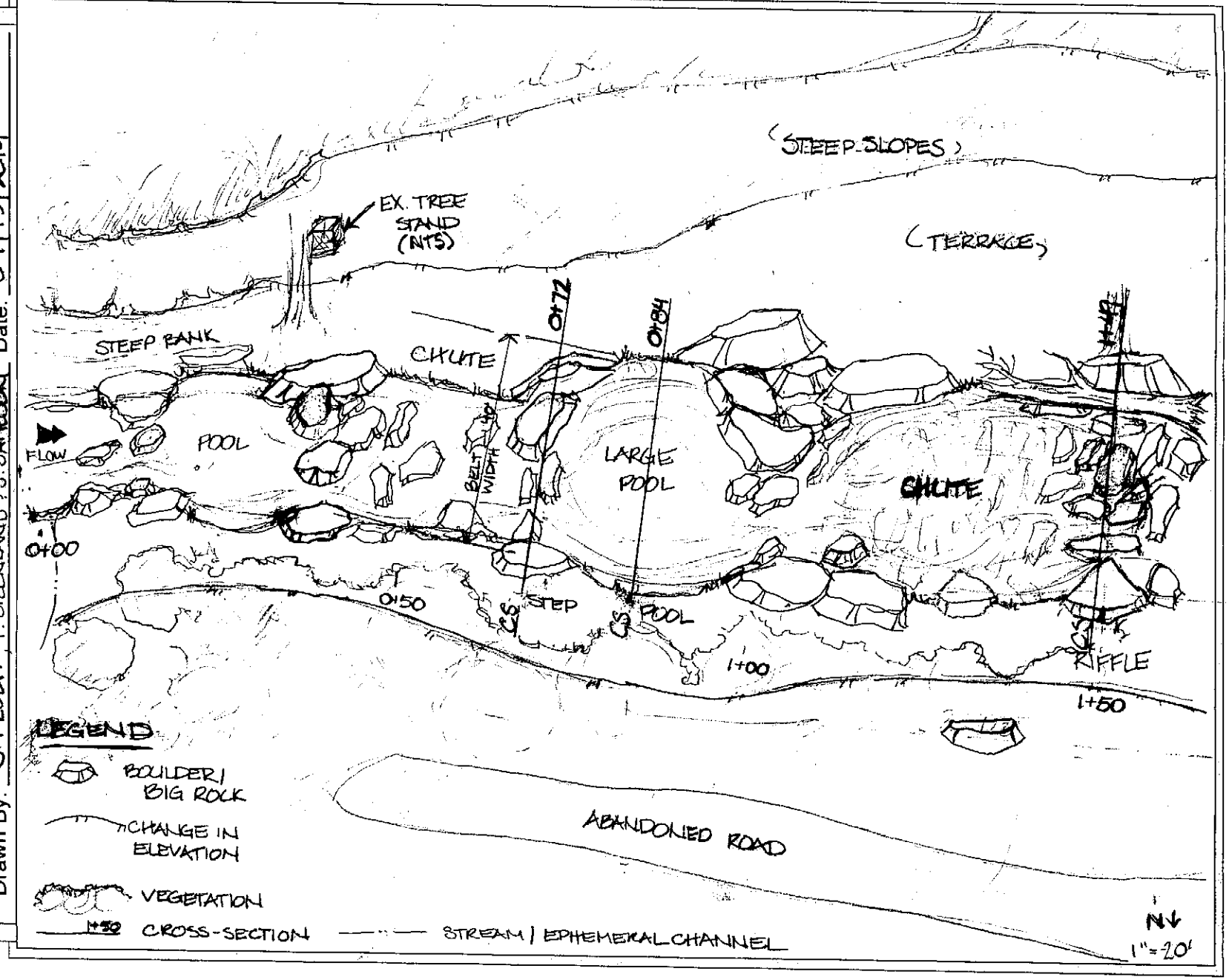
AREA-SITE LOCATION...REACH MAP

Stream: SHARMAN'S BRANCH, WASHINGTON CO., MARYLAND Reach: 4

Drawn By: S. PRUETT, P. STEENLAND & J. JAMESON Date: 04/15/2014



SHEET 1 OF 2

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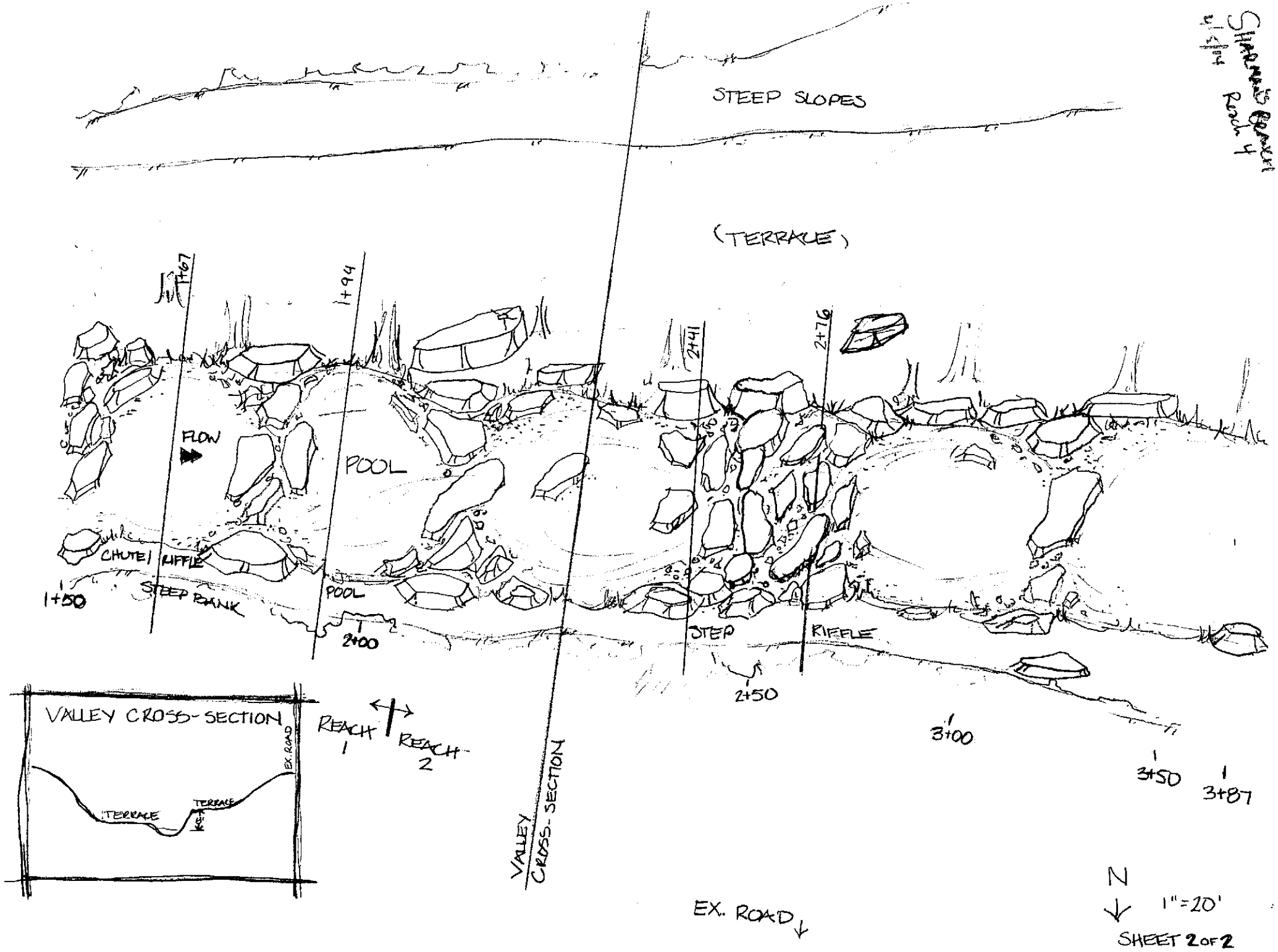
Shannon Creek
Reach 4
STEEP SLOPES
(TERRACE)
1+67
1+94
2+41
2+76
FLOW
POOL
CHUTE
RIFFLE
STEEP BANK
POOL
STEP
RIFFLE
1+50
2+00
2+50
3+00
3+50
3+87
VALLEY CROSS-SECTION
EX. ROAD
TERRACE
TERRACE
REACH 1
REACH 2
VALLEY CROSS-SECTION
EX. ROAD
N
1"=20'

SHEET 2 OF 2

0+72

Team 4

BM = 10.42

SB

SURVEY DATA ⟹ **CROSS - SECTION 2**

SITE: Step pool upper step Step 7 Date: 4/15/14

0+72

Item	STATION ft	BS ft	HI ft	FS ft	Elevation ft	NOTES / COMMENTS / REMARKS
29	BM	10.42	101.80			
30	0+00				5.24	
31	2+00				6.38	
32	3+2				7.93	
33	5.2				9.15	LB
34	7.2				9.54	WE surface
35	7.2				9.66	W
36	9.2				9.84	
37	11.6				10.05	
38	13.7				10.095	
39	15.8				9.84	
40	17.4				9.51	
41	18.7				9.34	
42	19.8				9.51	
43	21.6				9.80	
44	22.7				9.86	
45	24+00				10.0	
46	25+00				10.26	
47	26.4				9.76	
48	28.0				10.03	
49	30.0				10.10	
50	30.3				10.17	
51	32.3				9.84	
52	33.8				9.62	
53	34.8				9.26	WE RB surface
54	36.7				8.22	BF
55	38.6				7.11	
56	43.2				6.16	
57	48.9				5.43	
58	55.1				4.84	tape
59						

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0+84 10.42 BM Tea 4 SB

SURVEY DATA ⟹ **CROSS - SECTION** 1

SITE: UPPER Pool (Wider than Most) Pool 1 Date: 4/15/14

Location:

Party / Notes: HUC:

	Item	Distance, Point, or STATION ft	Back-Sight BS ft	Height of Instrument HI ft	Fore-Sight FS ft	Elevation ft	NOTES / COMMENTS / REMARKS
BM		~~LBKF~~	10.42	101.80	~~5.88~~		
0+02		~~LBKF~~			5.88		
0+84 0+03	3	~~RBK~~			7.76		LB
0+54	4	~~RBKF~~			9.10		
0+68	5	~~RBKF~~			9.40		
0+7.6	6	0+7.6			9.96		WE Surface of water
0+7.6	7	0+7.6			10.50		WE Bed elev.
0+00	8	0+9.			10.78		
10+00	9	0+10			10.78		
11+00	10	0+11			10.95		
12+00	11	0+12			11.10		
13+12	12	0+13.2			11.09		
14+03	13	0+14.3			10.37		
15+1	14	0+15.1			10.67		
16+00	15	0+16			10.62		
17+00	16	0+17			10.80		
18+00	17	0+18			10.92		
19+14	18	0+19.4			11.01		
20+00	19	0+20			11.21		
22+00	20	0+22			11.18		
24+00	21	0+24.8			10.98		
27+00	22	0+27			11.1		
3	23	30+00			11.74		
	24	31+00			11.68		thowg
	25	32+00			12.01		
	26	34+00			11.74		
	27	36+00			11.36		
	28	38+00			11.18		
		38+00			10.86		

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38+00	9.51	WE Surface
40+70	9.74	RB
42+50	9.04	Backfill
45+10	7.72	
47+50	6.46	
52+00	5.38	
57+00	5.22	
62+40	5.02	

1+49

Team 4 SB

1+49 Station

BM 6.18

Rep Riffle

SURVEY DATA ⟹ **CROSS - SECTION 4**

SITE: Upper Riffle (Schist) Date: 4/15/14

END OF BENCH 2+01

Item	STATION ft	B S ft	H I ft	F S ft	Elevation ft	NOTES COMMENTS REMARKS
29	0+00			[illegible]	3.99	PIN
30	0+02				5.72	
31	0+05.5				6.99	
32	0+06.5				~~7.97~~ 8.32	WELB
33	0+08				8.73	
34	0+10				9.00	
35	0+12				8.85	
36	0+14				8.66	
37	0+16				9.10	T
38	0+18				8.99	
39	0+20				8.32	
40	0+22				8.26	
41	0+24				8.0	
42	0+25.5				8.06	EW RB
43	0+26.3				7.03	EB
44	0+28				6.74	BF
45	0+30				6.41	
46	0+32				6.02	
47	0+34				5.63	
48	0+36				5.38	
49	0+38				5.93	
50	0+40				4.48	
51	0+42				3.99	
52	0+44				3.63	
53	0+45.5				3.39	pin
54						
55						
56						
57						
58						
59						

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Team 4 SB

SURVEY DATA ⟹ **CROSS - SECTION 3**

SITE: ~~Loop~~ Middle Chute 0+167 Date: 4/15/14

95.225

Item	STATION ft	B S ft	H I ft	F S ft	Elevation ft	NOTES COMMENTS REMARKS
29	BM	3.845				
30	0+00				3.79	
31	0+2				5.09	
32	0+4.4				5.87	WE LB surface
33	0+4.4				5.95	WE LB channel
34	0+5.5				6.22	
35	0+7.0				6.28	
36	0+8.4				6.70	
37	0+9.4				6.85	
38	0+10.7				6.95	
39	0+11.7				6.24	
40	+13.0				5.93	
41	+14.5				6.66	
42	+15.7				7.09	
43	+16.9				6.18	
44	+18.3				5.44	
45	+19.8				6.38	
46	+22.6				5.82	WE RB Surface
47	+24.6				4.75	BF
48	+31.3				3.18	
49	+37.2				2.78	end of tape
50						
51						
52						
53						
54						
55						
56						
57						
58						
59						

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~~1~~+94 91.38 9 Team 4 SB

6.18

9756

SURVEY DATA ⟹ **CROSS - SECTION 5**

SITE: Lower Pool Pool 2 Date: 4/15/14

1+94

B

HI = 95.225

Item	STATION ft	B S ft	H I ft	F S ft	Elevation ft	NOTES COMMENTS REMARKS
29	BM	[illegible]				
30	0+00	3.845			4.78	
31	+3.0				5.23	
32	+4.2				5.68	
33	+5.7				6.65	WE LB surface
34	+5.7				6.79	WE channel
35	+6.9				7.31	
36	+8.2				7.49	
37	+9.9				7.51	
38	+11.5				7.63	
39	+13.4				7.85	
40	+14.9				7.76	
41	+16.5				7.75	
42	+17.7				7.58	
43	+19.2				7.61	
44	+20.9				7.23	
45	+22.7				7.62	
46	+24.7				7.43	
47	+26.9				7.06	
48	+29.5				6.53	WE RB surface
49	+32.5				5.62	BF
50	+36.1				5.26	
51	+39.0				4.41	end of tape
52						
53						
54						
55						
56						
57						
58						
59						

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SURVEY DATA ⟶ **CROSS - SECTION** 1

SITE: Date: 4/15/14

Location: ~~[illegible]~~ Lowest Step Step 2

Party / Notes: Team 4 HUC:

