

East Fork Stones River Watershed

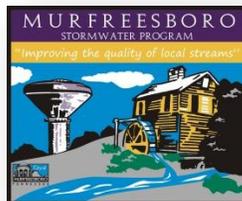
Visual Stream Assessment

Stream Characterization Study (Macro Invertebrate, Groundwater, Ph, Temperature, Conductivity, Dissolved Oxygen, and E-coli Spring Sampling)



Bushman Creek at Dejarnette Ln

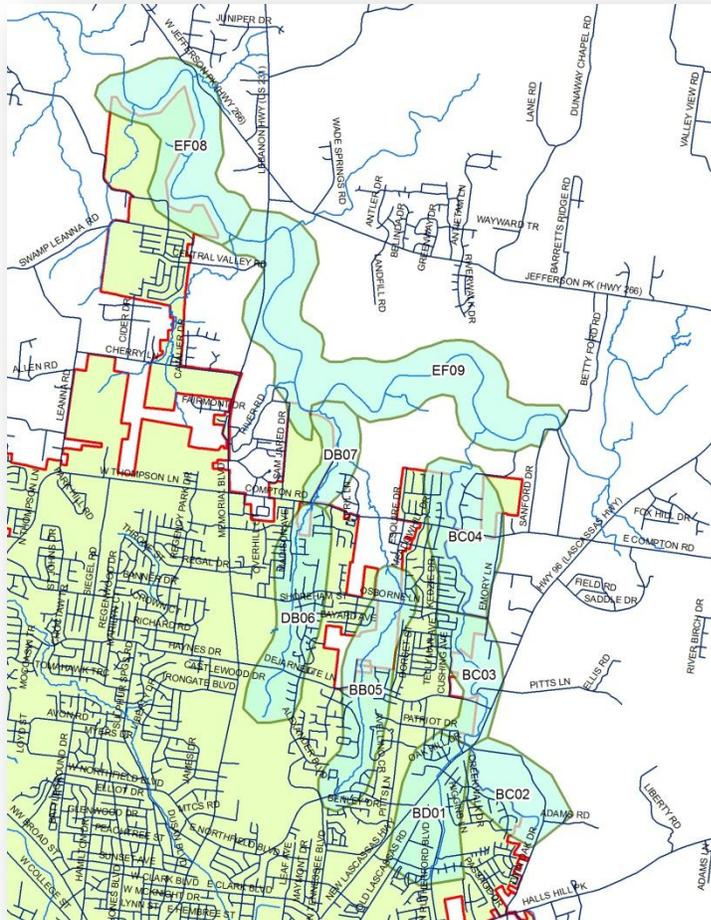
Spring and Summer 2011



East Fork Stones River Watershed VSA and Stream Characterization Introduction

General Overview

In the spring and summer months of 2011 the Murfreesboro Water and Sewer Department (MWSD) Stormwater Department conducted a visual stream assessment (VSA) in parts of the East Fork Stones River watershed. The 20.5 miles of stream were broken up into



sectors in order to catalog data more efficiently. While conducting the VSA, additional data was collected to fully characterize the watershed. The following parameters will be detailed further in individual sections of this report:

- I. Dye Tracing
- II. Probe (Ph, Conductivity, Temperature, and DO)
- III. Inadequate Buffer Analysis
- IV. Macro Invertebrate Analysis
- V. VSA Data
- VI. Spring e-coli samples

The purpose of this report is to give a better understanding of the condition of the East Fork Stones River and its tributaries

while archiving possible restoration and correction sites.

Watershed Description

The East Fork Stones River is one part of three forks which its headwaters are found in Cannon County, Tennessee. The East Fork meets the West Fork and eventually empties into the Cumberland River. Much of the upper East Fork resides in an agricultural land use. As the river nears the city the landuse becomes more residential with many of the in-city tributaries in an

urban environment. Like many other streams found in the Stones River watershed, the East Fork has several springs that feed its tributaries. Some of these tributaries like Bear Branch and



Dry Branch lose flow through the karst Ridley limestone and then have permanent flow where the contact of the Pierce limestone is exposed mainly around Compton Ln in north Murfreesboro. Bushman Creek on the other hand has a good flow year round due to a very large recharge basin. Several of the tributaries in the East Fork Stones River are listed on the 303d list for impairment.

Stream Name	Water body ID	Impairment	Cause
Bear Branch	TN05130203023 –0310	Habitat loss due to alteration in stream-side or littoral vegetative cover	Pasture grazing
“ ”	“ ”	Loss of biological integrity due to siltation	Land Development
“ ”	“ ”	Nutrients	
Unnamed Tributary to Bushman Creek (Big Ditch)	TN05130203023 –0210	Habitat loss due to alteration in stream-side or littoral vegetative cover	Discharges from MS4 area Channelization
“ ”	“ ”	Physical Substrate Habitat Alteration	
“ ”	“ ”	Loss of biological integrity due to siltation	

303(d) listed streams in the East Fork Stones River in Murfreesboro City Limits

Methodology

MWSD used the Maryland Protocol for guidance in its Visual Stream Assessment.



I. Office Preparation – First, all assessment areas were broken into sectors and then were given a sector ID number. Then all data such as VSA points and base data were loaded into a Trimble Nomad GPS receiver.

II. Data Collection – A GPS point was taken at each observed site and given an ID number based on the sector that the point was found in. As an example an erosion site in Bear Branch was observed and it was the 4th point in that sector, the point's ID would be BB0504. Many other

parameters are noted describing the particular site such as the ability to correct and access the site as well as the severity of the problem. These descriptions are recorded in the GPS in GIS coverages. Macro invertebrates, probe, and e-coli samples were also GPS'd in the field.

III. Report Generation - Once field work was complete all data was imported into a geodatabase and spatially corrected. Charts, maps, and diagrams were also created from field data mapping trends. VSA data points were tallied and observation points ranked based on a sum of numbers given for accessibility, correctability, and severity detailed later in this report.



I. Dye Tracing

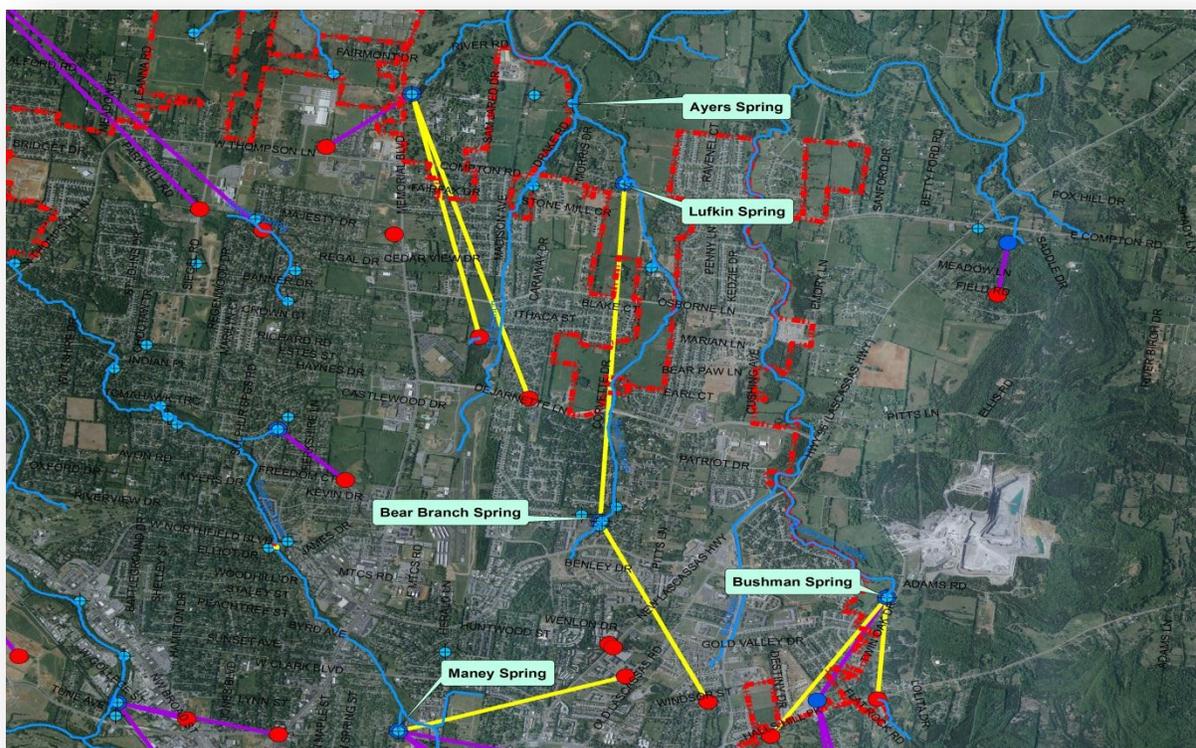
Dye tracing was performed by Albert Ogden, Ph.D., Kyle Wiseman, Bruce Ross, and Josh Upham in the winter and spring of 2011. This study was conducted aside from the Visual Stream Assessment but must be mentioned in this report due to its relativity to stream characteristics in the East Fork Stones River watershed.



Dye being injected into a sinkhole near DeJarnette Ln

During much of the year stream flow is minimal or resides underground. Sinkholes and losing stretches of stream take run off and water that may contain pollutants and may not appear again until the flow enters a stream. In some cases a sinkhole which receives water may be a long distance from a

stream or in a different surface watershed. Recent dye tracing in conjunction with existing traces done by Ogden, Crawford, and Aley provide crucial data in delineating recharge basins and therefore researching a watershed correctly. Spring location is



fundamental in dye tracing for it is often the detection point for injected dye. Visual Stream Assessments offer the perfect platform to locate springs visually along with probe data such as temperature and conductivity.

Once groundwater movement is known, then stream observations make more since. As the above map show, Bear Branch gains and loses flow as the surface stream channel

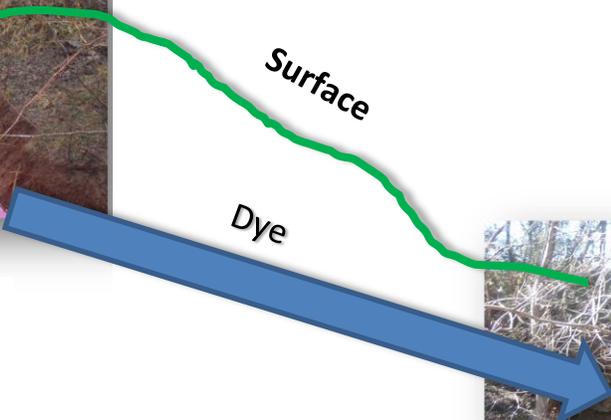
crosses or nears the subsurface groundwater flow. Dye injected as far away as Greenland Dr. was detected at Lufkin Spring near Compton Rd. and the East Fork.



Major wet weather spring located during VSA on Bear Branch

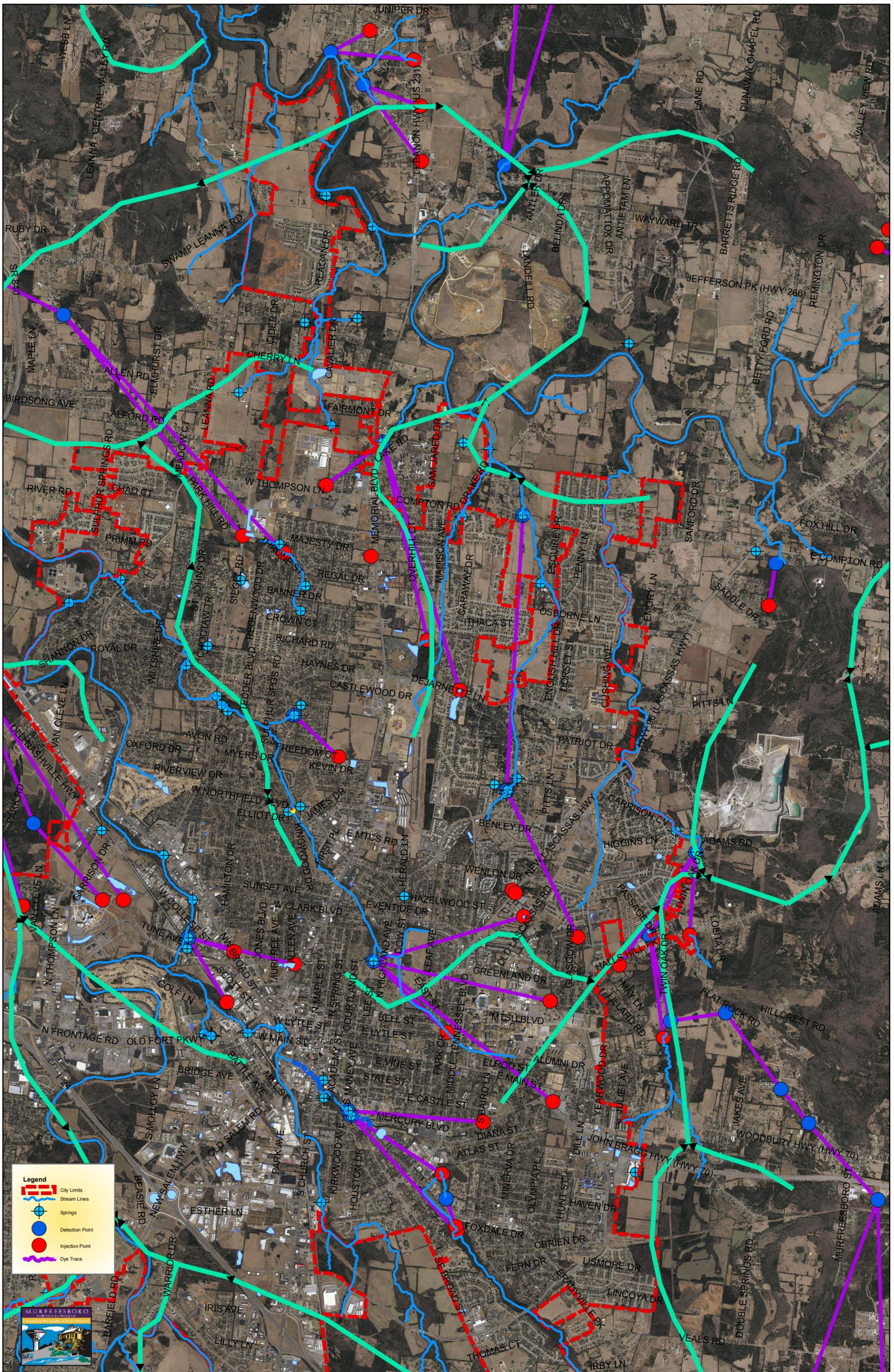


Injection



Detection





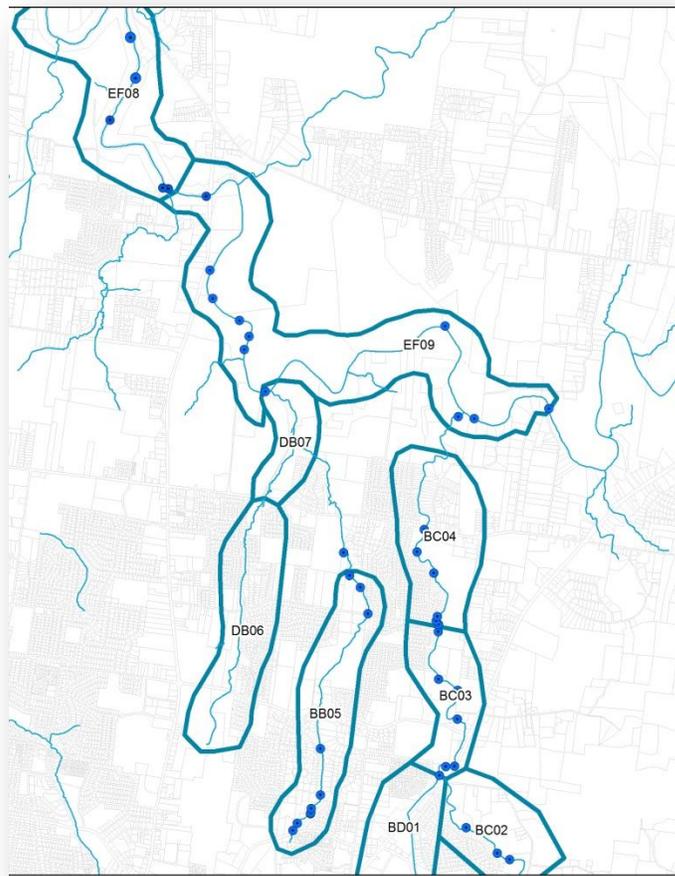
Dye Traces in the East Fork Stones River Watershed

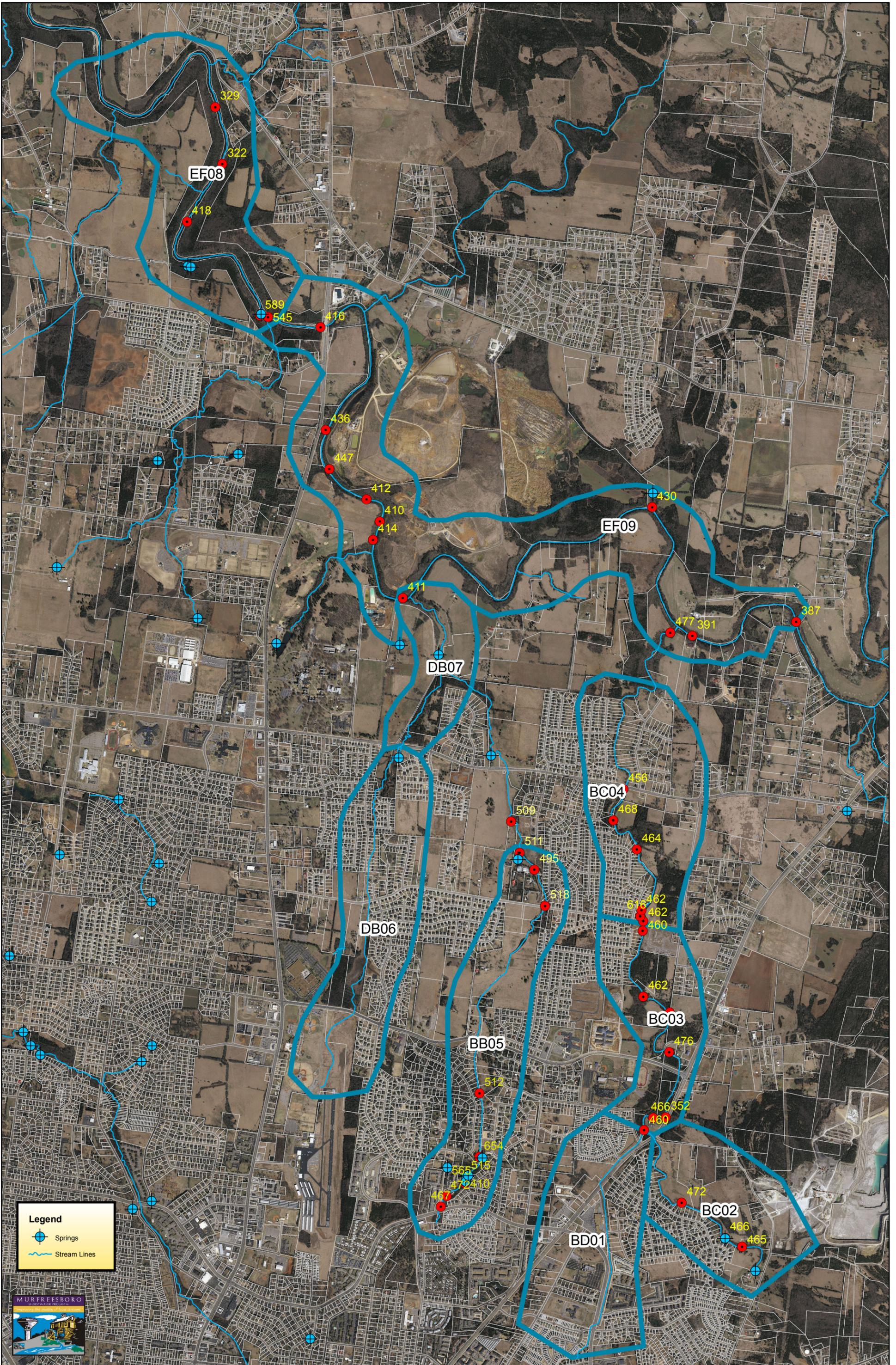
II. Probe Readings (Ph, Conductivity, and Temperature)

As part of the Murfreesboro Water and Sewer Department's VSA and Watershed

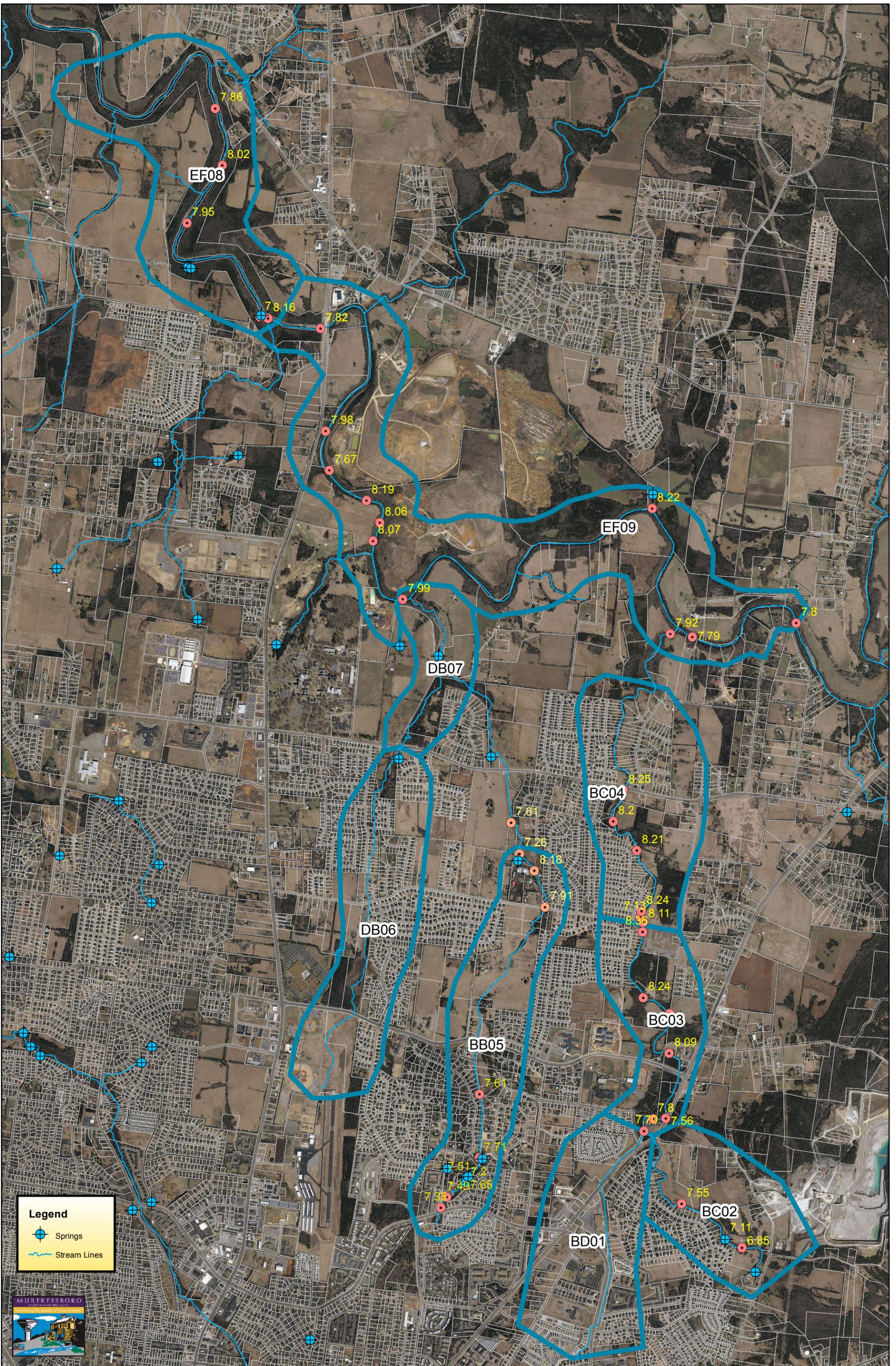


Characterization, the Stormwater department uses a probe to measure Ph, conductivity, and temperature. The probe readings allow the streams to be analyzed to find losing and gaining segments of stream. Groundwater entering a stream will usually lower the temperature of the stream and raise the conductivity reading. Higher temperatures also can be measured when there is low flow in the stream or an inadequate vegetative cover.

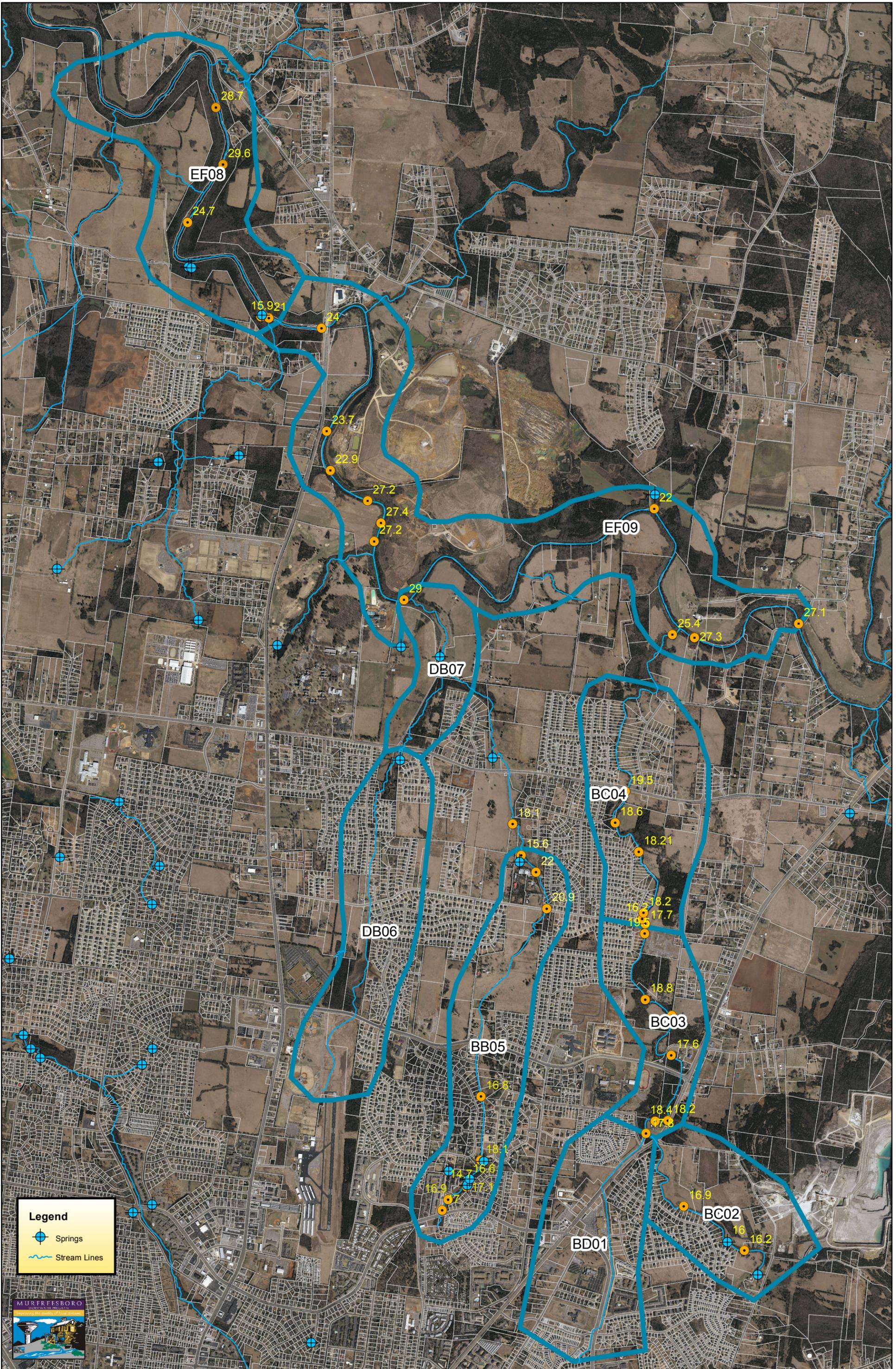




Conductivity Readings in the East Fork Stones River Watershed



Ph Readings in the East Fork Stones River Watershed



Temperature Readings in the East Fork Stones River Watershed

III. Inadequate Buffer Study

What is a riparian zone?

The area of vegetation on either side of stream is called the riparian zone. This area is an important part of the stream which regulates water temperature with its tree canopy and provides aquatic habitat. The riparian zone also holds the stream bank in place protecting against erosion and eventually sedimentation of a stream.

What is an inadequate buffer?

When a stream lacks adequate vegetative cover and between it and the surrounding land area it is called an inadequate buffer. An inadequate vegetation buffer provides less of a filtering mechanism for surface run off to the stream. Often times characteristics can be noted where there is an inadequate buffer and a point is taken.

Characteristics of an Inadequate Buffer



Excessive sunlight that reaches the stream with no correlation to stream width.



