APPENDIX A – UNNAMED TRIBUTARY TO ZEKIAH SWAMP RUN
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UNNAMED TRIBUTARY TO ZEKIAH SWAMP RUN, CHARLES COUNTY, MD

Drainage Area (sq. mi.):	0.52	Rosgen Stream Type:	E4
Stream Order:	1	Survey Date:	April 2004
Percent Imperviousness:	1.70		

Land Use (%): Urban: 0.00 Agricultural: 7.00 Forest: 93.00

General Study Reach Description: The study reach is located on private property approximately 200 feet upstream of Estevez Road. The gravel bed stream is vertically and laterally stable with riffle/pool features. Both the pool and riffle features contain woody debris. The floodplain consists of forested wetlands, which results in the reach having undulating banks. The floodplain is densely forested with a canopy of tulip poplar, beech, and oak. The understory consists of a moderately dense layer of greenbrier, holly, and honeysuckle. Map and GPS coordinates are not provided for sites located on private property.

Photo 1. Upstream view of monumented Cross Section 1.

Photo 2. Upstream view of monumented Cross Section 2.

Photo 3. Downstream view of monumented Cross Section 3.

Photo 4. Upstream view of monumented Cross Section 4

Photo 5. Downstream view of monumented Cross Section 5.

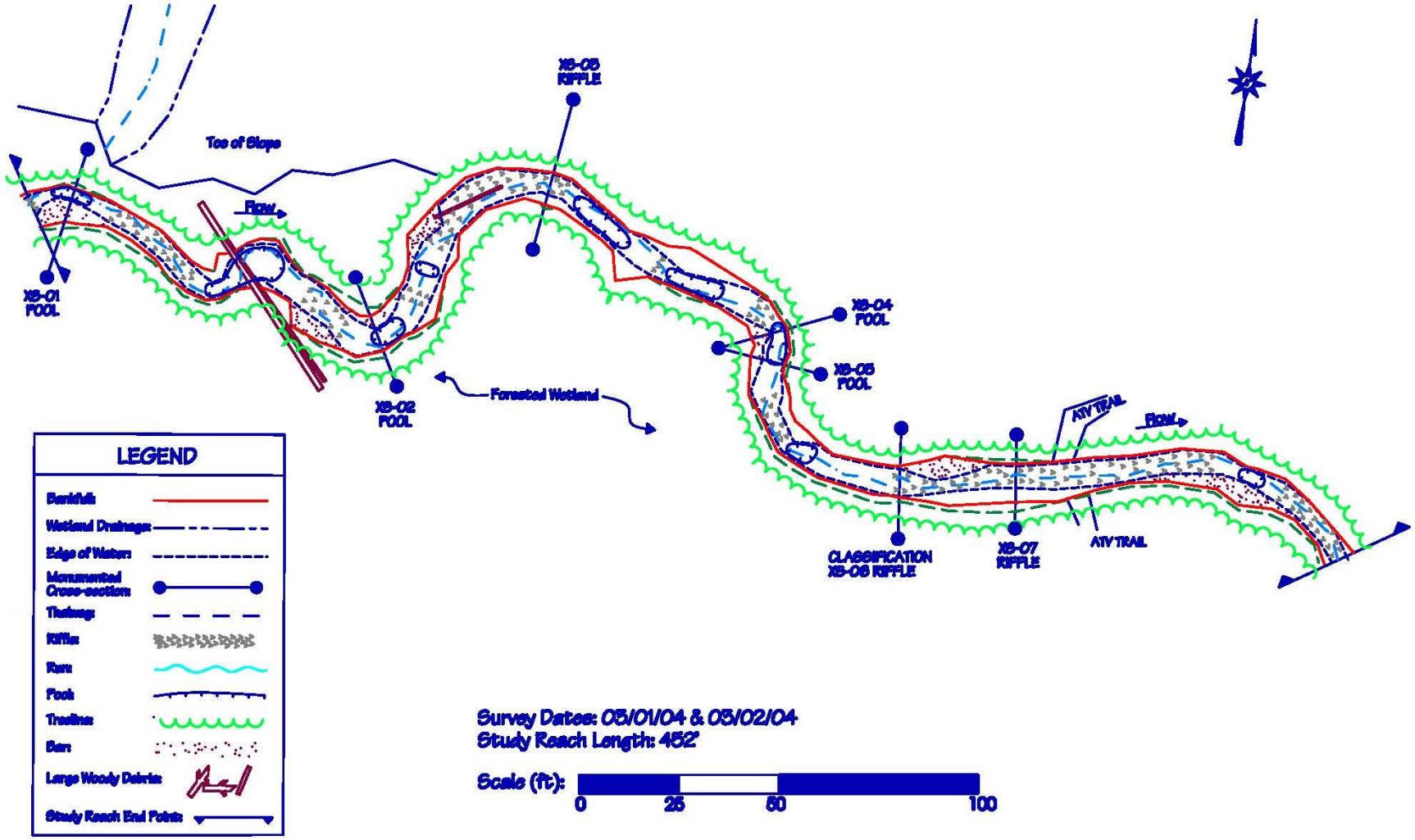
Photo 6. Upstream view of monumented classification Cross Section 6.