BM = 3.845

HI = 75.225

Item	Distance, Point, or STATION ft	Back-Sight BS ft	Height of Instrument HI ft	Fore-Sight FS ft	Elevation ft	REMARKS / COMMENTS / NOTES
1	0.0	7.706				
2	4.5	7.55				
3	7.6	8.09				
4	10.5	8.36				
5	13.8	9.24				
6	16.4	9.56				
7	24.2	10.0				
8	25.2	9.35				
9	26.2	8.72				
10	29.6	6.97				
11	32.2	7.58				
12	34.5	8.44				
13	35.5	9.47				Water Edge L Bank
14	35.8	10.15				
15	36.7	10.55				
16	37.8	9.24				
17	38.9	9.27				
18	40.0	9.10				
19	41.5	10.16				
20	44.0	9.42				
21	45.5	9.62				
22	46.2	10.39				
23	48.4	9.78				Water Edge R Bank
24	48.4	10.28				streambed
25	49.0	9.83				
26	50.8	9.58				
27	52.0	10.22				
28	54.7	10.52				
	58.0	6.56				

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Team 4 SB

SURVEY DATA ⟹ CROSS - SECTION 6

SITE: Cross section 2+76 Lowest Riffle Date: 4/15/14

Item	STATION ft	BS ft	HI ft	FS ft	Elevation ft	NOTES / COMMENTS / REMARKS
29	0	3.29	88.82			
30	0+2	3.39				
31	0+5	4.18				BF
32	0+5.9	4.71				
33	0+7	5.07				
34	0+9.7	5.00				
35	0+12.4	4.86				
36	0+14.3	4.84				
37	0+15.7	5.07				
38	0+16.8	5.55				
39	0+17.6	5.30				
40	0+19	5.56				
41	0+20	5.70				
42	0+20.1	7.21				
43	0+21	7.33				
44	0+22.1	6.65				
45	0+23	6.24				
46	0+24.5	6.13				
47	0+24.9	5.70				
48	0+25.5	5.51				
49	0+27.2	5.79				
50	0+27.3	7.79				
51	0+28	7.27				
52	0+28.6	7.05				
53	0+30.2	6.92				
54	0+30.6	6.46				
55	0+32.0	6.42				
56	0+32.4	6.08				Water surface
57	0+32.8	5.79				
58	0+34.4	5.6				
59	0+36	4.13				

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SURVEY DATA ⟹ **CROSS - SECTION 7**

SITE: VS 2+76 Date: 4/15/14

Item	STATION ft	B S ft	H I ft	F S ft	Elevation ft	NOTES COMMENTS REMARKS
29	0+36.5	5.68				
30	0+40.3	2.77				
31	0+41	4.17				
32	0+42.5	3.48				
33	0+44	2.75				
34	0+46.5	1.90				
35						
36						
37						
38						
39						
40						
41						
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51						
52						
53						
54						
55						
56						
57						
58						
59						

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① 194 Pool
x section : 42.4
BF w : 29
BF $\bar{d}$: 1.64
w/D : 17.6

③ 72 Step
x-Section : 50.1
BF w = 32.7
BF $\bar{d}$: 1.58
w/D : 20.64

5 149 Representative Riffle
BF x-Section : 37.7
BF w : 26
BF $\bar{d}$: 1.45
w/D : 17.88

4 167 Riffle (chute)
BF x-section : 33.3
BF w : 17.0
BF $\bar{d}$: 1.54
w/D : 11.03

⑤ 84 Pool (upper)
BF x-section : 68.8
BF w : 38.3
BF $\bar{d}$: 1.76
w/d : 21.65

⑥ 276 Riffle (A)
BF x-section : 41.4
BF w : 31
BF $\bar{d}$: 1.33
w/d : 23.25

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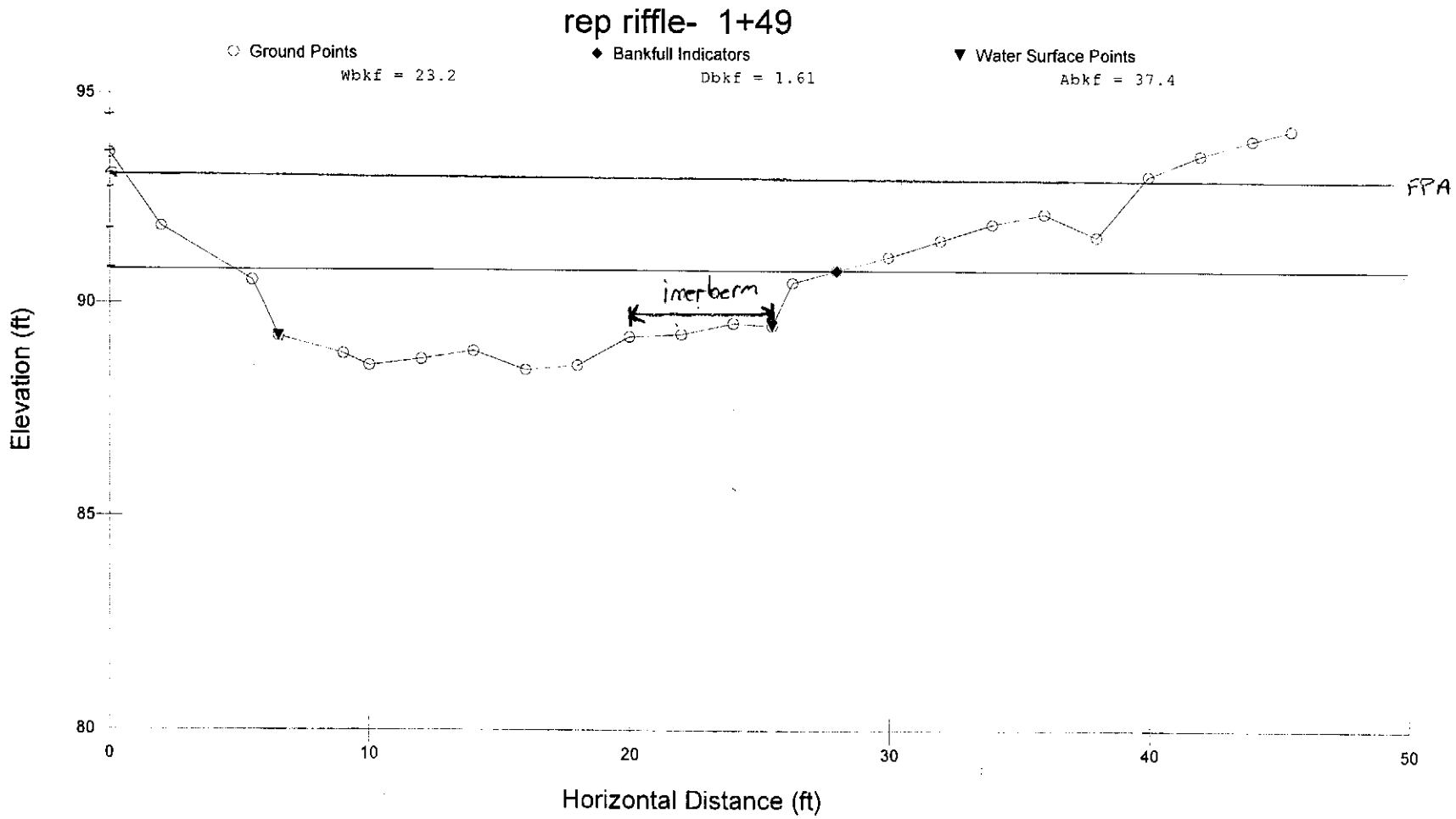
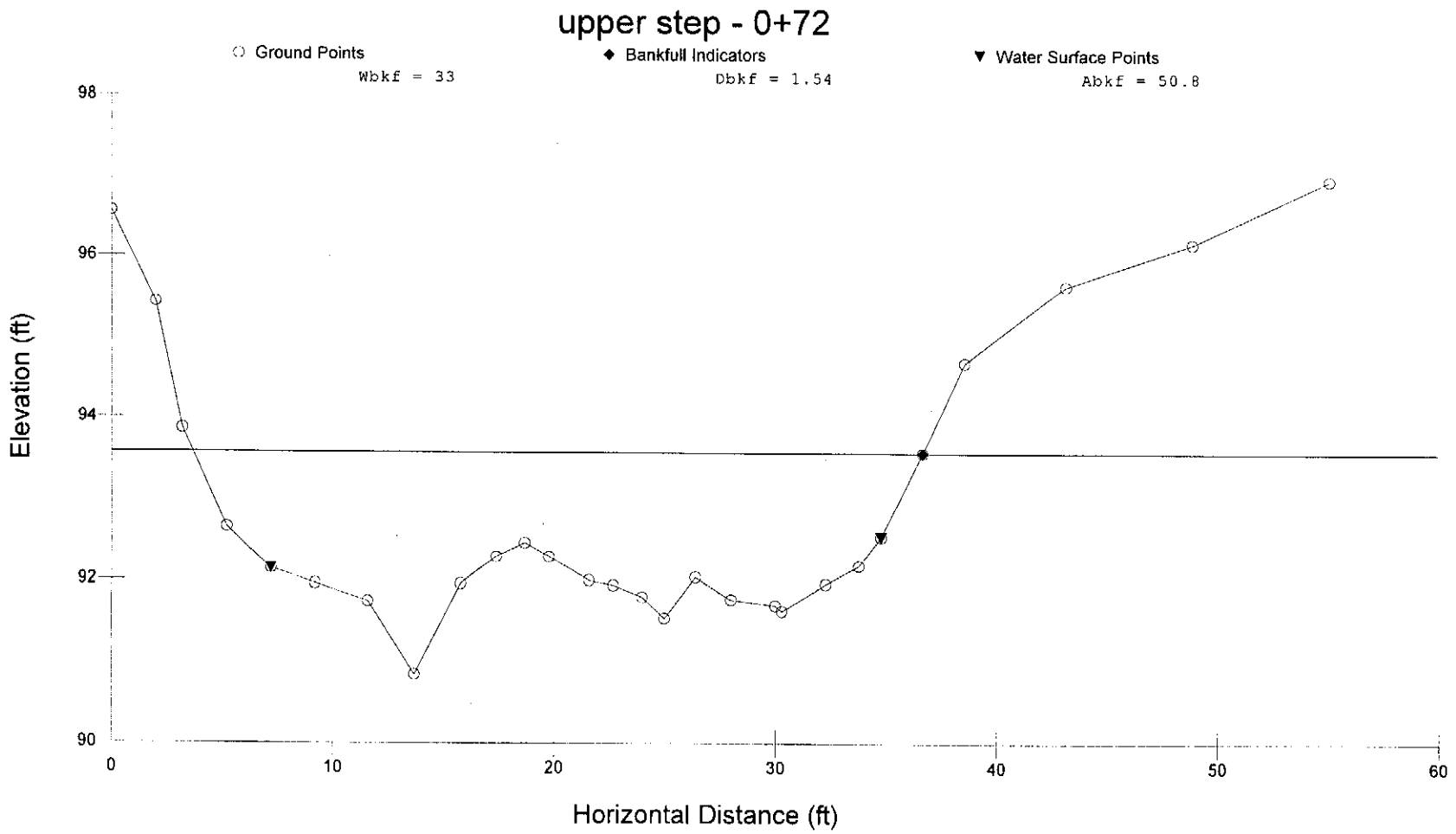
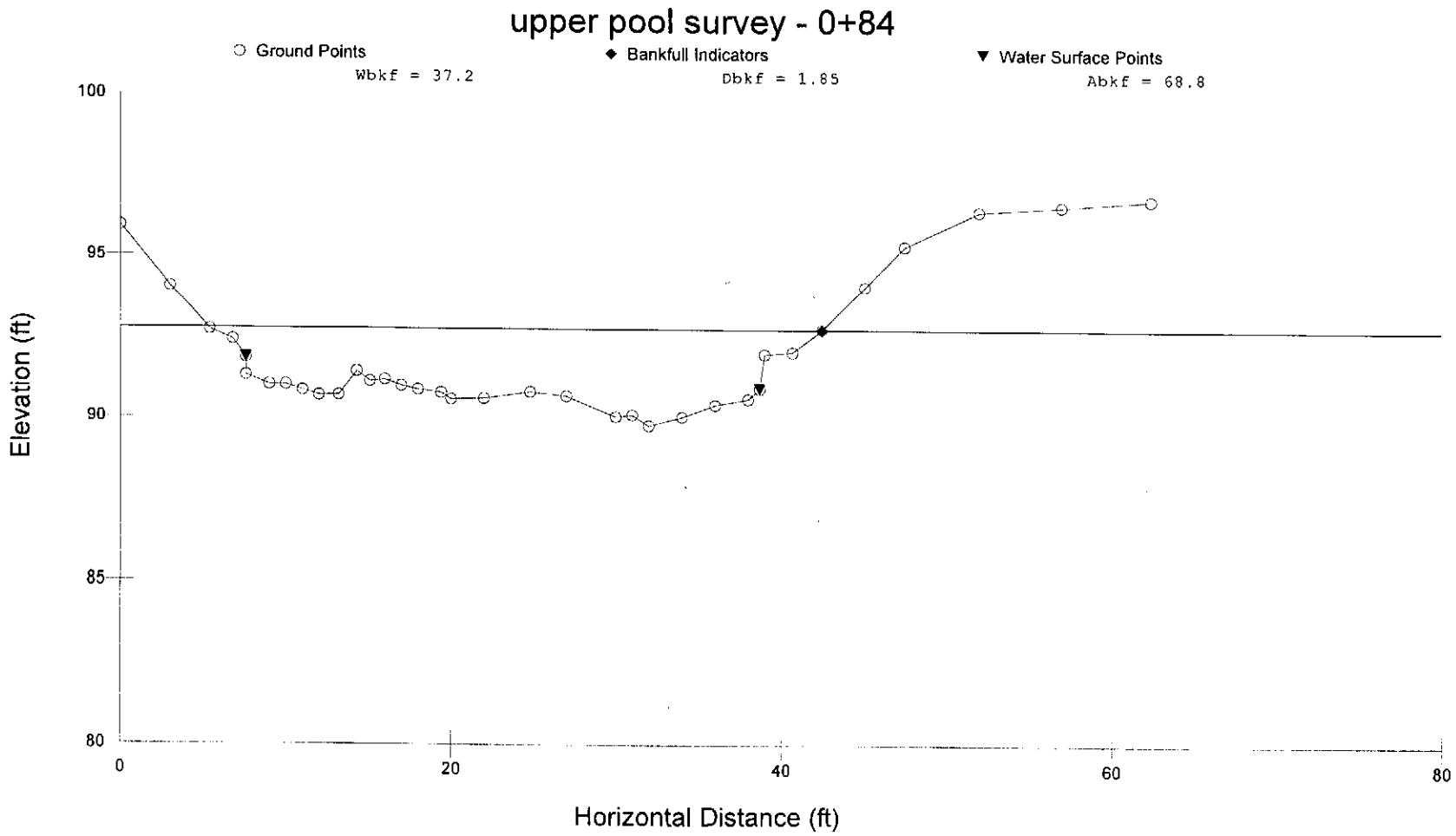