Eroding stream bank



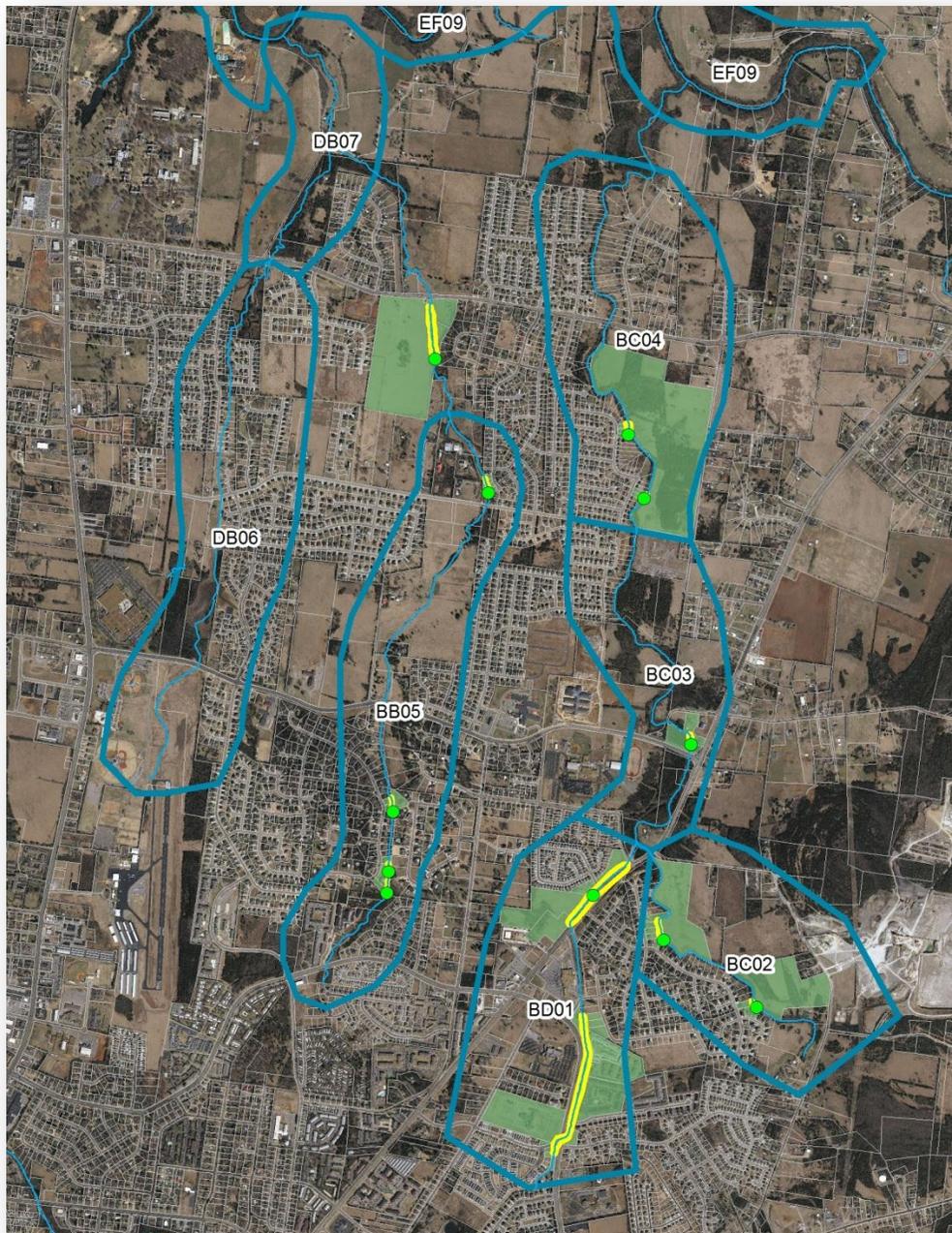
High temperature readings relative to the the stream



Abundant algae growth

Inadequate buffer findings in the East Fork Stones River Watershed

Parcels containing inadequate buffer	51
Inadequate Buffer Length	7,372 ft (1.3 miles)
Total Stream length/ percent inadequate	17.8 miles (13.6% Inadequate)



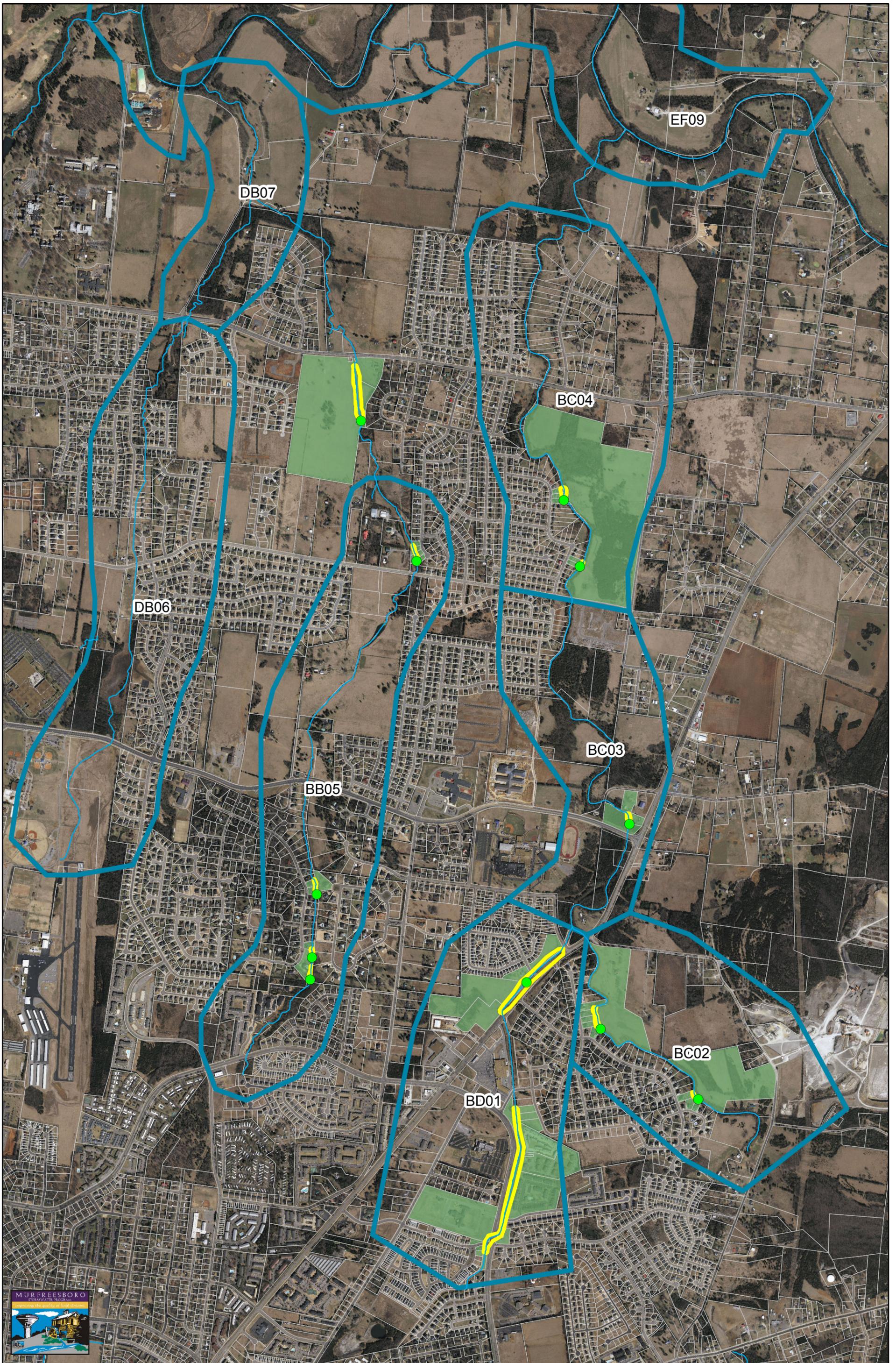
Conclusions and Planning

While inadequate buffer locations were prevalent in the East Fork Stones River watershed, the watershed had a smaller percentage of inadequate buffers than other



watersheds in the city. In order to help vegetate these areas and stabilize banks, the city will hold its annual “Tree Day” event Spring 2012. The Murfreesboro Water and Sewer will send a mail out to all streamside land owners inviting the resident to pick up native shrubs and trees to be planted along the bank. A riparian zone education flier is also attached with the initial mail out. This allows the city to educate residents while inviting them to the event.

Once the event is held a shapefile will be created in GIS for all residents who picked up trees. This shapefile will be laid over inadequate buffer areas from this assessment to calculate areas of inadequate buffer that have received possible treatment.



East Fork Stones River Inadequate Buffer Areas

IV. Macro Invertebrate Study

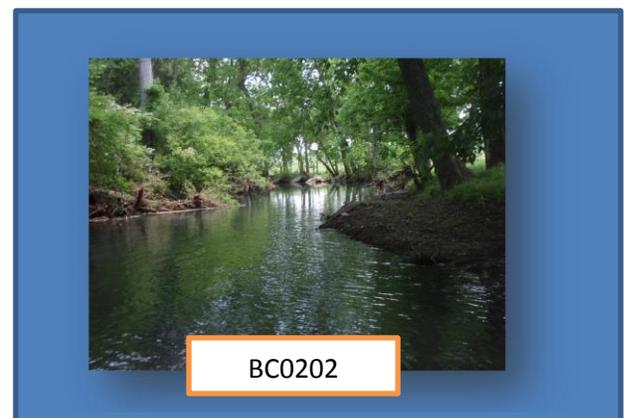
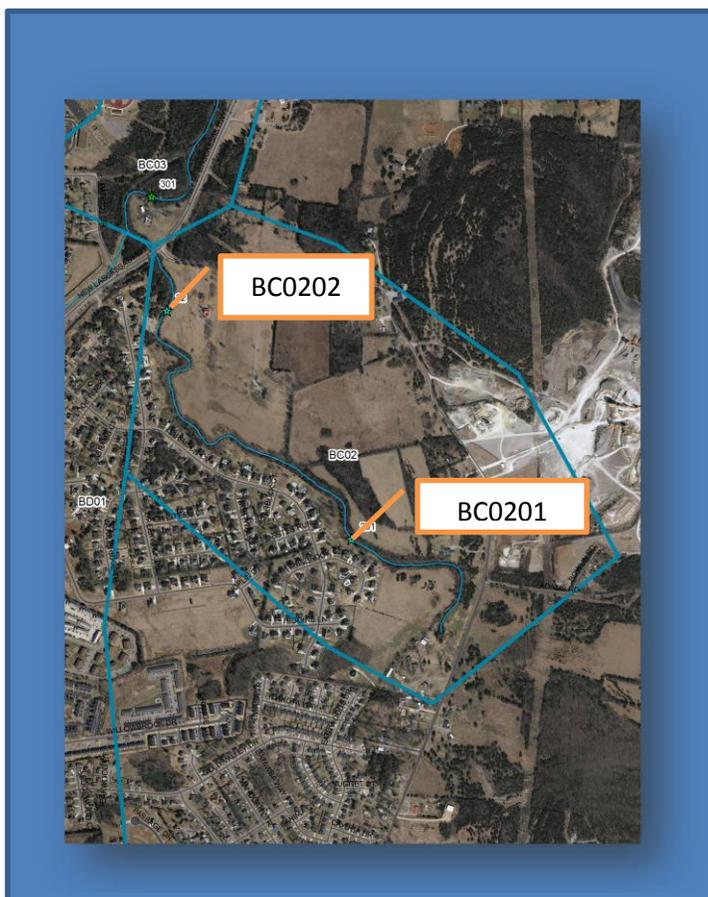
Macro invertebrates were studied during the East Fork Stones River Watershed Visual Stream Assessment and Watershed Characterization. A GPS point was taken at locations sampled for macro invertebrates.



Datasheets obtained from EPA.gov were used to document conditions at macro locations and tally observations. Aquatic biology found in a stream can indicate what water quality conditions are in that particular water body. Some aquatic life will not live in polluted water while other organisms are tolerant to pollution. **Note – while some aspects were used from the TDEC S.O.P. for Macro Invertebrate Sampling this data should not be viewed as official and should only be viewed as a snapshot of*

aquatic life in that particular location. Metrics were not used but are going to be incorporated into future VSA's

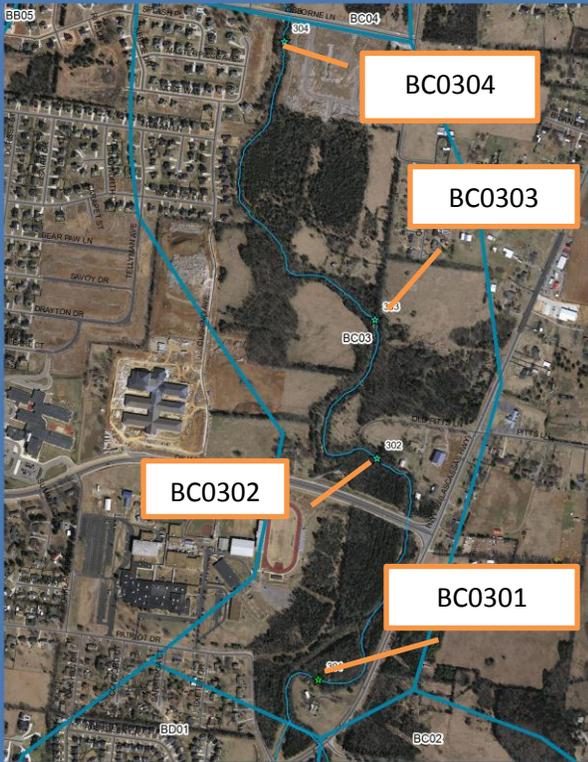
Bushman Creek BC02 Results



MWSD – East Fork Stones River Watershed VSA and Watershed Characterization

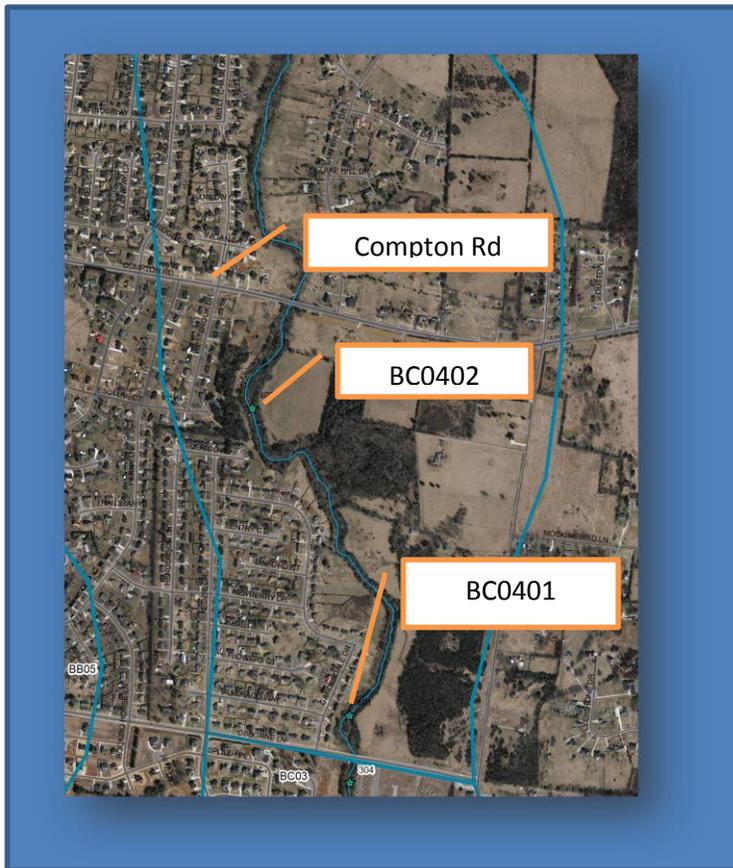
Site ID	Isopoda	Amphipoda	Gastropoda	Coleoptera	Ephmeroptera	Plecoptera	Trichoptera
BC0201	> 10	>10	> 10	>10	0	0	0
BC0202	> 50	> 10	> 10	> 50	0	0	0

Bushman Creek BC03



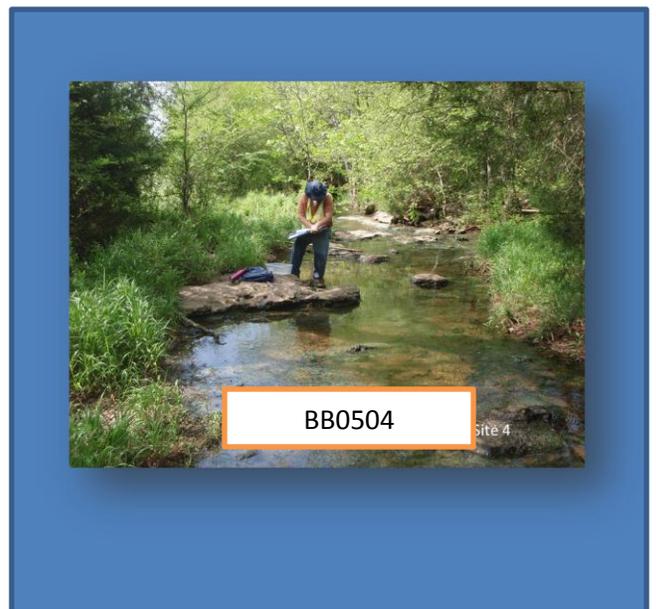
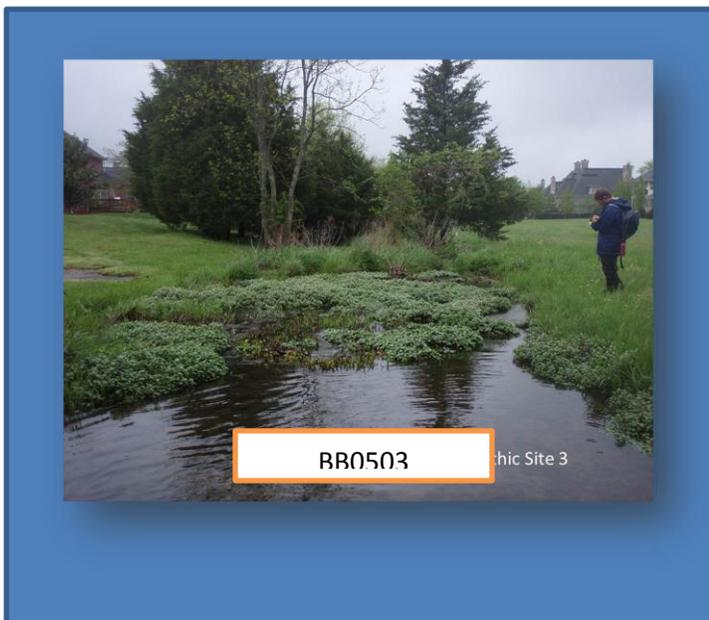
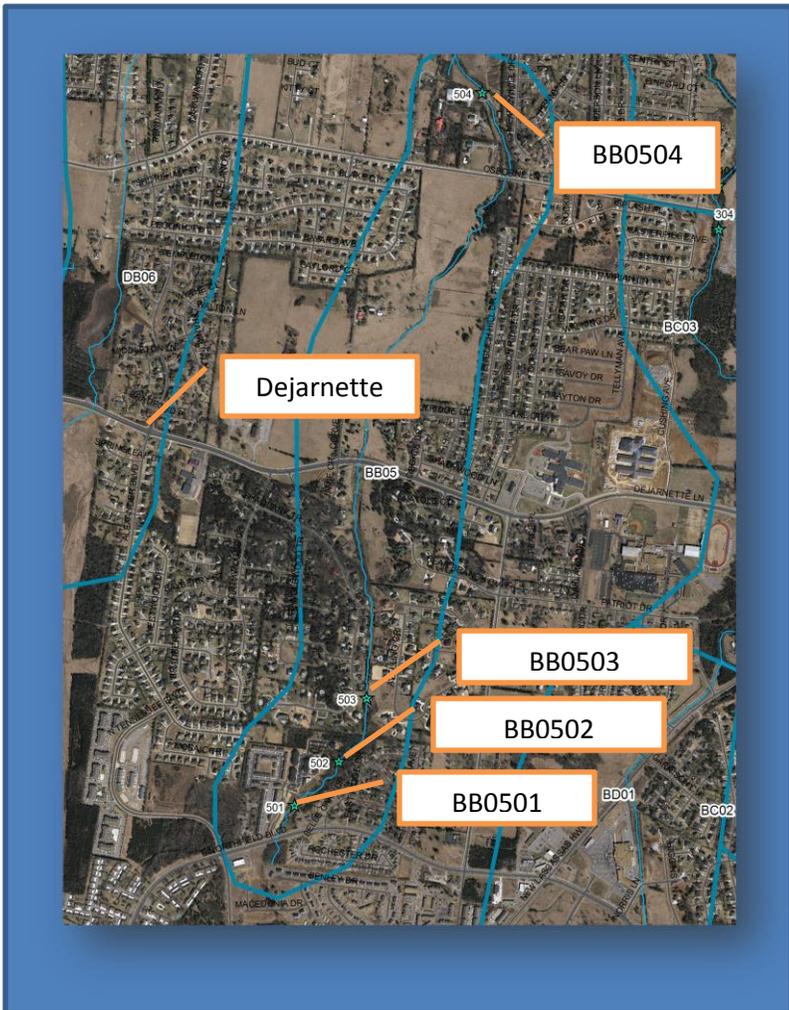
Site ID	Isopoda	Amphipoda	Gastropoda	Coleoptera	Ephmeroptera	Plecoptera	Trichoptera
BC0301	> 10	>10	> 10		0	> 10	0
BC0302	> 10	> 10	> 10	>10		> 10	
BC0303	3-9	> 10		> 50	0	> 10	0
BC0304				>10			>50

Bushman Creek BC04



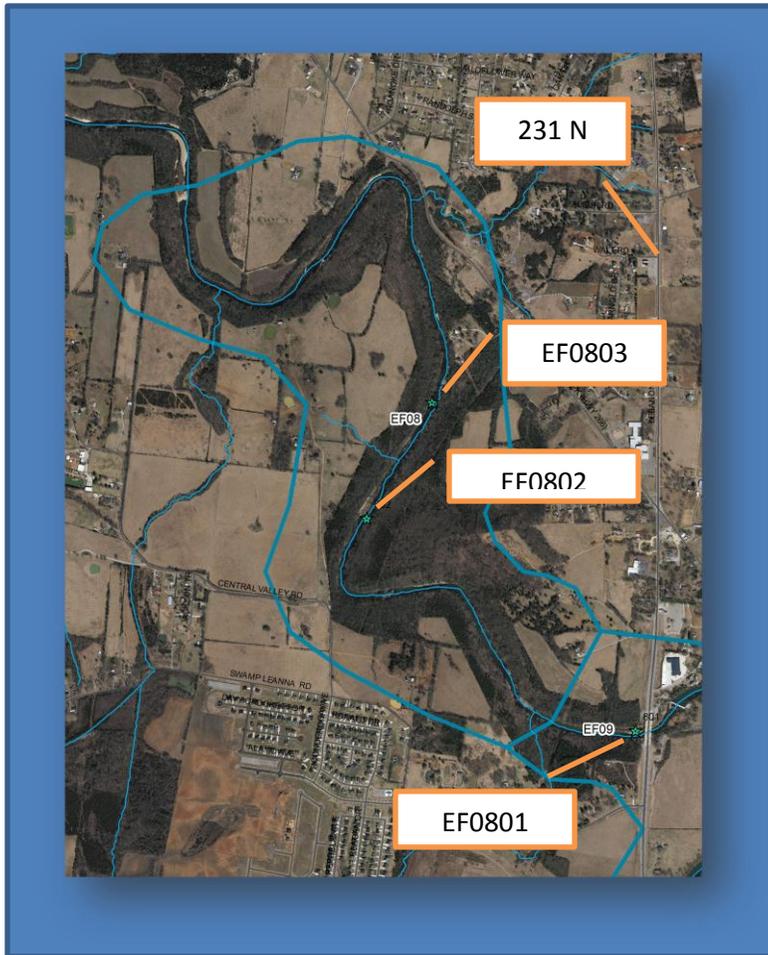
Site ID	Isopoda	Amphipoda	Gastropoda	Coleoptera	Ephmeroptera	Plecoptera	Zygoptera
BC0401	0	3-9	> 10	>10	0	1	0
BC0402	> 50	0	> 50	> 50	0	0	3-9

Bear Branch BB05



Site ID	Isopoda	Amphipoda	Gastropoda	Coleoptera	Ephmeroptera	Plecoptera	Trichoptera
BB0501	0	0	0	0	0	0	0
BB0502	> 50	> 10	0	0	0	0	0
BB0503	0	0	0	0	0	0	0
BB0504	0	0	0	0	0	0	0

East Fork Stones River EF08



Summary

The type of benthic macro invertebrates found in stream can help identify the quality of water in that particular stream. Organisms like Stoneflies, May Flies, Caddis Flies, Water Pennies, and others will only tolerate moderate to clean water. While a variety of macro invertebrates were found in Bear Branch, especially groundwater influenced areas, the greater diversity of organisms were found in Bushman Creek and the East Fork Stones River. Site EF0803 on the East Fork Stones River near the Coleman Farm contained the richest diversity of macro invertebrates while parts of Bear Branch had no life observed possibly due to the losing nature of certain segment and lack of ability to sustain flow.



See Attached Macro Invertebrate Data Sheets

V. Visual Stream Assessment Conclusions and Data Sheets

The following section details each GPS point or VSA site in data sheets. A point was given an ID number based on the sector the point was taken in. An erosion site found near the head of Bushman Creek would be given an ID of *BC03* due to it being in the *BC* sector. Once the point was taken, the point was characterized based on the severity, ability to correct, and the ability to access the site. Other descriptions were taken about the individual location in order to provide a good description of that point. Some descriptions require further in office research. For example historical maps may be queried to provide more information about an abandoned road crossing observed.

1. Conclusions

Three common problems occurred throughout the East Fork Stones River Watershed that are in some cases easy to correct.

A. Inadequate Buffer



Although cases of inadequate buffer were not as severe as previous watersheds assessed, they were extremely common and often resulted in minor erosion areas. These areas almost always were a result of mowing to the bank. The inadequate buffer areas were detailed further in section III. MWSD will send all stream side property owners in the East Fork Stones River Watershed riparian zone management

information as well invite the entire watershed to receive trees at the 2012 MWSD Tree Day event.

B. Erosion Sites

As mentioned above, erosion sites were often caused by the lack of riparian vegetation and resulted in minor bank erosion. Sediment was observed downstream of these sites especially in Bear Branch where rocks were sometimes 50% embedded. Erosion was noted throughout the East Fork Stones River.

C. Debris or Fence Blockages

The remains of fences crossing the stream and debris blockages were also



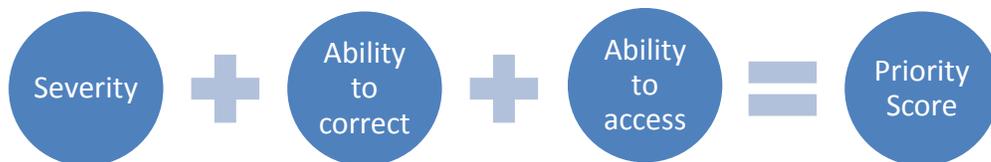
observed frequently. The fences often were just one strand of wire but were holding debris back. Debris blockages sometimes were also caused by fallen trees in some cases found at tornado crossings.

These sites are easy to correct but sometimes are hard to access. Stream clean ups or boy scout projects may be effective ways of clearing

these sections of stream.

2. Prioritization Rankings

The prioritization chart is intended to rank the best opportunity for correcting a problem. **The sum of severity, correctability, and accessibility equals the best opportunity in ascending order.** For example, an inadequate buffer with a ranking of 5 for most severe and a long length, best accessibility of 1, and easy correctability (purchase of large quantity of seedlings) of 1; may be a better than a minor erosion site (1) with a bad correctability (5) and accessibility (5).



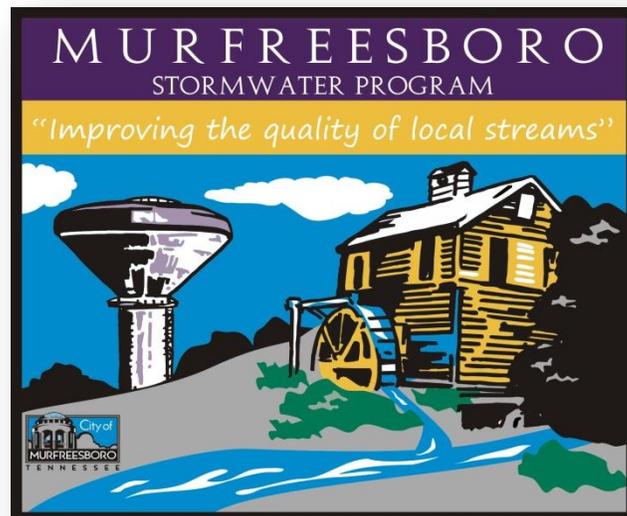
East Fork Stones River

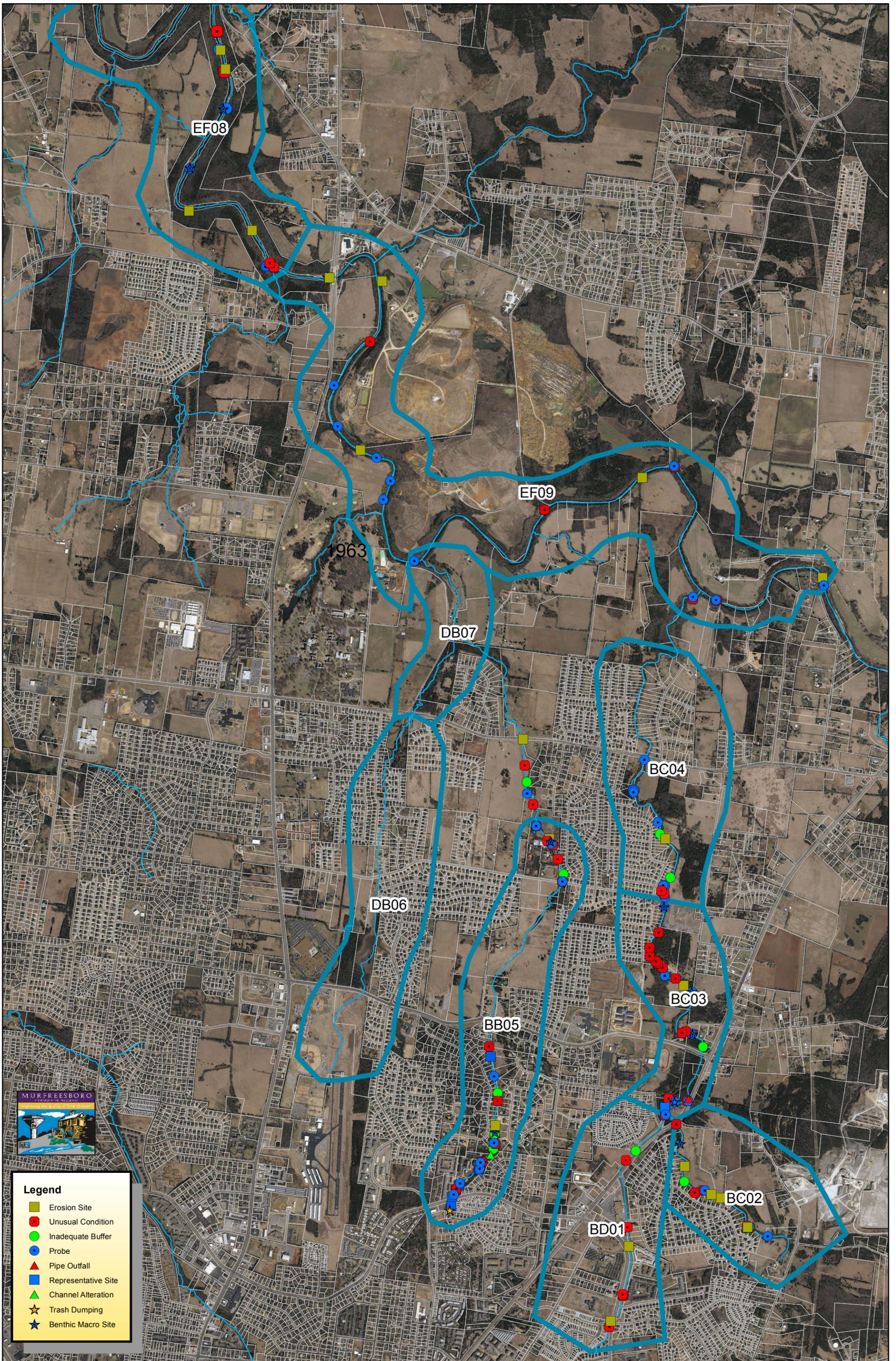
Visual Stream Assessment Priority Rankings

Observation points or problems GPS'd and mapped are given a ranking based on the severity of the problem, the ability to correct the problem, and the ability to access the site. Severity is ranked 1 being the most severe and 5 being the least. A site that is easy to correct is given a score of 1 and a site that is difficult to correct is given a score of 5. Lastly a site that is easy to access in vehicle or on foot is ranked 1 and sites that is difficult to access on foot are given a ranking of 5. These three parameters are added to get a total. The sites are ranked from least to greatest. The best opportunity is at the top of the list and the most difficult at the bottom.