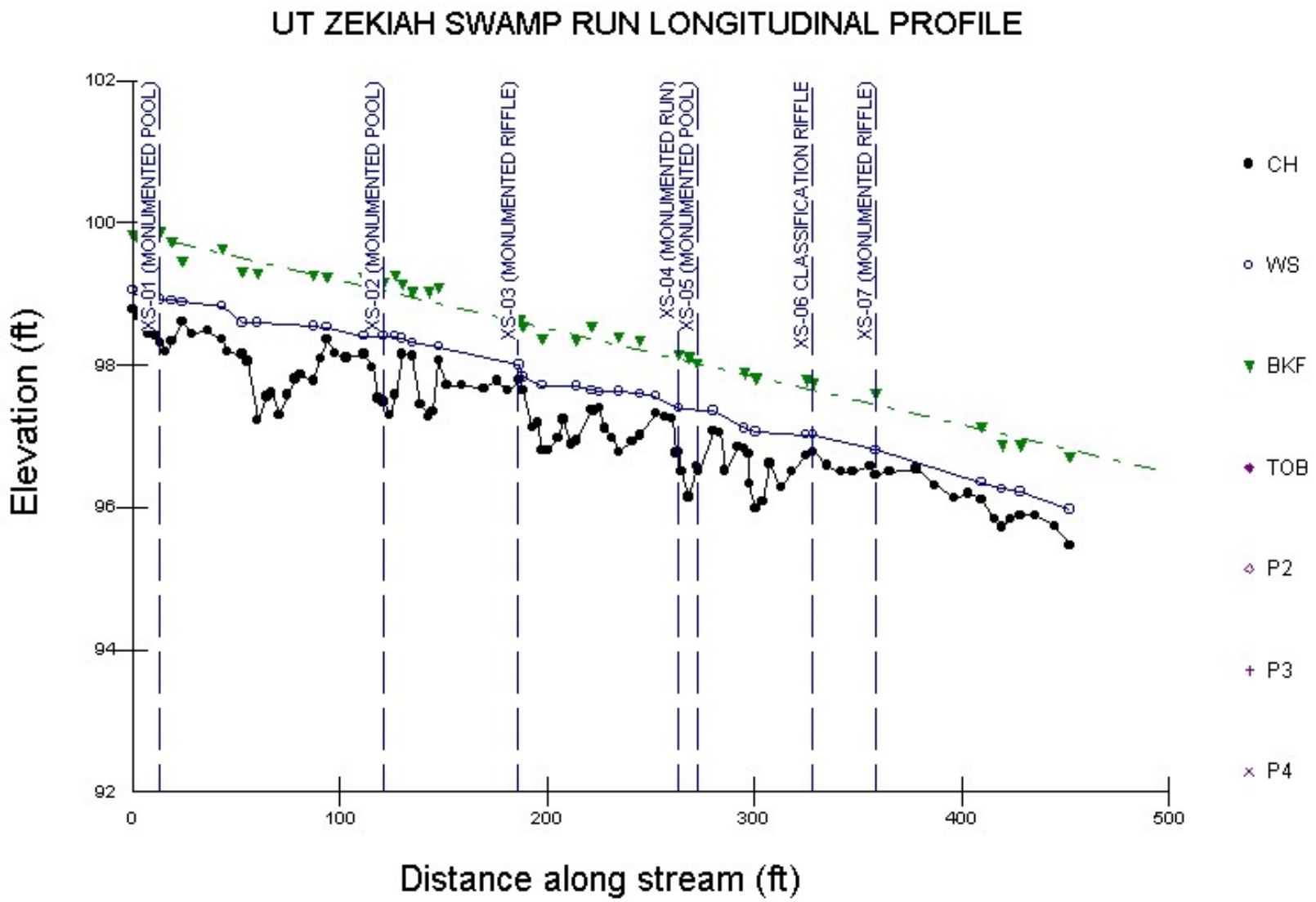
Photo 7. Upstream view of monumented Cross Section 7.