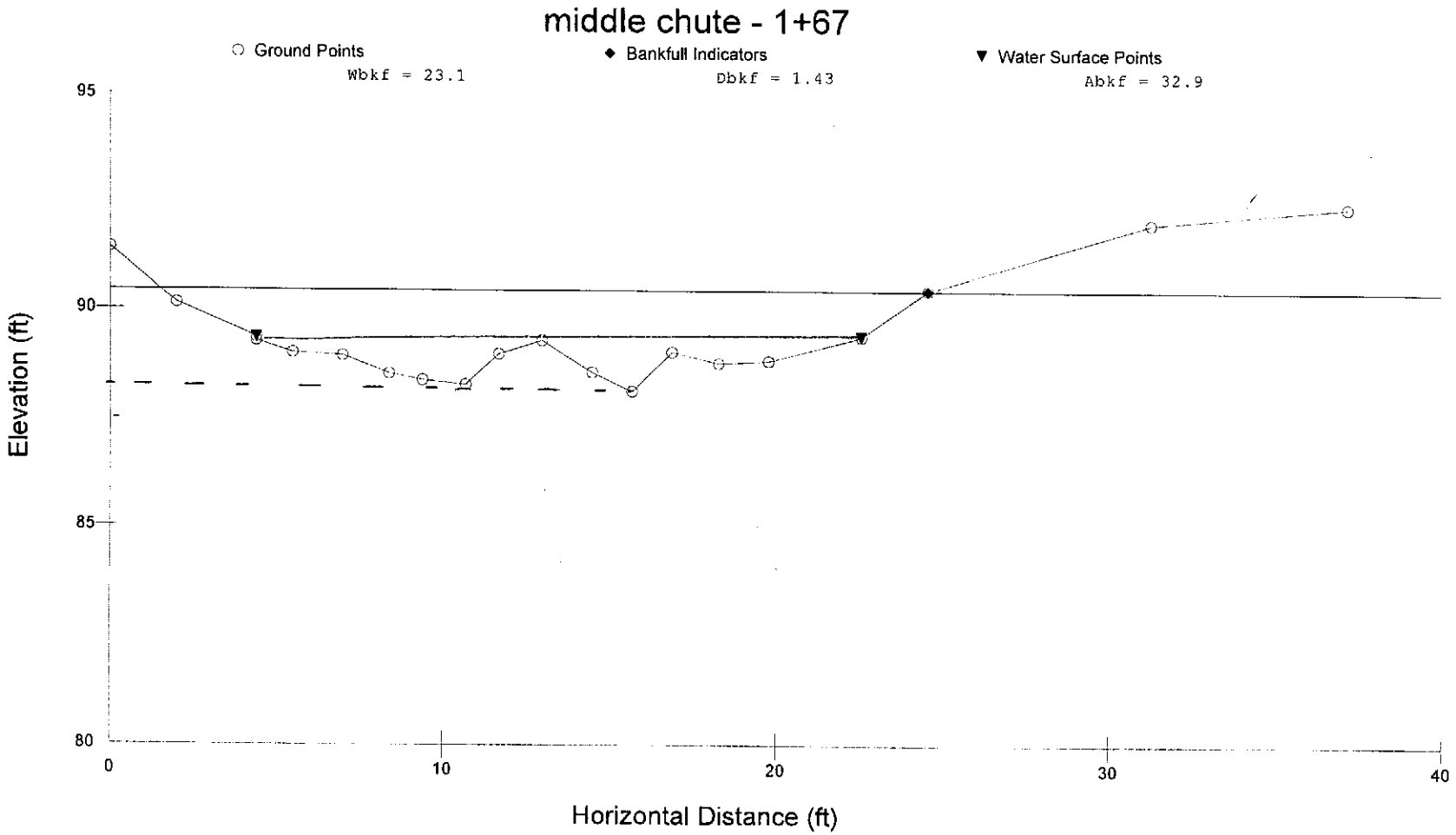
Shannon's Branch
Reach 4 4/15/14



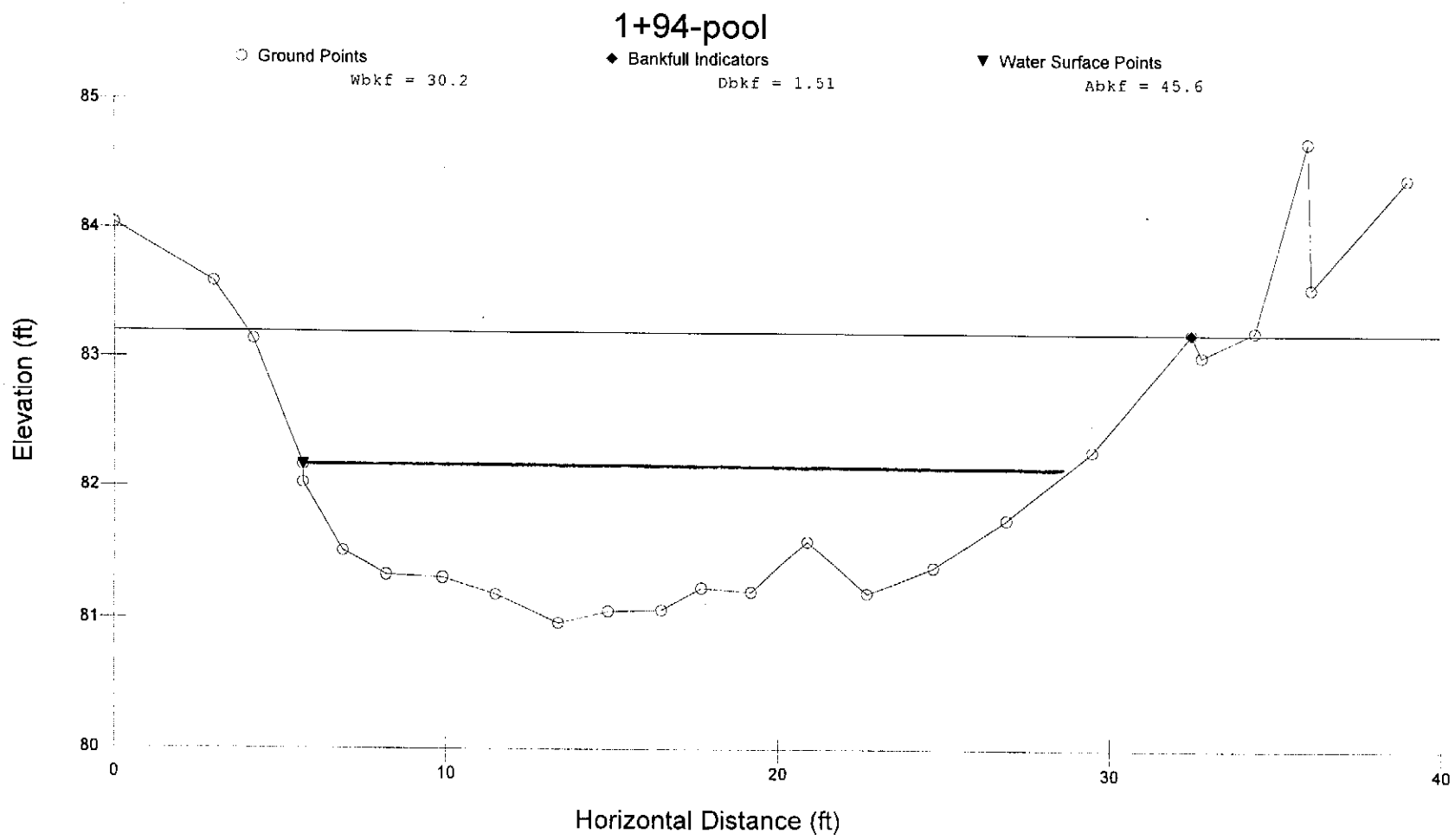
Shannon's Branch
4/15/14 Reach 4



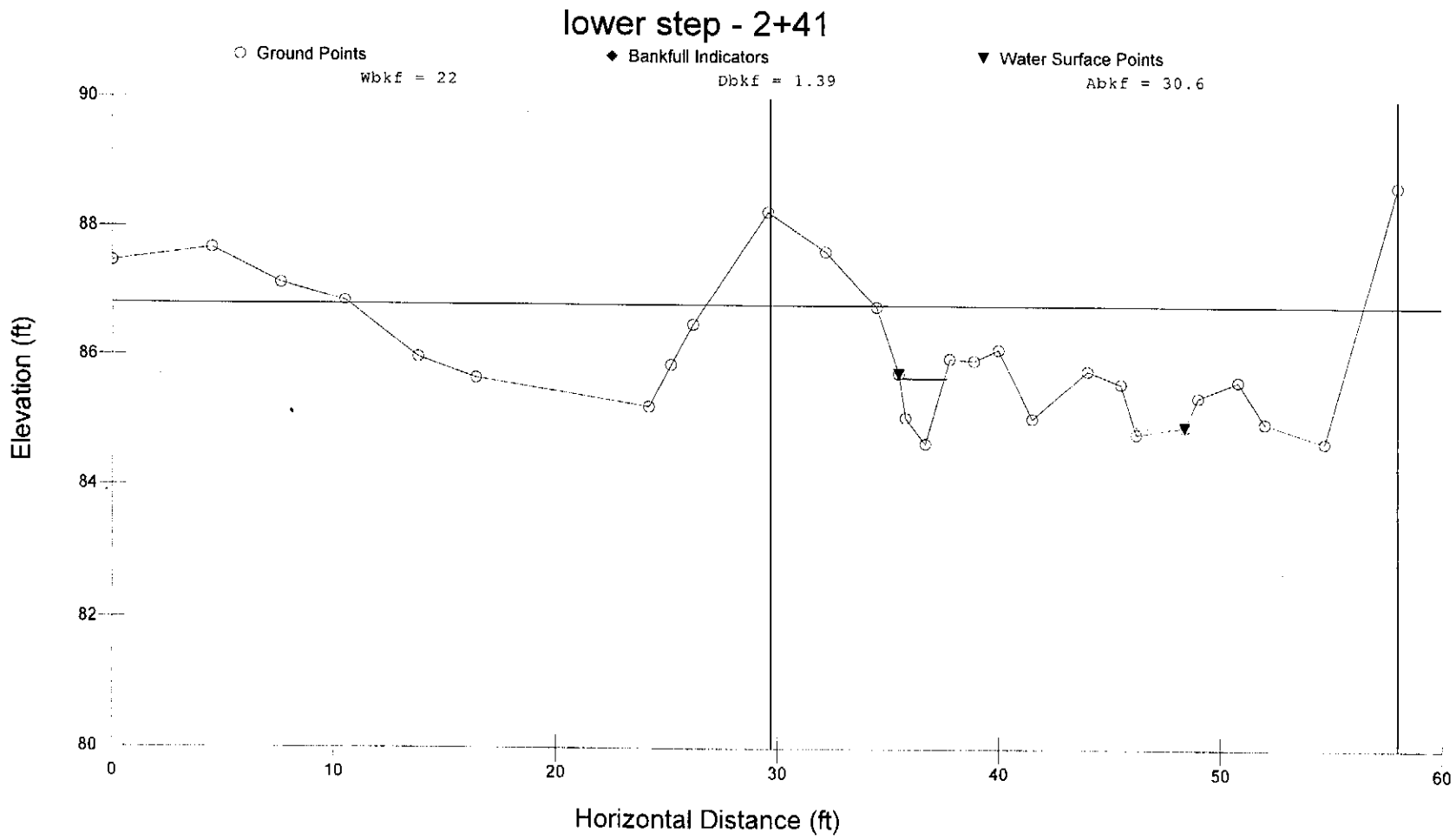
Shannon Beaver
Team 4
4/15/14



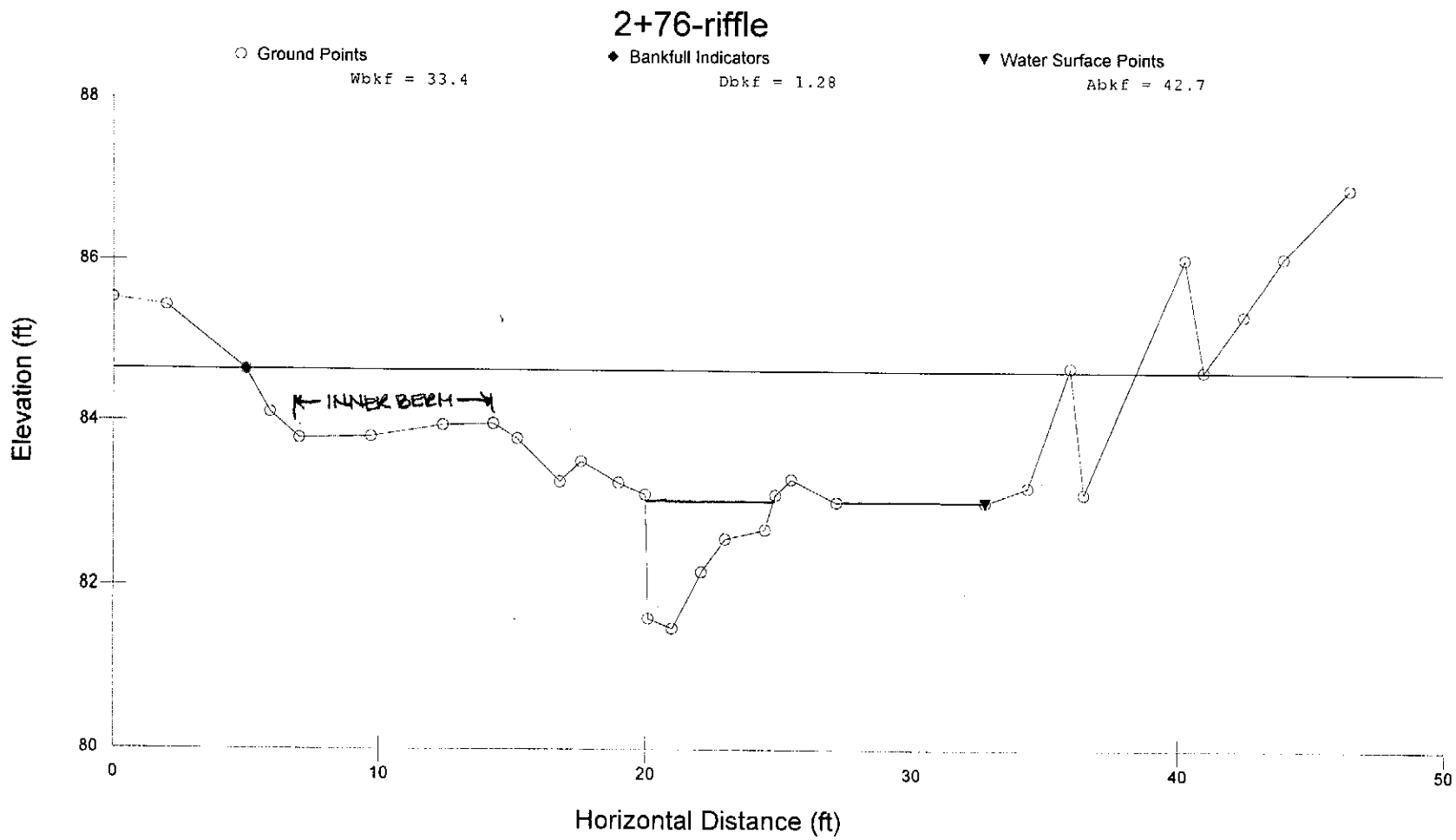
SHARMAN'S BRANCH
4/15/14 Team 4



Shannon's Branch
Team 4 4/15/14

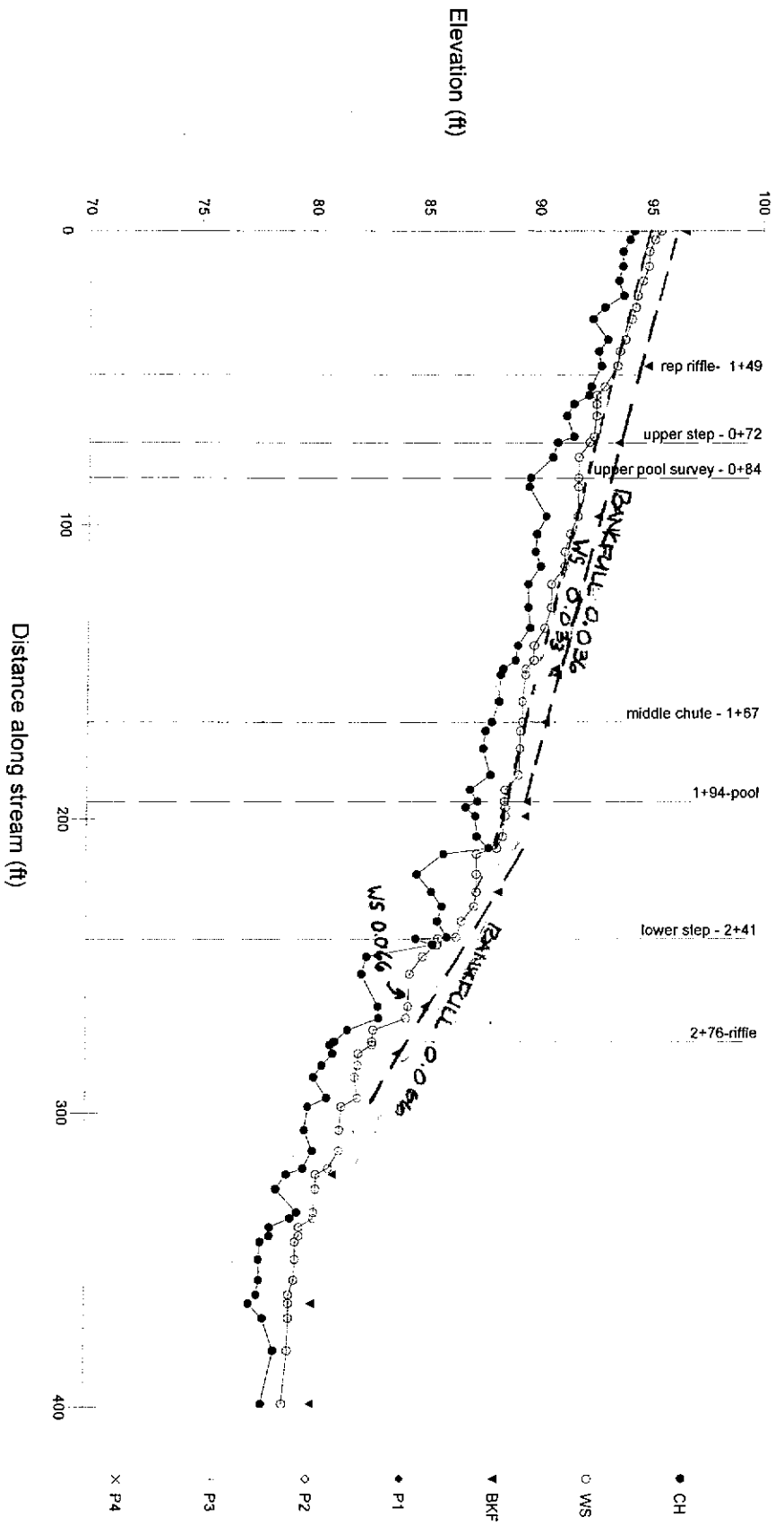


SHARMANS BRANCH
TOAM 4 4/15/14



Sharman's Branch
4/15/14 Team 4

Profile Team 4 4/15/14
Sharman's Branch



SURVEY DATA ⟶ **LONGITUDINAL PROFILE 2**

SITE: Sharman's Run Date: 4/15/14

Location: Crew 4

Party / Notes: HUC:

	Distance, Point, or	Back-Sight	Height of Instru-ment	Thalweg		Water Surface		Bankfull		Low Bank HI		NOTES
				Fore-Sight	Elevation	Fore-Sight	Elevation	Fore-Sight	Elevation	Fore-Sight	Elevation	e.g. Riffle Run Pool Glide
	STATION	BS	HI	FS	Elev.	FS	Elev.	FS	Elev.	FS	Elev.	
	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	
28	1+35			10.31	89.69	9.67	90.33					
29	1+41			10.89	89.11	10.12	89.88					
30	1+46			11.00	89.00	10.12	89.88					~~xs Riffle~~ (Rep)
	1+49				88.46		89.50		90.82			
31	1+51			11.65	88.35	10.24	89.50	9.08	90.92			
32	1+60			11.70	88.30	10.65	89.35					
33	1+67			12.00	88.00	[redacted]	89.35	9.60	90.40			xs
34	1+70			12.28	87.72	10.75	89.25					
35	1+76			12.38	87.62	10.75	89.25					
36	1+85			12.05	87.95	10.80	89.20					
37	1+90			12.95	87.05	11.40	88.60		89.61			~~xs Lower~~ Pool
	1+94				87.38		88.50					
38	1+96			13.15	86.85	11.40	88.60					
39	1+99			12.70	87.30	11.40	88.60	10.47	89.53			
40	2+06			12.64	87.36	11.50	88.50					
41	2+10			12.10	87.90	11.75	88.25					
42	2+12			14.12	85.88	12.64	87.36					
43	2+19			15.31	84.69	12.64	87.36					
44	2+25			14.46	87.54	12.64	87.36	11.67	88.33			
45	2+30			14.18	85.82	12.74	87.26					
46	2+35			14.38	85.62	13.30	86.70					
47	2+40.5			13.93	86.06	13.53	86.47					
48	2+41			15.34	84.66	14.34	85.66					
49	2+43			14.58	85.42	14.38	85.62					
50	2+47			17.52	82.48	15.02	84.98					
51	2+53			17.75	82.25	15.60	84.40					~~xs Lower Pool~~
	2+63				84.68		85.75					
52	2+64			17.00	83.00	15.67	84.33	14.92	85.08			
53	2+68			16.98	83.02	15.76	84.24					
54	TP			16.05	83.95							

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SURVEY DATA ⟶ **LONGITUDINAL PROFILE 3**

SITE: Sharman's Run **Date:** 4/15/14

Location: Crew 4

Party / Notes: HUC:

	Distance, Point, or STATION ft	Back-Sight BS ft	Height of Instrument HI ft	Thalweg Fore-Sight FS ft	Thalweg Elevation Elev. ft	Water Surface Fore-Sight FS ft	Water Surface Elevation Elev. ft	Bankfull Fore-Sight FS ft	Bankfull Elevation Elev. ft	Low Bank HI Fore-Sight FS ft	Low Bank HI Elevation Elev. ft	NOTES e.g. Riffle Run Pool Glide
55		4.87	88.82									
56	2+72 ~~2+76~~			7.72	81.62 ~~81.03~~	6.03	82.79 ~~82.74~~					~~XS~~ Lowest Riffle