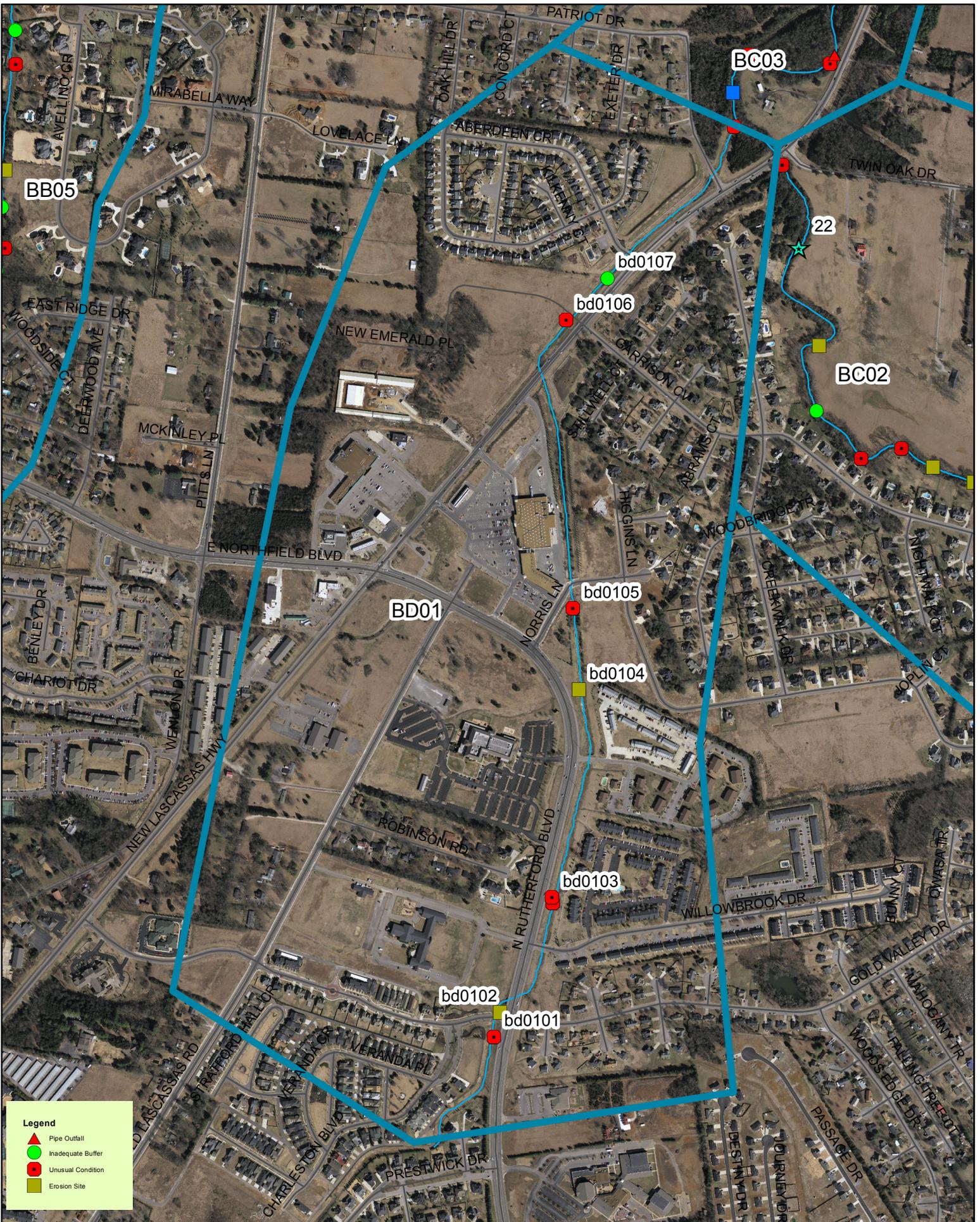
ID	Date	Description	Severity	Correctability	Access	Total
bc0210	5/10/2011	Erosion Site	2	0	1	3
bc0202	5/10/2011	Inadequate Buffer	1	2	1	4
bb0509	4/20/2011	Inadequate Buffer	4	1	1	6
bb0511	4/20/2011	Inadequate Buffer	3	2	1	6
BB0523	4/22/2011	Inadequate Buffer	1	3	2	6
bc0209	5/10/2011	Inadequate Buffer	3	2	1	6
bc0401	5/20/2011	Debris Blockage	2	3	1	6
bc0403	5/20/2011	Inadequate Buffer	4	1	1	6
bc0405	5/20/2011	Inadequate Buffer	3	2	1	6
bd0107	7/12/2011	Inadequate Buffer	1	4	1	6
bb0514	4/20/2011	Inadequate Buffer	4	1	2	7
bb0525	4/22/2011	Erosion Site	3	3	1	7
bc0203	5/10/2011	Erosion Site	3	3	1	7
bc0211	5/10/2011	Debris blockage On bushman	5	1	1	7
bc0306	5/12/2011	Old Road	1	5	1	7
bc0315	5/12/2011	Fence	5	1	1	7
bc0404	5/20/2011	Erosion Site	3	3	1	7
bd0104	7/12/2011	Head cut	5	1	1	7
bb0501	4/20/2011	Trash Dumping	4	2	2	8
bb0504	4/20/2011	Debris Dam	4	2	2	8
bc0207	5/10/2011	Boulders line	2	4	2	8
bc0313	5/12/2011	Bank altered	4	3	1	8
bc0305	5/12/2011	Inadequate Buffer	5	1	3	9
bc0307	5/12/2011	Fence	1	5	3	9
bc0311	5/12/2011	Fence	5	1	3	9
ef0801	7/1/2011	Head cut	3	4	2	9

ef0901	7/6/2011	Erosion Site	3	4	2	9
ef0902	7/6/2011	Erosion Site	3	3	3	9
bb0512	4/20/2011	Inadequate Buffer	4	4	2	10
bb0517	4/22/2011	Inadequate Buffer	4	2	4	10
bc0205	5/10/2011	Erosion Site	5	2	3	10
ef0804	7/1/2011	Erosion Site	3	3	4	10
ef0909	7/6/2011	Erosion Site	5	4	1	10
bc0206	5/10/2011	Erosion Site	5	5	1	11
bc0310	5/12/2011	Bank altered	2	4	5	11
bd0102	7/12/2011	Head cut	5	5	1	11
ef0903	7/6/2011	Debris	3	3	5	11
ef0907	7/12/2011	Inadequate Buffer	5	1	5	11
bb0508	4/20/2011	Channel Alteration	5	5	5	15





East Fork Stones River Stream Assessment Points



Big Ditch (BD01) VSA Points



BD0101 Possible Sinks



- 7/12/2011
- 86°21'10.824"W,
35°51'50.342"N
- Josh Upham and Bruce Ross
- Possible fall outs or sinking locations. Possible dye trace injection points.

BD0102 Erosion Site



- 7/12/2011
- Josh Upham and Bruce Ross
- 86°21'10.34"W,
35°51'51.856"N
- Head cut around culvert on both sides.
- Severity = 5
- Correctability = 1
- Accessibility = 1

BD0104 Possible Throat



- 7/12/2011
- 86°21'6.409"W,
35°51'59.062"N
- Josh Upham and Bruce Ross
- Possible sinkhole throat.
Possible dye trace injection
point. Losing segment of Big
Ditch.

BD0104 Erosion Site



- 7/12/2011
- Josh Upham and Bruce Ross
- 86°21'4.466"W,
35°52'11.944"N
- Minor erosion around
stormwater outfall .
- Severity = 5
- Correctability = 1
- Accessibility = 1

BD0105 Possible Wetland

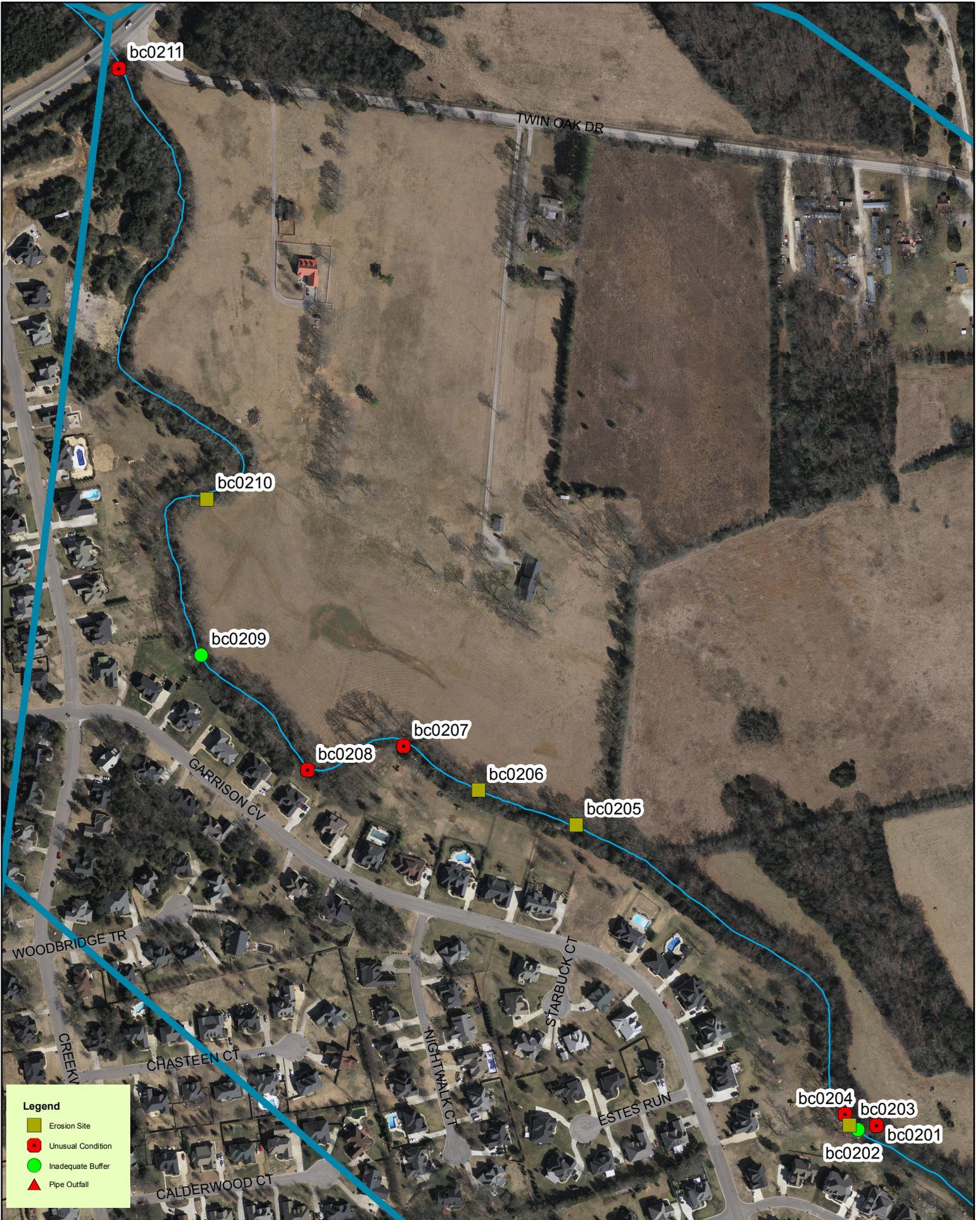


- 7/12/2011
- 86°21'4.839"W,
35°52'16.881"N
- Josh Upham and Bruce Ross
- Possible in-stream wetland or groundwater seep area. Sustains aquatic life in dry weather but not flowing.

BD0106 Water Pool



- 7/12/2011
- Josh Upham and Bruce Ross
- 86°21'5.514"W,
35°52'34.694"N
- Possible window or throat to groundwater.



Bushman Creek (BC02) VSA Points



BD0107 Inadequate Buffer



- 7/12/2011
- 86°21'4.839"W,
35°52'16.881"N
- Josh Upham and Bruce Ross
- Length 5,000 Ft +
- Side Inadequate = Both
- Severity = 1
- Correctability = 4
- Accessibility = 1
- All but small sections of Big Ditch have no riparian vegetation.

BC0201 Possible Spring



- 5/10/2011
- 86°20'24.841"W,
35°52'17.079"N
- Josh Upham and Tommy Biddix
- Possible spring. Heavy flow that could be seeping around dam but could also be spring based on position similar to all other nearby springs.

BC0202 Inadequate Buffer



- 5/10/2011
- Josh Upham and Tommy Biddix
- 86°20'25.448"W,
35°52'16.969"N
- Length = 100 Ft
- Side of stream = right
- Severity = 1
- Correctability = 2
- Accessibility = 1

BC0203 Erosion Site



- 5/10/2011
- 86°20'25.702"W,
35°52'17.081"N
- Josh Upham and Tommy Biddix
- Stream side = left
- Severity = 3
- Correctability = 3
- Accessibilty = 1
- Erosion due to dam and inadequate buffer.

BC0204 Seepage Zone



- 5/10/2011
- Josh Upham and Tommy Biddix
- Groundwater seepage on both sides of the stream bank for 200 ft. Probably from around dam.

BC0205 Erosion Site



- 5/10/2011
- 86°20'34.45"W,
35°52'24.836"N
- Josh Upham and Tommy Biddix
- Stream side = left
- Length = 30 Ft
- Severity = 5
- Correctability = 2
- Accessibilty = 3

BC0206 Erosion Site



- 5/10/2011
- 86°20'37.557"W,
35°52'25.734"N
- Josh Upham and Tommy Biddix
- Stream side = Left
- Severity = 5
- Correctability = 1
- Accessibility = 1

BC0207 Boulders



- 5/10/2011
- 86°20'39.968"W,
35°52'26.867"N
- Josh Upham and Tommy Biddix
- Severity = 2
- Correctability = 4
- Accessibilty = 2
- Boulders lining bank

BC0208 Stream bank wall



- 5/10/2011
- 86°20'43.024"W,
35°52'26.247"N
- Josh Upham and Tommy Biddix
- Stream side = Left
- Small block wall constructed on stream bank

BC0209 Inadequate Buffer



- 5/10/2011
- 86°20'46.439"W,
35°52'29.231"N
- Josh Upham and Tommy Biddix
- Stream side = Left
- Length = 150 Ft
- Severity = 3
- Correctability = 2
- Accessibility = 1
- Small residential area of inadequate buffer. Tree plantings would help.

BC0210 Erosion Site

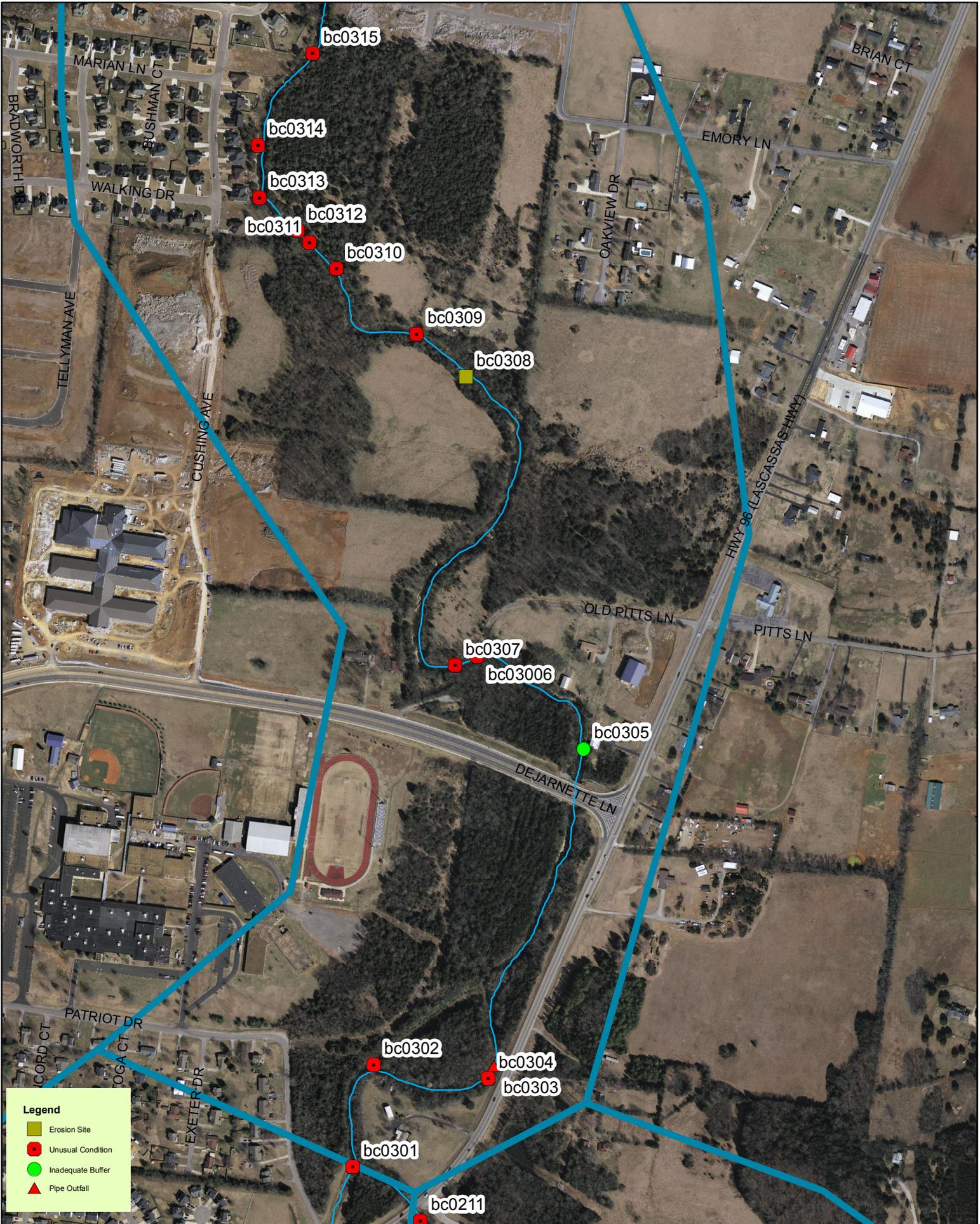


- 5/10/2011
- 86°20'46.285"W,
35°52'33.255"N
- Josh Upham and Tommy Biddix
- Stream side = Right
- Severity = 2
- Correctability = 0
- Accessibility = 1
- Erosion due to inadequate buffer.

BC02011 Debris Blockage



- 5/10/2011
- 86°20'49.076"W,
35°52'44.436"N
- Josh Upham and Tommy Biddix
- Severity = 5
- Correctability = 1
- Accessibility = 1
- Debris blockage at bridge.



Bushman Creek (BC03) VSA Points



BC0301 Big Ditch



- 5/10/2011
- 86°20'52.85"W,
35°52'46.817"N
- Josh Upham and Tommy Biddix
- Big Ditch enters Bushman Creek

BC0302 Meander



- 5/10/2011
- 86°20'51.58"W,
35°52'51.347"N
- Josh Upham and Tommy Biddix
- Stream side = Left
- Meander being silted in.

BC0303 Pipe Outfall



- 5/10/2011
- 86°20'45.531"W,
35°52'50.209"N
- Josh Upham and Tommy Biddix
- Unmapped pipe outfall

BC0304 Clear Flow

- 5/10/2011
- 86°20'45.0531"W,
35°52'50.209"N
- Josh Upham and Tommy Biddix
- Stream side = Right
- Same point as above. Clear flow draining from lake on other side of Hwy 96.

BC0305 Inadequate Buffer



- 5/12/2011
- $86^{\circ}20'40.434''W$,
 $35^{\circ}53'5.092''N$
- Josh Upham and Tommy Biddix
- Stream side = right
- Length = 100 Ft
- Severity = 5
- Correctability = 1
- Accessibility = 3
- Tree planting should correct problem

BC0306 Old Road



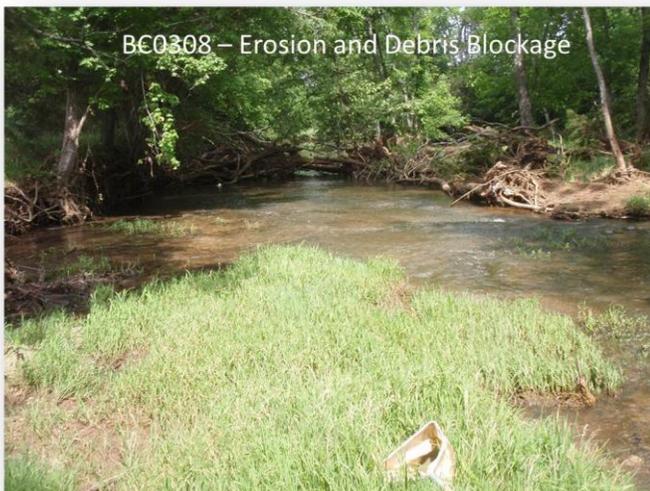
- 5/12/2011
- $86^{\circ}20'46.135''W$,
 $35^{\circ}53'9.175''N$
- Josh Upham and Tommy Biddix
- Old Bushman Creek Rd crossing or as indicated on historic maps, Bushnell Rd. Possible fish barrier.

BC0307 Fence



- 5/12/2011
- 86°20'47.303"W,
35°53'8.822"N
- Josh Upham and Tommy Biddix
- Severity = 1
- Correctability = 5
- Accessibility = 3
- Wire fence crossing stream and holding debris.

BC0308 Erosion Site



- 5/12/2011
- 86°20'46.809"W,
35°53'21.376"N
- Josh Upham and Tommy Biddix
- Stream side = Left
- Severity = 4
- Correctability = 2
- Accessibility = 3

BC0309 Fence



- 5/12/2011
- $86^{\circ}20'49.444''\text{W}$,
 $35^{\circ}53'23.254''\text{N}$
- Josh Upham and Tommy Biddix
- Wire fence on stream side

BC0310 Bank Altered



- 5/12/2011
- $86^{\circ}20'53.826''\text{W}$,
 $35^{\circ}53'26.117''\text{N}$
- Josh Upham and Tommy Biddix
- Stream side = Left
- Severity = 2
- Correctability = 4
- Accessibility = 5
- Old stone work along banks.
Possibly historic.

BC0311 Fence



- 5/12/2011
- 86°20'55.264"W,
35°53'27.24"N
- Josh Upham and Tommy Biddix
- Severity = 5
- Correctability = 1
- Accessibility = 3
- Wire fence across stream.
Could be easily removed.

BC0312 Stone Wall



- 5/12/2011
- 86°20'55.887"W,
35°53'27.782"N
- Josh Upham and Tommy Biddix
- Stream side = Right
- Relic stonewall on streambank.

BC0313 Bank Altered



- 5/12/2011
- 86°20'58.019"W,
35°53'29.253"N
- Josh Upham and Tommy Biddix
- Severity = 4
- Correctability = 3
- Accessibility = 1
- Scouring of bank.

BC0314 Stone Wall

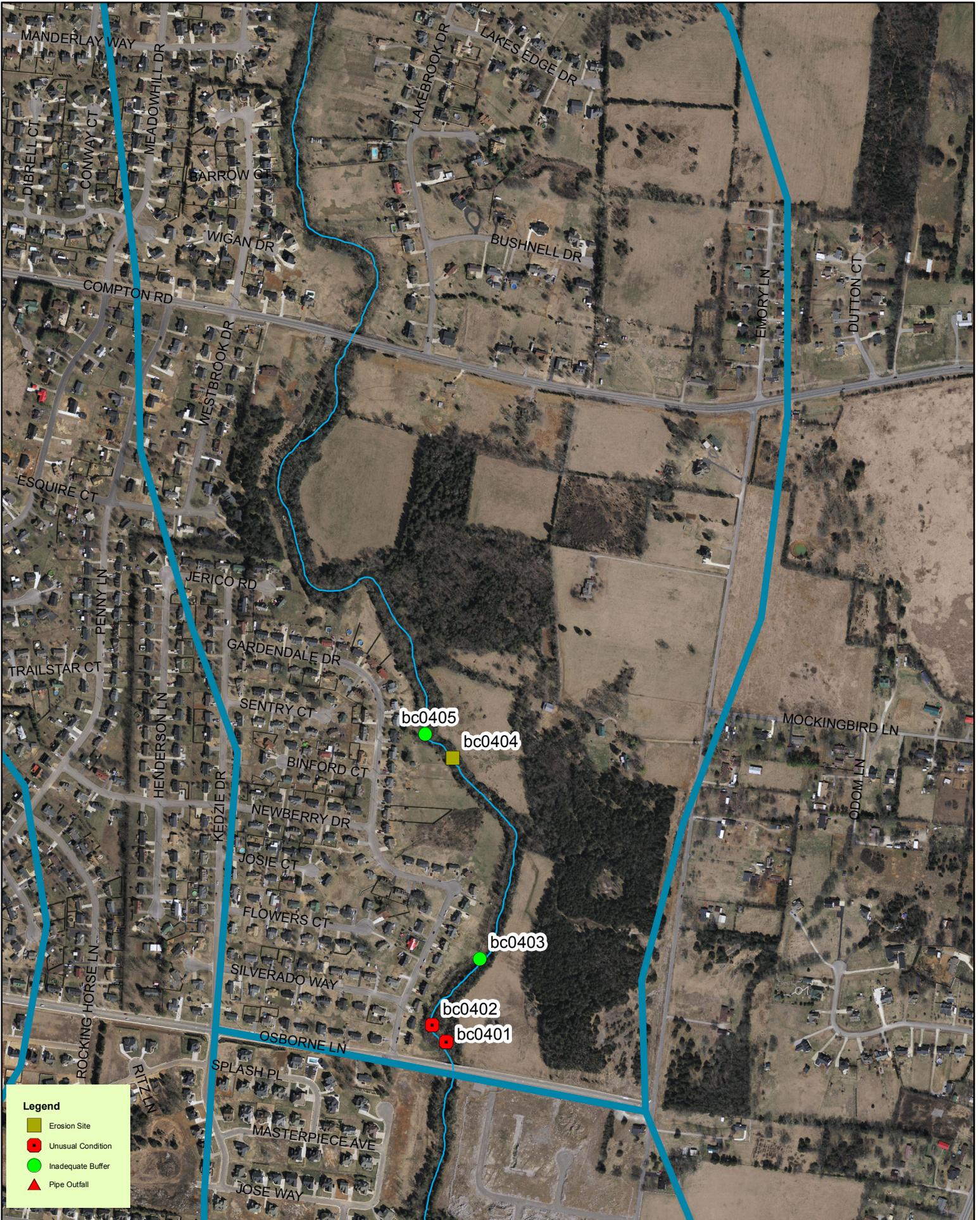


- 5/12/2011
- 86°20'58.053"W,
35°53'51.488"N
- Josh Upham and Tommy Biddix
- Stream side = Left
- Possible off line wetland installed by resident.

BC0315 Fence



- 5/12/2011
- $86^{\circ}20'55.203''W$,
 $35^{\circ}53'35.509''N$
- Josh Upham and Tommy Biddix
- Severity = 5
- Correctability = 1
- Accessibility = 1
- Fence across stream collecting debris. Not in use would be easy to remove.



Bushman Creek (BC04) VSA Points



BC0401 Debris Dam



- 5/20/2011
- 86°20'53.2"W,
35°53'45.815"N
- Josh Upham and Tommy Biddix
- Severity = 2
- Correctability = 3
- Accessibilty = 1
- Woody debris with trash embedded.

BC0402 Small Seep



- 5/10/2011
- 86°20'54.435"W,
35°53'46.659"N
- Josh Upham and Tommy Biddix
- Stream side = Left
- Small groundwater seep

BC0403 Inadequate Buffer



- 5/20/2011
- $86^{\circ}20'50.924''W$,
 $35^{\circ}53'50.185''N$
- Josh Upham and Tommy Biddix
- Stream side = Left
- Length = 100 Ft
- Severity = 4
- Correctability = 1
- Accessibility = 1
- May be easement, native shrubs could be planted.

BC0404 Erosion Site

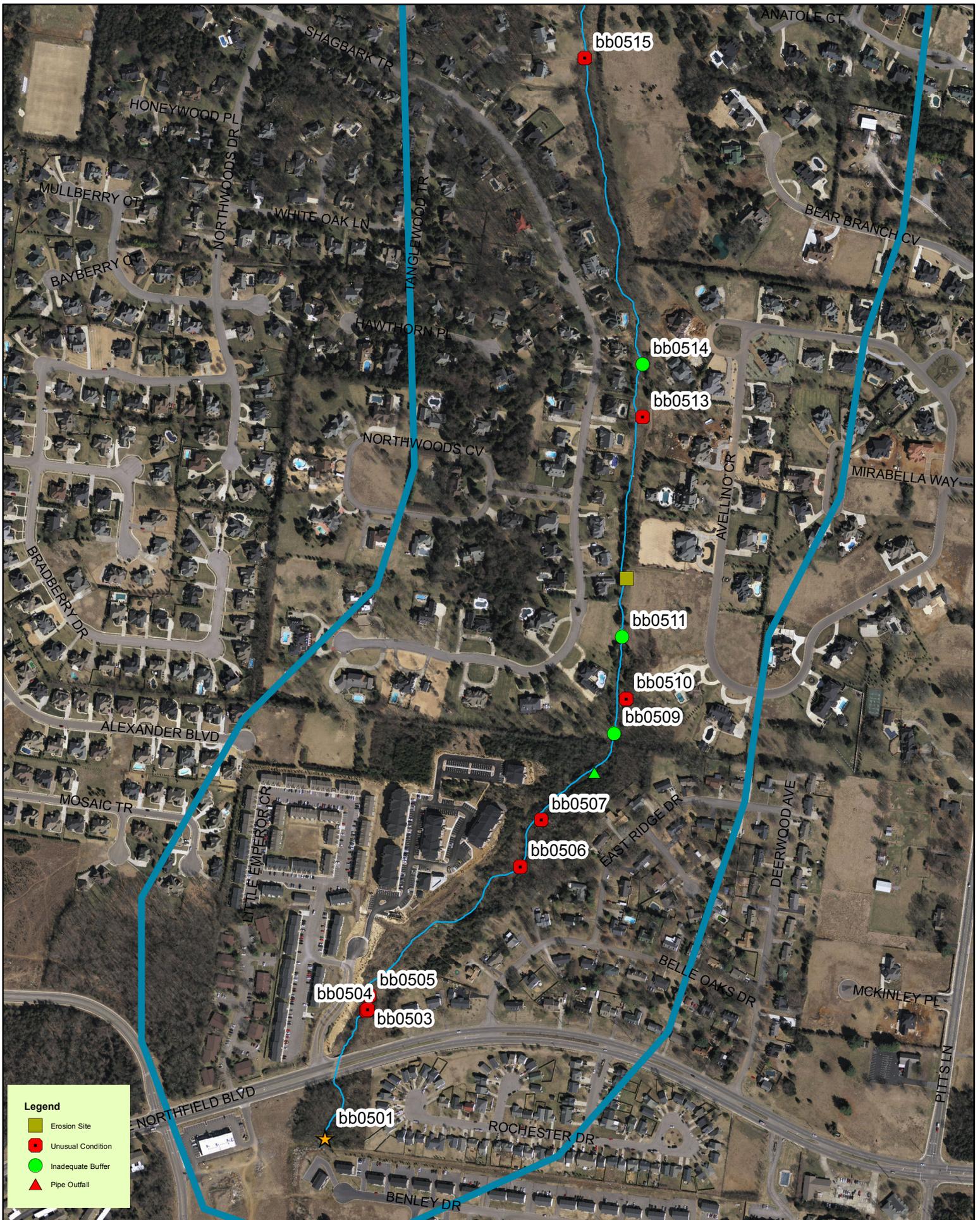


- 5/10/2011
- $86^{\circ}20'53.08''W$,
 $35^{\circ}54'0.566''N$
- Josh Upham and Tommy Biddix
- Stream side = Left
- Severity = 3
- Correctability = 3
- Accessibility = 1
- Possibly due inadequate buffer

BC0405 Inadequate Buffer



- 5/20/2011
- 86°20'54.879"W,
35°54'1.763"N
- Josh Upham and Tommy Biddix
- Stream side = Left
- Length = 100 Ft
- Severity = 3
- Correctability = 2
- Accessibility = 1
- Good location for native trees and shrubs.



Bear Branch (BB05) 1 VSA Points

BB0501 Trash Dumping



- 4/20/2011
- 86°22'2.996"W,
35°52'19.685"N
- Josh Upham and Bruce Ross
- Severity = 4
- Correctability = 4
- Accessibility = 2
- Truck Loads = 10
- Various trash types

BB0503 Sediment Pool



- 4/20/2011
- 86°22'0.991"W,
35°52'26.479"N
- Josh Upham and Bruce Ross
- Large accumulation of
sediment.

BB0504 Debris Dam



- 4/20/2011
- 86°22'0.923"W,
35°52'26.527"N
- Josh Upham and Bruce Ross
- Severity = 4
- Correctability = 2
- Accessibility = 2
- Truck Loads = 10
- Embedded with trash/ good volunteer clean up.

BB0505 Wetland like



- 4/20/2011
- 86°22'0.852"W,
35°52'27.079"N
- Josh Upham and Bruce Ross
- Linear wetland like area with bedrock joints.

BB0506 Debris Dam



- 4/20/2011
- 86°21'53.404"W,
35°52'32.323"N
- Josh Upham and Bruce Ross
- Spring of moderate flow. Will be investigated further.

BB0507 Wetland like



- 4/20/2011
- 86°21'52.364"W,
35°52'34.204"N
- Josh Upham and Bruce Ross
- Small seep

BB0508 Channel Alteration



- 4/20/2011
- 86°21'49.759"W,
35°52'36.133"N
- Josh Upham and Bruce Ross
- Length = 1,000 Ft
- Stream side = Both
- Severity = 5
- Correctability = 5
- Accessibility = 5
- Stream appears to be channelized

BB0509 Inadequate Buffer



- 4/20/2011
- 86°21'48.76"W,
35°52'37.702"N
- Josh Upham and Bruce Ross
- Stream side = Left
- Length 100 Ft
- Severity = 4
- Correctability = 1
- Accessibility = 1
- Would benefit from tree planting

BB0510 Small Seep



- 4/20/2011
- 86°21'46.336"W,
35°52'40.573"N
- Josh Upham and Bruce Ross
- Small Seep

BB0511 Inadequate Buffer



- 4/20/2011
- 86°21'48.385"W,
35°52'41.623"N
- Josh Upham and Bruce Ross
- Stream side = Both
- Length 100 Ft
- Severity = 3
- Correctability = 2
- Accessibility = 1
- Erosion occurring because of inadequate buffer.