Cross Section Summary Table

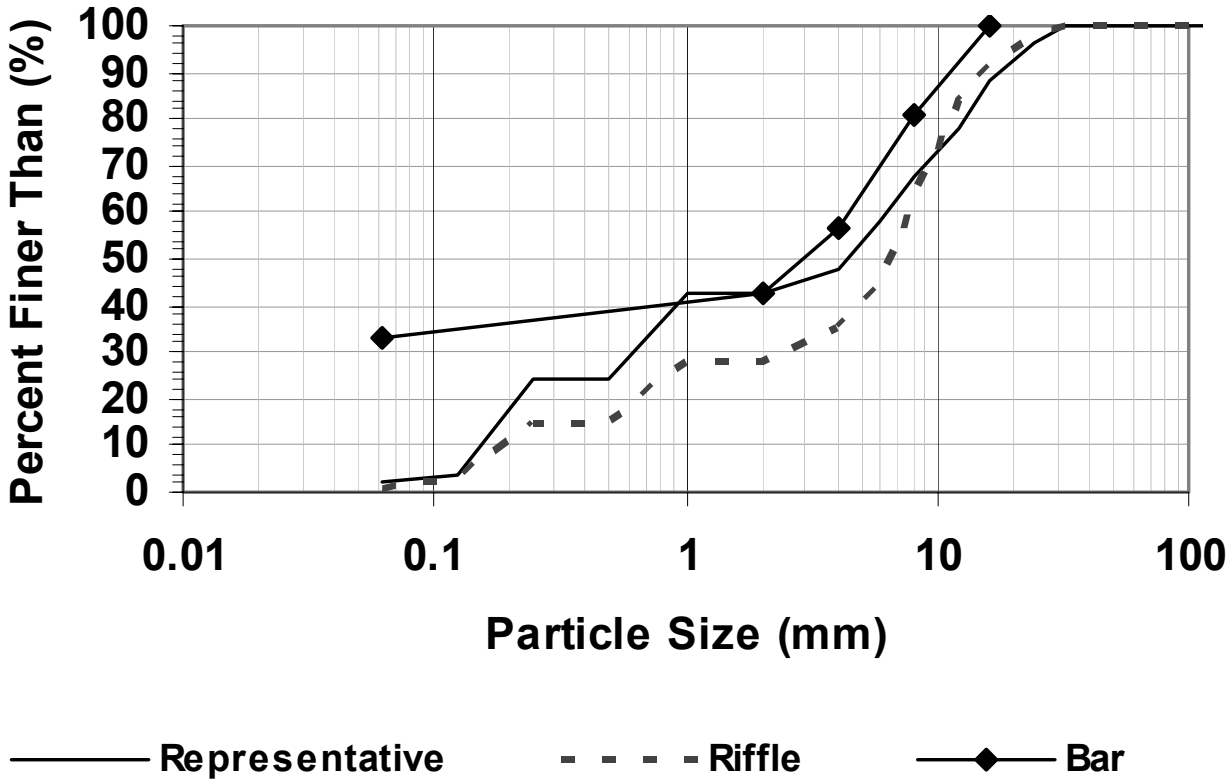
	Monumented						
	XS-01 Pool	**XS-02 Pool**	**XS-03 Riffle**	**XS-04 Run**	**XS-05 Pool**	**XS-06 Classification Riffle**	**XS-07 Riffle**
Bankfull Width (ft)	8.77	10.41	9.42	8.23	12.39	7.86	9.33
Bankfull Cross-sectional Area (ft^2)	7.83	9.77	8.63	5.26	7.43	6.69	7.08
Hydraulic Radius (ft)	0.65	0.77	0.71	0.50	0.50	0.66	0.69
Mean Bankfull Depth (ft)	0.89	0.94	0.92	0.64	0.60	0.85	0.76
Maximum Bankfull Depth (ft)	1.56	1.71	1.19	1.19	1.43	1.05	1.16
Wetted Perimeter (ft)	12.14	12.68	12.19	10.63	14.83	10.09	10.20
Width/Depth Ratio	9.85	11.07	10.24	12.86	20.65	9.25	12.28
Entrenchment Ratio	N/A	N/A	N/A	N/A	N/A	4.92	N/A