57	2+77			7.98	80.84	6.03	82.79					
58	2+80			7.85	80.97	6.60	82.12	5.02	82.80			
59	2+84			8.33	80.49	6.72	82.10					
60	2+88			8.69	80.13	6.86	81.96					
61	2+95			8.11	80.71	6.73	82.09					
62	2+98			8.95	79.87	7.45	81.37					
63	3+06			9.10	79.72	7.54	81.28					
64	3+13			8.73	80.09	7.56	81.26					
65	3+19			9.16	79.66	8.03	80.79					
66	3+21			9.90	78.92	8.57	80.25	~~7.84~~	~~80.98~~			
67	3+26			10.35	78.47	8.58	80.24					
68	3+34			9.43	79.39	8.67	80.15					
69	3+36			9.73	79.09	8.68	80.14					
70	3+39			10.61	78.21	9.33	79.49					
71	3+42			10.62	78.20	9.33	79.49					
72	3+44			11.20	77.86	9.50	79.32					
73	3+50			11.09	77.73	9.50	79.32					
74	3+57			11.08	77.79	9.55	79.27					
75	3+62			11.20	77.62	9.78	79.04					
76	3+65			11.55	77.27	9.78	79.04	8.77	80.05			
77	3+70			10.90	77.92	9.78	79.04					
78	3+81			10.42	78.40	9.81	79.01					
79	3+99			10.95	77.87	10.03	78.79	~~8.77~~	~~80.05~~			
80												
81												

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SURVEY DATA ⟶ **LONGITUDINAL PROFILE 1**

SITE: Sharman's Run Date: 4/15/14

Location: Crew 4

Party / Notes: HUC:

	Distance, Point, or STATION ft	Back-Sight BS ft	Height of Instrument HI ft	Thalweg Fore-Sight FS ft	Thalweg Elevation Elev. ft	Water Surface Fore-Sight FS ft	Water Surface Elevation Elev. ft	Bankfull Fore-Sight FS ft	Bankfull Elevation Elev. ft	Low Bank HI Fore-Sight FS ft	Low Bank HI Elevation Elev. ft	NOTES e.g. Riffle Run Pool Glide
1			100.00									
2		8.62										
3	0+00			5.80	94.2	4.60	95.40	3.5	96.50			
4	0+03			6.00	94.0	4.88	95.12					
5	0+07			6.30	93.7	5.13	94.87					
6	0+12			6.30	93.7	5.14	94.86					
7	0+17			6.48	93.52	5.39	94.61					
8	0+22			6.25	93.75	5.64	94.36					
9	0+26			7.10	92.90	5.72	94.28					
10	0+30			7.62	92.38	5.89	94.11					
11	0+37			6.96	93.04	6.18	93.82					
12	0+41			7.35	92.65	6.41	93.59					
13	0+46			7.24	92.76	6.41	93.49	5.14	94.86			
14	0+53			7.68	92.32	6.51	92.92					
15	0+56			7.78	92.22	7.08	92.57					
16	0+59			8.45	91.55	7.43	92.57					
17	0+63			8.76	91.24	7.45	92.57					
18	0+70			8.44	91.56	7.55	92.45		93.58			XS Step Pool
	0+72				90.89		92.26					
19	0+77			9.36	90.64	8.21	91.89		92.76			
20	0+84			10.34	89.66	[redacted]	91.89	~~8.43~~	~~92.57~~			XS Pool
21	0+87			10.40	89.60	8.21	91.79					
22	0+97			9.64	90.36	8.23	91.77	7.33	92.67			
23	1+03			10.04	89.96	8.57	91.43					
24	1+09			10.10	89.90	8.80	91.20					
25	1+14			9.87	90.13	8.80	91.20					
26	1+20			10.41	89.59	9.38	90.62	~~8.99~~	~~91.01~~			
27	1+28			10.40	89.60	9.38	90.62					

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REPRESENTATIVE RIFFLE (PROTRUSION)

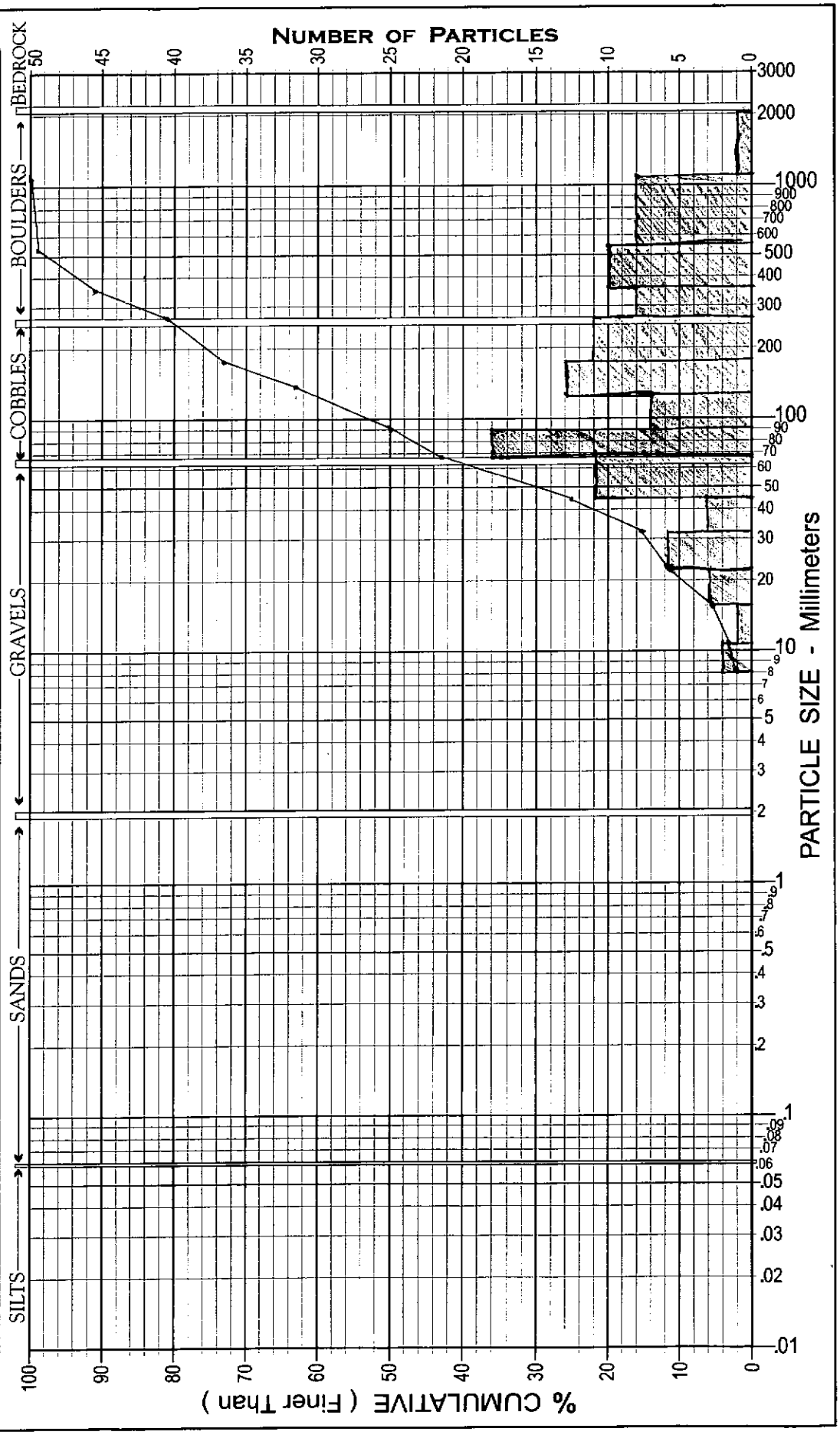
PEBBLE COUNT DATA

LOCATION: SHARMAN'S BRANCH Date: 04/15/2014

REACH: PARTY:

Stream Type: TEAM 4 (B-TYPE SECTION) Valley Type:

HUC:



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REPRESENTATIVE RIFFLE (PROTRUSION)
B-TYPE SECTION

Site: SHARMAN'S BRANCH Date: 04/15/2014

Location: HUC:

Party: TEAM 4

Inches	PARTICLE	Millimeters		Dot Count for RIFFLE 1	POOL 2	COMP. 3	RIFFLE (1) TOT #	ITEM %	% CUM	POOL (2) TOT #	ITEM %	% CUM	COMPOSITE (3) TOT #	ITEM %	% CUM
							Reach:			Reach:			Reach:		
							Date:			Date:			Date:		
	Silt / Clay	< .062	S/C												
	Very Fine	.062 - .125	SAND												
	Fine	.125 - .25													
	Medium	.25 - .50													
	Coarse	.50 - 1.0													
.04 - .08	Very Coarse	1.0 - 2													
.08 - .16	Very Fine	2 - 4	GRAVEL												
.16 - .22	Fine	4 - 5.7													
.22 - .31	Fine	5.7 - 8													
.31 - .44	Medium	8 - 11.3					2	1.96	1.96						
.44 - .63	Medium	11.3 - 16					1	0.98	2.94						
.63 - .89	Coarse	16 - 22.6					3	2.94	5.88						
.89 - 1.3	Coarse	22.6 - 32					6	5.88	11.76						
1.3 - 1.8	Very Coarse	32 - 45					3	2.94	14.70						
1.8 - 2.5	Very Coarse	45 - 64					11	10.78	25.48						
2.5 - 3.5	Small	64 - 90	COBBLE				18	17.65	43.13						
3.5 - 5.0	Small	90 - 128					7	6.86	49.99						
5.0 - 7.1	Large	128 - 180					13	12.75	62.74						
7.1 - 10.1	Large	180 - 256					11	10.78	73.52						
10.1 - 14.3	Small	256 - 362	BOULDER				8	7.84	81.36						
14.3 - 20	Small	362 - 512					10	9.80	91.16						
20 - 40	Medium	512 - 1024					8	7.84	99.00						
40 - 80	Large-Vry Large	1024 - 2048					1	0.98	99.98						
	Bedrock		BDRK												
Stream Type:			**Valley Type:**			TOTAL→	102	100	100%						

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Site: Sharman Creek Date: 4/15/14

Location: Upper Reach HUC:

Party: Team 4

Inches	PARTICLE	Millimeters		Dot Count for RIFFLE 1	POOL 2	COMP. 3	RIFFLE (1) TOT #	ITEM %	% CUM	POOL (2) TOT #	ITEM %	% CUM	COMPOSITE (3) TOT #	ITEM %	% CUM
	Silt / Clay	< .062	S/C				1	1.41	1.41	—	—	—	1	0.98	0.98
	Very Fine	.062 - .125	SAND				—	—		—	—	—	—	—	—
	Fine	.125 - .25					—	—		—	—	—	—	—	—
	Medium	.25 - .50					—	—		2	6.45	6.45	2	1.96	2.94
	Coarse	.50 - 1.0					3	4.23	5.63	—	—		3	2.94	5.88
.04 - .08	Very Coarse	1.0 - 2					—	—		—	—		—	—	
.08 - .16	Very Fine	2 - 4	GRAVEL				—	—		—	—		—	—	
.16 - .22	Fine	4 - 5.7					—	—		—	—		—	—	
.22 - .31	Fine	5.7 - 8					—	—		—	—		—	—	
.31 - .44	Medium	8 - 11.3					—	—		—	—		—	—	
.44 - .63	Medium	11.3 - 16					1	1.41	7.04	—	—		1	0.98	6.86
.63 - .89	Coarse	16 - 22.6					1	1.41	8.45	2	6.45	12.9	3	2.94	9.8
.89 - 1.3	Coarse	22.6 - 32					1	1.41	9.86	3	9.68	22.58	4	3.92	13.7
1.3 - 1.8	Very Coarse	32 - 45					1	1.41	11.27	2	6.45	29.03	3	2.94	16.7
1.8 - 2.5	Very Coarse	45 - 64					5	7.04	18.31	7	22.58	51.61	12	11.76	28.4
2.5 - 3.5	Small	64 - 90	COBBLE				9	12.68	30.99	2	6.45	58.06	11	10.78	39.2
3.5 - 5.0	Small	90 - 128					—	—	30.99	5	16.13	74.19	5	4.9	44.1
5.0 - 7.1	Large	128 - 180					6	8.45	39.4	2	6.45	80.65	8	7.8	52
7.1 - 10.1	Large	180 - 256					3	4.23	43.7	1	3.23	83.87	4	3.9	55.9
10.1 - 14.3	Small	256 - 362	BOULDER				1	1.41	45.1	1	3.23	87.1	2	2	57.8
14.3 - 20	Small	362 - 512					2	2.82	47.9	1	3.23	90.32	3	2.94	60.8
20 - 40	Medium	512 - 1024					8	11.27	59.2	0	—	90.32	8	7.84	68.63
40 - 80	Large-Vry Large	1024 - 2048					12	16.9	76.1	2	6.45	96.7	14	13.73	82.35
	Bedrock		BDRK				17	23.94	100	1	3.23	100	18	17.65	100
Stream Type:			Valley Type:			TOTAL→	71	100	100	31	100		102		

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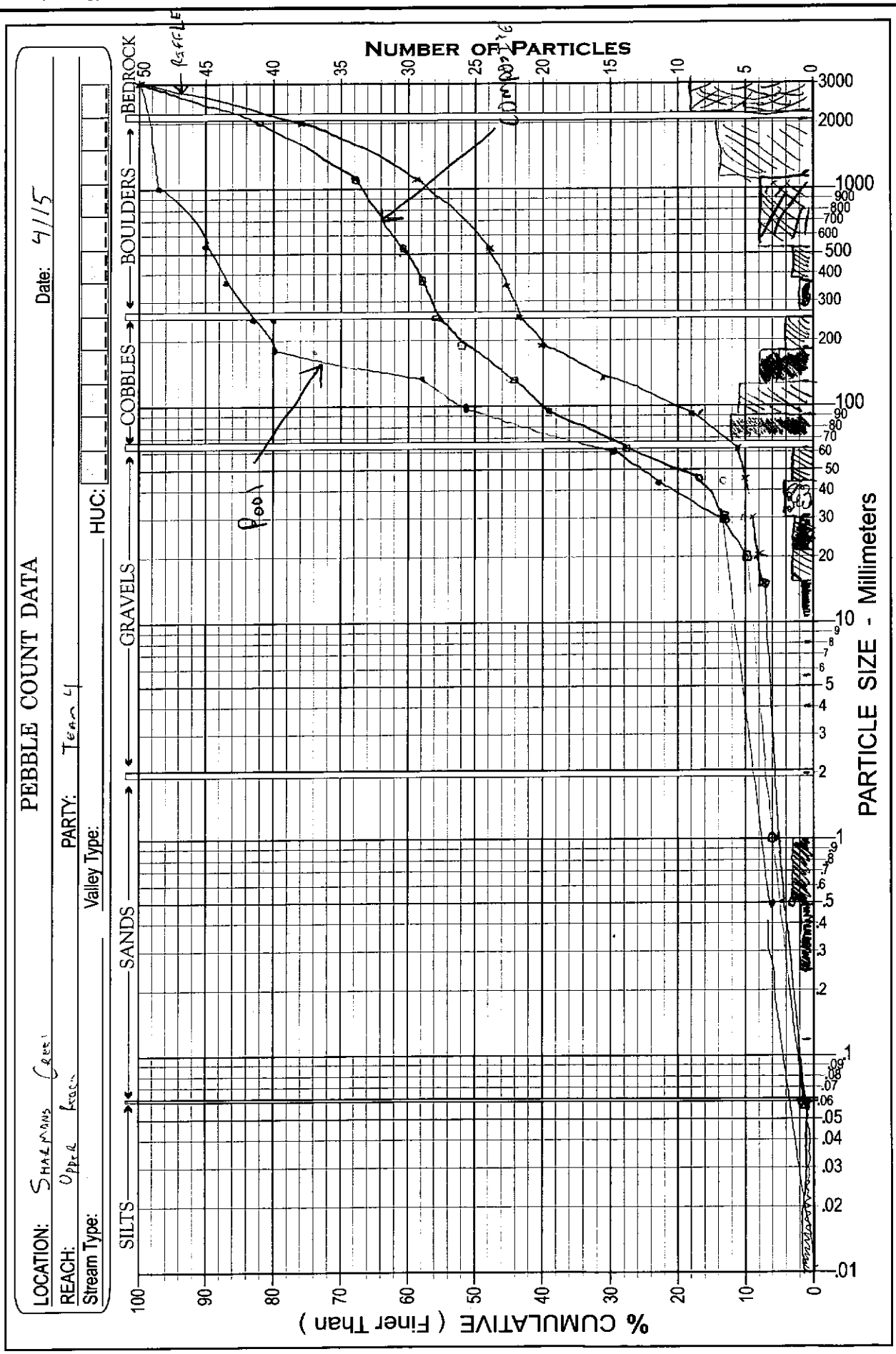

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Worksheet B-1. Field Form for Level II Stream Classification (*First Field Day*).

Stream: Sharman's Branch			
Basin:	Drainage Area:	acres 3.6	mi^2
Location: Washington County, MD			
Twp.&Rge:	Sec.&Qtr.:		
Cross-Section Monuments (Lat./Long.):		Date: 4/15/14	
Observers: Group 4		Valley Type:	

Bankfull WIDTH (W_{bkf}) WIDTH of the stream channel at bankfull stage elevation, in a riffle section.	26	ft
Bankfull DEPTH (d_{bkf}) Mean DEPTH of the stream channel cross-section, at bankfull stage elevation, in a riffle section ($d_{bkf} = A_{bkf} / W_{bkf}$).	1.454	ft
Bankfull X-Section AREA (A_{bkf}) AREA of the stream channel cross-section, at bankfull stage elevation, in a riffle section.	37.8	ft^2
Width/Depth Ratio (W_{bkf} / d_{bkf}) Bankfull WIDTH divided by bankfull mean DEPTH, in a riffle section.	17.88	ft/ft
Maximum DEPTH (d_{max}) Maximum depth of the bankfull channel cross-section, or distance between the bankfull stage and Thalweg elevations, in a riffle section.	2.36	ft
WIDTH of Flood-Prone Area (W_{fpa}) Twice maximum DEPTH, or ($2 \times d_{mbkf}$) = the stage/elevation at which flood-prone area WIDTH is determined in a riffle section.	40	ft
Entrenchment Ratio (ER) The ratio of flood-prone area WIDTH divided by bankfull channel WIDTH (W_{fpa} / W_{bkf}) (riffle section).	1.54	ft/ft
Channel Materials (Particle Size Index) D_{50} The D_{50} particle size index represents the median or dominant diameter of channel materials, as sampled proportionately from the channel surface, between the bankfull stage and Thalweg elevations.	167	mm
Water Surface SLOPE (S) Channel slope = "rise over run" for a reach approximately 20–30 bankfull channel widths in length, with the "riffle-to-riffle" water surface slope representing the gradient at bankfull stage.	0.036	ft/ft
Channel SINUOSITY (k) Sinuosity is an index of channel pattern, determined from a ratio of stream length divided by valley length (SL / VL); or estimated from a ratio of valley slope divided by channel slope (S_{val} / S).	1.05	

Stream Type B3/1 **See Classification Key (Figure B-2)**

C - BR - BC

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.033
.037
.022
.0367
.038
.033
3.33 SLOPE FOR B-TYPE

Worksheet B-2. Computations of velocity and discharge using various methods (*First Field Day*).

Bankfull VELOCITY & DISCHARGE Estimates

Stream:	Sharman's Branch	Location:	Washington County, MD
Date:	4/15/14	Stream Type:	
Valley Type:			
Observers:	Group 4	HUC:	-- -- -- -- -- -- -- -- -- -- --

INPUT VARIABLES			OUTPUT VARIABLES		
Bankfull Riffle Cross-Sectional AREA	37.8	A_{bkf} (ft^2)	Bankfull Riffle Mean DEPTH	1.454	d_{bkf} (ft)
Bankfull Riffle WIDTH	26	W_{bkf} (ft)	Wetted PERIMETER ~ $(2 * d_{bkf}) + W_{bkf}$	28.9	W_p (ft)
D_{84} at Riffle	402.21	Dia. (mm)	D_{84} (mm) / 304.8	1.32	D_{84} (ft)
Bankfull SLOPE	0.036	S_{bkf} (ft / ft)	Hydraulic RADIUS A_{bkf} / W_p	1.31	R (ft)
Gravitational Acceleration	32.2	g (ft / sec^2)	Relative Roughness R(ft) / D_{84} (ft)	0.99	R / D_{84}
Drainage Area	3.6	DA (mi^2)	Shear Velocity $u^* = (gRS)^{1/2}$	1.23	u^* (ft/sec)

ESTIMATION METHODS	Bankfull VELOCITY		Bankfull DISCHARGE	
1. Friction Factor / Relative Roughness $\bar{u} = [\,2.83 + 5.66 * Log\{R / D_{84}\}\,]\,u^*$	2.78	ft / sec	105.0	cfs
2. Roughness Coefficient: a) Manning's *n* from Friction Factor / Relative Roughness (Figs. B-34, B-35) $\bar{u} = 1.49*R^{2/3}*S^{1/2}/n$ $n =$ 0.06	5.64	ft / sec	213.2	cfs
2. Roughness Coefficient: b) Manning's *n* from Stream Type (Fig. B-36) $\bar{u} = 1.49*R^{2/3}*S^{1/2}/n$ $n =$ 0.06	5.64	ft / sec	213.2	cfs
2. Roughness Coefficient: c) Manning's *n* from Jarrett (USGS): $\bar{u} = 1.49*R^{2/3}*S^{1/2}/n$ $n = 0.39*S^{0.38}*R^{-0.16}$ Note: This equation is applicable to steep, step/pool, high boundary roughness, cobble- and boulder-dominated stream systems; i.e., for Stream Types A1, A2, A3, B1, B2, B3, C2 & E3 $n =$ .106	3.19	ft / sec	120.7	cfs
3. Other Methods (Hey, Darcy-Weisbach, Chezy C, etc.)		ft / sec		cfs
3. Other Methods (Hey, Darcy-Weisbach, Chezy C, etc.)		ft / sec		cfs
4. Continuity Equations: a) USGS Gage Data $\bar{u} = Q / A$ Return Period for Bankfull Discharge Q = ____ year		ft / sec		cfs
4. Continuity Equations: b) Regional Curves $\bar{u} = Q / A$	3.49	ft / sec	120	cfs

Protrusion Height Options for the D_{84} Term in the Relative Roughness Relation (R/D_{84}) – Estimation Method 1

Option 1.	For **sand-bed** channels: Measure 100 **"protrusion heights"** of sand dunes from the downstream side of feature to the top of feature. Substitute the D_{84} sand dune protrusion height in ft for the D_{84} term in method 1.
Option 2.	For **boulder-dominated** channels: Measure 100 **"protrusion heights"** of boulders on the sides from the bed elevation to the top of the rock on that side. Substitute the D_{84} boulder protrusion height in ft for the D_{84} term in method 1.
Option 3.	For **bedrock-dominated** channels: Measure 100 **"protrusion heights"** of rock separations, steps, joints or uplifted surfaces above channel bed elevation. Substitute the D_{84} bedrock protrusion height in ft for the D_{84} term in method 1.
Option 4.	For **log-influenced** channels: Measure **"protrusion heights"** proportionate to channel width of log diameters or the height of the log on upstream side if embedded. Substitute the D_{84} protrusion height in ft for the D_{84} term in method 1.