BB0512 Erosion Site



- 4/20/2011
- 86°21'48.174"W,
35°52'43.949"N
- Josh Upham and Bruce Ross
- Stream side = Right
- Length = 100 Ft
- Severity = 4
- Correctability = 4
- Accessibility = 2

BB0513 Possible Wetland



- 4/20/2011
- 86°21'47.418"W,
35°52'50.473"N
- Josh Upham and Bruce Ross
- Wetland like area.

BB0514 Inadequate Buffer



- 4/20/2011
- 86°21'47.398"W,
35°52'52.614"N
- Josh Upham and Bruce Ross
- Stream side = Both
- Length = 500 Ft
- Severity = 4
- Correctability = 1
- Accessibility = 2
- Tree planting would benefit this area.

BB0515 Possible Wetland



- 4/20/2011
- 86°21'50.382"W,
35°53'4.967"N
- Josh Upham and Bruce Ross
- Wetland like area with channel alteration.

BB0516 Inadequate Buffer



- 4/22/2011
- 86°21'38.52"W,
35°53'48.067"N
- Josh Upham and Bruce Ross
- Stream sinks in this location.

BB0517 Inadequate Buffer



- 4/22/2011
- 86°21'26.188"W,
35°53'50.937"N
- Josh Upham and Bruce Ross
- Stream side = Right
- Length = 1500 Ft
- Severity = 4
- Correctability = 2
- Accessibility = 4
- Inadequate buffer causing erosion.

BB0518 Fence



- 4/22/2011
- 86°21'28.053"W,
35°53'55.052"N
- Josh Upham and Bruce Ross
- Severity = 1
- Correctability = 3
- Accessibility = 2
- Old fence crossing stream.
Not in use and should be easy
to remove.

BB0519 Inadequate Buffer



- 4/22/2011
- 86°21'29.916"W,
35°53'58.738"N
- Josh Upham and Bruce Ross
- Concrete slab crossing stream.

BB0521 Major Spring



- 4/22/2011
- 86°21'35.636"W,
35°54'3.614"N
- Josh Upham and Bruce Ross
- Major wet weather spring with heavy flow. Should be investigated further.

BB0522 Debris Blockage



- 4/22/2011
- 86°21'36.296"W,
35°54'9.579"N
- Josh Upham and Bruce Ross
- Severity = 3
- Correctability = 2
- Accessibility = 1
- Debris possibly from 2009 Tornado.

BB0523 Inadequate Buffer



- 4/22/2011
- 86°21'38.486"W,
35°54'15.538"N
- Josh Upham and Bruce Ross
- Stream side = Both
- Length = 1,150 Ft
- Severity = 1
- Correctability = 3
- Accessibility = 2
- Area could benefit from tree planting.

BB0524 Sinking Location

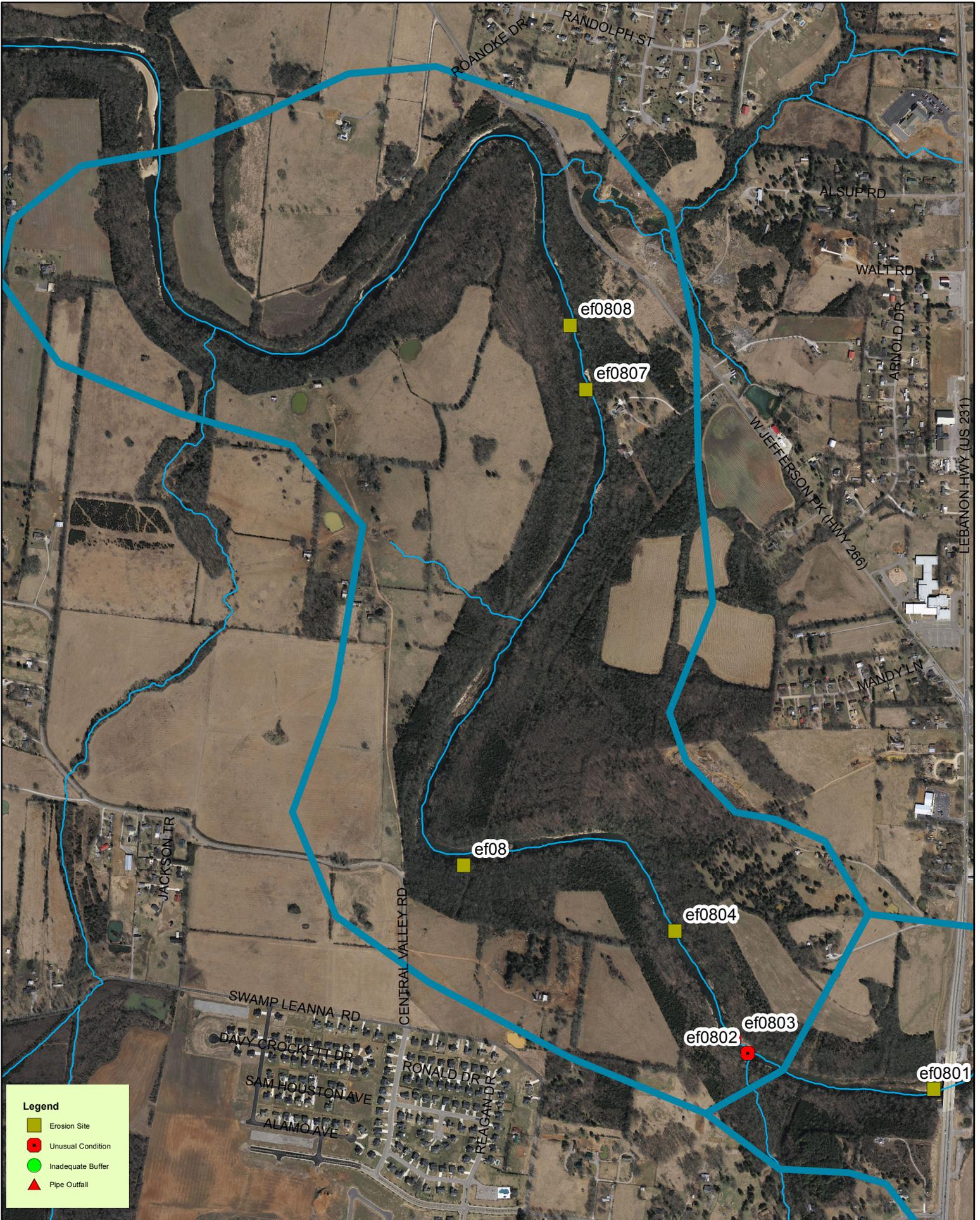


- 4/22/2011
- 86°21'39.138"W,
35°54'19.829"N
- Josh Upham and Bruce Ross
- Possible sinking location.

BB0525 Erosion Site



- 4/22/2011
- 86°21'18.856"W,
35°54'38.604"N
- Josh Upham and Bruce Ross
- Stream side = Right
- Severity = 3
- Correctability = 3
- Accessibility = 1
- Area strong groundwater influence. Bank has been altered causing erosion.



East Fork Stones River (EF08)
VSA Points



EF0801 Erosion Site



- 7/1/2011
- 86°22'43.379"W,
35°56'29.449"N
- Josh Upham and Bruce Ross
- Stream side = Left
- Length = 600 Ft
- Severity = 3
- Correctability = 4
- Accessibility = 2
- Head cut and erosion possibly due to headwall and outfall.

EF0802 Stream Enters



- 7/1/2011
- 86°22'20.587"W,
35°56'37.245"N
- Josh Upham and Bruce Ross
- Stream side = Left
- Stream enters with good flow,
headwater near Siegel Park.

EF0803 Erosion Site



- 7/1/2011
- 86°23'2.961"W,
35°56'33.612"N
- Josh Upham and Bruce Ross
- Stream side = Left
- Moderate spring enters.

EF0804 Erosion Site



- 7/1/2011
- 86°23'8.85"W,
35°56'42.238"N
- Josh Upham and Bruce Ross
- Stream side = Left
- Severity = 3
- Correctability = 3
- Accessibility = 4
- Erosion persists slightly down left bank.

EF0805 Erosion Site



- 7/1/2011
- 86°23'29.454"W,
35°56'47.297"N
- Josh Upham and Bruce Ross
- Stream side = Left
- Severity = 3
- Correctability = 3
- Accessibility = 5

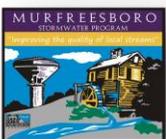
EF0806 Erosion Site

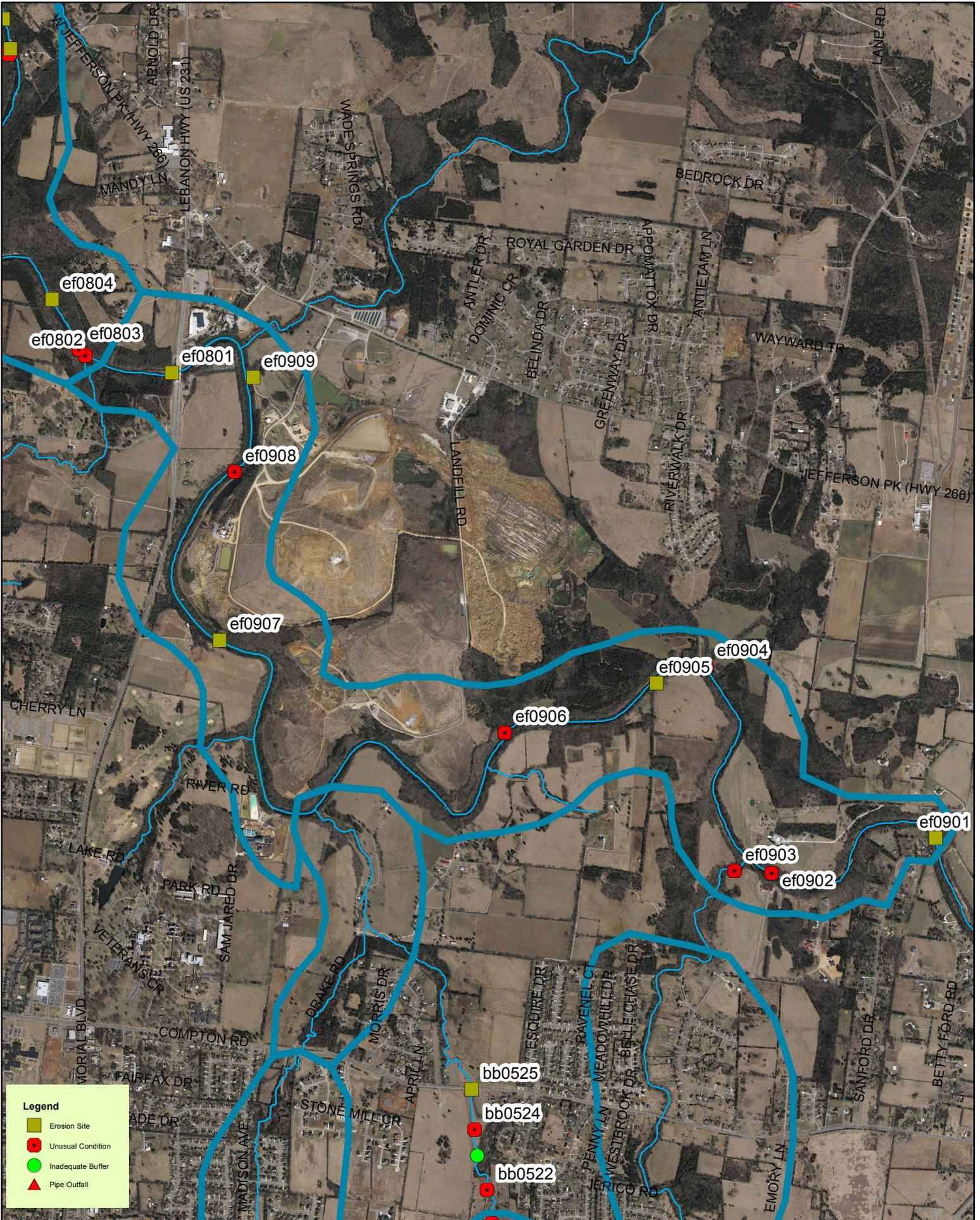


- 7/1/2011
- 86°23'8.85"W,
35°56'42.238"N
- Josh Upham and Bruce Ross
- Stream side = Left
- Severity = 3
- Correctability = 3
- Accessibility = 5

EF0807 Erosion Site

- 7/1/2011
- 86°23'18.931"W,
35°76'30.359"N
- Josh Upham and Bruce Ross
- Stream side = Left
- Severity = 3
- Correctability = 3
- Accessibility = 5
- Erosion around wet weather conveyance at Coleman farm.





East Fork Stones River (EF09)
VSA Points

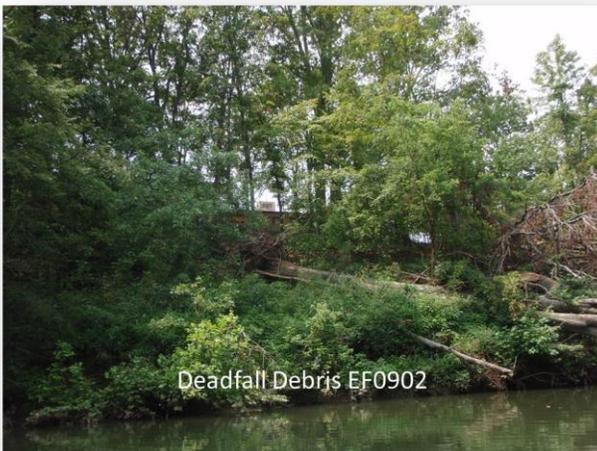


EF0901 Erosion Site



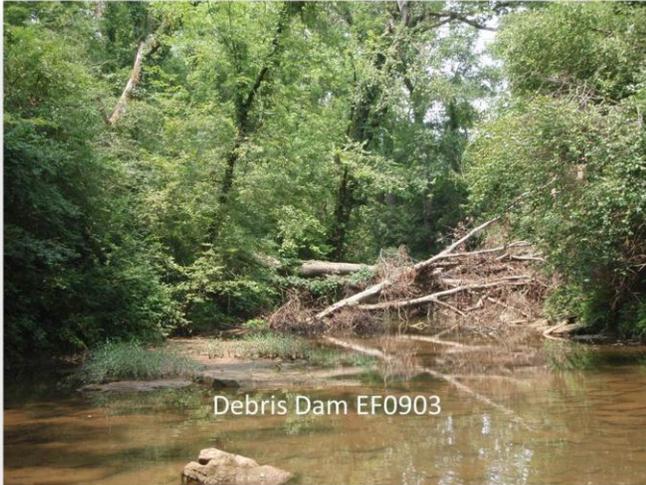
- 7/6/2011
- 86°20'2.033"W,
35°55'10.173"N
- Josh Upham and Bruce Ross
- Stream side = Left
- Severity = 3
- Correctability = 4
- Accessibility = 2
- Erosion continuous down left bank.

EF0902 Erosion Site



- 7/6/2011
- 86°20'36.466"W,
35°55'4.172"N
- Josh Upham and Bruce Ross
- Stream side = Left
- Severity = 3
- Correctability = 3
- Accessibility = 3
- Trees falling due to erosion.

EF0903 Debris Blockage



- 7/6/2011
- 86°20'44.25"W,
35°55'4.428"N
- Josh Upham and Bruce Ross
- Severity = 3
- Correctability = 3
- Accessibility = 5
- Debris blockage on Bushman Creek.

EF0904 Stream Enters



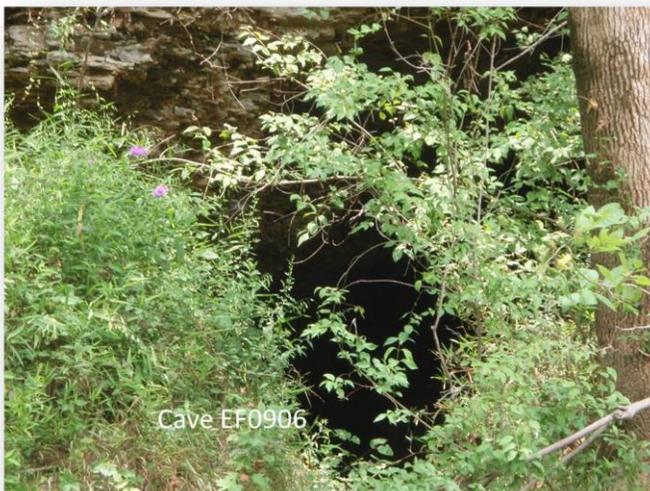
- 7/6/2011
- 86°20'50.562"W,
35°55'39.614"N
- Josh Upham and Bruce Ross
- Stream side = Right
- Stream enters from spring.

EF0905 Erosion Site



- 7/6/2011
- 86°20'21.883"W,
35°55'36.509"N
- Josh Upham and Bruce Ross
- Stream side = Left
- Severity = 5
- Correctability = 1
- Accessibility = 2
- Erosion site due to cattle in stream.

EF0906 Cave/ Tunnel



- 7/6/2011
- 86°21'33.038"W,
35°55'28.087"N
- Josh Upham and Bruce Ross
- Stream side = Right
- Small cave or tunnel.

EF0907 Erosion Site



- 7/6/2011
- 86°22'33.379"W,
35°55'43.784"N
- Josh Upham and Bruce Ross
- Stream side = Left
- Severity = 5
- Correctability = 1
- Accessibility = 5
- Erosion due to minor inadequate buffer.

EF0908 Old Structure



- 7/6/2011
- 86°22'40.349"W,
35°56'12.725"N
- Josh Upham and Bruce Ross
- Stream side = Left
- Old structure

EF0909 Erosion Site



- 7/6/2011
- 86°22'26.309"W,
35°56'29.048"N
- Josh Upham and Bruce Ross
- Stream side = Right
- Severity = 5
- Correctability = 4
- Accessibility = 1

VI. East Fork Stones River E-coli Spring Sampling

Murfreesboro sits on top of a karst geology where sinkholes often receive surface runoff during storm events. This water sometimes discharges into a stream as a spring a long



distance from the receiving sinkhole . As mentioned before, dye tracing can help map these underground waterways. Once dye tracing is complete a recharge basin can be delineated from a spring. This is the area of land that drains through the subsurface to the spring. MWSD samples all major springs frequently for e-coli in order to keep a baseline of water quality. When a high reading is found in a spring the recharge basin can be analyzed for possible pollutant sources. Only two of the major springs in the East Fork Stones River

watershed were sampled for this report due to private property and accessibility issues.

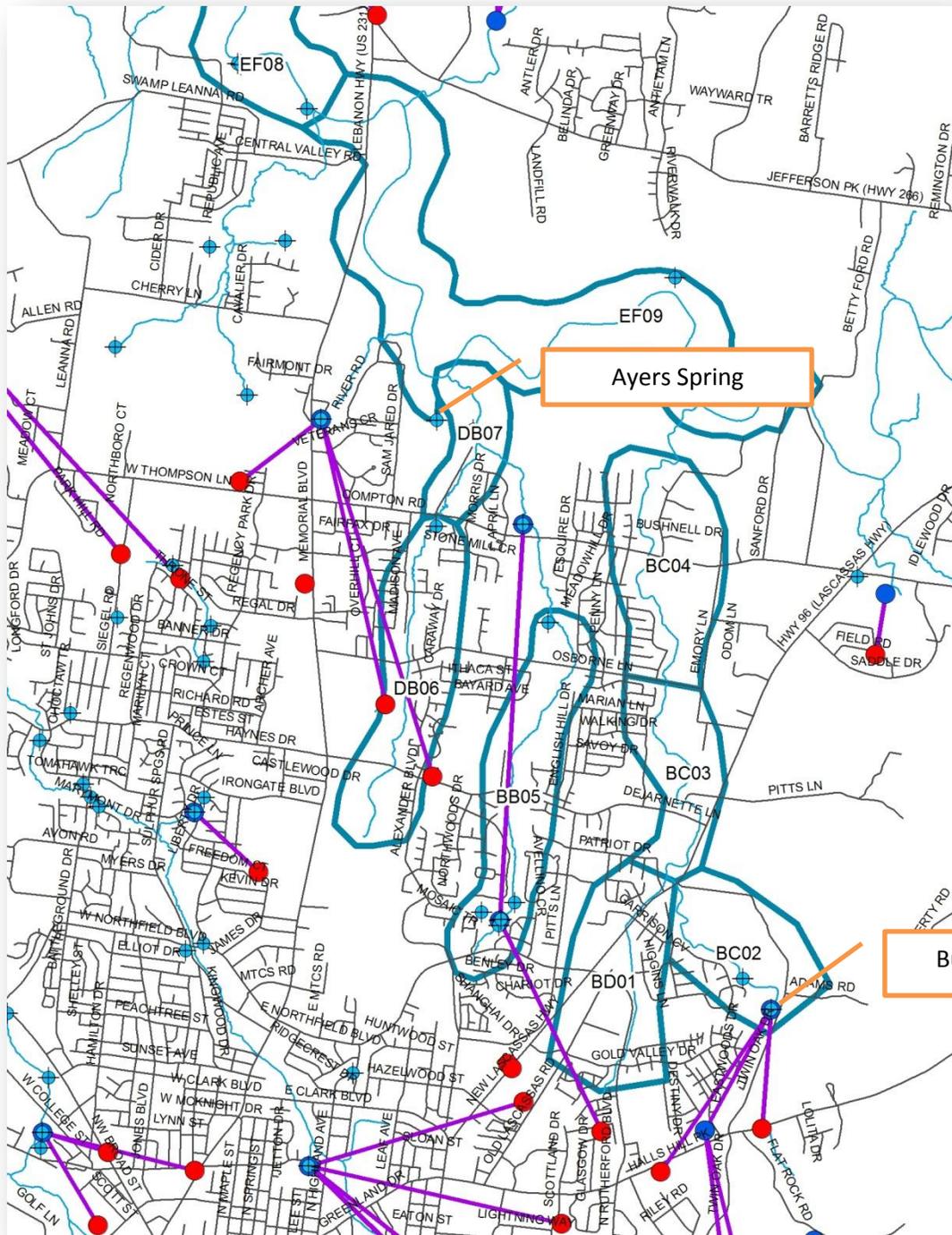
Ayers Spring

Ayers spring, which flows into Bear Branch, was sampled and was found to have a high e-coli concentration. Ayers Spring was monitored in spring 2011 for dye but never tested positive. Dye was detected at nearby Lufkin Spring and VA Spring. This means that the dye got trapped in a pool and diluted, the dye was missed, or Ayers Spring has a narrow but large recharge basin as evident by its flow. Due to its close proximity to the City's water intake and impairments to Bear Branch, this spring will be studied in the future.

Bushman Spring

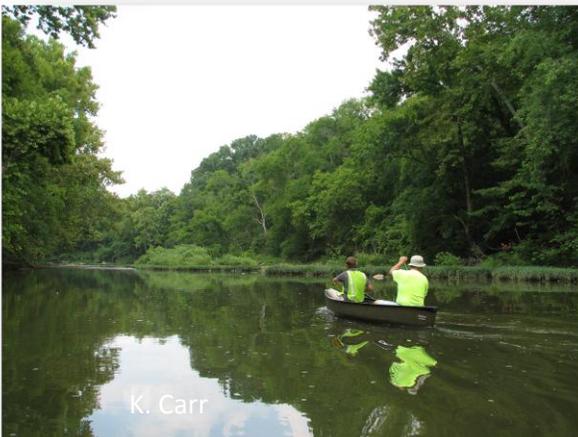
Bushman Spring forms the tributary to EFSR Bushman Creek and was also known as Bushnell Creek as found on old maps. Past dye traces by Aley, Crawford, Ogden indicate that Bushman Creek has an extremely large recharge basin. Dye has been detected from as far away as Bradyville Pike. Bushman Spring was also sampled for e-coli and tested low.

Ayers Spring	1, 424 MPN
Bushman Spring	20 MPN



Red = Dye Injected, Blue = Dye Detected

Miscellaneous Photographs



PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

BC02 Macro

WATERSHED FEATURES	Predominant Surrounding Landuse <input type="checkbox"/> Forest <input type="checkbox"/> Commercial <input type="checkbox"/> Field/Pasture <input type="checkbox"/> Industrial <input type="checkbox"/> Agricultural <input type="checkbox"/> Other _____ <input checked="" type="checkbox"/> Residential	Local Watershed NPS Pollution <input type="checkbox"/> No evidence <input checked="" type="checkbox"/> Some potential sources <input type="checkbox"/> Obvious sources Local Watershed Erosion <input type="checkbox"/> None <input type="checkbox"/> Moderate <input checked="" type="checkbox"/> Heavy
RIPARIAN VEGETATION (18 meter buffer)	Indicate the dominant type and record the dominant species present <input checked="" type="checkbox"/> Trees <input checked="" type="checkbox"/> Shrubs <input checked="" type="checkbox"/> Grasses <input type="checkbox"/> Herbaceous dominant species present _____	
INSTREAM FEATURES	Estimated Reach Length _____ m Estimated Stream Width <u>30</u> m ft Sampling Reach Area _____ m ² Area in km ² (m ² x 1000) _____ km ² Estimated Stream Depth <u>1 ft</u> m Surface Velocity _____ m/sec (at thalweg)	Canopy Cover <input type="checkbox"/> Partly open <input checked="" type="checkbox"/> Partly shaded <input type="checkbox"/> Shaded High Water Mark _____ m Proportion of Reach Represented by Stream Morphology Types <input type="checkbox"/> Rills _____% <input type="checkbox"/> Run _____% <input type="checkbox"/> Pool _____% Channelized <input type="checkbox"/> Yes <input type="checkbox"/> No Dam Present <input type="checkbox"/> Yes <input type="checkbox"/> No
LARGE WOODY DEBRIS	LWD _____ m ² Density of LWD _____ m ² /km ² (LWD/ reach area)	
AQUATIC VEGETATION	Indicate the dominant type and record the dominant species present <input type="checkbox"/> Rooted emergent <input type="checkbox"/> Rooted submergent <input type="checkbox"/> Rooted floating <input type="checkbox"/> Free floating <input type="checkbox"/> Floating Algae <input checked="" type="checkbox"/> Attached Algae dominant species present <u>Macrophytes</u> Portion of the reach with aquatic vegetation _____%	
WATER QUALITY	Temperature <u>16.2</u> °C Specific Conductance <u>465</u> Dissolved Oxygen _____ pH <u>7.26</u> Turbidity _____ WQ Instrument Used _____	Water Odors <input type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Fishy <input type="checkbox"/> Other _____ Water Surface Oils <input type="checkbox"/> Slick <input type="checkbox"/> Sheen <input type="checkbox"/> Globes <input type="checkbox"/> Flecks <input type="checkbox"/> None <input type="checkbox"/> Other _____ Turbidity (if not measured) <input type="checkbox"/> Clear <input type="checkbox"/> Slightly turbid <input type="checkbox"/> Turbid <input type="checkbox"/> Opaque <input type="checkbox"/> Stained <input type="checkbox"/> Other _____
SEDIMENT/SUBSTRATE	Odors <input type="checkbox"/> Normal <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Anaerobic <input type="checkbox"/> None <input type="checkbox"/> Other _____ Oils <input type="checkbox"/> Absent <input type="checkbox"/> Slight <input type="checkbox"/> Moderate <input type="checkbox"/> Profuse	Deposits <input type="checkbox"/> Sludge <input type="checkbox"/> Sawdust <input type="checkbox"/> Paper fiber <input type="checkbox"/> Sand <input type="checkbox"/> Relief shells <input type="checkbox"/> Other _____ Looking at stones which are not deeply embedded, are the undersides black in color? <input type="checkbox"/> Yes <input type="checkbox"/> No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	Diameter	% Composition in Sampling Reach	Substrate Type	Characteristic	% Composition in Sampling Area
Bedrock		<u>30%</u>	Leaves	sticks, wood, coarse plant materials (CPOM)	
Boulder	> 256 mm (10")		Muck-Mud	black, very fine organic (FPOM)	
Cobble	64-256 mm (2.5"-10")	<u>100%</u>	Marl	grey, shell fragments	
Gravel	2-64 mm (0.1"-2.5")	<u>10%</u>			
Sand	0.06-2mm (gritty)				
Silt	0.004-0.06 mm				
Clay	< 0.004 mm (slick)				

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME <u>Bushman</u>	LOCATION	
STATION # _____ RIVERMILE _____	STREAM CLASS	
LAT _____ LONG _____	RIVER BASIN <u>Stones</u>	
STORET # _____	AGENCY <u>MWSD</u>	
INVESTIGATORS		
FORM COMPLETED BY <u>Josh V. Hawn</u>	DATE <u>5/10/11</u> TIME <u>10:30</u> <input checked="" type="radio"/> AM <input type="radio"/> PM	REASON FOR SURVEY <u>VSA</u>

WEATHER CONDITIONS	Now <input type="checkbox"/> storm (heavy rain) <input type="checkbox"/> rain (steady rain) <input type="checkbox"/> showers (intermittent) <input type="checkbox"/> %cloud cover _____ <input type="checkbox"/> clear/sunny	Past 24 hours <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> % _____	Has there been a heavy rain in the last 7 days? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Air Temperature _____ °C Other _____
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SITE LOCATION/MAP	Draw a map of the site and indicate the areas sampled (or attach a photograph)
	<p style="text-align: center;">Dam</p> <p>The map shows a horizontal stream with a dam structure in the middle. To the left of the dam, there are two sampling points marked with an asterisk and the number '8'. Below the stream, there are three rectangular boxes representing sampling areas or structures.</p>

STREAM CHARACTERIZATION	Stream Subsystem <input checked="" type="checkbox"/> Perennial <input type="checkbox"/> Intermittent <input type="checkbox"/> Tidal Stream Origin <input type="checkbox"/> Glacial <input type="checkbox"/> Spring-fed <input type="checkbox"/> Non-glacial montane <input type="checkbox"/> Mixture of origins <input type="checkbox"/> Swamp and bog <input type="checkbox"/> Other _____	Stream Type <input type="checkbox"/> Coldwater <input type="checkbox"/> Warmwater Catchment Area _____ km ²
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BENTHIC MACROINVERTEBRATE FIELD DATA SHEET

STREAM NAME <u>Bushman</u>		LOCATION	
STATION # _____	RIVERMILE _____	STREAM CLASS <u>Stones</u>	
LAT _____	LONG _____	RIVER BASIN <u>Stones</u>	
STORET # _____		AGENCY <u>MWSD</u>	
INVESTIGATORS		LOT NUMBER	
FORM COMPLETED BY <u>Josh Ugham</u>		DATE <u>5/10/11</u>	REASON FOR SURVEY <u>USA</u>
		TIME <u>11:30</u>	AM PM

HABITAT TYPES	Indicate the percentage of each habitat type present <input type="checkbox"/> Cobble _____ % <input type="checkbox"/> Snags _____ % <input type="checkbox"/> Vegetated Banks <u>20</u> % <input type="checkbox"/> Sand _____ % <input type="checkbox"/> Submerged Macrophytes <u>20</u> % <input type="checkbox"/> Other (_____) _____ %
SAMPLE COLLECTION	Gear used <input checked="" type="checkbox"/> D-frame <input type="checkbox"/> kick-net <input type="checkbox"/> Other _____ How were the samples collected? <input checked="" type="checkbox"/> wading <input type="checkbox"/> from bank <input type="checkbox"/> from boat Indicate the number of jobs/dicks taken in each habitat type. <input type="checkbox"/> Cobble _____ <input type="checkbox"/> Snags _____ <input type="checkbox"/> Vegetated Banks _____ <input type="checkbox"/> Sand _____ <input type="checkbox"/> Submerged Macrophytes _____ <input type="checkbox"/> Other (_____) _____
GENERAL COMMENTS	Below <u>Dick</u>

QUALITATIVE LISTING OF AQUATIC BIOTA

Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare, 2 = Common, 3 = Abundant, 4 = Dominant

Periphyton	0	1	2	3	4	Slimes	0	1	2	3	4
Filamentous Algae	0	1	2	3	4	Macroinvertebrates	0	1	2	3	4
Macrophytes	0	1	2	3	4	Fish	0	1	2	3	4

FIELD OBSERVATIONS OF MACROBENTHOS

Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare (1-3 organisms), 2 = Common (3-9 organisms), 3 = Abundant (>10 organisms), 4 = Dominant (>50 organisms)

