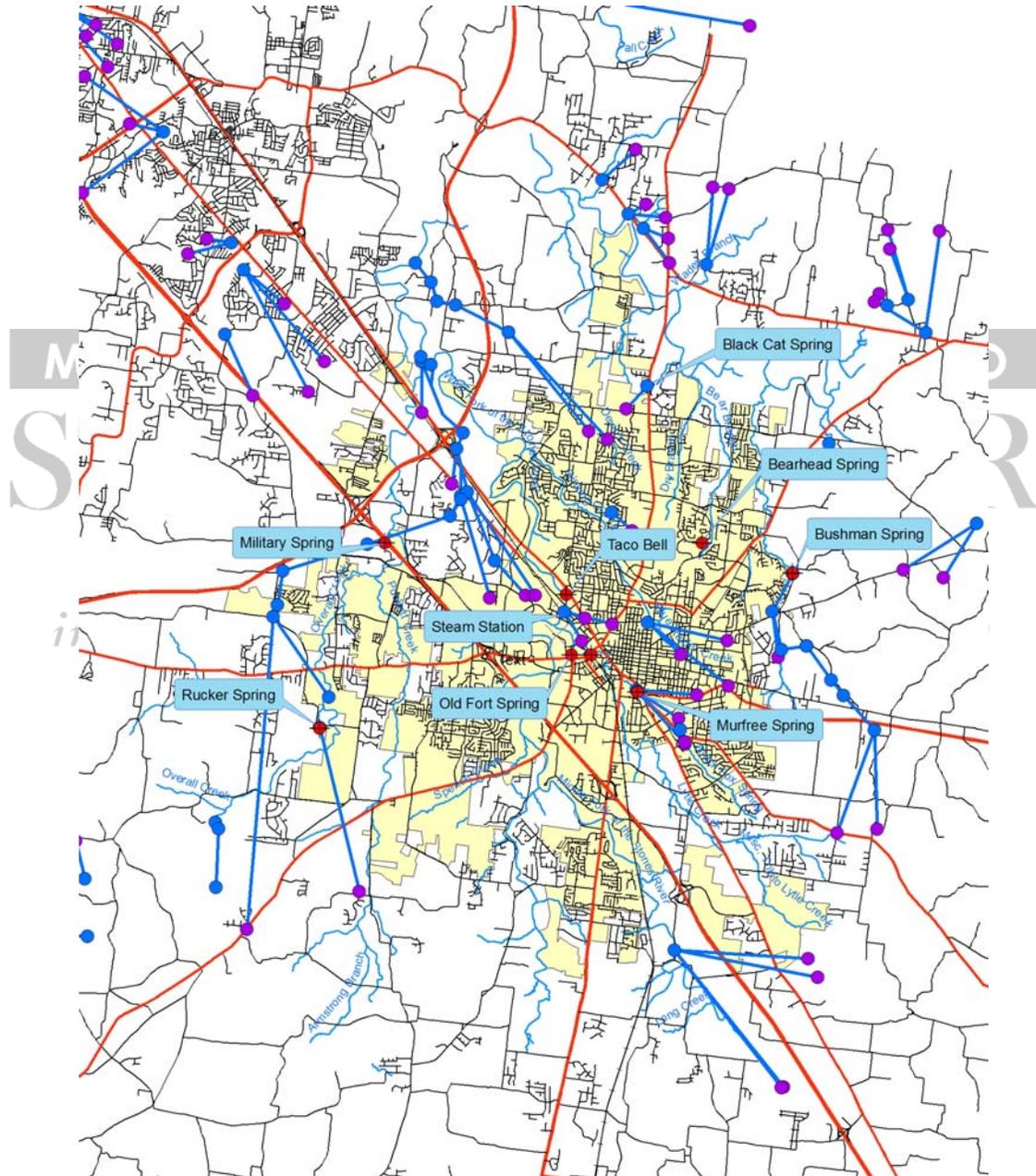
Previous High Readings were Lower

Several of the springs that were tested in the June 2010 IDDE in the Town Creek watershed that had readings between 1,800 to 2,300 tested much lower. This is thought to be a combination of lower rainfall and infiltration rates pushing perched contaminants downward and a lower water table during this round of sampling.

Non Agricultural Springs

Two springs (Bear head – Empress Dr and TB - West Fork of the Stones) had high e-coli counts with suspected recharge basins not containing any livestock or agricultural parcels. DNA analysis and dye tracing could help to locate pollution source or if these are natural background levels.

Springs Containing High E-coli Levels



Springs with high E-coli content (red) with dye traces (trace = blue, injection point = purple, and detection point = blue) E-coli source can be tracked up stream by looking at existing traces

Spring Photos



Murfree Spring



Seep near Discovery Center



Three Rivers Spring

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Riverrock Spring



Discovery Center



Black Fox Spring



Military Spring



Devin's Creek



Rucker Spring



WFSR Cave

E
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improving the quality



Wallace Karst Window



Alexander Spring



Wetland near Bear Head Spring



Maney Spring



Downstream of VA Spring and Lake



Rosebank Spring



Spring Branch



Bushman Creek

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Dairy Karst Window



TB Spring

Correlation of Agricultural E-coli Sources and Sinkholes with Springs in the Horde Subterranean River

Water draining from the large Snail Shell Cave springs upward to form the head of Overall Creek southwest of Murfreesboro. The majority of the water stays underground as seen by Ogden and Crawford dye traces. Water travels underground and occasionally a percentage of water will form a spring near a bend in Overall Creek as the creek is influenced by joints and fractures. In some locations the Horde Subterranean River travels away from Overall Creek as evident by sinkholes and dye traces. The sinkholes will accept surface drainage and feed the subterranean river while being a long distance from any surface stream. When the subterranean river crosses the creek a spring or seep when enter containing this ground water. This process is mimicked in other places in the Murfreesboro city limits. In the Horde Subterranean River it is suspected that livestock near sinkholes and karst windows contribute to high e-coli readings in downstream springs. Other springs containing high e-coli content such as TB Spring and Murfree spring have a recharge basin which does not contain agricultural use.