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Worksheet B-3a. Morphological relations, including dimensionless ratios (*First Field Day*).

Stream: SHARMAN BRANCH Location: WASHINGTON Co, MD

Observers: Date: 04/15/2014 Valley Type: Stream Type:

River Reach Dimension Summary Data.....1

B-Type (n=2) A-Type (n=1)

Riffle Dimensions*, **, ***		Mean	Min	Max		Riffle Dimensions & Dimensionless Ratios****		Mean	Min	Max
Riffle Width (W_{bkf})	B/A	23.15 / 33.4	23.1	23.2	ft	Riffle Cross-Sectional Area (A_{bkf}) (ft^2)	B/A	35.15 / 42.7	32.9	37.4
Riffle Mean Depth (d_{bkf})	B/A	1.52 / 1.28	1.43	1.61	ft	Riffle Width/Depth Ratio (W_{bkf} / d_{bkf})	B/A	15.23 / 26.09	16.15	14.41
Riffle Maximum Depth (d_{max})	B/A	2.345 / 3.15	2.33	2.36	ft	Riffle Max Depth to Riffle Mean Depth (d_{max} / d_{bkf})	B/A	1.55 / 2.50	1.6	1.5
Width of Flood-Prone Area (W_{fpa})	B/A	[redacted] / 46.5	37.2	39.96	ft	Entrenchment Ratio (W_{fpa} / W_{bkf})	B/A	1.67 / 1.4	1.6	1.7
Riffle Inner Berm Width (W_{ib})	B/A	13.5 / 26.9	13.5		ft	Riffle Inner Berm Width to Riffle Width (W_{ib} / W_{bkf})	B/A	0.58 / 0.81		
Riffle Inner Berm Depth (d_{ib})	B/A	0.47 / 0.74	0.47		ft	Riffle Inner Berm Depth to Mean Depth (d_{ib} / d_{bkf})	B/A	0.37 / [illegible]	1.10	
Riffle Inner Berm Area (A_{ib})	B/A	33.4 / 20	[illegible]		ft^2	Riffle Inner Berm Area to Riffle Area (A_{ib} / A_{bkf})	B/A	1.062 / 0.47		
Riffle Inner Berm W/D Ratio (W_{ib} / d_{ib})	B/A	28.72 / 36.35								

Borderline for A-Type

PUCKER TIME?

B-Type ONLY (n=2)

Pool Dimensions*, **, ***	Mean	Min	Max		Pool Dimensions & Dimensionless Ratios****	Mean	Min	Max
Pool Width (W_{bkfp})	33.7	30.19	37.21	ft	Pool Width to Riffle Width (W_{bkfp} / W_{bkf})	1.46	1.31	1.60
Pool Mean Depth (d_{bkfp})	1.68	1.51	1.85	ft	Pool Mean Depth to Riffle Mean Depth (d_{bkfp} / d_{bkf})	1.10	1.06	1.15
Pool Cross-Sectional Area (A_{bkfp})	57.19	45.57	68.82	ft	Pool Area to Riffle Area (A_{bkfp} / A_{bkf})	1.63	1.39	1.84
Pool Maximum Depth (d_{maxp})	2.60	2.23	2.97	ft	Pool Max Depth to Riffle Mean Depth (d_{maxp} / d_{bkf})	1.71	1.56	1.84
Pool Inner Berm Width (W_{ibp})				ft	Pool Inner Berm Width to Pool Width (W_{ibp} / W_{bkfp})			
Pool Inner Berm Depth (d_{ibp})				ft	Pool Inner Berm Depth to Pool Depth (d_{ibp} / d_{bkfp})			
Pool Inner Berm Area (A_{ibp})				ft^2	Pool Inner Berm Area to Pool Area (A_{ibp} / A_{bkfp})			
Point Bar Slope (S_{pb})				ft/ft	Pool Inner Berm Width/Depth Ratio (W_{ibp} / d_{ibp})			

NO BERM IN POOLS

NO BERM IN POOLS

Run Dimensions*	Mean	Min	Max		Run Dimensionless Ratios****	Mean	Min	Max
Run Width (W_{bkfr})				ft	Run Width to Riffle Width (W_{bkfr} / W_{bkf})			
Run Mean Depth (d_{bkfr})				ft	Run Mean Depth to Riffle Mean Depth (d_{bkfr} / d_{bkf})			
Run Cross-Sectional Area (A_{bkfr})				ft	Run Area to Riffle Area (A_{bkfr} / A_{bkf})			
Run Maximum Depth (d_{maxr})				ft	Run Max Depth to Riffle Mean Depth (d_{maxr} / d_{bkf})			
Run Width/Depth Ratio (W_{bkfr} / d_{bkfr})				ft				

Glide Dimensions*	Mean	Min	Max		Glide Dimensions & Dimensionless Ratios****	Mean	Min	Max
Glide Width (W_{bkfg})				ft	Glide Width to Riffle Width (W_{bkfg} / W_{bkf})			
Glide Mean Depth (d_{bkfg})				ft	Glide Mean Depth to Riffle Mean Depth (d_{bkfg} / d_{bkf})			
Glide Cross-Sectional Area (A_{bkfg})				ft	Glide Area to Riffle Area (A_{bkfg} / A_{bkf})			
Glide Maximum Depth (d_{maxg})				ft	Glide Max Depth to Riffle Mean Depth (d_{maxg} / d_{bkf})			
Glide Width/Depth Ratio (W_{bkfg} / d_{bkfg})				ft/ft	Glide Inner Berm Width/Depth Ratio (W_{ibg} / d_{ibg})			
Glide Inner Berm Width (W_{ibg})				ft	Glide Inner Berm Width to Glide Width (W_{ibg}/W_{bkfg})			
Glide Inner Berm Depth (d_{ibg})				ft	Glide Inner Berm Depth to Glide Depth (d_{ibg} / d_{bkfg})			
Glide Inner Berm Area (A_{ibg})				ft^2	Glide Inner Berm Area to Glide Area (A_{ibg} / A_{bkfg})			

B-Type (n=1) A-Type (n=1)

Step**		Mean	Min	Max		Step Dimensionless Ratios****		Mean	Min	Max
Step Width (W_{bkfs})	B/A	33.02 / 22.02			ft	Step Width to Riffle Width (W_{bkfs} / W_{bkf})	B/A	1.43 / 0.66		
Step Mean Depth (d_{bkfs})	B/A	1.54 / 1.39			ft	Step Mean Depth to Riffle Mean Depth (d_{bkfs} / d_{bkf})	B/A	1.01 / 1.09		
Step Cross-Sectional Area (A_{bkfs})	B/A	50.83 / 30.57			ft	Step Area to Riffle Area (A_{bkfs} / A_{bkf})	B/A	1.45 / 0.72		
Step Maximum Depth (d_{maxs})	B/A	2.73 / 2.14			ft	Step Max Depth to Riffle Mean Depth (d_{maxs} / d_{bkf})	B/A	1.80 / 1.67		
Step Width/Depth Ratio (W_{bkfs} / d_{bkfs})	B/A	21.44 / 15.84								

*

*Riffle–Pool system (i.e., C, E, F stream types) bed features include riffles, runs, pools and glides.

**Step–Pool system (i.e., A, B, G stream types) bed features include riffles, rapids, chutes, pools and steps (note: include rapids and chutes in riffle category).

***Convergence-Divergence system (i.e., D stream types) bed features include riffles and pools; cross-sections taken at riffles for classification purposes.

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B-Type S_{BKF}: 3.6%
A-Type S_{BKF}: 6.6%

Worksheet B-3b. Morphological relations, including dimensionless ratios (*First Field Day*).

Stream: Sharmin's Branch Location:

Observers: Group 4 Date: 4/15/14 Valley Type: C-BR-BC Stream Type: B4/A4

River Reach Summary Data.....2

Hydraulics

Streamflow: Estimated Mean Velocity at Bankfull Stage ($\bar{u}_{bkf}$)	3.19	ft/sec	Estimation Method	Jarrett	
Streamflow: Estimated Discharge at Bankfull Stage (Q_{bkf})	120.7	cfs	Drainage Area	3.6	mi²

Applicable to Step-pool

Channel Pattern

Geometry	Mean	Min	Max		Dimensionless Geometry Ratios	Mean	Min	Max
Linear Wavelength (λ)	N/A	N/A	N/A	ft	Linear Wavelength to Riffle Width (λ / W_{bkf})	N/A	N/A	N/A
Stream Meander Length (L_m)	N/A	N/A	N/A	ft	Stream Meander Length Ratio (L_m / W_{bkf})	N/A	N/A	N/A
Radius of Curvature (R_c)	N/A	N/A	N/A	ft	Radius of Curvature to Riffle Width (R_c / W_{bkf})	N/A	N/A	N/A
Belt Width (W_{blt})	40	36	44	ft	Meander Width Ratio (W_{blt} / W_{bkf})	1.54	1.38	1.69
Arc Length (L_a)	N/A	N/A	N/A	ft	Arc Length to Riffle Width (L_a / W_{bkf})	N/A		
Riffle Length (L_r)	B 16.3 / A 8.75	15 / 7	20 / 12	ft	Riffle Length to Riffle Width (L_r / W_{bkf})	B 0.50 / A 0.262	0.38 / 0.21	0.77 / 0.36
Individual Pool Length (L_p)	B 17 / A 15.75	14 / 15	19 / 16	ft	Individual Pool Length to Riffle Width (L_p / W_{bkf})	B 0.75 / A 0.49	0.60 / 0.45	0.82 / 0.48
Pool to Pool Spacing (P_s)	B 26.5 / A 28.75	22 / 15	30 / 35	ft	Pool to Pool Spacing to Riffle Width (P_s / W_{bkf})	B 1.10 / A 0.86	0.95 / 0.45	1.45 / 1.05

B: 20, 28, 15

Channel Profile

Valley Slope (S_{val})	4.8	ft/ft	Average Water Surface Slope (S)	B 2.35% / A 6.6%	ft/ft	Sinuosity (S_{val} / S)	N/A
Stream Length (SL) (B-TYPE)	635	ft	Valley Length (VL) (B-TYPE)	604	ft	Sinuosity (SL / VL)	1.025
Low Bank Height (LBH)	start N/A / end N/A	ft	Max Depth (d_{max}) 2.73	start / end	ft	Bank-Height Ratio (BHR) (LBH / d_{max})	start N/A / end N/A

B-1.051
A-1.00

Facet Slopes	Mean	Min	Max		Dimensionless Facet Slope Ratios	Mean	Min	Max
Riffle Slope (S_{rif})	B 3.4 / A 7.24	2.5 / 5.6	4.6 / 8.7	ft/ft	Riffle Slope to Average Water Surface Slope (S_{rif} / S)	B 1.02 / A 1.10	0.75 / 0.85	1.38 / 1.32
~~Run Slope (S_{run})~~				ft/ft	Run Slope to Average Water Surface Slope (S_{run} / S)	N/A		
Pool Slope (S_p)	B 1.3 / A 1.3	0.5 / 0.5	2.0 / 3.0	ft/ft	Pool Slope to Average Water Surface Slope (S_p / S)	B 0.39 / A 0.20	0.15 / 0.08	0.90 / 0.46
~~Glide Slope (S_g)~~				ft/ft	Glide Slope to Average Water Surface Slope (S_g / S)	N/A		
Step Slope (S_s)	B 7.6 / A 27.5	6.5 / 20.0	8.7 / 34.9	ft/ft	Step Slope to Average Water Surface Slope (S_s / S)	B 2.25 / A 4.18	1.95 / 3.04	2.6 / 5.17

Max Depths[a]	Mean	Min	Max		Dimensionless Depth Ratios	Mean	Min	Max
Max Riffle Depth (d_{maxrif})	B 2.345 / A 3.15	2.33	2.30	ft	Max Riffle Depth to Mean Riffle Depth (d_{maxrif} / d_{bkf})	B 1.54 / A 2.07	1.53	1.55
~~Max Run Depth (d_{maxrun})~~				ft	~~Max Run Depth to Mean Riffle Depth (d_{maxrun} / d_{bkf})~~			
Max Pool Depth (d_{maxp})	B 2.16 / A —	2.23 / —	2.97 / —	ft	Max Pool Depth to Mean Riffle Depth (d_{maxp} / d_{bkf})	B 1.71 / A —	1.46 / —	1.95 / —
~~Max Glide Depth (d_{maxg})~~				ft	~~Max Glide Depth to Mean Riffle Depth (d_{maxg} / d_{bkf})~~			
Max Step Depth (d_{maxs})	B 2.72 / A 2.14	— / —	— / —	ft	Max Step Depth to Mean Riffle Depth (d_{maxs} / d_{bkf})	B 1.79 / A 1.41		

Channel Materials

	Reach[b]	Riffle[c]	Bar		Reach[b]	Riffle[c]	Bar	Protrusion Height[d]	
% Silt/Clay	0.98		Ø	D_{16}	42.04			47.27	mm
% Sand	4.9		Ø	D_{35}	79.83			78.01	mm
% Gravel	22.55	N/A	25.49	D_{50}	167	N/A	N/A	128.0	mm
% Cobble	27.45		48.04	D_{84}	BR			402.21	mm
% Boulder	26.47		26.47	D_{95}	BR			761.47	mm
% Bedrock	17.65		Ø	D_{100}	BR			2047.9	mm

[a] Min, max & mean depths are measured from Thalweg to bankfull at mid-point of feature for riffles, runs & steps, the deepest part of pools, & at the tail-out of glides.
[b] Composite sample of riffles and pools within the designated reach.
[c] Active bed of a riffle.
[d] Height of roughness feature above bed.