Porifera	0	1	2	3	4	Anisoptera	0	1	2	3	4	Chironomidae	0	1	2	3	4
Hydrezoa	0	1	2	3	4	Zygoptera	0	1	2	3	4	Ephemeroptera	0	1	2	3	4
Platyhelminthes	0	1	2	3	4	Hemiptera	0	1	2	3	4	Trichoptera	0	1	2	3	4
Turbellaria	0	1	2	3	4	Collembola	0	1	2	3	4	Other	0	1	2	3	4
Hydradorea	0	1	2	3	4	Lepidoptera	0	1	2	3	4						
Oligochaeta	0	1	2	3	4	Stenonema	0	1	2	3	4						
Isopoda	0	1	2	3	4	Corydalidae	0	1	2	3	4						
Amphipoda	0	1	2	3	4	Tipulidae	0	1	2	3	4						
Decapoda	0	1	2	3	4	Empididae	0	1	2	3	4						
Gastropoda	0	1	2	3	4	Simuliidae	0	1	2	3	4						
Bivalvia	0	1	2	3	4	Tubificidae	0	1	2	3	4						
						Culicidae	0	1	2	3	4						

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

BCOD Macro 2

WATERSHED FEATURES	Predominant Surrounding Landuse <input type="checkbox"/> Forest <input type="checkbox"/> Commercial <input type="checkbox"/> Field/Pasture <input type="checkbox"/> Industrial <input type="checkbox"/> Agricultural <input type="checkbox"/> Other _____ <input type="checkbox"/> Residential	Local Watershed NPS Pollution <input type="checkbox"/> No evidence <input type="checkbox"/> Some potential sources <input type="checkbox"/> Obvious sources Local Watershed Erosion <input type="checkbox"/> None <input type="checkbox"/> Moderate <input type="checkbox"/> Heavy
RIPARIAN VEGETATION (18 meter buffer)	Indicate the dominant type and record the dominant species present <input checked="" type="checkbox"/> Trees <input checked="" type="checkbox"/> Shrubs <input checked="" type="checkbox"/> Grasses <input type="checkbox"/> Herbaceous dominant species present _____	
INSTREAM FEATURES	Estimated Reach Length _____ m Estimated Stream Width <u>30</u> m <i>ft</i> Sampling Reach Area _____ m ² Area in km ² (m ² x 1000) _____ km ² Estimated Stream Depth <u>3 inches</u> m Surface Velocity _____ m/sec (at thalweg)	
LARGE WOODY DEBRIS	LWD _____ m ² Density of LWD _____ m ² /km ² (LWD/ reach area)	
AQUATIC VEGETATION	Indicate the dominant type and record the dominant species present <input type="checkbox"/> Rooted emergent <input type="checkbox"/> Rooted submergent <input type="checkbox"/> Rooted floating <input type="checkbox"/> Free floating <input type="checkbox"/> Floating Algae <input type="checkbox"/> Attached Algae dominant species present _____ Portion of the reach with aquatic vegetation _____ %	
WATER QUALITY	Temperature <u>12.3</u> °C Specific Conductance <u>463</u> Dissolved Oxygen _____ pH <u>7.60</u> Turbidity _____ WQ Instrument Used _____	
SEDIMENT/SUBSTRATE	Odors <input type="checkbox"/> None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Anaerobic <input type="checkbox"/> None <input type="checkbox"/> Other _____ Oils <input type="checkbox"/> Absent <input type="checkbox"/> Slight <input type="checkbox"/> Moderate <input type="checkbox"/> Profuse	
	Deposits <input type="checkbox"/> Sludge <input type="checkbox"/> Sawdust <input type="checkbox"/> Paper fiber <input type="checkbox"/> Sand <input type="checkbox"/> Relict shells <input type="checkbox"/> Other _____ Looking at stones which are not deeply embedded, are the undersides black in color? <input type="checkbox"/> Yes <input type="checkbox"/> No	

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	Diameter	% Composition in Sampling Reach	Substrate Type	Characteristic	% Composition in Sampling Area
Bedrock			Detritus	sticks, wood, coarse plant materials (CPOM)	
Boulder	> 256 mm (10")				
Cobble	64-256 mm (2.5"-10")		Muck-Mud	black, very fine organic (FPOM)	
Gravel	2-64 mm (0.1"-2.5")	<u>80</u>			
Sand	0.06-2mm (gritty)		Marl	grey, shell fragments	
Silt	0.004-0.06 mm				
Clay	< 0.004 mm (slick)				

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

BOOD Macro 2

STREAM NAME <i>Bushman</i>	LOCATION	
STATION # <i>2</i> RIVERMILE	STREAM CLASS	
LAT _____ LONG _____	RIVER BASIN <i>Stones</i>	
STORET # _____	AGENCY <i>MWSA</i>	
INVESTIGATORS		
FORM COMPLETED BY <i>Josh Opham</i>	DATE <i>5/10</i> TIME <i>10:28</i> AM PM	REASON FOR SURVEY <i>VSA</i>

WEATHER CONDITIONS	Now <input type="checkbox"/> storm (heavy rain) <input type="checkbox"/> rain (steady rain) <input type="checkbox"/> showers (intermittent) <input type="checkbox"/> %cloud cover _____ <input type="checkbox"/> clear/sunny	Past 24 hours <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> % _____ <input type="checkbox"/>	Has there been a heavy rain in the last 7 days? <input type="checkbox"/> Yes <input type="checkbox"/> No Air Temperature _____ °C Other _____
SITE LOCATION/MAP	Draw a map of the site and indicate the areas sampled (or attach a photograph)		
STREAM CHARACTERIZATION	Stream Subsystem <input checked="" type="checkbox"/> Perennial <input type="checkbox"/> Intermittent <input type="checkbox"/> Tidal Stream Origin <input checked="" type="checkbox"/> Glacial <input type="checkbox"/> Non-glacial montane <input type="checkbox"/> Swamp and bog <input type="checkbox"/> Spring-fed <input type="checkbox"/> Mixture of origins <input type="checkbox"/> Other _____		Stream Type <input type="checkbox"/> Coldwater <input type="checkbox"/> Warmwater Catchment Area _____ km ²

BC02 Macro 2

BENTHIC MACROINVERTEBRATE FIELD DATA SHEET

STREAM NAME <u>Bushman</u>		LOCATION	
STATION # _____	RIVERMILE _____	STREAM CLASS	
LAT _____	LONG _____	RIVER BASIN <u>Stones</u>	
STORET # _____		AGENCY <u>MW50</u>	
INVESTIGATORS <u>JM TB</u>		LOT NUMBER	
FORM COMPLETED BY <u>Josh Upham</u>		DATE <u>5/19/11</u>	REASON FOR SURVEY <u>USA</u>
		TIME <u>12:18</u>	AM PM

HABITAT TYPES	Indicate the percentage of each habitat type present
	<input type="checkbox"/> Cobble <u>90</u> % <input type="checkbox"/> Snags _____ % <input type="checkbox"/> Vegetated Banks <u>10</u> % <input type="checkbox"/> Sand _____ % <input type="checkbox"/> Submerged Macrophytes _____ % <input type="checkbox"/> Other () _____ %
SAMPLE COLLECTION	Gear used <input checked="" type="checkbox"/> D-frame <input type="checkbox"/> kick-net <input type="checkbox"/> Other _____ How were the samples collected? <input checked="" type="checkbox"/> wading <input type="checkbox"/> from bank <input type="checkbox"/> from boat
	Indicate the number of /abs/kicks taken in each habitat type. <input checked="" type="checkbox"/> Cobble <u>2</u> <input type="checkbox"/> Snags _____ <input type="checkbox"/> Vegetated Banks _____ <input type="checkbox"/> Sand _____ <input type="checkbox"/> Submerged Macrophytes _____ <input type="checkbox"/> Other () _____
GENERAL COMMENTS	

QUALITATIVE LISTING OF AQUATIC BIOTA

Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare, 2 = Common, 3 = Abundant, 4 = Dominant

Periphyton	0	1	2	3	4	Slimes	0	1	2	3	4
Filamentous Algae	0	1	2	3	4	Macroinvertebrates	0	1	2	3	4
Macrophytes	0	1	2	3	4	Fish	0	1	2	3	4

FIELD OBSERVATIONS OF MACROBENTHOS

Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare (1-3 organisms), 2 = Common (3-9 organisms), 3 = Abundant (>10 organisms), 4 = Dominant (>50 organisms)

Porifera	0	1	2	3	4	Anisoptera	0	1	2	3	4	Chironomidae	0	1	2	3	4
Hydrozoa	0	1	2	3	4	Zygoptera	0	1	2	3	4	Ephemeroptera	0	1	2	3	4
Platyhelminthes	0	1	2	3	4	Hemiptera	0	1	2	3	4	Trichoptera	0	1	2	3	4
Turbellaria	0	1	2	3	4	Collembola	0	1	2	3	4	Other	0	1	2	3	4
Hydroneura	0	1	2	3	4	Lepidoptera	0	1	2	3	4	Banded Sulphur Crayfish 3 15+					
Oligochaeta	0	1	2	3	4	Stenonema	0	1	2	3	4						
Isopoda	0	1	2	3	4	Corydalidae	0	1	2	3	4						
Amphipoda	0	1	2	3	4	Tipulidae	0	1	2	3	4						
Decapoda	0	1	2	3	4	Empididae	0	1	2	3	4						
Gastropoda	0	1	2	3	4	Simuliidae	0	1	2	3	4						
Bivalvia	0	1	2	3	4	Tubificidae	0	1	2	3	4						
						Culicidae	0	1	2	3	4						

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

BLO3 Macro 1

WATERSHED FEATURES	Predominant Surrounding Landuse <input checked="" type="checkbox"/> Forest <input type="checkbox"/> Commercial <input type="checkbox"/> Field/Pasture <input type="checkbox"/> Industrial <input type="checkbox"/> Agricultural <input type="checkbox"/> Other _____ <input checked="" type="checkbox"/> Residential	Local Watershed NPS Pollution <input type="checkbox"/> No evidence <input type="checkbox"/> Some potential sources <input type="checkbox"/> Obvious sources Local Watershed Erosion <input type="checkbox"/> None <input checked="" type="checkbox"/> Moderate <input type="checkbox"/> Heavy
RIPARIAN VEGETATION (18 meter buffer)	Indicate the dominant type and record the dominant species present <input checked="" type="checkbox"/> Trees <input checked="" type="checkbox"/> Shrubs <input checked="" type="checkbox"/> Grasses <input type="checkbox"/> Herbaceous dominant species present <u>Hardwood / MUSLIVE</u>	
INSTREAM FEATURES	Estimated Reach Length _____ m Estimated Stream Width <u>50</u> m <u>ft</u> Sampling Reach Area _____ m ² Area in km ² (m ² x 1000) _____ km ² Estimated Stream Depth <u>3 inch</u> m Surface Velocity _____ m/sec (at thalweg)	
LARGE WOODY DEBRIS	LWD _____ m ² Density of LWD _____ m ² /km ² (LWD/ reach area)	
AQUATIC VEGETATION	Indicate the dominant type and record the dominant species present <input type="checkbox"/> Rooted emergent <input checked="" type="checkbox"/> Rooted submergent <input type="checkbox"/> Rooted floating <input type="checkbox"/> Free floating <input type="checkbox"/> Floating Algae <input type="checkbox"/> Attached Algae dominant species present <u>Macrophytes</u> Portion of the reach with aquatic vegetation <u>50</u> %	
WATER QUALITY	Temperature <u>18.4</u> °C Specific Conductance <u>400</u> Dissolved Oxygen _____ pH <u>7.8</u> Turbidity _____ WQ Instrument Used _____	
SEDIMENT/SUBSTRATE	Water Odors <input type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input checked="" type="checkbox"/> Fishy <input type="checkbox"/> Other _____ Water Surface Oils <input type="checkbox"/> Slick <input type="checkbox"/> Sheen <input type="checkbox"/> Grease <input type="checkbox"/> Flecks <input type="checkbox"/> None <input type="checkbox"/> Other _____ Turbidity (if not measured) <input type="checkbox"/> Clear <input type="checkbox"/> Slightly turbid <input type="checkbox"/> Turbid <input type="checkbox"/> Opaque <input type="checkbox"/> Stained <input type="checkbox"/> Other _____	
	Odors <input type="checkbox"/> Normal <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Anaerobic <input type="checkbox"/> None <input type="checkbox"/> Other _____ Deposits <input type="checkbox"/> Sludge <input type="checkbox"/> Sawdust <input type="checkbox"/> Paper fiber <input type="checkbox"/> Sand <input type="checkbox"/> Relict shells <input type="checkbox"/> Other _____ Oils <input type="checkbox"/> Absent <input type="checkbox"/> Slight <input type="checkbox"/> Moderate <input type="checkbox"/> Profuse Looking at stones which are not deeply embedded, are the undersides black in color? <input type="checkbox"/> Yes <input type="checkbox"/> No	

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	Diameter	% Composition in Sampling Reach	Substrate Type	Characteristic	% Composition in Sampling Area
Bedrock		100	Detritus	sticks, wood, coarse plant materials (CPOM)	30
Boulder	> 256 mm (10")				
Cobble	64-256 mm (2.5"-10")	20%	Muck-Mud	black, very fine organic (FPOM)	
Gravel	2-64 mm (0.1"-2.5")	20%			
Sand	0.06-2mm (gritty)		Marl	grey, shell fragments	
Silt	0.004-0.06 mm				
Clay	< 0.004 mm (slick)				

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

D03

STREAM NAME <u>Bushman</u>	LOCATION
STATION # _____ RIVERMILE _____	STREAM CLASS
LAT _____ LONG _____	RIVER BASIN <u>Stones</u>
STORET # _____	AGENCY <u>MWSD</u>
INVESTIGATORS	
FCRM COMPLETED BY	DATE TIME <u>10:30</u> AM <input checked="" type="radio"/> PM
	REASON FOR SURVEY <u>ISA</u>

WEATHER CONDITIONS	Now <input type="checkbox"/> storm (heavy rain) <input type="checkbox"/> rain (steady rain) <input type="checkbox"/> showers (intermittent) <input type="checkbox"/> %cloud cover _____ <input type="checkbox"/> clear/sunny	Past 24 hours <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> _____% <input type="checkbox"/>	Has there been a heavy rain in the last 7 days? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Air Temperature _____ °C Other _____
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SITE LOCATION/MAP	Draw a map of the site and indicate the areas sampled (or attach a photograph) <div style="height: 300px; border: 1px solid black; margin-top: 10px;"></div>
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STREAM CHARACTERIZATION	Stream Subsystem <input checked="" type="checkbox"/> Perennial <input type="checkbox"/> Intermittent <input type="checkbox"/> Tidal Stream Origin <input type="checkbox"/> Glacial <input checked="" type="checkbox"/> Spring-fed <input type="checkbox"/> Non-glacial montane <input checked="" type="checkbox"/> Mixture of origins <input type="checkbox"/> Swamp and bog <input type="checkbox"/> Other _____	Stream Type <input type="checkbox"/> Coldwater <input type="checkbox"/> Warmwater Catchment Area _____ km ²
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BC0301 Macro I
BENTHIC MACROINVERTEBRATE FIELD DATA SHEET

STREAM NAME <u>Bushman</u>		LOCATION	
STATION # _____ RIVERMILE _____		STREAM CLASS	
LAT _____ LONG _____		RIVER BASIN <u>Stones</u>	
STORET # _____		AGENCY <u>MWSD</u>	
INVESTIGATORS <u>SM TB</u>			LOT NUMBER
FORM COMPLETED BY <u>Josh O'Pham</u>		DATE <u>5/10/11</u> TIME <u>7:03</u> AM PM	REASON FOR SURVEY <u>VSA</u>

HABITAT TYPES	Indicate the percentage of each habitat type present <input type="checkbox"/> Cobble _____ % <input type="checkbox"/> Snags _____ % <input type="checkbox"/> Vegetated Banks <u>100%</u> <input type="checkbox"/> Sand _____ % <input type="checkbox"/> Submerged Macrophytes <u>50%</u> <input type="checkbox"/> Other (_____) _____ %
SAMPLE COLLECTION	Gear used <input checked="" type="checkbox"/> D-frame <input type="checkbox"/> kick-net <input type="checkbox"/> Other _____ How were the samples collected? <input checked="" type="checkbox"/> wading <input type="checkbox"/> from bank <input type="checkbox"/> from boat Indicate the number of subs/dicks taken in each habitat type. <input type="checkbox"/> Cobble <u>2</u> <input type="checkbox"/> Snags <u>2</u> <input type="checkbox"/> Vegetated Banks _____ <input type="checkbox"/> Sand _____ <input type="checkbox"/> Submerged Macrophytes _____ <input type="checkbox"/> Other (_____) _____
GENERAL COMMENTS	

QUALITATIVE LISTING OF AQUATIC BIOTA

Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare, 2 = Common, 3 = Abundant, 4 = Dominant

Periphyton	0	1	2	3	4	Slimes	0	1	2	3	4
Filamentous Algae	0	1	2	3	4	Macroinvertebrates	0	1	2	3	4
Macrophytes	0	1	2	<u>3</u>	4	Fish	0	1	2	3	4

FIELD OBSERVATIONS OF MACROBENTHOS

Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare (1-3 organisms), 2 = Common (3-9 organisms), 3 = Abundant (>10 organisms), 4 = Dominant (>50 organisms)

Porifera	0	1	2	3	4	Anisoptera	0	1	2	3	4	Chironomidae	0	1	2	3	4
Hydrozoa	0	1	2	3	4	Zygoptera	0	1	2	3	4	Ephemeroptera	0	1	2	<u>3</u>	4
Platyhelminthes	0	1	2	3	4	Hemiptera	0	1	2	3	4	Trichoptera	0	1	2	3	4
Turbellaria	0	1	2	3	4	Collembola	0	1	2	3	4	Other	0	1	2	3	4
Nematoda	0	1	2	3	4	Lepidoptera	0	1	2	3	4						
Oligochaeta	0	1	2	3	4	Stenopodidae	0	1	2	3	4						
Isopoda	0	1	2	<u>3</u>	4	Corydalidae	0	1	2	3	4						
Amphipoda	0	1	2	<u>3</u>	4	Tipulidae	0	1	2	3	4						
Decapoda	0	1	2	3	4	Empididae	0	1	2	3	4						
Gastropoda	0	1	2	<u>3</u>	4	Simuliidae	0	1	2	3	4						
Bivalvia	0	1	2	3	4	Tubificidae	0	1	2	3	4						
						Culexidae	0	1	2	3	4						

Crawfish

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

5
BC03 site 2

WATERSHED FEATURES	Predominant Surrounding Landuse <input checked="" type="checkbox"/> Forest <input type="checkbox"/> Commercial <input type="checkbox"/> Field/Pasture <input type="checkbox"/> Industrial <input checked="" type="checkbox"/> Agricultural <input type="checkbox"/> Other _____ <input type="checkbox"/> Residential		Local Watershed NPS Pollution <input checked="" type="checkbox"/> No evidence <input type="checkbox"/> Some potential sources <input type="checkbox"/> Obvious sources Local Watershed Erosion <input checked="" type="checkbox"/> None <input type="checkbox"/> Moderate <input type="checkbox"/> Heavy
RIPARIAN VEGETATION (18 meter buffer)	Indicate the dominant type and record the dominant species present <input checked="" type="checkbox"/> Trees <input checked="" type="checkbox"/> Shrubs <input type="checkbox"/> Grasses <input type="checkbox"/> Herbaceous dominant species present <u>WILLOW</u>		
INSTREAM FEATURES	Estimated Reach Length _____ m <u>100 ft</u> Estimated Stream Width _____ m <u>45 ft</u> Sampling Reach Area _____ m ² Area in km ² (m ² x 1000) _____ km ² Estimated Stream Depth _____ m <u>2 inches</u> Surface Velocity (at thalweg) _____ m/sec <u>2 ft</u>		Canopy Cover <input type="checkbox"/> Partly open <input checked="" type="checkbox"/> Partly shaded <input type="checkbox"/> Shaded High Water Mark _____ m Proportion of Reach Represented by Stream Morphology Types <input type="checkbox"/> Riffle <u>90</u> % <input type="checkbox"/> Run <u>30</u> % <input type="checkbox"/> Pool _____ % Channelized <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Dam Present <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
LARGE WOODY DEBRIS	LWD _____ m ² Density of LWD _____ m ² /km ² (LWD/ reach area)		
AQUATIC VEGETATION	Indicate the dominant type and record the dominant species present <input type="checkbox"/> Rooted emergent <input type="checkbox"/> Rooted submergent <input type="checkbox"/> Rooted floating <input type="checkbox"/> Free floating <input type="checkbox"/> Floating Algae <input type="checkbox"/> Attached Algae dominant species present _____ Portion of the reach with aquatic vegetation <u>100</u> %		
WATER QUALITY	Temperature <u>17.0</u> °C Specific Conductance <u>470</u> Dissolved Oxygen _____ pH <u>8.09</u> Turbidity _____ WQ Instrument Used _____		Water Odors <input type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Fishy <input type="checkbox"/> Other _____ Water Surface Oils <input type="checkbox"/> Slack <input type="checkbox"/> Sheen <input type="checkbox"/> Glass <input type="checkbox"/> Flecks <input type="checkbox"/> None <input type="checkbox"/> Other _____ Turbidity (if not measured) <input type="checkbox"/> Clear <input type="checkbox"/> Slightly turbid <input type="checkbox"/> Turbid <input type="checkbox"/> Opaque <input type="checkbox"/> Stained <input type="checkbox"/> Other _____
SEDIMENT/SUBSTRATE	Odors <input type="checkbox"/> Normal <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Anaerobic <input type="checkbox"/> None <input type="checkbox"/> Other _____ Oils <input checked="" type="checkbox"/> Absent <input type="checkbox"/> Slight <input type="checkbox"/> Moderate <input type="checkbox"/> Profuse		Deposits <input type="checkbox"/> Sludge <input type="checkbox"/> Sawdust <input type="checkbox"/> Paper fiber <input type="checkbox"/> Sand <input type="checkbox"/> Relict shells <input type="checkbox"/> Other _____ Looking at stones which are not deeply embedded, are the undersides black in color? <input type="checkbox"/> Yes <input type="checkbox"/> No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	Diameter	% Composition in Sampling Reach	Substrate Type	Characteristic	% Composition in Sampling Area
Bedrock		<u>100</u> %	Detritus	sticks, wood, coarse plant materials (CPOM)	
Boulder	> 256 mm (10")		Muck-Mud	black, very fine organic (FPOM)	
Cobble	64-256 mm (2.5"-10")		Marl	grey, shell fragments	
Gravel	2-64 mm (0.1"-2.5")	<u>40</u> %			
Sand	0.06-2mm (gr. ty)				
Silt	0.004-0.06 mm				
Clay	< 0.004 mm (silt)				

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

BC0302

STREAM NAME <u>Bushman</u>	LOCATION	
STATION # <u>RIVERMILE</u>	STREAM CLASS	
LAT <u> </u>	RIVER BASIN <u>Stones</u>	
STORET # <u> </u>	AGENCY <u>ANLSD</u>	
INVESTIGATORS <u>Joh IB</u>		
FORM COMPLETED BY <u>Josh L'Pham</u>	DATE <u>5/12/11</u> TIME <u>10:40</u> <input checked="" type="radio"/> AM <input type="radio"/> PM	REASON FOR SURVEY <u>VSA</u>

WEATHER CONDITIONS	Now <input type="checkbox"/> storm (heavy rain) <input type="checkbox"/> rain (steady rain) <input type="checkbox"/> showers (intermittent) <input type="checkbox"/> %cloud cover <input type="checkbox"/> clear/sunny	Past 24 hours <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> % <input type="checkbox"/>	Has there been a heavy rain in the last 7 days? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Air Temperature _____ °C Other _____
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SITE LOCATION/MAP	Draw a map of the site and indicate the areas sampled (or attach a photograph) <div style="text-align: center; margin-top: 50px;"> </div>
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STREAM CHARACTERIZATION	Stream Subsystem <input type="checkbox"/> Perennial <input type="checkbox"/> Intermittent <input type="checkbox"/> Tidal Stream Origin <input type="checkbox"/> Glacial <input checked="" type="checkbox"/> Spring-fed <input type="checkbox"/> Non-glacial montane <input type="checkbox"/> Mixture of origins <input type="checkbox"/> Swamp and bog <input type="checkbox"/> Other _____	Stream Type <input type="checkbox"/> Coldwater <input type="checkbox"/> Warmwater Catchment Area _____ km ²
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SC03
Site 2

BENTHIC MACROINVERTEBRATE FIELD DATA SHEET

STREAM NAME <u>Bushman</u>	LOCATION
STATION # _____ RIVERMILE _____	STREAM CLASS
LAT _____ LONG _____	RIVER BASIN <u>Stone 5</u>
STORET # _____	AUTUMN <u>MWSD</u>
INVESTIGATORS <u>JM TB</u>	LOT NUMBER
FORM COMPLETED BY	DATE <u>5/12/11</u> TIME <u>10:00</u> <input checked="" type="radio"/> AM <input type="radio"/> PM
	REASON FOR SURVEY <u>VSA</u>

HABITAT TYPES	Indicate the percentage of each habitat type present <input type="checkbox"/> Cobble _____ % <input type="checkbox"/> Snags _____ % <input type="checkbox"/> Vegetated Banks <u>2</u> % <input type="checkbox"/> Sand _____ % <input type="checkbox"/> Submerged Macrophytes _____ % <input type="checkbox"/> Other (_____) _____ %
SAMPLE COLLECTION	Gear used <input checked="" type="checkbox"/> D-frame <input type="checkbox"/> kick-net <input type="checkbox"/> Other _____ How were the samples collected? <input checked="" type="checkbox"/> wading <input type="checkbox"/> from bank <input type="checkbox"/> from boat Indicate the number of jobs/dicks taken in each habitat type. <input type="checkbox"/> Cobble _____ <input type="checkbox"/> Snags _____ <input type="checkbox"/> Vegetated Banks _____ <input type="checkbox"/> Sand _____ <input type="checkbox"/> Submerged Macrophytes _____ <input type="checkbox"/> Other (_____) _____
GENERAL COMMENTS	

QUALITATIVE LISTING OF AQUATIC BIOTA

Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare, 2 = Common, 3 = Abundant, 4 = Dominant

Periphyton	0	1	2	3	4	Slimes	0	1	2	3	4
Filamentous Algae	0	1	2	3	4	Macroinvertebrates	0	1	2	3	4
Macrophytes	0	1	2	3	4	Fish	0	1	2	3	4

FIELD OBSERVATIONS OF MACROBENTHOS

Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare (1-3 organisms), 2 = Common (3-9 organisms), 3 = Abundant (>10 organisms), 4 = Dominant (>50 organisms)

Porifera	0	1	2	3	4	Anisoptera	0	1	2	3	4	Chironomidae	0	1	2	3	4
Hydrozoa	0	1	2	3	4	Zygoptera	0	1	2	3	4	Ephemeroptera	0	1	2	3	4
Platyhelminthes	0	1	2	3	4	Hemiptera	0	1	2	3	4	Trichoptera	0	1	2	3	4
Turbellaria	0	1	2	3	4	Collembola	0	1	2	3	4	Other	0	1	2	3	4
Hydrulella	0	1	2	3	4	Lepidoptera	0	1	2	3	4						
Oligochaeta	0	1	2	3	4	Stenopoda	0	1	2	3	4						
Isopoda	0	1	2	3	4	Corydalidae	0	1	2	3	4						
Amphipoda	0	1	2	3	4	Tipulidae	0	1	2	3	4						
Decapoda	0	1	2	3	4	Empididae	0	1	2	3	4						
Gastropoda	0	1	2	3	4	Simuliidae	0	1	2	3	4						
Bivalvia	0	1	2	3	4	Tubificidae	0	1	2	3	4						
						Culicidae	0	1	2	3	4						

Craw fish 3
 Stone fly 3

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

BC03 Site 3

WATERSHED FEATURES	Predominant Surrounding Landuse <input checked="" type="checkbox"/> Forest <input type="checkbox"/> Commercial <input checked="" type="checkbox"/> Field/Pasture <input type="checkbox"/> Industrial <input type="checkbox"/> Agricultural <input type="checkbox"/> Other _____ <input type="checkbox"/> Residential		Local Watershed NPS Pollution <input checked="" type="checkbox"/> No evidence <input type="checkbox"/> Some potential sources <input type="checkbox"/> Obvious sources Local Watershed Erosion <input checked="" type="checkbox"/> None <input type="checkbox"/> Moderate <input type="checkbox"/> Heavy	
RIPARIAN VEGETATION (18 meter buffer)	Indicate the dominant type and record the dominant species present <input type="checkbox"/> Trees <input checked="" type="checkbox"/> Shrubs <input checked="" type="checkbox"/> Grasses <input type="checkbox"/> Herbaceous dominant species present <u>invasive</u>			
INSTREAM FEATURES	Estimated Reach Length _____ m <u>200 ft</u> Estimated Stream Width _____ m <u>45 ft</u> Sampling Reach Area _____ m ² Area in km ² (m ² x 1000) _____ km ² Estimated Stream Depth _____ m <u>2 inches</u> Surface Velocity _____ m/sec (at thalweg)		Canopy Cover <input checked="" type="checkbox"/> Partly open <input checked="" type="checkbox"/> Partly shaded <input type="checkbox"/> Shaded High Water Mark _____ m Proportion of Reach Represented by Stream Morphology Types <input type="checkbox"/> Riffle <u>40</u> % <input type="checkbox"/> Run _____ % <input type="checkbox"/> Pool <u>60</u> % Channelized <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Dam Present <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
LARGE WOODY DEBRIS	LWD _____ m ³ Density of LWD _____ m ³ /km ² (LWD/ reach area)			
AQUATIC VEGETATION	Indicate the dominant type and record the dominant species present <input type="checkbox"/> Rooted emergent <input checked="" type="checkbox"/> Rooted submergent <input type="checkbox"/> Rooted floating <input type="checkbox"/> Free floating <input checked="" type="checkbox"/> Floating Algae <input type="checkbox"/> Attached Algae dominant species present _____ Portion of the reach with aquatic vegetation _____ %			
WATER QUALITY	Temperature <u>18.6</u> °C Specific Conductance <u>478</u> Dissolved Oxygen _____ pH <u>8.22</u> Turbidity _____ WQ Instrument Used _____		Water Odors <input checked="" type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Fishy <input type="checkbox"/> Other _____ Water Surface Oils <input type="checkbox"/> Slick <input type="checkbox"/> Sheen <input type="checkbox"/> Glass <input type="checkbox"/> Flecks <input type="checkbox"/> None <input type="checkbox"/> Other _____ Turbidity (if not measured) <input type="checkbox"/> Clear <input type="checkbox"/> Slightly turbid <input type="checkbox"/> Turbid <input type="checkbox"/> Opaque <input type="checkbox"/> Stained <input type="checkbox"/> Other _____	
SEDIMENT/SUBSTRATE	Odors <input type="checkbox"/> None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Anaerobic <input type="checkbox"/> None <input type="checkbox"/> Other _____ Oils <input type="checkbox"/> Absent <input type="checkbox"/> Slight <input type="checkbox"/> Moderate <input type="checkbox"/> Profuse		Deposits <input type="checkbox"/> Sludge <input type="checkbox"/> Sawdust <input type="checkbox"/> Paper fiber <input type="checkbox"/> Sand <input type="checkbox"/> Relict shells <input type="checkbox"/> Other _____ Looking at stones which are not deeply embedded, are the undersides black in color? <input type="checkbox"/> Yes <input type="checkbox"/> No	

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	Diameter	% Composition in Sampling Reach	Substrate Type	Characteristic	% Composition in Sampling Area
Bedrock		100%	Detritus	sticks, wood, coarse plant materials (CPOM)	
Boulder	> 256 mm (10")		Muck-Mud	black, very fine organic (FPOM)	
Cobble	64-256 mm (2.5"-10")	20%	Marl	grey, shell fragments	
Gravel	2-64 mm (0.1"-2.5")	20%			
Sand	0.06-2mm (gr. ty)				
Silt	0.004-0.06 mm				
Clay	< 0.004 mm (silt)				

6003 site 3

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME <u>Bushman</u>	LOCATION
STATION # <u>RIVERMILE</u>	STREAM CLASS
LAT <u>LONG</u>	RIVER BASIN <u>stones</u>
STORET #	AGENCY <u>MUSD</u>
INVESTIGATORS	
FORM COMPLETED BY	DATE TIME <u>10:30</u> <u>AM</u> :M
REASON FOR SURVEY <u>ISA</u>	