UNNAMED TRIBUTARY TO ZEKIAH SWAMP RUN
Charles County, MD




UT ZEKIAH SWAMP RUN LONGITUDINAL PROFILE
Elevation (ft)
Distance along stream (ft)
102
100
98
96
94
92
0
100
200
300
400
500
XS-01 (MONUMENTED POOL)
XS-02 (MONUMENTED POOL)
XS-03 (MONUMENTED RIFFLE)
XS-04 (MONUMENTED RUN)
XS-05 (MONUMENTED POOL)
XS-06 CLASSIFICATION RIFFLE
XS-07 (MONUMENTED RIFFLE)
CH
WS
BKF
TOB
P2
P3
P4

UT Zekiah Swamp Run Particle Size Distribution



Reference Reach Summary Table

No.	Variable	Symbol	Units		UT Zekiah SwampRun
1	Stream type				E4
2	Drainage area		mi^2		0.52
3	Riffle Bankfull width	W_{bkf}	feet	Mean	8.87
				Min	7.86
				Max	9.42
4	Riffle Bankfull mean depth	d_{bkf}	feet	Mean	0.84
				Min	0.76
				Max	0.92
5	Width depth ratio	W/d		Mean	10.59
				Min	9.25
				Max	12.28
6	Riffle Bankfull cross sectional area	A_{bkf}	ft_2	Mean	7.47
				Min	6.69
				Max	8.63
7	Pool Bankfull cross sectional area	A_{pool}	ft_2	Mean	8.34
				Min	7.43
				Max	9.77
8	Riffle Bankfull maximum depth	d_{max}	feet	Mean	1.13
				Min	1.05
				Max	1.19
9	Max Riffle depth/ Mean riffle depth	d_{riff}/d_{bkf}		Mean	1.33
				Min	1.24
				Max	1.40
10	Low bank height to max d_{bkf} ratio	LBH/d_{riff}		Mean	1.00
				Min	N/A
				Max	N/A
11	Width of flood prone area	W_{fpa}	feet	Mean	38.69
				Min	N/A
				Max	N/A
12	Entrenchment Ratio	W_{fpa}/W_{bkf}		Mean	4.92
				Min	N/A
				Max	N/A
13	Meander Length	L_m	feet	Mean	52.05
				Min	40.85
				Max	62.17
14	Ratio of meander length to bankfull width	L_m/W_{bkf}		Mean	6.62
				Min	5.20
				Max	7.91
15	Radius of curvature	R_c	feet	Mean	17.68
				Min	8.51
				Max	36.25
16	Ratio: Radius of curvature to bankfull width	R_c/W_{bkf}		Mean	2.25
				Min	1.08
				Max	4.61
17	Belt Width	W_{blt}	feet	Mean	37.28
				Min	19.82
				Max	58.96
18	Meander width ratio	W_{blt}/W_{bkf}		Mean	4.74
				Min	2.52
				Max	7.50