REGIONAL CURVE DATA

X-S_A: 34.4 ft²

W_{BKF}: 24.4'

d_{BKF}: 1.41'

U: 3.49

Q: 120

W_{BKF}:
B: 23.15
A: 33.4

MEAN RIFFLE - (B) 1.52

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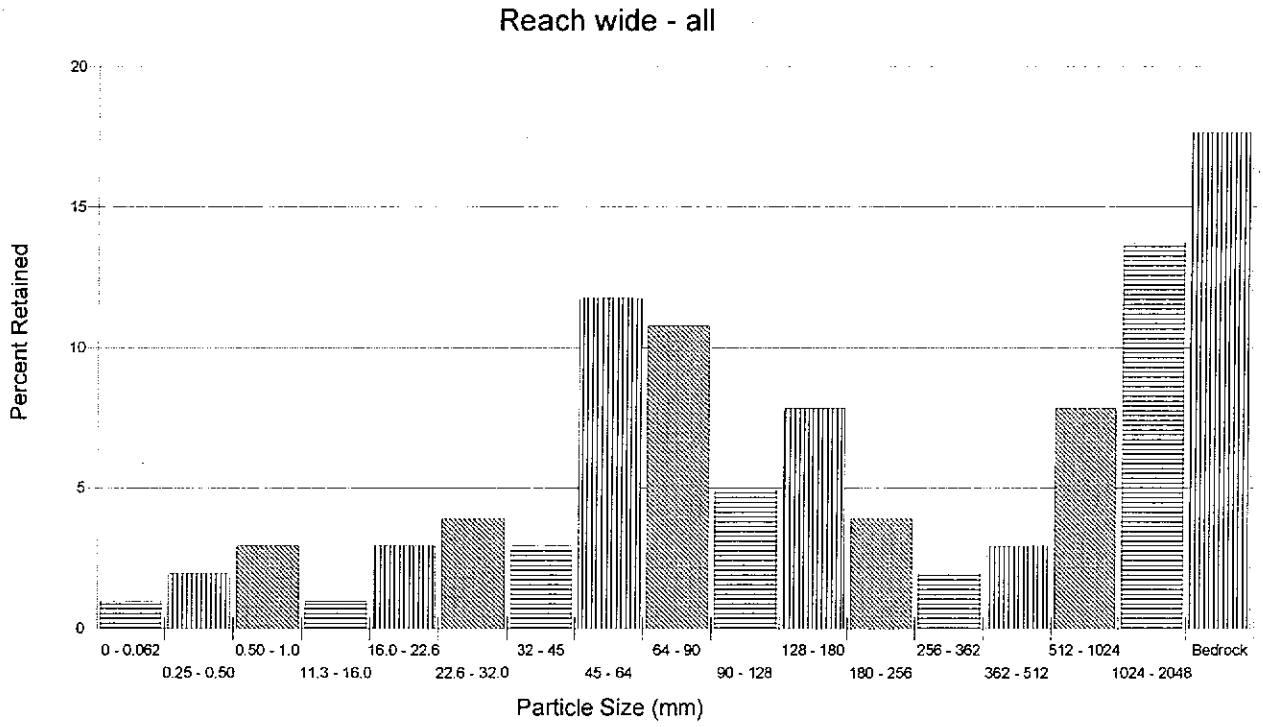
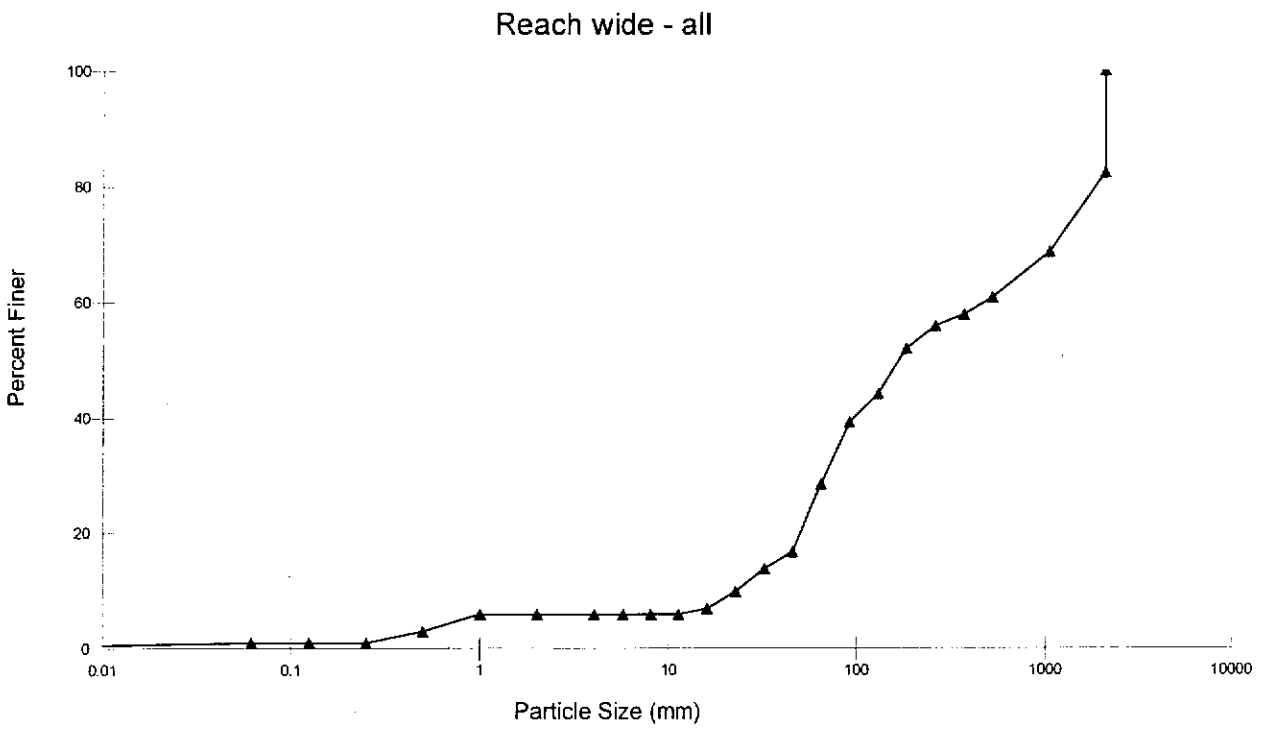

Reach wide - all
Percent Retained
20
15
10
5
0
0 - 0.062
0.25 - 0.50
0.50 - 1.0
11.3 - 16.0
16.0 - 22.6
22.6 - 32.0
32 - 45
45 - 64
64 - 90
90 - 128
128 - 180
180 - 256
256 - 362
362 - 512
512 - 1024
1024 - 2048
Bedrock
Particle Size (mm)


Reach wide - all
Percent Finer
100
80
60
40
20
0
0.01
0.1
1
10
100
1000
10000
Particle Size (mm)

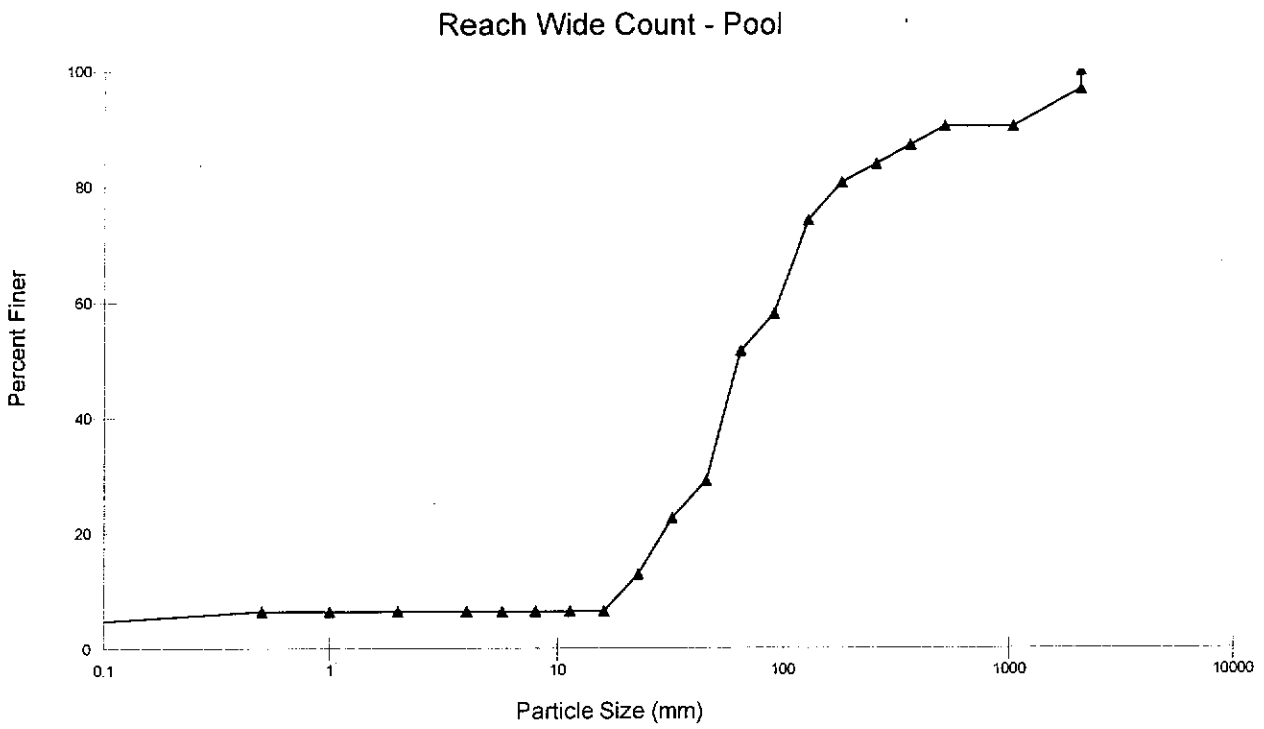
RIVERMORPH PARTICLE SUMMARY

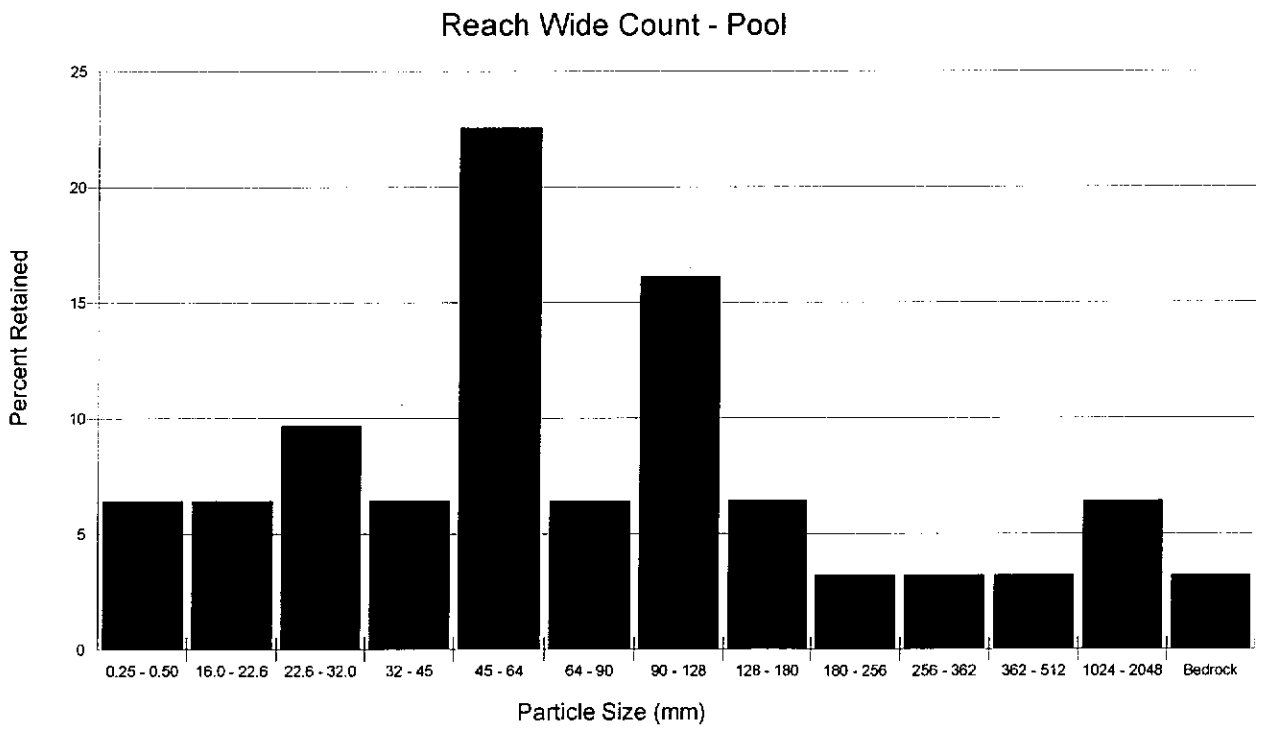
River Name: Sharman Branch
Reach Name: Reach 1
Sample Name: Reach Wide Count - Pool
Survey Date: 04/15/2014

Size (mm)	TOT #	ITEM %	CUM %
0 - 0.062	0	0.00	0.00
0.062 - 0.125	0	0.00	0.00
0.125 - 0.25	0	0.00	0.00
0.25 - 0.50	2	6.45	6.45
0.50 - 1.0	0	0.00	6.45
1.0 - 2.0	0	0.00	6.45
2.0 - 4.0	0	0.00	6.45
4.0 - 5.7	0	0.00	6.45
5.7 - 8.0	0	0.00	6.45
8.0 - 11.3	0	0.00	6.45
11.3 - 16.0	0	0.00	6.45
16.0 - 22.6	2	6.45	12.90
22.6 - 32.0	3	9.68	22.58
32 - 45	2	6.45	29.03
45 - 64	7	22.58	51.61
64 - 90	2	6.45	58.06
90 - 128	5	16.13	74.19
128 - 180	2	6.45	80.65
180 - 256	1	3.23	83.87
256 - 362	1	3.23	87.10
362 - 512	1	3.23	90.32
512 - 1024	0	0.00	90.32
1024 - 2048	2	6.45	96.77
Bedrock	1	3.23	100.00

D16 (mm)	25.61
D35 (mm)	50.02
D50 (mm)	62.65
D84 (mm)	260.27
D95 (mm)	1767
D100 (mm)	Bedrock
Silt/Clay (%)	0
Sand (%)	6.45
Gravel (%)	45.16
Cobble (%)	32.26
Boulder (%)	12.9
Bedrock (%)	3.23

Total Particles = 31 (need at least 60).