WEATHER CONDITIONS	<input type="checkbox"/> storm (heavy rain) <input type="checkbox"/> rain (steady rain) <input type="checkbox"/> showers (intermittent) <input type="checkbox"/> %cloud cover <input type="checkbox"/> clear/sunny	Past 24 hours <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> % <input type="checkbox"/>	Has there been a heavy rain in the last 7 days? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Air Temperature <u>85</u> °C Other _____
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SITE LOCATION/MAP

Draw a map of the site and indicate the areas sampled (or attach a photograph)

STREAM CHARACTERIZATION	Stream Subsystem <input checked="" type="checkbox"/> Perennial <input type="checkbox"/> Intermittent <input type="checkbox"/> Tidal	Stream Type <input type="checkbox"/> Coldwater <input type="checkbox"/> Warmwater
	Stream Origin <input type="checkbox"/> Glacial <input type="checkbox"/> Spring-fed <input type="checkbox"/> Non-glacial montane <input type="checkbox"/> Mixture of origins <input type="checkbox"/> Swamp and bog <input type="checkbox"/> Other _____	Catchment Area _____ km ²

BC03 site 3

BENTHIC MACROINVERTEBRATE FIELD DATA SHEET

STREAM NAME <u>Bushman</u>	LOCATION
STATION # <u>RIVERMILE</u>	STREAM CLASS
LAT <u>LONG</u>	RIVER BASIN <u>Stones (EFR)</u>
STORET #	AGENCY <u>MWLD</u>
INVESTIGATORS <u>BJ JU</u>	LOT NUMBER
FORM COMPLETED BY <u>Josh Upham</u>	DATE <u>TIME</u> AM PM
	REASON FOR SURVEY <u>VSA</u>

HABITAT TYPES	Indicate the percentage of each habitat type present <input type="checkbox"/> Cobble <u>20</u> % <input type="checkbox"/> Snags <u> </u> % <input type="checkbox"/> Vegetated Banks <u>100</u> % <input type="checkbox"/> Sand <u> </u> % <input type="checkbox"/> Submerged Macrophytes <u> </u> % <input type="checkbox"/> Other (<u> </u>) <u> </u> %
SAMPLE COLLECTION	Gear used <input type="checkbox"/> D-frame <input type="checkbox"/> kick-net <input type="checkbox"/> Other <u> </u> How were the samples collected? <input checked="" type="checkbox"/> wading <input type="checkbox"/> from bank <input type="checkbox"/> from boat Indicate the number of abs/dcks taken in each habitat type. <input type="checkbox"/> Cobble <u> </u> <input type="checkbox"/> Snags <u> </u> <input type="checkbox"/> Vegetated Banks <u>2</u> <input type="checkbox"/> Sand <u> </u> <input type="checkbox"/> Submerged Macrophytes <u>2</u> <input type="checkbox"/> Other (<u> </u>) <u> </u>
GENERAL COMMENTS	

QUALITATIVE LISTING OF AQUATIC BIOTA

Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare, 2 = Common, 3 = Abundant, 4 = Dominant

Periphyton	0	1	2	3	4	Slimes	0	1	2	3	4
Filamentous Algae	0	1	2	3	4	Macroinvertebrates	0	1	2	3	4
Macrophytes	0	1	2	3	4	Fish	0	1	2	3	4

FIELD OBSERVATIONS OF MACROBENTHOS

Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare (1-3 organisms), 2 = Common (3-9 organisms), 3 = Abundant (>10 organisms), 4 = Dominant (>50 organisms)

Porifera	0	1	2	3	4	Anisoptera	0	1	2	3	4	Chironomidae	0	1	2	3	4
Hydrezoa	0	1	2	3	4	Zygoptera	0	1	2	3	4	Ephemeroptera	0	1	2	3	4
Platyhelminthes	0	1	2	3	4	Hemiptera	0	1	2	3	4	Trichoptera	0	1	2	3	4
Turbellaria	0	1	2	3	4	Coleoptera	0	1	2	3	4	Other	0	1	2	3	4
Hydradinea	0	1	2	3	4	Lepidoptera	0	1	2	3	4						
Oligochaeta	0	1	2	3	4	Storidae	0	1	2	3	4						
Isopoda	0	1	2	3	4	Corydalidae	0	1	2	3	4						
Amphipoda	0	1	2	3	4	Tipulidae	0	1	2	3	4						
Decapoda	0	1	2	3	4	Empididae	0	1	2	3	4						
Gastropoda	0	1	2	3	4	Simuliidae	0	1	2	3	4						
Bivalvia	0	1	2	3	4	Tubificidae	0	1	2	3	4						
						Culicidae	0	1	2	3	4						

Apple Beetle (3)
 water penny (3)
 Stonefly (3)

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

BLO3 site 4

WATERSHED FEATURES	Predominant Surrounding Landuse <input type="checkbox"/> Forest <input type="checkbox"/> Commercial <input type="checkbox"/> Field/Pasture <input type="checkbox"/> Industrial <input type="checkbox"/> Agricultural <input type="checkbox"/> Other _____ <input checked="" type="checkbox"/> Residential		Local Watershed NPS Pollution <input type="checkbox"/> No evidence <input type="checkbox"/> Some potential sources <input type="checkbox"/> Obvious sources Local Watershed Erosion <input type="checkbox"/> None <input type="checkbox"/> Moderate <input type="checkbox"/> Heavy	
RIPARIAN VEGETATION (18 meter buffer)	Indicate the dominant type and record the dominant species present <input checked="" type="checkbox"/> Trees <input checked="" type="checkbox"/> Shrubs <input checked="" type="checkbox"/> Grasses <input type="checkbox"/> Herbaceous dominant species present _____			
INSTREAM FEATURES	Estimated Reach Length _____ m Estimated Stream Width <u>45 Ft</u> m Sampling Reach Area _____ m ² Area in km ² (m ² x 1000) _____ km ² Estimated Stream Depth _____ m <u>1.5 Ft</u> Surface Velocity _____ m/sec (at thalweg)		Canopy Cover <input checked="" type="checkbox"/> Partly open <input type="checkbox"/> Partly shaded <input type="checkbox"/> Shaded High Water Mark _____ m Proportion of Reach Represented by Stream Morphology Types <input type="checkbox"/> Riffle <u>00</u> % <input type="checkbox"/> Run _____ % <input type="checkbox"/> Pool <u>97</u> % Channelized <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Dam Present <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
LARGE WOODY DEBRIS	LWD _____ m ² Density of LWD _____ m ² /km ² (LWD/ reach area)			
AQUATIC VEGETATION	Indicate the dominant type and record the dominant species present <input type="checkbox"/> Rooted emergent <input type="checkbox"/> Rooted submergent <input type="checkbox"/> Rooted floating <input type="checkbox"/> Free floating <input type="checkbox"/> Floating Algae <input type="checkbox"/> Attached Algae dominant species present _____ Portion of the reach with aquatic vegetation <u>00</u> %			
WATER QUALITY	Temperature <u>19.5</u> °C Specific Conductance <u>460</u> Dissolved Oxygen _____ pH <u>8.30</u> Turbidity _____ WQ Instrument Used _____		Water Odors <input type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Fishy <input type="checkbox"/> Other _____ Water Surface Oils <input type="checkbox"/> Slick <input type="checkbox"/> Sheen <input type="checkbox"/> Glass <input type="checkbox"/> Flecks <input type="checkbox"/> None <input type="checkbox"/> Other _____ Turbidity (if not measured) <input type="checkbox"/> Clear <input type="checkbox"/> Slightly turbid <input type="checkbox"/> Turbid <input type="checkbox"/> Opaque <input type="checkbox"/> Stained <input type="checkbox"/> Other _____	
SEDIMENT/SUBSTRATE	Odors <input type="checkbox"/> Normal <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Anaerobic <input type="checkbox"/> None <input type="checkbox"/> Other _____ Oils <input checked="" type="checkbox"/> Absent <input type="checkbox"/> Slight <input type="checkbox"/> Moderate <input type="checkbox"/> Profuse		Deposits <input type="checkbox"/> Sludge <input type="checkbox"/> Sawdust <input type="checkbox"/> Paper fiber <input type="checkbox"/> Sand <input type="checkbox"/> Relict shells <input type="checkbox"/> Other _____ Looking at stones which are not deeply embedded, are the undersides black in color? <input type="checkbox"/> Yes <input type="checkbox"/> No	

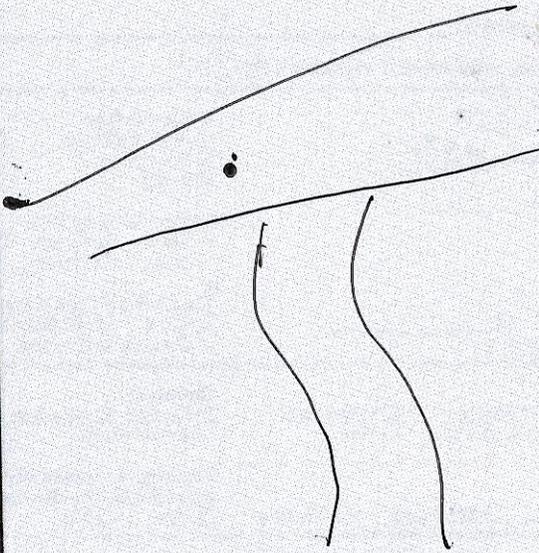
INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	Diameter	% Composition in Sampling Reach	Substrate Type	Characteristic	% Composition in Sampling Area
Bedrock			Detritus	sticks, wood, coarse plant materials (CPOM)	
Boulder	> 256 mm (10")				
Cobble	64-256 mm (2.5"-10")		Muck-Mud	black, very fine organic (FPOM)	
Gravel	2-64 mm (0.1"-2.5")	<u>100%</u>			
Sand	0.06-2mm (gritty)		Marl	grey, shell fragments	
Silt	0.004-0.06 mm				
Clay	< 0.004 mm (slick)				

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

BC Site 4

STREAM NAME <u>Bushman</u>	LOCATION
STATION # <u>RIVERMILE</u>	STREAM CLASS
LAT <u> </u> LONG <u> </u>	RIVER BASIN <u>SPORES</u>
STORET #	AGENCY <u>MWD</u>
INVESTIGATORS <u>TG Jd</u>	
FORM COMPLETED BY <u>Josh Ulfam</u>	DATE <u>5/18/11</u> TIME <u>11:40</u> <input checked="" type="radio"/> AM <input type="radio"/> PM
REASON FOR SURVEY	

WEATHER CONDITIONS	Now <input type="checkbox"/> storm (heavy rain) <input type="checkbox"/> rain (steady rain) <input type="checkbox"/> showers (intermittent) <input type="checkbox"/> %cloud cover <input type="checkbox"/> clear/sunny	Past 24 hours <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> % <input type="checkbox"/>	Has there been a heavy rain in the last 7 days? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Air Temperature <u>90</u> °C Other _____
SITE LOCATION/MAP	Draw a map of the site and indicate the areas sampled (or attach a photograph)		
STREAM CHARACTERIZATION	Stream Subsystem <input type="checkbox"/> Perennial <input type="checkbox"/> Intermittent <input type="checkbox"/> Tidal Stream Origin <input type="checkbox"/> Glacial <input checked="" type="checkbox"/> Spring-fed <input type="checkbox"/> Non-glacial montane <input type="checkbox"/> Mixture of origins <input type="checkbox"/> Swamp and bog <input type="checkbox"/> Other _____		
		Stream Type <input type="checkbox"/> Coldwater <input type="checkbox"/> Warmwater	Catchment Area _____ km ²



BC 03 site 4

BENTHIC MACROINVERTEBRATE FIELD DATA SHEET

STREAM NAME		LOCATION	
STATION #	RIVERMILE	STREAM CLASS	
LAT	LONG	RIVER BASIN <u>stones</u>	
STORET #		AGENCY <u>MAZSO</u>	
INVESTIGATORS <u>TLJ JEL</u>		LOT NUMBER	
FORM COMPLETED BY <u>yash Dpham</u>		DATE TIME <u>5/12/11</u> <u>11:30</u> AM PM	REASON FOR SURVEY <u>RSA</u>

HABITAT TYPES	Indicate the percentage of each habitat type present <input type="checkbox"/> Cobble _____% <input type="checkbox"/> Snags _____% <input type="checkbox"/> Vegetated Banks <u>10</u> % <input type="checkbox"/> Sand _____% <input type="checkbox"/> Submerged Macrophytes _____% <input type="checkbox"/> Other () _____%
	Gear used <input checked="" type="checkbox"/> D-frame <input type="checkbox"/> kick-net <input type="checkbox"/> Other _____ How were the samples collected? <input type="checkbox"/> wading <input type="checkbox"/> from bank <input type="checkbox"/> from boat Indicate the number of subs/dicks taken in each habitat type. <input type="checkbox"/> Cobble _____ <input type="checkbox"/> Snags _____ <input type="checkbox"/> Vegetated Banks _____ <input type="checkbox"/> Sand _____ <input type="checkbox"/> Submerged Macrophytes _____ <input type="checkbox"/> Other () _____
GENERAL COMMENTS	

QUALITATIVE LISTING OF AQUATIC BIOTA

Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare, 2 = Common, 3 = Abundant, 4 = Dominant

Periphyton	0	1	2	3	4	Slimes	0	1	2	3	4
Filamentous Algae	0	1	2	3	4	Macroinvertebrates	0	1	2	3	4
Macrophytes	0	1	2	3	4	Fish	0	1	2	3	4

FIELD OBSERVATIONS OF MACROBENTHOS

Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare (1-3 organisms), 2 = Common (3-9 organisms), 3 = Abundant (>10 organisms), 4 = Dominant (>50 organisms)

Porifera	0	1	2	3	4	Anisoptera	0	1	2	3	4	Chironomidae	0	1	2	3	4
Hydrozoa	0	1	2	3	4	Zygoptera	0	1	2	3	4	Ephemeroptera	0	1	2	3	4
Platyhelminthes	0	1	2	3	4	Hemiptera	0	1	2	3	4	Trichoptera	0	1	2	3	4
Turbellaria	0	1	2	3	4	Collembola	0	1	2	3	4	Other	0	1	2	3	4
Nematoda	0	1	2	3	4	Lepidoptera	0	1	2	3	4						
Oligochaeta	0	1	2	3	4	Stenobothridae	0	1	2	3	4						
Isopoda	0	1	2	3	4	Corydalidae	0	1	2	3	4						
Amphipoda	0	1	2	3	4	Tipulidae	0	1	2	3	4						
Decapoda	0	1	2	3	4	Empididae	0	1	2	3	4						
Gastropoda	0	1	2	3	4	Simuliidae	0	1	2	3	4						
Bivalvia	0	1	2	3	4	Tubificidae	0	1	2	3	4						
						Culexidae	0	1	2	3	4						

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

BC04 site 1

WATERSHED FEATURES	Predominant Surrounding Landuse <input type="checkbox"/> Forest <input type="checkbox"/> Commercial <input type="checkbox"/> Field/Pasture <input type="checkbox"/> Industrial <input checked="" type="checkbox"/> Agricultural <input type="checkbox"/> Other _____ <input checked="" type="checkbox"/> Residential (left)	Local Watershed NPS Pollution <input type="checkbox"/> No evidence <input type="checkbox"/> Some potential sources <input type="checkbox"/> Obvious sources Local Watershed Erosion <input type="checkbox"/> None <input type="checkbox"/> Moderate <input type="checkbox"/> Heavy
RIPARIAN VEGETATION (18 meter buffer)	Indicate the dominant type and record the dominant species present <input checked="" type="checkbox"/> Trees <input checked="" type="checkbox"/> Sarcoc <input checked="" type="checkbox"/> Grasses <input type="checkbox"/> Herbaceous dominant species present <u>INVASIVE</u>	
INSTREAM FEATURES	Estimated Reach Length <u>50 ft</u> <input type="checkbox"/> m Estimated Stream Width <u>20 ft</u> <input type="checkbox"/> m Sampling Reach Area _____ m ² Area in km ² (m ² x1000) _____ km ² Estimated Stream Depth _____ m <u>3-4 inch</u> Surface Velocity _____ m/sec (at thalweg)	
LARGE WOODY DEBRIS	LWD _____ m ² Density of LWD _____ m ² /km ² (LWD/ reach area)	
AQUATIC VEGETATION	Indicate the dominant type and record the dominant species present <input type="checkbox"/> Rooted emergent <input type="checkbox"/> Rooted submergent <input type="checkbox"/> Rooted floating <input type="checkbox"/> Free floating <input type="checkbox"/> Floating Algae <input type="checkbox"/> Attached Algae dominant species present <u>NONE</u> Portion of the reach with aquatic vegetation <u>0</u> %	
WATER QUALITY	Temperature <u>18.2</u> °C Specific Conductance <u>462</u> Dissolved Oxygen _____ pH <u>8.24</u> Turbidity _____ WQ Instrument Used _____	
SEDIMENT/SUBSTRATE	Water Odors <input type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Fishy <input type="checkbox"/> Other _____ Water Surface Oils <input type="checkbox"/> Slick <input type="checkbox"/> Sheen <input type="checkbox"/> Glass <input type="checkbox"/> Flecks <input type="checkbox"/> None <input type="checkbox"/> Other _____ Turbidity (if not measured) <input checked="" type="checkbox"/> Clear <input type="checkbox"/> Slightly turbid <input type="checkbox"/> Turbid <input type="checkbox"/> Opaque <input type="checkbox"/> Stained <input type="checkbox"/> Other _____	
	Deposits <input type="checkbox"/> Sludge <input type="checkbox"/> Sawdust <input type="checkbox"/> Paper fiber <input type="checkbox"/> Sand <input type="checkbox"/> Relict shells <input type="checkbox"/> Other _____ Looking at stones which are not deeply embedded, are the undersides black in color? <input type="checkbox"/> Yes <input type="checkbox"/> No	

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	Diameter	% Composition in Sampling Reach	Substrate Type	Characteristic	% Composition in Sampling Area
Bedrock			Debris	sticks, wood, coarse plant materials (CPOM)	
Boulder	> 256 mm (10")		Muck-Mud	black, very fine organic (FPOM)	
Cobble	64-256 mm (2.5"-10")	<u>100</u>			
Gravel	2-64 mm (0.1"-2.5")	<u>40</u>	Marl	grey, shell fragments	
Sand	0.06-2mm (gr. ty)				
Silt	0.004-0.06 mm				
Clay	< 0.004 mm (silt)				

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

PCO of SITE 1

STREAM NAME <i>Bushman</i>	LOCATION
STATION # <i>2901</i> RIVERMILE	STREAM CLASS
LAT _____ LONG _____	RIVER BASIN
STORET #	AGENCY
INVESTIGATORS <i>Tommy Biddix</i> <i>Josh Upham</i>	
FORM COMPLETED BY	DATE _____ AM _____ PM
	REASON FOR SURVEY

WEATHER CONDITIONS	Now <input type="checkbox"/> storm (heavy rain) <input type="checkbox"/> rain (steady rain) <input type="checkbox"/> showers (intermittent) <input type="checkbox"/> %cloud cover _____ <input type="checkbox"/> clear/sunny	Past 24 hours <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> % _____ <input type="checkbox"/>	Has there been a heavy rain in the last 7 days? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Air Temperature <u>15</u> °C Other _____
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SITE LOCATION/MAP	Draw a map of the site and indicate the areas sampled (or attach a photograph)
	<p style="text-align: center;"><i>OSBORNE</i></p>

STREAM CHARACTERIZATION	Stream Subsystem <input type="checkbox"/> Perennial <input type="checkbox"/> Intermittent <input type="checkbox"/> Tidal	Stream Type <input type="checkbox"/> Coldwater <input type="checkbox"/> Warmwater
	Stream Origin <input type="checkbox"/> Glacial <input checked="" type="checkbox"/> Spring-fed <input type="checkbox"/> Non-glacial montane <input type="checkbox"/> Mixture of origins <input type="checkbox"/> Swamp and bog <input type="checkbox"/> Other _____	Catchment Area _____ km ²

BC04 site 1

BENTHIC MACROINVERTEBRATE FIELD DATA SHEET

STREAM NAME <u>Bushman</u>	LOCATION
STATION # <u>04-1</u> RIVERMILE	STREAM CLASS
LAT _____ LONG _____	RIVER BASIN <u>States</u>
STORET #	AGENCY <u>MWD</u>
INVESTIGATORS <u>CS & JD</u>	LOT NUMBER
FORM COMPLETED BY <u>Josh Opham</u>	DATE <u>5/20</u> TIME <u>11:00</u> <input checked="" type="radio"/> AM <input type="radio"/> PM
	REASON FOR SURVEY <u>VSA</u>

HABITAT TYPES	Indicate the percentage of each habitat type present <input type="checkbox"/> Cobble _____ % <input type="checkbox"/> Snags _____ % <input type="checkbox"/> Vegetated Banks _____ % <input type="checkbox"/> Sand _____ % <input type="checkbox"/> Submerged Macrophytes <u>12</u> % <input type="checkbox"/> Other (_____) _____ %
SAMPLE COLLECTION	Gear used <input checked="" type="checkbox"/> D-frame <input type="checkbox"/> kick-net <input type="checkbox"/> Other _____ How were the samples collected? <input checked="" type="checkbox"/> wading <input type="checkbox"/> from bank <input type="checkbox"/> from boat Indicate the number of /abs/kicks taken in each habitat type. <input type="checkbox"/> Cobble _____ <input type="checkbox"/> Snags _____ <input type="checkbox"/> Vegetated Banks _____ <input type="checkbox"/> Sand _____ <input type="checkbox"/> Submerged Macrophytes _____ <input type="checkbox"/> Other (_____) _____
GENERAL COMMENTS	

QUALITATIVE LISTING OF AQUATIC BIOTA

Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare, 2 = Common, 3 = Abundant, 4 = Dominant

Periphyton	0	1	2	3	4	Slimes	0	1	2	3	4
Filamentous Algae	0	1	2	3	4	Macroinvertebrates	0	1	2	3	4
Macrophytes	0	1	2	3	4	Fish	0	1	2	3	4

FIELD OBSERVATIONS OF MACROBENTHOS

Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare (1-3 organisms), 2 = Common (3-9 organisms), 3 = Abundant (>10 organisms), 4 = Dominant (>50 organisms)

sediment

Porifera	0	1	2	3	4	Anisoptera	0	1	2	3	4	Chironomidae	0	1	2	3	4
Hydrezoa	0	1	2	3	4	Zygoptera	0	1	2	3	4	Ephemeroptera	0	1	2	3	4
Platyhelminthes	0	1	2	3	4	Hemiptera	0	1	2	3	4	Trichoptera	0	1	2	3	4
Turbellaria	0	1	2	3	4	Coleoptera	0	1	2	3	4	Other	0	1	2	3	4
Hydradrea	0	1	2	3	4	Lepidoptera	0	1	2	3	4						
Oligochaeta	0	1	2	3	4	Sialidae	0	1	2	3	4						
Isopoda	0	1	2	3	4	Corydalidae	0	1	2	3	4						
Amphipoda	0	1	2	3	4	Tipulidae	0	1	2	3	4						
Decapoda	0	1	2	3	4	Empididae	0	1	2	3	4						
Gastropoda	0	1	2	3	4	Simuliidae	0	1	2	3	4						
Bivalvia	0	1	2	3	4	Tubificidae	0	1	2	3	4						
						Culicidae	0	1	2	3	4						

bandled
 sculpin = common
 crawfish = common
 stonefly =)

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

BCO⁴ site 2

WATERSHED FEATURES	Predominant Surrounding Landuse <input checked="" type="checkbox"/> Forest <input type="checkbox"/> Field/Pasture <input type="checkbox"/> Agricultural <input checked="" type="checkbox"/> Residential <input type="checkbox"/> Commercial <input type="checkbox"/> Industrial <input type="checkbox"/> Other _____	Local Watershed NPS Pollution <input type="checkbox"/> No evidence <input type="checkbox"/> Some potential sources <input type="checkbox"/> Obvious sources Local Watershed Erosion <input type="checkbox"/> None <input type="checkbox"/> Moderate <input type="checkbox"/> Heavy
RIPARIAN VEGETATION (18 meter buffer)	Indicate the dominant type and record the dominant species present <input checked="" type="checkbox"/> Trees <input checked="" type="checkbox"/> Shrubs <input checked="" type="checkbox"/> Grasses <input type="checkbox"/> Herbaceous dominant species present <u>Invasive</u>	
INSTREAM FEATURES	Estimated Reach Length <u>40 m</u> Estimated Stream Width <u>20 m</u> Sampling Reach Area _____ m ² Area in km ² (m ² x 1000) _____ km ² Estimated Stream Depth <u>3m = 3 ft</u> Surface Velocity _____ m/sec	Canopy Cover <input type="checkbox"/> Partly open <input checked="" type="checkbox"/> Partly shaded <input type="checkbox"/> Shaded High Water Mark _____ m Proportion of Reach Represented by Stream Morphology Types <input type="checkbox"/> Rills _____ % <input type="checkbox"/> Run _____ % <input type="checkbox"/> Pool <u>20</u> % Channelized <input type="checkbox"/> Yes <input type="checkbox"/> No Dam Present <input type="checkbox"/> Yes <input type="checkbox"/> No
LARGE WOODY DEBRIS	LWD _____ m ³ Density of LWD _____ m ³ /km ² (LWD/ reach area)	
AQUATIC VEGETATION	Indicate the dominant type and record the dominant species present <input checked="" type="checkbox"/> Rooted emergent <input checked="" type="checkbox"/> Rooted submergent <input type="checkbox"/> Rooted floating <input type="checkbox"/> Free floating <input checked="" type="checkbox"/> Floating Algae <input type="checkbox"/> Attached Algae dominant species present _____ Portion of the reach with aquatic vegetation _____ %	
WATER QUALITY	Temperature <u>16.0</u> °C Specific Conductance <u>4108</u> Dissolved Oxygen _____ pH <u>6.20</u> Turbidity _____ WQ Instrument Used _____	Water Odors <input type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Fishy <input type="checkbox"/> Other _____ Water Surface Oils <input type="checkbox"/> Slick <input type="checkbox"/> Sheen <input type="checkbox"/> Gloss <input type="checkbox"/> Flecks <input type="checkbox"/> None <input type="checkbox"/> Other _____ Turbidity (if not measured) <input type="checkbox"/> Clear <input type="checkbox"/> Slightly turbid <input type="checkbox"/> Turbid <input type="checkbox"/> Opaque <input type="checkbox"/> Stained <input type="checkbox"/> Other _____
SEDIMENT/SUBSTRATE	Odors <input type="checkbox"/> Normal <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Anaerobic <input type="checkbox"/> None <input type="checkbox"/> Other _____ Oils <input type="checkbox"/> Absent <input type="checkbox"/> Slight <input type="checkbox"/> Moderate <input type="checkbox"/> Profuse	Deposits <input type="checkbox"/> Sludge <input type="checkbox"/> Sawdust <input type="checkbox"/> Paper fiber <input type="checkbox"/> Sand <input type="checkbox"/> Relict shells <input type="checkbox"/> Other _____ Looking at stones which are not deeply embedded, are the undersides black in color? <input type="checkbox"/> Yes <input type="checkbox"/> No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	Diameter	% Composition in Sampling Reach	Substrate Type	Characteristic	% Composition in Sampling Area
Bedrock		60	Detritus	sticks, wood, coarse plant materials (CPOM)	
Boulder	> 256 mm (10")		Muck-Mud	black, very fine organic (FPOM)	
Cobble	64-256 mm (2.5"-10")	20			
Gravel	2-64 mm (0.1"-2.5")	20			
Sand	0.06-2mm (gr. ty)		Marl	grey, shell fragments	
Silt	0.004-0.06 mm				
Clay	< 0.004 mm (silt)				

**PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET
(FRONT)**

BC04 site 2

STREAM NAME <u>Bushman</u>	LOCATION
STATION # <u>RIVERMILE</u>	STREAM CLASS
LAT <u>LONG</u>	RIVER BASIN <u>Stones</u>
STORET #	AGENCY <u>MWS</u>
INVESTIGATORS <u>JB Jcl</u>	
FORM COMPLETED BY <u>Josh Ophan</u>	DATE TIME <u>12</u> AM <input checked="" type="radio"/> PM
	REASON FOR SURVEY <u>VSA</u>

WEATHER CONDITIONS	<input type="checkbox"/> storm (heavy rain) <input type="checkbox"/> rain (steady rain) <input type="checkbox"/> showers (intermittent) <input type="checkbox"/> %cloud cover <input type="checkbox"/> clear/sunny	Past 24 hours <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> % <input type="checkbox"/>	Has there been a heavy rain in the last 7 days? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Air Temperature <u>85</u> °C Other _____
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SITE LOCATION/MAP	Draw a map of the site and indicate the areas sampled (or attach a photograph)
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STREAM CHARACTERIZATION	Stream Subsystem <input type="checkbox"/> Perennial <input type="checkbox"/> Intermittent <input type="checkbox"/> Tidal	Stream Type <input type="checkbox"/> Coldwater <input type="checkbox"/> Warmwater
	Stream Origin <input type="checkbox"/> Glacial <input checked="" type="checkbox"/> Spring-fed <input type="checkbox"/> Non-glacial montane <input checked="" type="checkbox"/> Mixture of origins <input type="checkbox"/> Swamp and bog <input type="checkbox"/> Other _____	Catchment Area _____ km ²

BC04 Site 2

BENTHIC MACROINVERTEBRATE FIELD DATA SHEET

STREAM NAME <u>Bushman</u>	LOCATION	
STATION # <u>RIVERMILE</u>	STREAM CLASS	
LAT _____ LONG _____	RIVER BASIN <u>stones</u>	
STORET # _____	AGENCY <u>MWDSD</u>	
INVESTIGATORS <u>JV + JB</u>	LOT NUMBER	
FORM COMPLETED BY <u>Josh vPham</u>	DATE <u>12/05/20</u> TIME <u>1:00</u> AM PM	REASON FOR SURVEY <u>VSA</u>

HABITAT TYPES	Indicate the percentage of each habitat type present <input type="checkbox"/> Cobble _____% <input type="checkbox"/> Snags _____% <input type="checkbox"/> Vegetated Banks <u>100</u> % <input type="checkbox"/> Sand _____% <input type="checkbox"/> Submerged Macrophytes _____% <input type="checkbox"/> Other (_____) _____%
SAMPLE COLLECTION	Gear used <input checked="" type="checkbox"/> D-frame <input type="checkbox"/> kick-net <input type="checkbox"/> Other _____ How were the samples collected? <input checked="" type="checkbox"/> wading <input type="checkbox"/> from bank <input type="checkbox"/> from boat Indicate the number of /abs/kicks taken in each habitat type. <input type="checkbox"/> Cobble _____ <input type="checkbox"/> Snags _____ <input type="checkbox"/> Vegetated Banks _____ <input type="checkbox"/> Sand _____ <input type="checkbox"/> Submerged Macrophytes _____ <input type="checkbox"/> Other (_____) _____
GENERAL COMMENTS	

QUALITATIVE LISTING OF AQUATIC BIOTA

Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare, 2 = Common, 3 = Abundant, 4 = Dominant

Periphyton	0	1	2	3	4	Slimes	0	1	2	3	4
Filamentous Algae	0	1	2	3	4	Macroinvertebrates	0	1	2	3	4
Macrofitves	0	1	2	3	4	Fish	0	1	2	3	4

FIELD OBSERVATIONS OF MACROBENTHOS

Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare (1-3 organisms), 2 = Common (3-9 organisms), 3 = Abundant (>10 organisms), 4 = Dominant (>50 organisms)

Porifera	0	1	2	3	4	Anisoptera	0	1	2	3	4	Chironomidae	0	1	2	3	4
Hydrezoa	0	1	2	3	4	Zygoptera	0	1	2	3	4	Ephemeroptera	0	1	2	3	4
Platyhelminthes	0	1	2	3	4	Hemiptera	0	1	2	3	4	Trichoptera	0	1	2	3	4
Turbellaria	0	1	2	3	4	Coleoptera	0	1	2	3	4	Other	0	1	2	3	4
Hydradinea	0	1	2	3	4	Lepidoptera	0	1	2	3	4	Crawfish (4) water pennies riffle Beetles					
Oligochaeta	0	1	2	3	4	Sialidae	0	1	2	3	4						
Isopoda	0	1	2	3	4	Corydalidae	0	1	2	3	4						
Amphipoda	0	1	2	3	4	Tipulidae	0	1	2	3	4						
Decapoda	0	1	2	3	4	Empididae	0	1	2	3	4						
Gastropoda	0	1	2	3	4	Simuliidae	0	1	2	3	4						
Bivalvia	0	1	2	3	4	Tubificidae	0	1	2	3	4						
						Culicidae	0	1	2	3	4						