Reference Reach Data Summary

No.	Variable	Symbol	Units		UT Zekiah SwampRun
19	Sinuosity	K			1.33
20	Valley Slope	S_{val}	ft/ft		0.0084
21	Average Water Surface Slope	S_{avg}	ft/ft		0.0066
22	Pool Water Surface Slope	S_{pool}	ft/ft	Mean	0.0029
				Min	0.0010
				Max	0.0061
23	Pool WS slope / Average WS slope	S_{pool}/S_{avg}		Mean	0.44
				Min	0.15
				Max	0.93
24	Riffle Water Surface slope	Sriff	ft/ft	Mean	0.0097
				Min	0.0067
				Max	0.0128
25	Riffle WS slope / Average WS slope	S_{rifF}/S_{avg}		Mean	1.47
				Min	1.01
				Max	1.93
26	Run WS Slope	S_{run}/S_{avg}	ft/ft	Mean	0.0077
				Min	0.0020
				Max	0.0200
27	Run WS slope / Average WS slope	S_{run}/S_{avg}	ft/ft	Mean	1.16
				Min	0.30
				Max	3.03
28	Glide WS Slope	S_{glide}		Mean	0.0049
				Min	0.0018
				Max	0.0094
29	Glide WS slope / Average WS slope	S_{glide}/S_{avg}	ft/ft	Mean	0.75
				Min	0.28
				Max	1.42
30	Maximum pool depth	d_{pool}	feet	Mean	1.73
				Min	1.29
				Max	2.26
31	Ratio of max pool depth to average bankfull depth	d_{pool}/d_{bkf}		Mean	2.03
				Min	1.52
				Max	2.66
32	Max Run Depth	d_{run}	feet	Mean	1.22
				Min	1.09
				Max	1.37
33	Ratio of max run depth to average bankfull depth	d_{run}/d_{bkf}		Mean	1.44
				Min	1.28
				Max	1.61
34	Max Glide Depth	d_{glide}	feet	Mean	1.22
				Min	1.03
				Max	1.39
35	Ratio of max glide depth to average bankfull depth	d_{glide}/d_{bkf}	feet	Mean	1.44
				Min	1.21
				Max	1.64

Reference Reach Data Summary

No.	Variable	Symbol	Units		UT Zekiah SwampRun
36	Pool length	L_{pool}	feet	Mean	24.56
				Min	12.64
				Max	40.69
37	Ratio of pool length to bankfull width	L_{pool}/W_{bkf}	feet	Mean	3.12
				Min	1.61
				Max	5.18
38	Pool width	W_{pool}	feet	Mean	10.52
				Min	8.77
				Max	12.39
39	Ratio of pool width to bankfull width	W_{pool}/W_{bkf}		Mean	1.34
				Min	1.12
				Max	1.58
40	Ratio of pool area to bankfull area	A_{pool}/A_{bkf}		Mean	1.25
				Min	1.11
				Max	1.46
41	Point bar slope	S_{pb}	ft/ft	Mean	0.14
				Min	N/A
				Max	N/A
42	Pool to pool spacing	p-p	feet	Mean	51.12
				Min	19.56
				Max	122.33
43	Ratio of pool to pool spacing to bankfull width	$p\text{-}p/W_{bkf}$		Mean	6.50
				Min	2.49
				Max	15.56
Materials					
44	Particle Size Distribution - Channel	D_{16}	mm		0.20
		D_{35}	mm		0.79
		D_{50}	mm		4.34
		D_{84}	mm		14.12
		D_{95}	mm		21.78
45	Particle Size Distribution - Riffle	D_{16}	mm		0.54
		D_{35}	mm		4.00
		D_{50}	mm		6.43
		D_{84}	mm		11.30
		D_{95}	mm		19.77
46	Particle Size Distribution - Bar	D_{16}	mm		0.00
		D_{35}	mm		2.22
		D_{50}	mm		6.07
		D_{84}	mm		18.46
		D_{95}	mm		22.27
47	Largest Particle Size		mm		35.00

USFWS-SHARP COARSE WOODY DEBRIS	
Stream: Unnamed Tributary to Zekiah Swamp Run	Page 1 of 1
Reach: Reference Reach	Date: 7/24/2004
adapted from E.G. Robinson and R.L. Beschta. 1990	Crew: MAS & KR

Survey total = Number of LWD pieces greater than 0.65 ft (20 cm) in diameter (small end) and 4.9 ft (1.5 m) in length

Reach Length (ft) =452				BF Width (ft) = 8				
Large end diam (ft)	Avg. diam (ft)	Length (ft)	Influence Zones	Horiz. Orient.	Rootwad instream/out	Debris Grouped / Ungrouped	Provides Grade Control	Notes (CWD location - pool, run, riffle, glide) (CWD responsible for pool formation: dominant, secondary, negligible)
0.90	0.80	19.0	2 3 4	45	Out	UG	N	Riffle
0.60	0.60	12.0	3 4	10	Out	UG	N	Riffle
1.10	1.40	5.5	3 4	130	Out	G	N	Pool-spans ch

Influence Zone and Horizontal Orientation - see back of sheet

Rootwad in/out refers to the rootwad being located in or out of the stream

Debris Grouped/Ungrouped: grouped debris is debris that is part of collection of debris, ungrouped debris is a single piece by itself