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

BB 0501

WATERSHED FEATURES	Predominant Surrounding Landuse <input type="checkbox"/> Forest <input checked="" type="checkbox"/> Commercial <input type="checkbox"/> Field/Pasture <input type="checkbox"/> Industrial <input type="checkbox"/> Agricultural <input type="checkbox"/> Other _____ <input checked="" type="checkbox"/> Residential		Local Watershed NPS Pollution <input type="checkbox"/> No evidence <input type="checkbox"/> Some potential sources <input type="checkbox"/> Obvious sources Local Watershed Erosion <input type="checkbox"/> None <input checked="" type="checkbox"/> Moderate <input type="checkbox"/> Heavy
RIPARIAN VEGETATION (18 meter buffer)	Indicate the dominant type and record the dominant species present <input type="checkbox"/> Trees <input type="checkbox"/> Shrubs <input type="checkbox"/> Grasses <input type="checkbox"/> Herbaceous dominant species present _____		
INSTREAM FEATURES	Estimated Reach Length <u>30</u> m Estimated Stream Width <u>10</u> m Sampling Reach Area _____ m ² Area in km ² (m ² x 1000) _____ km ² Estimated Stream Depth _____ m Surface Velocity _____ m/sec (at thalweg)	Canopy Cover <input checked="" type="checkbox"/> Partly open <input type="checkbox"/> Partly shaded <input type="checkbox"/> Shaded High Water Mark _____ m Proportion of Reach Represented by Stream Morphology Types <input type="checkbox"/> Riffle <u>100</u> % <input type="checkbox"/> Run <u>00</u> % <input type="checkbox"/> Pool <u>00</u> % Channelized <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Dam Present <input type="checkbox"/> Yes <input type="checkbox"/> No	
LARGE WOODY DEBRIS	LWD _____ m ³ Density of LWD _____ m ³ /km ² (LWD/ reach area)		
AQUATIC VEGETATION	Indicate the dominant type and record the dominant species present <input checked="" type="checkbox"/> Rooted emergent <input checked="" type="checkbox"/> Rooted submergent <input checked="" type="checkbox"/> Rooted floating <input type="checkbox"/> Free floating <input type="checkbox"/> Floating Algae <input type="checkbox"/> Attached Algae dominant species present _____ Portion of the reach with aquatic vegetation <u>60</u> %		
WATER QUALITY	Temperature <u>16.9</u> °C Specific Conductance <u>472</u> Dissolved Oxygen _____ pH <u>7.49</u> Turbidity <u>High</u> WQ Instrument Used _____	Water Odors <input checked="" type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Fishy <input type="checkbox"/> Other _____ Water Surface Oils <input type="checkbox"/> Slick <input type="checkbox"/> Sheen <input type="checkbox"/> Glines <input type="checkbox"/> Flecks <input type="checkbox"/> None <input type="checkbox"/> Other _____ Turbidity (if not measured) <input type="checkbox"/> Clear <input type="checkbox"/> Slightly turbid <input type="checkbox"/> Turbid <input type="checkbox"/> Opaque <input type="checkbox"/> Stained <input type="checkbox"/> Other _____	
SEDIMENT/SUBSTRATE	Odors <input type="checkbox"/> Normal <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Anaerobic <input type="checkbox"/> None <input type="checkbox"/> Other _____ Oils <input checked="" type="checkbox"/> Absent <input type="checkbox"/> Slight <input type="checkbox"/> Moderate <input type="checkbox"/> Profuse	Deposits <input type="checkbox"/> Sludge <input type="checkbox"/> Sawdust <input type="checkbox"/> Paper fiber <input type="checkbox"/> Sand <input type="checkbox"/> Relic shells <input type="checkbox"/> Other _____ Looking at stones which are not deeply embedded, are the undersides black in color? <input type="checkbox"/> Yes <input type="checkbox"/> No	

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	Diameter	% Composition in Sampling Reach	Substrate Type	Characteristic	% Composition in Sampling Area
Bedrock		80	Lertus	sticks, wood, coarse plant materials (CPOM)	
Boulder	> 256 mm (10")				
Cobble	64-256 mm (2.5"-10")	10	Muck-Mud	black, very fine organic (FPOM)	
Gravel	2-64 mm (0.1"-2.5")				
Sand	0.06-2mm (gr. ty)				
Silt	0.004-0.06 mm				
Clay	< 0.004 mm (silt)		Marl	grey, shell fragments	

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET

BB0501 (FRONT)

STREAM NAME <u>Bear Branch</u>	LOCATION	
STATION # <u>1</u> RIVERMILE	STREAM CLASS	
LAT _____ LONG _____	RIVER BASIN <u>Stones</u>	
STORET # _____	AGENCY <u>MAISO</u>	
INVESTIGATORS <u>Bruce Boss</u>	DATE <u>4/20/11</u>	REASON FOR SURVEY
FORM COMPLETED BY <u>Josh Ophan</u>	TIME <u>12:30</u> AM <input checked="" type="radio"/> PM	<u>VSA</u>

WEATHER CONDITIONS	Now <input type="checkbox"/> storm (heavy rain) <input type="checkbox"/> rain (steady rain) <input type="checkbox"/> showers (intermittent) <input type="checkbox"/> %cloud cover _____ <input type="checkbox"/> clear/sunny	Past 24 hours <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> % _____ <input type="checkbox"/>	Has there been a heavy rain in the last 7 days? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Air Temperature <u>10</u> °C Other _____
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SITE LOCATION/MAP	Draw a map of the site and indicate the areas sampled (or attach a photograph) <div style="text-align: center; margin-top: 20px;"> </div>
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STREAM CHARACTERIZATION	Stream Subsystem <input type="checkbox"/> Perennial <input checked="" type="checkbox"/> Intermittent <input type="checkbox"/> Tidal Stream Origin <input type="checkbox"/> Glacial <input checked="" type="checkbox"/> Spring-fed <input type="checkbox"/> Non-glacial montane <input type="checkbox"/> Mixture of origins <input checked="" type="checkbox"/> Swamp and bog <input type="checkbox"/> Other _____	Stream Type <input checked="" type="checkbox"/> Coldwater <input type="checkbox"/> Warmwater Catchment Area _____ km ²
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B0501

BENTHIC MACROINVERTEBRATE FIELD DATA SHEET

STREAM NAME <u>Bear Branch</u>		LOCATION
STATION# <u>1</u>	RIVERMILE	STREAM CLASS
LAT _____	LONG _____	RIVER BASIN
STORET #		ATTN
INVESTIGATORS		LOT NUMBER
FORM COMPLETED BY		DATE _____ AM PM
		REASON FOR SURVEY

HABITAT TYPES	Indicate the percentage of each habitat type present <input type="checkbox"/> Cobble _____% <input type="checkbox"/> Snags _____% <input type="checkbox"/> Vegetated Banks _____% <input type="checkbox"/> Sand _____% <input type="checkbox"/> Submerged Macrophytes _____% <input type="checkbox"/> Other (_____) _____%
SAMPLE COLLECTION	Gear used <input type="checkbox"/> D-frame <input type="checkbox"/> kick-net <input type="checkbox"/> Other _____ How were the samples collected? <input type="checkbox"/> wading <input type="checkbox"/> from bank <input type="checkbox"/> from boat Indicate the number of /abs/dicks taken in each habitat type. <input type="checkbox"/> Cobble _____ <input type="checkbox"/> Snags _____ <input type="checkbox"/> Vegetated Banks _____ <input type="checkbox"/> Sand _____ <input type="checkbox"/> Submerged Macrophytes _____ <input type="checkbox"/> Other (_____) _____
GENERAL COMMENTS	

QUALITATIVE LISTING OF AQUATIC BIOTA

Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare, 2 = Common, 3 = Abundant, 4 = Dominant

Periphyton	0	1	2	3	4	Slimes	0	1	2	3	4
Filamentous Algae	0	1	2	3	4	Macroinvertebrates	0	1	2	3	4
Macrophytes	0	1	2	3	4	Fish	0	1	2	3	4

FIELD OBSERVATIONS OF MACROBENTHOS

Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare (1-3 organisms), 2 = Common (3-9 organisms), 3 = Abundant (>10 organisms), 4 = Dominant (>50 organisms)

Porifera	0	1	2	3	4	Anisoptera	0	1	2	3	4	Chironomidae	0	1	2	3	4
Hydrozoa	0	1	2	3	4	Zygoptera	0	1	2	3	4	Ephemeroptera	0	1	2	3	4
Platyhelminthes	0	1	2	3	4	Hemiptera	0	1	2	3	4	Trichoptera	0	1	2	3	4
Turbellaria	0	1	2	3	4	Coleoptera	0	1	2	3	4	Other	0	1	2	3	4
Nematoda	0	1	2	3	4	Lepidoptera	0	1	2	3	4						
Oligochaeta	0	1	2	3	4	Stenobothridae	0	1	2	3	4						
Isopoda	0	1	2	3	4	Corydalidae	0	1	2	3	4						
Amphipoda	0	1	2	3	4	Tipulidae	0	1	2	3	4						
Decapoda	0	1	2	3	4	Empididae	0	1	2	3	4						
Gastropoda	0	1	2	3	4	Simuliidae	0	1	2	3	4						
Bivalvia	0	1	2	3	4	Tabanidae	0	1	2	3	4						
						Culicidae	0	1	2	3	4						

Midge Fly
Dominant
50+

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

B30507

WATERSHED FEATURES	Predominant Surrounding Landuse <input type="checkbox"/> Forest <input type="checkbox"/> Commercial <input type="checkbox"/> Field/Pasture <input type="checkbox"/> Industrial <input type="checkbox"/> Agricultural <input type="checkbox"/> Other _____ <input type="checkbox"/> Residential	Local Watershed NPS Pollution <input type="checkbox"/> No evidence <input type="checkbox"/> Some potential sources <input type="checkbox"/> Obvious sources Local Watershed Erosion <input type="checkbox"/> None <input type="checkbox"/> Moderate <input type="checkbox"/> Heavy
RIPARIAN VEGETATION (18 meter buffer)	Indicate the dominant type and record the dominant species present <input type="checkbox"/> Trees <input type="checkbox"/> Shrubs <input type="checkbox"/> Grasses <input type="checkbox"/> Herbaceous dominant species present _____	
INSTREAM FEATURES	Estimated Reach Length <u>10</u> m Estimated Stream Width <u>5</u> m Sampling Reach Area _____ m ² Area in km ² (m ² x1000) _____ km ² Estimated Stream Depth <u>5</u> inches Surface Velocity _____ m/sec (at thalweg)	Canopy Cover <input type="checkbox"/> Partly open <input type="checkbox"/> Partly shaded <input checked="" type="checkbox"/> Shaded High Water Mark _____ m Proportion of Reach Represented by Stream Morphology Types <input type="checkbox"/> Rills <u>00</u> % <input type="checkbox"/> Run <u>00</u> % <input type="checkbox"/> Pool <u>00</u> % Channelized <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Dam Present <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
LARGE WOODY DEBRIS	LWD _____ m ² Density of LWD _____ m ² /km ² (LWD/ reach area)	
AQUATIC VEGETATION	Indicate the dominant type and record the dominant species present <input type="checkbox"/> Rooted emergent <input type="checkbox"/> Rooted submergent <input type="checkbox"/> Rooted floating <input type="checkbox"/> Free floating <input type="checkbox"/> Floating Algae <input type="checkbox"/> Attached Algae dominant species present <u>Macrophytes</u> Portion of the reach with aquatic vegetation <u>00</u> %	
WATER QUALITY	Temperature <u>10.6</u> °C Specific Conductance <u>515</u> Dissolved Oxygen _____ pH <u>7.51</u> Turbidity _____ WQ Instrument Used _____	Water Odors <input type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Fishy <input type="checkbox"/> Other _____ Water Surface Oils <input type="checkbox"/> Slick <input type="checkbox"/> Sheen <input type="checkbox"/> Glass <input type="checkbox"/> Flecks <input type="checkbox"/> None <input type="checkbox"/> Other _____ Turbidity (if not measured) <input checked="" type="checkbox"/> Clear <input type="checkbox"/> Slightly turbid <input type="checkbox"/> Turbid <input type="checkbox"/> Opaque <input type="checkbox"/> Stained <input type="checkbox"/> Other _____
SEDIMENT/SUBSTRATE	Odors <input type="checkbox"/> Normal <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Anaerobic <input type="checkbox"/> None <input type="checkbox"/> Other _____ Deposits <input type="checkbox"/> Sludge <input type="checkbox"/> Sawdust <input type="checkbox"/> Paper fibers <input type="checkbox"/> Sand <input type="checkbox"/> Relief shells <input type="checkbox"/> Other _____ Oils <input type="checkbox"/> Absent <input type="checkbox"/> Slight <input type="checkbox"/> Moderate <input type="checkbox"/> Profuse Looking at stones which are not deeply embedded, are the undersides black in color? <input type="checkbox"/> Yes <input type="checkbox"/> No	

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	Diameter	% Composition in Sampling Reach	Substrate Type	Characteristic	% Composition in Sampling Area
Heartrock		<u>100</u>	Detritus	sticks, wood, coarse plant materials (CPOM)	
Boulder	> 256 mm (10")		Muck-Mud	black, very fine organic (FPOM)	
Cobble	64-256 mm (2.5"-10")				
Gravel	2-64 mm (0.1"-2.5")	<u>40</u>	Marl	grey, shell fragments	
Sand	0.06-2mm (gr. ty)				
Silt	0.004-0.06 mm				
Clay	< 0.004 mm (silt)				

B B 0507

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET
(FRONT)

STREAM NAME <u>Wras</u>	LOCATION
STATION # <u>2</u> RIVERMILE	STREAM CLASS
LAT _____ LONG _____	RIVER BASIN <u>Stamps</u>
STORET #	AGENCY <u>MWSU</u>
INVESTIGATORS <u>BK JU</u>	
FORM COMPLETED BY <u>Upham</u>	DATE <u>2/20/11</u> TIME <u>5:00</u> AM <input type="checkbox"/> PM <input checked="" type="checkbox"/>
	REASON FOR SURVEY

WEATHER CONDITIONS	Now	Past 24 hours	Has there been a heavy rain in the last 7 days? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
	<input checked="" type="checkbox"/> storm (heavy rain) <input type="checkbox"/> rain (steady rain) <input type="checkbox"/> showers (intermittent) <input type="checkbox"/> %cloud cover _____ <input type="checkbox"/> clear/sunny	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> %	Air Temperature _____ °C Other _____

SITE LOCATION/MAP

Draw a map of the site and indicate the areas sampled (or attach a photograph)

The map shows a stream flowing from the top right towards the bottom left. A sampling site is marked with an asterisk and labeled 'Site'. A spring is labeled 'Spring' at the top right. A building is labeled 'Apts' at the bottom left. A north arrow is labeled 'Northfield' at the bottom right.

STREAM CHARACTERIZATION	Stream Subsystem <input type="checkbox"/> Perennial <input checked="" type="checkbox"/> Intermittent <input type="checkbox"/> Tidal	Stream Type <input type="checkbox"/> Coldwater <input checked="" type="checkbox"/> Warmwater
	Stream Origin <input type="checkbox"/> Glacial <input checked="" type="checkbox"/> Spring-fed <input type="checkbox"/> Non-glacial montane <input checked="" type="checkbox"/> Mixture of origins <input type="checkbox"/> Swamp and bog <input type="checkbox"/> Other _____	Catchment Area _____ km ²

BB0502

BENTHIC MACROINVERTEBRATE FIELD DATA SHEET

STREAM NAME <u>Bear</u>		LOCATION	
STATION # <u>2</u> RIVERMILE		STREAM CLASS	
LAT _____ LONG _____		RIVER BASIN	
STORET #		AGENCY	
INVESTIGATORS		LOT NUMBER	
FORM COMPLETED BY		DATE _____ AM PM	REASON FOR SURVEY

HABITAT TYPES	Indicate the percentage of each habitat type present <input type="checkbox"/> Cobble _____% <input type="checkbox"/> Snags _____% <input type="checkbox"/> Vegetated Banks _____% <input type="checkbox"/> Sand _____% <input type="checkbox"/> Submerged Macrophytes _____% <input type="checkbox"/> Other (_____) _____%
SAMPLE COLLECTION	Gear used <input type="checkbox"/> D-frame <input type="checkbox"/> kick-net <input type="checkbox"/> Other _____ How were the samples collected? <input type="checkbox"/> wading <input type="checkbox"/> from bank <input type="checkbox"/> from boat Indicate the number of /abs/dicks taken in each habitat type. <input type="checkbox"/> Cobble _____ <input type="checkbox"/> Snags _____ <input type="checkbox"/> Vegetated Banks _____ <input type="checkbox"/> Sand _____ <input type="checkbox"/> Submerged Macrophytes _____ <input type="checkbox"/> Other (_____) _____
GENERAL COMMENTS	

QUALITATIVE LISTING OF AQUATIC BIOTA

Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare, 2 = Common, 3 = Abundant, 4 = Dominant

Periphyton	0	1	2	3	4	Slimes	0	1	2	3	4
Filamentous Algae	0	1	2	3	4	Macroinvertebrates	0	1	2	3	4
Macrophytes	0	1	2	3	4	Fish	0	1	2	3	4

FIELD OBSERVATIONS OF MACROBENTHOS

Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare (1-3 organisms), 2 = Common (3-9 organisms), 3 = Abundant (>10 organisms), 4 = Dominant (>50 organisms)

Ponifera	0	1	2	3	4	Anisoptera	0	1	2	3	4	Chironomidae	0	1	2	3	4
Hydrozoa	0	1	2	3	4	Zygoptera	0	1	2	3	4	Ephemeroptera	0	1	2	3	4
Platyhelminths	0	1	2	3	4	Hemiptera	0	1	2	3	4	Trichoptera	0	1	2	3	4
Turbellaria	0	1	2	3	4	Coleoptera	0	1	2	3	4	Other	0	1	2	3	4
Hydrulella	0	1	2	3	4	Lepidoptera	0	1	2	3	4	EPT = 0					
Oligochaeta	0	1	2	3	4	Stratiotidae	0	1	2	3	4						
Isopoda	0	1	2	3	4	Corydalidae	0	1	2	3	4						
Amphipoda	0	1	2	3	4	Tipulidae	0	1	2	3	4						
Decapoda	0	1	2	3	4	Empididae	0	1	2	3	4						
Gastropoda	0	1	2	3	4	Simuliidae	0	1	2	3	4						
Bivalvia	0	1	2	3	4	Tubificidae	0	1	2	3	4						
						Culicidae	0	1	2	3	4						

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

BOS 03

WATERSHED FEATURES	Predominant Surrounding Landuse <input type="checkbox"/> Forest <input type="checkbox"/> Commercial <input type="checkbox"/> Field/Pasture <input type="checkbox"/> Industrial <input type="checkbox"/> Agricultural <input type="checkbox"/> Other _____ <input checked="" type="checkbox"/> Residential		Local Watershed NPS Pollution <input type="checkbox"/> No evidence <input type="checkbox"/> Some potential sources <input type="checkbox"/> Obvious sources Local Watershed Erosion <input type="checkbox"/> None <input type="checkbox"/> Moderate <input type="checkbox"/> Heavy
RIPARIAN VEGETATION (18 meter buffer)	Indicate the dominant type and record the dominant species present <input type="checkbox"/> Trees <input type="checkbox"/> Shrubs <input type="checkbox"/> Grasses <input type="checkbox"/> Herbaceous dominant species present _____		
INSTREAM FEATURES	Estimated Reach Length _____ m Estimated Stream Width _____ m Sampling Reach Area _____ m ² Area in km ² (m ² x 1000) _____ km ² Estimated Stream Depth _____ m Surface Velocity (at thalweg) _____ m/sec	Canopy Cover <input type="checkbox"/> Partly open <input type="checkbox"/> Partly shaded <input type="checkbox"/> Shaded High Water Mark _____ m Proportion of Reach Represented by Stream Morphology Types <input type="checkbox"/> Riffle _____ % <input type="checkbox"/> Run _____ % <input type="checkbox"/> Pool _____ % Channelized <input type="checkbox"/> Yes <input type="checkbox"/> No Dam Present <input type="checkbox"/> Yes <input type="checkbox"/> No	
LARGE WOODY DEBRIS	LWD _____ m ² Density of LWD _____ m ² /km ² (LWD/ reach area)		
AQUATIC VEGETATION	Indicate the dominant type and record the dominant species present <input checked="" type="checkbox"/> Rooted emergent <input type="checkbox"/> Rooted submergent <input checked="" type="checkbox"/> Rooted floating <input type="checkbox"/> Free floating <input type="checkbox"/> Floating Algae <input type="checkbox"/> Attached Algae dominant species present <u>Rooted</u> Portion of the reach with aquatic vegetation _____ %		
WATER QUALITY	Temperature <u>16.7</u> °C Specific Conductance <u>500</u> Dissolved Oxygen _____ pH <u>7.07</u> Turbidity _____ WQ Instrument Used _____	Water Odors <input checked="" type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Fishy <input type="checkbox"/> Other _____ Water Surface Oils <input type="checkbox"/> Slick <input type="checkbox"/> Sheen <input type="checkbox"/> Glass <input type="checkbox"/> Flecks <input type="checkbox"/> None <input type="checkbox"/> Other _____ Turbidity (if not measured) <input type="checkbox"/> Clear <input type="checkbox"/> Slightly turbid <input type="checkbox"/> Turbid <input type="checkbox"/> Opaque <input type="checkbox"/> Stained <input type="checkbox"/> Other _____	
SEDIMENT/SUBSTRATE	Odors <input type="checkbox"/> Normal <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Anaerobic <input type="checkbox"/> None <input type="checkbox"/> Other _____ Oils <input type="checkbox"/> Absent <input type="checkbox"/> Slight <input type="checkbox"/> Moderate <input type="checkbox"/> Profuse	Deposits <input type="checkbox"/> Sludge <input type="checkbox"/> Sawdust <input type="checkbox"/> Paper fiber <input type="checkbox"/> Sand <input type="checkbox"/> Relict shells <input type="checkbox"/> Other _____ Looking at stones which are not deeply embedded, are the undersides black in color? <input type="checkbox"/> Yes <input type="checkbox"/> No	

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	Diameter	% Composition in Sampling Reach	Substrate Type	Characteristic	% Composition in Sampling Area
Bedrock		50	Detritus	sticks, wood, coarse plant materials (CPOM)	
Boulder	> 256 mm (10")		Muck-Mud	black, very fine organic (FPOM)	
Cobble	64-256 mm (2.5"-10")		Marl	grey, shell fragments	
Gravel	2-64 mm (0.1"-2.5")	50			
Sand	0.06-2mm (gr.ty)				
Silt	0.004-0.06 mm				
Clay	< 0.004 mm (slick)				

**PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET
(FRONT)**

B60503

STREAM NAME <u>Bear</u>	LOCATION
STATION # <u>3</u> RIVERMILE	STREAM CLASS
LAT _____ LONG _____	RIVER BASIN <u>Stones</u>
STORET #	AGENCY
INVESTIGATORS <u>RR JU</u>	
FORM COMPLETED BY <u>JU</u>	DATE <u>4/20/11</u> TIME <u>10:51</u> AM <input checked="" type="radio"/> PM
	REASON FOR SURVEY <u>USA</u>

WEATHER CONDITIONS	Now <input type="checkbox"/> storm (heavy rain) <input type="checkbox"/> rain (steady rain) <input checked="" type="checkbox"/> showers (intermittent) <input type="checkbox"/> %cloud cover <input type="checkbox"/> clear/sunny	Past 24 hours <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> % <input type="checkbox"/>	Has there been a heavy rain in the last 7 days? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Air Temperature <u>10</u> °C Other _____
	<u>100</u> %		

SITE LOCATION/MAP	Draw a map of the site and indicate the areas sampled (or attach a photograph)

STREAM CHARACTERIZATION	Stream Subsystem <input checked="" type="checkbox"/> Perennial <input type="checkbox"/> Intermittent <input type="checkbox"/> Tidal	Stream Type <input checked="" type="checkbox"/> Coldwater <input type="checkbox"/> Warmwater
	Stream Origin <input type="checkbox"/> Glacial <input checked="" type="checkbox"/> Spring-fed <input type="checkbox"/> Non-glacial montane <input type="checkbox"/> Mixture of origins <input type="checkbox"/> Swamp and bog <input type="checkbox"/> Other _____	Catchment Area _____ km ²

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

BB0504

WATERSHED FEATURES	Predominant Surrounding Landuse <input type="checkbox"/> Forest <input type="checkbox"/> Commercial <input type="checkbox"/> Field/Pasture <input type="checkbox"/> Industrial <input checked="" type="checkbox"/> Agricultural <input type="checkbox"/> Other _____ <input checked="" type="checkbox"/> Residential	Local Watershed NPS Pollution <input checked="" type="checkbox"/> No evidence <input type="checkbox"/> Some potential sources <input type="checkbox"/> Obvious sources Local Watershed Erosion <input type="checkbox"/> None <input checked="" type="checkbox"/> Moderate <input type="checkbox"/> Heavy
RIPARIAN VEGETATION (18 meter buffer)	Indicate the dominant type and record the dominant species present <input checked="" type="checkbox"/> Trees <input type="checkbox"/> Shrubs <input checked="" type="checkbox"/> Grasses <input type="checkbox"/> Herbaceous dominant species present <u>Pine</u>	
INSTREAM FEATURES	Estimated Reach Length <u>7 Ft</u> m Estimated Stream Width <u>20 Ft</u> m Sampling Reach Area _____ m ² Area in km ² (m ² x 1000) _____ km ² Estimated Stream Depth _____ m Surface Velocity _____ m/sec (at thalweg)	Canopy Cover <input type="checkbox"/> Partly open <input type="checkbox"/> Partly shaded <input checked="" type="checkbox"/> Shaded High Water Mark _____ m Proportion of Reach Represented by Stream Morphology Types <input type="checkbox"/> Riffle <u>40</u> % <input type="checkbox"/> Run <u>50</u> % <input type="checkbox"/> Pool <u>10</u> % Channelized <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Dam Present <input type="checkbox"/> Yes <input type="checkbox"/> No
LARGE WOODY DEBRIS	LWD _____ m ² Density of LWD _____ m ² /km ² (LWD/ reach area)	
AQUATIC VEGETATION	Indicate the dominant type and record the dominant species present <input checked="" type="checkbox"/> Rooted emergent <input type="checkbox"/> Rooted submergent <input type="checkbox"/> Rooted floating <input type="checkbox"/> Free floating <input type="checkbox"/> Floating Algae <input checked="" type="checkbox"/> Attached Algae dominant species present <u>Blue Green</u> Portion of the reach with aquatic vegetation <u>70</u> %	
WATER QUALITY	Temperature <u>22</u> °C Specific Conductance <u>495</u> Dissolved Oxygen _____ pH <u>6.18</u> Turbidity <u>High</u> WQ Instrument Used _____	Water Odors <input checked="" type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Fishy <input type="checkbox"/> Other _____ Water Surface Oils <input type="checkbox"/> Slick <input type="checkbox"/> Sheen <input type="checkbox"/> Gloss <input type="checkbox"/> Flecks <input type="checkbox"/> None <input type="checkbox"/> Other _____ Turbidity (if not measured) <input type="checkbox"/> Clear <input type="checkbox"/> Slightly turbid <input type="checkbox"/> Turbid <input type="checkbox"/> Opaque <input type="checkbox"/> Stained <input type="checkbox"/> Other _____
SEDIMENT/SUBSTRATE	Odors <input type="checkbox"/> Normal <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Anaerobic <input type="checkbox"/> None <input type="checkbox"/> Other _____ Oils <input type="checkbox"/> Absent <input type="checkbox"/> Slight <input type="checkbox"/> Moderate <input type="checkbox"/> Profuse Deposits <input type="checkbox"/> Sludge <input type="checkbox"/> Sawdust <input type="checkbox"/> Paper fiber <input type="checkbox"/> Sand <input type="checkbox"/> Relict shells <input type="checkbox"/> Other _____ Looking at stones which are not deeply embedded, are the undersides black in color? <input type="checkbox"/> Yes <input type="checkbox"/> No	

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	Diameter	% Composition in Sampling Reach	Substrate Type	Characteristic	% Composition in Sampling Area
Heartrock		10	Detritus	sticks, wood, coarse plant materials (CPOM)	
Boulder	> 256 mm (10")	10			
Cobble	64-256 mm (2.5"-10")	10	Muck-Mud	black, very fine organic (FPOM)	
Gravel	2-64 mm (0.1"-2.5")	20			
Sand	0.06-2mm (gr.ty)		Marl	grey, shell fragments	
Silt	0.004-0.06 mm				
Clay	< 0.004 mm (slick)				

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME <u>Bear</u>	LOCATION
STATION # <u>4</u> RIVERMILE	STREAM CLASS
LAT _____ LONG _____	RIVER BASIN <u>LTONES</u>
STORET #	AGENCY <u>MWDSD</u>
INVESTIGATORS <u>Bruce Loss</u>	<u>Josh Chapman</u>
FCRM COMPLETED BY <u>JU</u>	DATE <u>7-25</u> AM/PM TIME <u>4:25</u>
	REASON FOR SURVEY <u>VSF</u>

WEATHER CONDITIONS	Now <input checked="" type="checkbox"/> storm (heavy rain) <input type="checkbox"/> rain (steady rain) <input type="checkbox"/> showers (intermittent) <input type="checkbox"/> %cloud cover _____ <input type="checkbox"/> clear/sunny	Past 24 hours <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> % _____ <input type="checkbox"/>	Has there been a heavy rain in the last 7 days? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Air Temperature <u>70</u> °C Other _____
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SITE LOCATION/MAP	Draw a map of the site and indicate the areas sampled (or attach a photograph) <div style="text-align: center; margin-top: 20px;"> </div>
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STREAM CHARACTERIZATION	Stream Subsystem <input type="checkbox"/> Perennial <input checked="" type="checkbox"/> Intermittent <input type="checkbox"/> Tidal	Stream Type <input checked="" type="checkbox"/> Coldwater <input type="checkbox"/> Warmwater Catchment Area _____ km ²
	Stream Origin <input type="checkbox"/> Glacial <input checked="" type="checkbox"/> Spring-fed <input type="checkbox"/> Non-glacial montane <input checked="" type="checkbox"/> Mixture of origins <input type="checkbox"/> Swamp and bog <input type="checkbox"/> Other _____	

B60504

BENTHIC MACROINVERTEBRATE FIELD DATA SHEET

STREAM NAME <u>Bear Branch</u>	LOCATION <u>OS of Osborne Ln</u>
STATION # _____ RIVERMILE _____	STREAM CLASS _____
LAT _____ LONG _____	RIVER BASIN <u>Stones</u>
STORET # _____	AGENCY <u>MUSD</u>
INVESTIGATORS _____	LOT NUMBER _____
FORM COMPLETED BY _____	DATE <u>4/22</u> TIME <u>2:54</u> AM <input checked="" type="checkbox"/> PM <input type="checkbox"/>
	REASON FOR SURVEY <u>VSA</u>

HABITAT TYPES	Indicate the percentage of each habitat type present <input type="checkbox"/> Cobble _____% <input type="checkbox"/> Snags _____% <input type="checkbox"/> Vegetated Banks _____% <input type="checkbox"/> Sand _____% <input type="checkbox"/> Submerged Macrophytes _____% <input type="checkbox"/> Other () _____%
SAMPLE COLLECTION	Gear used <input checked="" type="checkbox"/> D-frame <input type="checkbox"/> kick-net <input type="checkbox"/> Other _____ How were the samples collected? <input type="checkbox"/> wading <input type="checkbox"/> from bank <input type="checkbox"/> from boat Indicate the number of subs/dicks taken in each habitat type. <input type="checkbox"/> Cobble <u>2</u> <input type="checkbox"/> Snags <u>2</u> <input type="checkbox"/> Vegetated Banks <u>2</u> <input type="checkbox"/> Sand _____ <input type="checkbox"/> Submerged Macrophytes _____ <input type="checkbox"/> Other () _____
GENERAL COMMENTS	<u>A lot of Algae</u>

QUALITATIVE LISTING OF AQUATIC BIOTA

Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare, 2 = Common, 3 = Abundant, 4 = Dominant

Periphyton	0	1	2	3	4	Slimes	0	1	2	3	4
Filamentous Algae	0	1	2	3	4	Macroinvertebrates	0	1	2	3	4
Macrophytes	0	1	2	3	4	Fish	0	1	2	3	4

FIELD OBSERVATIONS OF MACROBENTHOS

Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare (1-3 organisms), 2 = Common (3-9 organisms), 3 = Abundant (>10 organisms), 4 = Dominant (>50 organisms)

Porifera	0	1	2	3	4	Anisoptera	0	1	2	3	4	Chironomidae	0	1	2	3	4
Hydrozoa	0	1	2	3	4	Zygoptera	0	1	2	3	4	Ephemeroptera	0	1	2	3	4
Platyhelminthes	0	1	2	3	4	Hemiptera	0	1	2	3	4	Trichoptera	0	1	2	3	4
Turbellaria	0	1	2	3	4	Collembola	0	1	2	3	4	Other	0	1	2	3	4
Hydradusa	0	1	2	3	4	Lepidoptera	0	1	2	3	4	<u>midge fly x1</u>					
Oligochaeta	0	1	2	3	4	Stenonema	0	1	2	3	4						
Isopoda	0	1	2	3	4	Corydalidae	0	1	2	3	4						
Amphipoda	0	1	2	3	4	Tipulidae	0	1	2	3	4						
Decapoda	0	1	2	3	4	Empididae	0	1	2	3	4						
Gastropoda	0	1	2	3	4	Simuliidae	0	1	2	3	4						
Bivalvia	0	1	2	3	4	Tubificidae	0	1	2	3	4						
						Culexidae	0	1	2	3	4						

880503

BENTHIC MACROINVERTEBRATE FIELD DATA SHEET

STREAM NAME <u>Bear</u>	LOCATION
STATION # <u>3</u> RIVERMILE	STREAM CLASS
LAT _____ LONG _____	RIVER BASIN <u>Stoddard</u>
STORET #	AGENCY <u>MOSI</u>
INVESTIGATORS <u>JL</u>	LOT NUMBER
FORM COMPLETED BY <u>JL</u>	DATE _____ AM PM
	REASON FOR SURVEY

HABITAT TYPES	Indicate the percentage of each habitat type present <input type="checkbox"/> Cobble _____% <input type="checkbox"/> Snags _____% <input type="checkbox"/> Vegetated Banks _____% <input type="checkbox"/> Sand _____% <input type="checkbox"/> Submerged Macrophytes _____% <input type="checkbox"/> Other () _____%
SAMPLE COLLECTION	Gear used <input type="checkbox"/> D-frame <input checked="" type="checkbox"/> Kick-net <input type="checkbox"/> Other _____ How were the samples collected? <input checked="" type="checkbox"/> Wading <input type="checkbox"/> from bank <input type="checkbox"/> from boat Indicate the number of grabs/kicks taken in each habitat type. <input type="checkbox"/> Cobble _____ <input type="checkbox"/> Snags _____ <input type="checkbox"/> Vegetated Banks _____ <input type="checkbox"/> Sand _____ <input type="checkbox"/> Submerged Macrophytes _____ <input type="checkbox"/> Other () _____
GENERAL COMMENTS	

QUALITATIVE LISTING OF AQUATIC BIOTA

Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare, 2 = Common, 3 = Abundant, 4 = Dominant

Periphyton	0	1	2	3	4	Slimes	0	1	2	3	4
Filamentous Algae	0	1	2	3	4	Macroinvertebrates	0	1	2	3	4
Macrophytes	0	1	2	3	4	Fish	0	1	2	3	4

FIELD OBSERVATIONS OF MACROBENTHOS

Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare (1-3 organisms), 2 = Common (3-9 organisms), 3 = Abundant (>10 organisms), 4 = Dominant (>50 organisms)

Porifera	0	1	2	3	4	Anisoptera	0	1	2	3	4	Chironomidae	0	1	2	3	4
Hydrezoa	0	1	2	3	4	Zygotera	0	1	2	3	4	Ephemeroptera	0	1	2	3	4
Platyhelminthes	0	1	2	3	4	Hemiptera	0	1	2	3	4	Trichoptera	0	1	2	3	4
Turbellaria	0	1	2	3	4	Collembola	0	1	2	3	4	Other	0	1	2	3	4
Hydradinea	0	1	2	3	4	Lepidoptera	0	1	2	3	4						
Oligochaeta	0	1	2	3	4	Stenobothridae	0	1	2	3	4						
Isopoda	0	1	2	3	4	Corydalidae	0	1	2	3	4						
Amphipoda	0	1	2	3	4	Tipulidae	0	1	2	3	4						
Decapoda	0	1	2	3	4	Empididae	0	1	2	3	4						
Gastropoda	0	1	2	3	4	Simuliidae	0	1	2	3	4						
Bivalvia	0	1	2	3	4	Tabanidae	0	1	2	3	4						
						Culicidae	0	1	2	3	4						

Midge 3
 Damsel 4
 Crawfish
 EPT = 0

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

Macro EFO301

WATERSHED FEATURES	Predominant Surrounding Landuse <input type="checkbox"/> Forest <input checked="" type="checkbox"/> Commercial <input type="checkbox"/> Field/Pasture <input checked="" type="checkbox"/> Industrial <input checked="" type="checkbox"/> Agricultural <input type="checkbox"/> Other _____ <input checked="" type="checkbox"/> Residential		Local Watershed NPS Pollution <input type="checkbox"/> No evidence <input type="checkbox"/> Some potential sources <input type="checkbox"/> Obvious sources Local Watershed Erosion <input type="checkbox"/> None <input type="checkbox"/> Moderate <input type="checkbox"/> Heavy
RIPARIAN VEGETATION (18 meter buffer)	Indicate the dominant type and record the dominant species present <input checked="" type="checkbox"/> Trees <input checked="" type="checkbox"/> Shrubs <input checked="" type="checkbox"/> Grasses <input checked="" type="checkbox"/> Herbaceous dominant species present _____		
INSTREAM FEATURES	Estimated Reach Length: <u>100 Ft</u> m Estimated Stream Width: <u>100 Ft</u> m Sampling Reach Area: _____ m ² Area in km ² (m ² x1000): _____ km ² Estimated Stream Depth: _____ m <u>34 Ft</u> Surface Velocity (at thalweg): _____ m/sec		Canopy Cover <input checked="" type="checkbox"/> Partly open <input checked="" type="checkbox"/> Partly shaded <input type="checkbox"/> Shaded High Water Mark _____ m Proportion of Reach Represented by Stream Morphology Types <input type="checkbox"/> Riffle _____ % <input type="checkbox"/> Run _____ % <input type="checkbox"/> Pool _____ % Channelized <input type="checkbox"/> Yes <input type="checkbox"/> No Dam Present <input type="checkbox"/> Yes <input type="checkbox"/> No
LARGE WOODY DEBRIS	LWD _____ m ² Density of LWD _____ m ² /km ² (LWD/ reach area)		
AQUATIC VEGETATION	Indicate the dominant type and record the dominant species present <input type="checkbox"/> Rooted emergent <input type="checkbox"/> Rooted submergent <input type="checkbox"/> Rooted floating <input type="checkbox"/> Free floating <input type="checkbox"/> Floating Algae <input type="checkbox"/> Attached Algae dominant species present _____ Portion of the reach with aquatic vegetation _____ %		
WATER QUALITY	Temperature <u>24</u> °C Specific Conductance <u>410</u> Dissolved Oxygen _____ pH <u>7.82</u> Turbidity _____ WQ Instrument Used _____		Water Odors <input type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Fishy <input type="checkbox"/> Other _____ Water Surface Oils <input type="checkbox"/> Slick <input type="checkbox"/> Sheen <input type="checkbox"/> Glass <input type="checkbox"/> Flecks <input type="checkbox"/> None <input type="checkbox"/> Other _____ Turbidity (if not measured) <input type="checkbox"/> Clear <input type="checkbox"/> Slightly turbid <input type="checkbox"/> Turbid <input type="checkbox"/> Opaque <input type="checkbox"/> Stained <input type="checkbox"/> Other _____
SEDIMENT/SUBSTRATE	Odors <input type="checkbox"/> Normal <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Anaerobic <input checked="" type="checkbox"/> None <input type="checkbox"/> Other _____ Oils <input checked="" type="checkbox"/> Absent <input type="checkbox"/> Slight <input type="checkbox"/> Moderate <input type="checkbox"/> Profuse		Deposits <input type="checkbox"/> Sludge <input type="checkbox"/> Sawdust <input type="checkbox"/> Paper fiber <input type="checkbox"/> Sand <input type="checkbox"/> Relict shells <input type="checkbox"/> Other _____ Looking at stones which are not deeply embedded, are the undersides black in color? <input type="checkbox"/> Yes <input type="checkbox"/> No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	Diameter	% Composition in Sampling Reach	Substrate Type	Characteristic	% Composition in Sampling Area
Bedrock			Detritus	sticks, wood, coarse plant materials (CPOM)	
Boulder	> 256 mm (10")				
Cobble	64-256 mm (2.5"-10")	<u>100%</u>	Muck-Mud	black, very fine organic (FPOM)	
Gravel	2-64 mm (0.1"-2.5")		Marl	grey, shell fragments	
Sand	0.06-2mm (gritty)				
Silt	0.004-0.06 mm				
Clay	< 0.004 mm (slick)				

Macro EF0801

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME <u>EFKR</u>	LOCATION	
STATION # <u>282</u> RIVERMILE _____	STREAM CLASS <u>1st</u>	
LAT _____ LONG _____	RIVER BASIN <u>Stones</u>	
STORET # _____	AGENCY <u>MUSD</u>	
INVESTIGATORS <u>Josh Graham & Bruce Ross</u>		
FORM COMPLETED BY <u>J.H.</u>	DATE TIME <u>7/11</u> AM <input checked="" type="radio"/> PM	REASON FOR SURVEY <u>USA</u>

WEATHER CONDITIONS	Now <input type="checkbox"/> storm (heavy rain) <input type="checkbox"/> rain (steady rain) <input type="checkbox"/> showers (intermittent) <input type="checkbox"/> %cloud cover _____ <input type="checkbox"/> clear/sunny	Past 24 hours <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> % <input type="checkbox"/>	Has there been a heavy rain in the last 7 days? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Air Temperature <u>95</u> °C Other _____
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SITE LOCATION/MAP	Draw a map of the site and indicate the areas sampled (or attach a photograph) <div style="text-align: center; margin-top: 50px;"> <p style="font-size: small;">Gravel</p> <p style="font-size: small;">731</p> <p style="font-size: small;">Water-till Dam</p> </div>
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STREAM CHARACTERIZATION	Stream Subsystem <input checked="" type="checkbox"/> Perennial <input type="checkbox"/> Intermittent <input type="checkbox"/> Tidal Stream Origin <input type="checkbox"/> Glacial <input type="checkbox"/> Spring-fed <input type="checkbox"/> Non-glacial montane <input type="checkbox"/> Mixture of origins <input type="checkbox"/> Swamp and bog <input type="checkbox"/> Other _____	Stream Type <input type="checkbox"/> Coldwater <input type="checkbox"/> Warmwater Catchment Area _____ km ²
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Macro 0801

BENTHIC MACROINVERTEBRATE FIELD DATA SHEET

STREAM NAME <u>E+SR</u>	LOCATION <u>Below Walter Hill Dam</u>
STATION# <u>0801</u> RIVERMILE	STREAM CLASS
LAT _____ LONG _____	RIVER BASIN <u>stones</u>
STORET#	AGENCY <u>MUSD</u>
INVESTIGATORS <u>Josh Opham</u> <u>Bruce Pess</u>	LOT NUMBER
FORM COMPLETED BY	DATE _____ AM PM
	REASON FOR SURVEY <u>VSA</u>

HABITAT TYPES	Indicate the percentage of each habitat type present: <input checked="" type="checkbox"/> Cobble <u>100</u> % <input type="checkbox"/> Snags _____ % <input type="checkbox"/> Vegetated Banks _____ % <input type="checkbox"/> Sand _____ % <input type="checkbox"/> Submerged Macrophytes _____ % <input type="checkbox"/> Other (_____) _____ %
SAMPLE COLLECTION	Gear used <input checked="" type="checkbox"/> D-frame <input type="checkbox"/> Kick-net <input type="checkbox"/> Other _____ How were the samples collected? <input checked="" type="checkbox"/> wading <input type="checkbox"/> from bank <input type="checkbox"/> from boat Indicate the number of /abs/dicks taken in each habitat type. <input type="checkbox"/> Cobble _____ <input type="checkbox"/> Snags _____ <input checked="" type="checkbox"/> Vegetated Banks _____ <input type="checkbox"/> Sand _____ <input type="checkbox"/> Submerged Macrophytes _____ <input type="checkbox"/> Other (_____) _____
GENERAL COMMENTS	

QUALITATIVE LISTING OF AQUATIC BIOTA

Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare, 2 = Common, 3 = Abundant, 4 = Dominant

Periphyton	0	1	2	3	4	Slimes	0	1	2	3	4
Filamentous Algae	0	1	2	3	4	Macroinvertebrates	0	1	2	3	4
Macrophytes	0	1	2	3	4	Fish	0	1	2	3	4

FIELD OBSERVATIONS OF MACROBENTHOS

Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare (1-3 organisms), 2 = Common (3-9 organisms), 3 = Abundant (>10 organisms), 4 = Dominant (>50 organisms)

Porifera	0	1	2	3	4	Anisoptera	0	1	2	3	4	Chironomidae	0	1	2	3	4
Hydrozoa	0	1	2	3	4	Zygoptera	0	1	2	3	4	Ephemeroptera	0	1	2	3	4
Platyhelminthes	0	1	2	3	4	Hemiptera	0	1	2	3	4	Trichoptera	0	1	2	3	4
Turbellaria	0	1	2	3	4	Collembola	0	1	2	3	4	Other	0	1	2	3	4
Hydradorea	0	1	2	3	4	Lepidoptera	0	1	2	3	4						
Oligochaeta	0	1	2	3	4	Sialidae	0	1	2	3	4						
Isopoda	0	1	2	3	4	Corydalidae	0	1	2	3	4						
Amphipoda	0	1	2	3	4	Tipulidae	0	1	2	3	4						
Decapoda	0	1	2	3	4	Empididae	0	1	2	3	4						
Gastropoda	0	1	2	3	4	Simuliidae	0	1	2	3	4						
Bivalvia	0	1	2	3	4	Tubificidae	0	1	2	3	4						
						Culicidae	0	1	2	3	4						

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

0802

WATERSHED FEATURES	Predominant Surrounding Land Use <input checked="" type="checkbox"/> Forest <input type="checkbox"/> Commercial <input type="checkbox"/> Field/Pasture <input type="checkbox"/> Industrial <input checked="" type="checkbox"/> Agricultural <input type="checkbox"/> Other _____ <input checked="" type="checkbox"/> Residential	Local Watershed NPS Pollution <input type="checkbox"/> No evidence <input type="checkbox"/> Some potential sources <input type="checkbox"/> Obvious sources Local Watershed Erosion <input type="checkbox"/> None <input type="checkbox"/> Moderate <input type="checkbox"/> Heavy
RIPARIAN VEGETATION (18 meter buffer)	Indicate the dominant type and record the dominant species present <input checked="" type="checkbox"/> Trees <input type="checkbox"/> Shrubs <input type="checkbox"/> Grasses <input type="checkbox"/> Herbaceous dominant species present _____	
INSTREAM FEATURES	Estimated Reach Length <u>100</u> m Ft Estimated Stream Width _____ m <u>100ft</u> Sampling Reach Area _____ m ² Area in km ² (m ² x1000) _____ km ² Estimated Stream Depth _____ m Surface Velocity _____ m/sec (at thalweg)	Canopy Cover <input checked="" type="checkbox"/> Partly open <input checked="" type="checkbox"/> Partly shaded <input type="checkbox"/> Shaded High Water Mark _____ m Proportion of Reach Represented by Stream Morphology Types <input type="checkbox"/> Riffle <u>100</u> % <input type="checkbox"/> Run _____ % <input type="checkbox"/> Pool <u>100</u> % Channelized <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Dam Present <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
LARGE WOODY DEBRIS	LWD _____ m ² Density of LWD _____ m ² /km ² (LWD/ reach area)	
AQUATIC VEGETATION	Indicate the dominant type and record the dominant species present <input type="checkbox"/> Rooted emergent <input type="checkbox"/> Rooted submergent <input type="checkbox"/> Rooted floating <input type="checkbox"/> Free floating <input type="checkbox"/> Floating Algae <input type="checkbox"/> Attached Algae dominant species present _____ Portion of the reach with aquatic vegetation _____ %	
WATER QUALITY	Temperature <u>24.7</u> °C Specific Conductance <u>416</u> Dissolved Oxygen _____ pH <u>7.7</u> Turbidity _____ WQ Instrument Used _____	Water Odors <input type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Fishy <input type="checkbox"/> Other _____ Water Surface Oil <input type="checkbox"/> Slick <input type="checkbox"/> Sheen <input type="checkbox"/> Glass <input type="checkbox"/> Flecks <input type="checkbox"/> None <input type="checkbox"/> Other _____ Turbidity (if not measured) <input type="checkbox"/> Clear <input type="checkbox"/> Slightly turbid <input type="checkbox"/> Turbid <input type="checkbox"/> Opaque <input type="checkbox"/> Stained <input type="checkbox"/> Other _____
SEDIMENT/SUBSTRATE	Odors <input type="checkbox"/> Normal <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Anaerobic <input type="checkbox"/> None <input type="checkbox"/> Other _____ Oils <input type="checkbox"/> Absent <input type="checkbox"/> Slight <input type="checkbox"/> Moderate <input type="checkbox"/> Profuse Deposits <input type="checkbox"/> Sludge <input type="checkbox"/> Sawdust <input type="checkbox"/> Paper fiber <input type="checkbox"/> Sand <input type="checkbox"/> Relief shells <input type="checkbox"/> Other _____ Looking at stones which are not deeply embedded, are the undersides black in color? <input type="checkbox"/> Yes <input type="checkbox"/> No	

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	Diameter	% Composition in Sampling Reach	Substrate Type	Characteristic	% Composition in Sampling Area
Bedrock			Levitus	sticks, wood, coarse plant materials (CPOM)	
Boulder	> 256 mm (10")		Muck-Mud	black, very fine organic (FPOM)	
Cobble	64-256 mm (2.5"-10")	20%	Marl	grey, shell fragments	
Gravel	2-64 mm (0.1"-2.5")	30%			
Sand	0.06-2mm (gr. ty)				
Silt	0.004-0.06 mm				
Clay	< 0.004 mm (silt)				

0802

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME <u>EFSR</u>	LOCATION <u>EFSR at Coleman Intake</u>
STATION # <u>02</u> RIVERMILE	STREAM CLASS
LAT _____ LONG _____	RIVER BASIN <u>Stones</u>
STORET #	AGENCY <u>MWSD</u>
INVESTIGATORS <u>Josh Uphan</u> <u>Bluce Ross</u>	
FORM COMPLETED BY	DATE _____ AM/PM REASON FOR SURVEY <u>VSA</u>

WEATHER CONDITIONS	<input type="checkbox"/> storm (heavy rain) <input type="checkbox"/> rain (steady rain) <input type="checkbox"/> showers (intermittent) <input checked="" type="checkbox"/> %cloud cover <input type="checkbox"/> clear/sunny	Past 24 hours <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> % <input type="checkbox"/>	Has there been a heavy rain in the last 7 days? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Air Temperature <u>95°</u> C Other _____
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SITE LOCATION/MAP	Draw a map of the site and indicate the areas sampled (or attach a photograph)
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STREAM CHARACTERIZATION	Stream Subsystem <input checked="" type="checkbox"/> Perennial <input type="checkbox"/> Intermittent <input type="checkbox"/> Tidal	Stream Type <input type="checkbox"/> Coldwater <input type="checkbox"/> Warmwater
	Stream Origin <input type="checkbox"/> Glacial <input type="checkbox"/> Spring-fed <input type="checkbox"/> Non-glacial montane <input type="checkbox"/> Mixture of origins <input type="checkbox"/> Swamp and bog <input type="checkbox"/> Other _____	Catchment Area _____ km ²

0802

BENTHIC MACROINVERTEBRATE FIELD DATA SHEET

STREAM NAME <u>EFBR</u>		LOCATION <u>EFBR at Coleman Farm</u>	
STATION # <u>02</u> RIVERMILE		STREAM CLASS	
LAT _____ LONG _____		RIVER BASIN <u>Stones</u>	
STORET #		AGENCY <u>MWSO</u>	
INVESTIGATORS <u>Josh Upham Bruce</u>		LOT NUMBER	
FORM COMPLETED BY <u>J.C.</u>		DATE <u>2:30</u> <u>7/1</u>	REASON FOR SURVEY
		TIME _____ AM PM	

HABITAT TYPES	Indicate the percentage of each habitat type present			
	<input checked="" type="checkbox"/> Cobble <u>100</u> %	<input type="checkbox"/> Snags _____ %	<input type="checkbox"/> Vegetated Banks _____ %	<input type="checkbox"/> Sand _____ %
SAMPLE COLLECTION	<input type="checkbox"/> Submerged Macrophytes _____ %			
	<input type="checkbox"/> Other (_____) _____ %			
	Gear used <input checked="" type="checkbox"/> D-frame <input type="checkbox"/> kick-net <input type="checkbox"/> Other _____			
How were the samples collected? <input checked="" type="checkbox"/> wading <input type="checkbox"/> from bank <input type="checkbox"/> from boat				
Indicate the number of abs/dicks taken in each habitat type.				
<input checked="" type="checkbox"/> Cobble _____ <input checked="" type="checkbox"/> Snags _____ <input checked="" type="checkbox"/> Vegetated Banks _____ <input type="checkbox"/> Sand _____				
<input checked="" type="checkbox"/> Submerged Macrophytes _____ <input type="checkbox"/> Other (_____) _____				
GENERAL COMMENTS				

QUALITATIVE LISTING OF AQUATIC BIOTA

Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare, 2 = Common, 3 = Abundant, 4 = Dominant

Periphyton	0	1	2	3	4	Slimes	0	1	2	3	4
Filamentous Algae	0	1	2	3	4	Macroinvertebrates	0	1	2	3	4
Macrophytes	0	1	2	3	4	Fish	0	1	2	3	4

FIELD OBSERVATIONS OF MACROBENTHOS

Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare (1-3 organisms), 2 = Common (3-9 organisms), 3 = Abundant (>10 organisms), 4 = Dominant (>50 organisms)

Porifera	0	1	2	3	4	Anisoptera	0	1	2	3	4	Chironomidae	0	1	2	3	4
Hydrozoa	0	1	2	3	4	Zygoptera	0	1	2	3	4	Ephemeroptera	0	1	2	3	4
Platyhelminthes	0	1	2	3	4	Hemiptera	0	1	2	3	4	Trichoptera	0	1	2	3	4
Turbellaria	0	1	2	3	4	Collembola	0	1	2	3	4	Other	0	1	2	3	4
Hydradrea	0	1	2	3	4	Lepidoptera	0	1	2	3	4						
Oligochaeta	0	1	2	3	4	Sialidae	0	1	2	3	4						
Isopoda	0	1	2	3	4	Corydalidae	0	1	2	3	4						
Amphipoda	0	1	2	3	4	Tipulidae	0	1	2	3	4						
Decapoda	0	1	2	3	4	Empididae	0	1	2	3	4						
Gastropoda	0	1	2	3	4	Simuliidae	0	1	2	3	4						
Bivalvia	0	1	2	3	4	Tubificidae	0	1	2	3	4						
						Culicidae	0	1	2	3	4						

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET

EFO803 (BACK)

WATERSHED FEATURES	Predominant Surrounding Landuse <input checked="" type="checkbox"/> Forest <input type="checkbox"/> Commercial <input type="checkbox"/> Field/Pasture <input type="checkbox"/> Industrial <input checked="" type="checkbox"/> Agricultural <input type="checkbox"/> Other _____ <input type="checkbox"/> Residential		Local Watershed NPS Pollution <input type="checkbox"/> No evidence <input type="checkbox"/> Some potential sources <input type="checkbox"/> Obvious sources Local Watershed Erosion <input type="checkbox"/> None <input type="checkbox"/> Moderate <input type="checkbox"/> Heavy	
RIPARIAN VEGETATION (18 meter buffer)	Indicate the dominant type and record the dominant species present <input checked="" type="checkbox"/> Trees <input checked="" type="checkbox"/> Shrubs <input checked="" type="checkbox"/> Grasses <input type="checkbox"/> Herbaceous dominant species present _____			
INSTREAM FEATURES	Estimated Reach Length _____ m Estimated Stream Width <u>50</u> m ^{ft} Sampling Reach Area _____ m ² Area in km ² (m ² x 1000) _____ km ² Estimated Stream Depth <u>3M-1ft</u> m Surface Velocity _____ m/sec		Canopy Cover <input checked="" type="checkbox"/> Partly open <input checked="" type="checkbox"/> Partly shaded <input type="checkbox"/> Shaded High Water Mark _____ m Proportion of Reach Represented by Stream Morphology Types <input type="checkbox"/> Riffle _____ % <input type="checkbox"/> Run _____ % <input type="checkbox"/> Pool _____ % Channelized <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Dam Present <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
LARGE WOODY DEBRIS	LWD _____ m ³ Density of LWD _____ m ³ /km ² (LWD/ reach area)			
AQUATIC VEGETATION	Indicate the dominant type and record the dominant species present <input type="checkbox"/> Rooted emergent <input type="checkbox"/> Rooted submergent <input type="checkbox"/> Rooted floating <input type="checkbox"/> Free floating <input type="checkbox"/> Floating Algae <input type="checkbox"/> Attached Algae dominant species present _____ Portion of the reach with aquatic vegetation <u>100</u> %			
WATER QUALITY	Temperature <u>28.6</u> °C Specific Conductance <u>322</u> Dissolved Oxygen _____ pH <u>8.08</u> Turbidity _____ WQ Instrument Used _____		Water Odors <input type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Fishy <input type="checkbox"/> Other _____ Water Surface Oils <input type="checkbox"/> Slick <input type="checkbox"/> Sheen <input type="checkbox"/> Gloss <input type="checkbox"/> Flecks <input type="checkbox"/> None <input type="checkbox"/> Other _____ Turbidity (if not measured) <input type="checkbox"/> Clear <input type="checkbox"/> Slightly turbid <input type="checkbox"/> Turbid <input type="checkbox"/> Opaque <input type="checkbox"/> Stained <input type="checkbox"/> Other _____	
SEDIMENT/SUBSTRATE	Odors <input type="checkbox"/> Normal <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Anaerobic <input type="checkbox"/> None <input type="checkbox"/> Other _____ Oils <input type="checkbox"/> Absent <input type="checkbox"/> Slight <input type="checkbox"/> Moderate <input type="checkbox"/> Profuse		Deposits <input type="checkbox"/> Sludge <input type="checkbox"/> Sawdust <input type="checkbox"/> Paper fiber <input type="checkbox"/> Sand <input type="checkbox"/> Relict shells <input type="checkbox"/> Other _____ Looking at stones which are not deeply embedded, are the undersides black in color? <input type="checkbox"/> Yes <input type="checkbox"/> No	

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	Diameter	% Composition in Sampling Reach	Substrate Type	Characteristic	% Composition in Sampling Area
Rock		50	Debris	sticks, wood, coarse plant materials (CPOM)	
Boulder	> 256 mm (10")				
Cobble	64-256 mm (2.5"-10")	50	Muck-Mud	black, very fine organic (FPOM)	
Gravel	2-64 mm (0.1"-2.5")				
Sand	0.06-2mm (gr. ty)				
Silt	0.004-0.06 mm		Marl	grey, shell fragments	
Clay	< 0.004 mm (silt)				

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME <u>EFSR</u>	LOCATION	
STATION # _____ RIVERMILE _____	STREAM CLASS	
LAT _____ LONG _____	RIVER BASIN <u>Stones EFSR</u>	
STORET # _____	AGENCY <u>MUSD</u>	
INVESTIGATORS <u>Bruce Ross & Josh Upham</u>		
FORM COMPLETED BY _____	DATE <u>7/15</u> AM: _____ PM: _____	REASON FOR SURVEY _____

WEATHER CONDITIONS	Now <input type="checkbox"/> storm (heavy rain) <input type="checkbox"/> rain (steady rain) <input type="checkbox"/> showers (intermittent) <input type="checkbox"/> %cloud cover _____ <input type="checkbox"/> clear/sunny	Past 24 hours <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> % _____ <input type="checkbox"/>	Has there been a heavy rain in the last 7 days? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Air Temperature <u>95</u> °C Other _____
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SITE LOCATION/MAP	Draw a map of the site and indicate the areas sampled (or attach a photograph) <div style="text-align: center; margin-top: 20px;"> </div>
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STREAM CHARACTERIZATION	Stream Subsystem <input type="checkbox"/> Perennial <input type="checkbox"/> Intermittent <input type="checkbox"/> Tidal Stream Origin <input type="checkbox"/> Glacial <input type="checkbox"/> Spring-fed <input type="checkbox"/> Non-glacial montane <input type="checkbox"/> Mixture of origins <input type="checkbox"/> Swamp and bog <input type="checkbox"/> Other _____	Stream Type <input type="checkbox"/> Coldwater <input type="checkbox"/> Warmwater Catchment Area _____ km ²
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Macro EPO803

BENTHIC MACROINVERTEBRATE FIELD DATA SHEET

STREAM NAME _____		LOCATION _____	
STATION # _____	RIVERMILE _____	STREAM CLASS _____	
LAT _____	LONG _____	RIVER BASIN _____	
STORET # _____		ALTITUDE _____	
INVESTIGATORS _____		LOT NUMBER _____	
FORM COMPLETED BY _____		DATE _____ AM _____ PM	REASON FOR SURVEY _____

HABITAT TYPES	Indicate the percentage of each habitat type present <input type="checkbox"/> Cobble _____% <input type="checkbox"/> Snags _____% <input type="checkbox"/> Vegetated Banks _____% <input type="checkbox"/> Sand _____% <input type="checkbox"/> Submerged Macrophytes _____% <input type="checkbox"/> Other (_____) _____%
	Gear used <input type="checkbox"/> D-frame <input type="checkbox"/> kick-net <input type="checkbox"/> Other _____ How were the samples collected? <input type="checkbox"/> wading <input type="checkbox"/> from bank <input type="checkbox"/> from boat Indicate the number of jobs/decks taken in each habitat type. <input type="checkbox"/> Cobble _____ <input type="checkbox"/> Snags _____ <input type="checkbox"/> Vegetated Banks _____ <input type="checkbox"/> Sand _____ <input type="checkbox"/> Submerged Macrophytes _____ <input type="checkbox"/> Other (_____) _____
GENERAL COMMENTS	

QUALITATIVE LISTING OF AQUATIC BIOTA

Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare, 2 = Common, 3 = Abundant, 4 = Dominant

Periphyton	0	1	2	3	4	Slimes	0	1	2	3	4
Filamentous Algae	0	1	2	3	4	Macroinvertebrates	0	1	2	3	4
Macrophytes	0	1	2	3	4	Fish	0	1	2	3	4

FIELD OBSERVATIONS OF MACROBENTHOS

Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare (1-3 organisms), 2 = Common (3-9 organisms), 3 = Abundant (>10 organisms), 4 = Dominant (>50 organisms)

Porifera	0	1	2	3	4	Anisoptera	0	1	2	3	4	Chironomidae	0	1	2	3	4	
Hydrozoa	0	1	2	3	4	Zygoptera	0	1	2	3	4	Ephemeroptera	0	1	2	3	4	
Platyhelminthes	0	1	2	3	4	Hemiptera	0	1	2	3	4	Trichoptera	0	1	2	3	4	
Turbellaria	0	1	2	3	4	Collembola	0	1	2	3	4	Other	0	1	2	3	4	
Hirudinea	0	1	2	3	4	Lepidoptera	0	1	2	3	4							
Oligochaeta	0	1	2	3	4	Sialidae	0	1	2	3	4							
Isopoda	0	1	2	3	4	Corydalidae	0	1	2	3	4							
Amphipoda	0	1	2	3	4	Tipulidae	0	1	2	3	4							
Decapoda	0	1	2	3	4	Empididae	0	1	2	3	4							
Gastropoda	0	1	2	3	4	Simuliidae	0	1	2	3	4							
Bivalvia	0	1	2	3	4	Tubificidae	0	1	2	3	4							
						Culexidae	0	1	2	3	4							