Reach Wide Count - Pool
Percent Finer
100
80
60
40
20
0
0.1
1
10
100
1000
10000
Particle Size (mm)


Reach Wide Count - Pool
Percent Retained
25
20
15
10
5
0
0.25 - 0.50
16.0 - 22.6
22.6 - 32.0
32 - 45
45 - 64
64 - 90
90 - 128
128 - 180
180 - 256
256 - 362
362 - 512
1024 - 2048
Bedrock
Particle Size (mm)

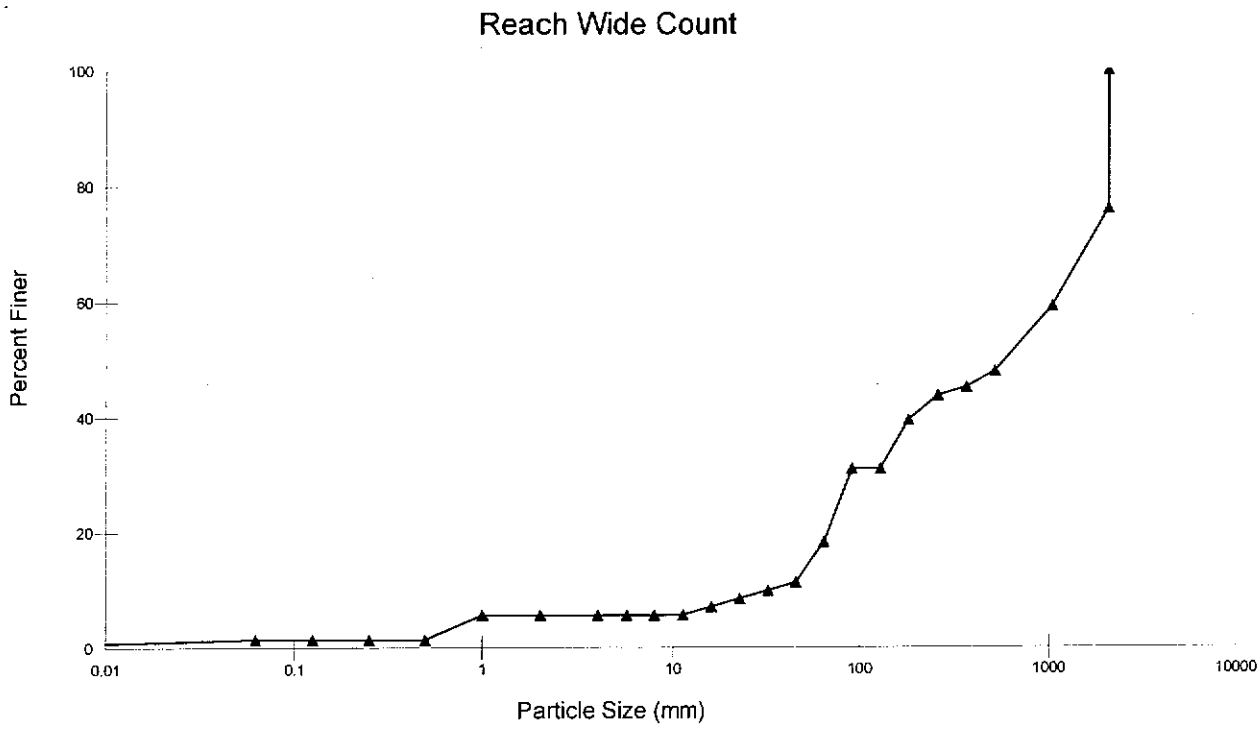
RIVERMORPH PARTICLE SUMMARY

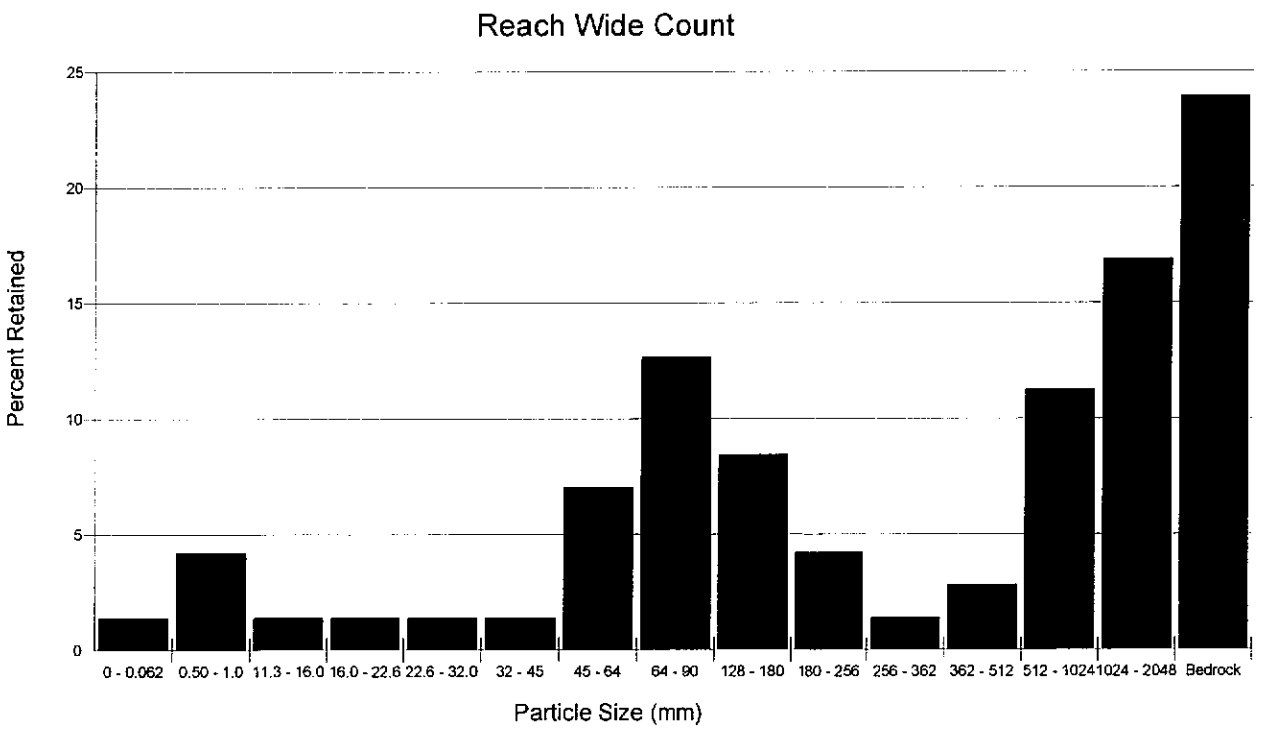
River Name: Sharman Branch
Reach Name: Reach 1
Sample Name: Reach Wide Count-Riffle
Survey Date: 04/15/2014

Size (mm)	TOT #	ITEM %	CUM %
0 - 0.062	1	1.41	1.41
0.062 - 0.125	0	0.00	1.41
0.125 - 0.25	0	0.00	1.41
0.25 - 0.50	0	0.00	1.41
0.50 - 1.0	3	4.23	5.63
1.0 - 2.0	0	0.00	5.63
2.0 - 4.0	0	0.00	5.63
4.0 - 5.7	0	0.00	5.63
5.7 - 8.0	0	0.00	5.63
8.0 - 11.3	0	0.00	5.63
11.3 - 16.0	1	1.41	7.04
16.0 - 22.6	1	1.41	8.45
22.6 - 32.0	1	1.41	9.86
32 - 45	1	1.41	11.27
45 - 64	5	7.04	18.31
64 - 90	9	12.68	30.99
90 - 128	0	0.00	30.99
128 - 180	6	8.45	39.44
180 - 256	3	4.23	43.66
256 - 362	1	1.41	45.07
362 - 512	2	2.82	47.89
512 - 1024	8	11.27	59.15
1024 - 2048	12	16.90	76.06
Bedrock	17	23.94	100.00

D16 (mm)	57.77
D35 (mm)	152.68
D50 (mm)	607.94
D84 (mm)	Bedrock
D95 (mm)	Bedrock
D100 (mm)	Bedrock
Silt/Clay (%)	1.41
Sand (%)	4.22
Gravel (%)	12.68
Cobble (%)	25.35
Boulder (%)	32.4
Bedrock (%)	23.94

Total Particles = 71.


Reach Wide Count
Percent Finer
100
80
60
40
20
0
0.01
0.1
1
10
100
1000
10000
Particle Size (mm)


Reach Wide Count
Percent Retained
25
20
15
10
5
0
0 - 0.062
0.50 - 1.0
11.3 - 16.0
16.0 - 22.6
22.6 - 32.0
32 - 45
45 - 64
64 - 90
128 - 180
180 - 256
256 - 362
362 - 512
512 - 1024
1024 - 2048
Bedrock
Particle Size (mm)

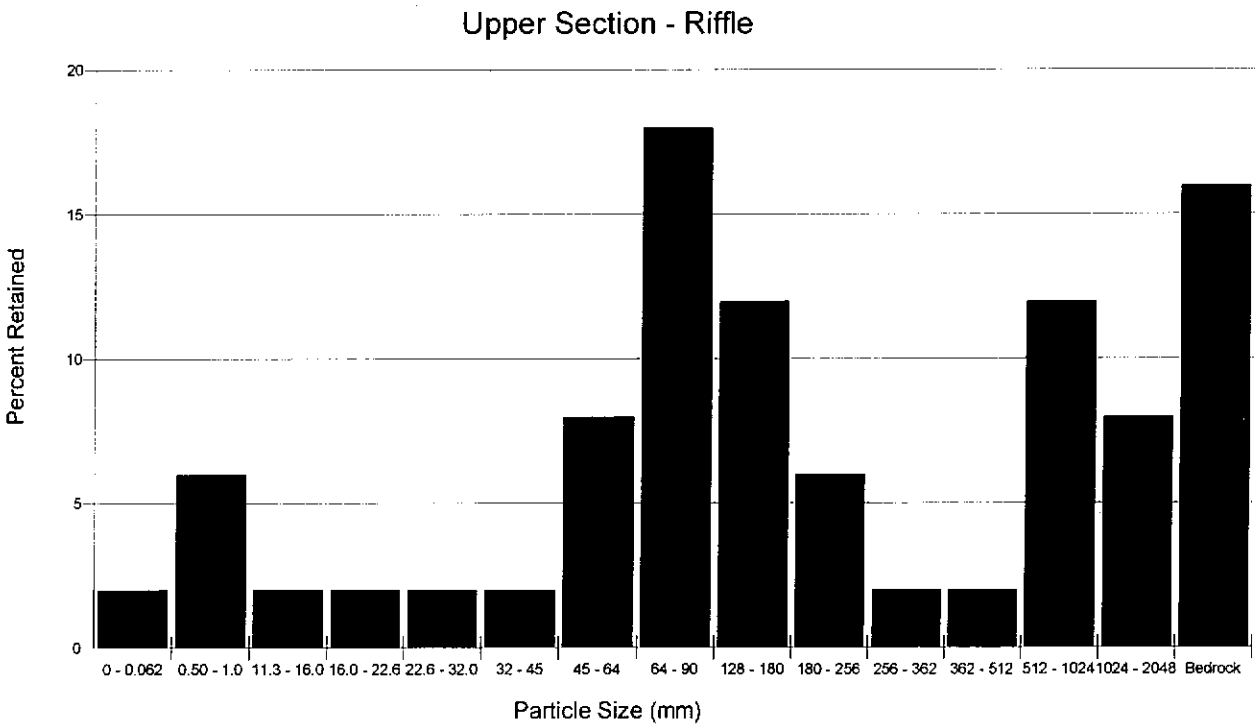
RIVERMORPH PARTICLE SUMMARY

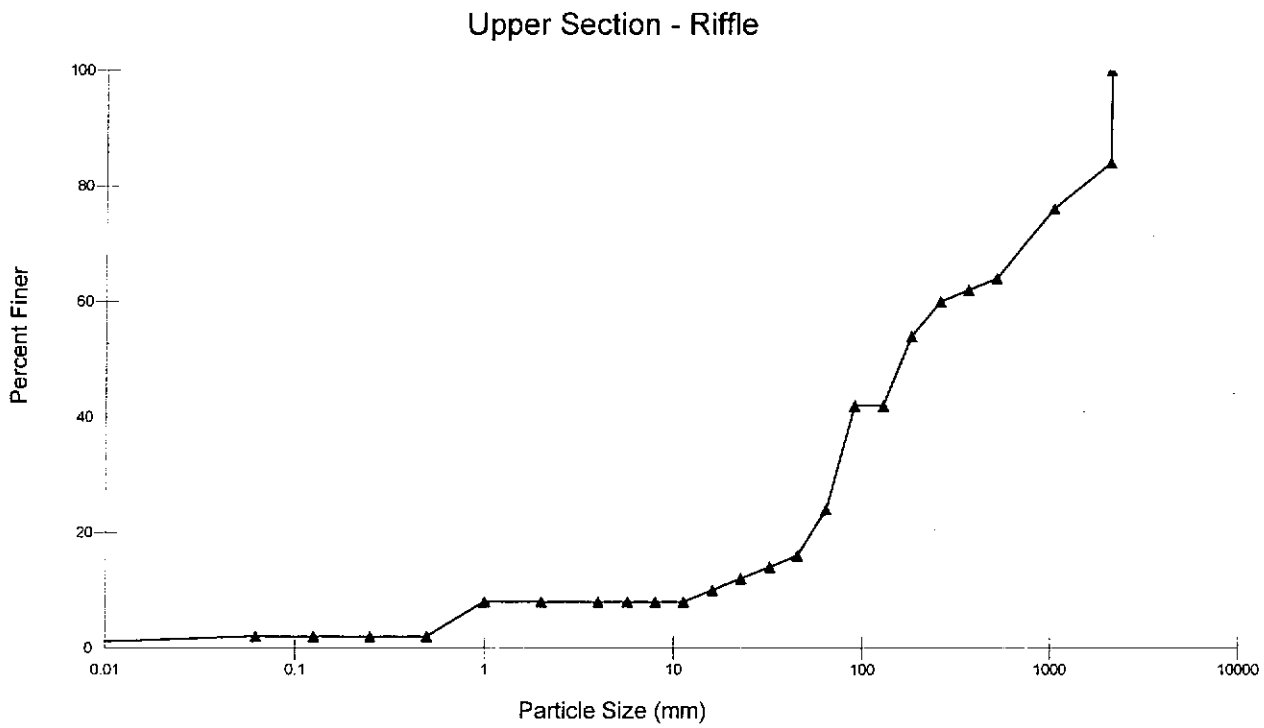
River Name: Sharman Branch
Reach Name: Reach 1
Sample Name: Upper Section - Riffle
Survey Date: 04/15/2014

Size (mm)	TOT #	ITEM %	CUM %
0 - 0.062	1	2.00	2.00
0.062 - 0.125	0	0.00	2.00
0.125 - 0.25	0	0.00	2.00
0.25 - 0.50	0	0.00	2.00
0.50 - 1.0	3	6.00	8.00
1.0 - 2.0	0	0.00	8.00
2.0 - 4.0	0	0.00	8.00
4.0 - 5.7	0	0.00	8.00
5.7 - 8.0	0	0.00	8.00
8.0 - 11.3	0	0.00	8.00
11.3 - 16.0	1	2.00	10.00
16.0 - 22.6	1	2.00	12.00
22.6 - 32.0	1	2.00	14.00
32 - 45	1	2.00	16.00
45 - 64	4	8.00	24.00
64 - 90	9	18.00	42.00
90 - 128	0	0.00	42.00
128 - 180	6	12.00	54.00
180 - 256	3	6.00	60.00
256 - 362	1	2.00	62.00
362 - 512	1	2.00	64.00
512 - 1024	6	12.00	76.00
1024 - 2048	4	8.00	84.00
Bedrock	8	16.00	100.00

D16 (mm)	45
D35 (mm)	79.89
D50 (mm)	162.67
D84 (mm)	Bedrock
D95 (mm)	Bedrock
D100 (mm)	Bedrock
Silt/Clay (%)	2
Sand (%)	6
Gravel (%)	16
Cobble (%)	36
Boulder (%)	24
Bedrock (%)	16

Total Particles = 50 (need at least 60).


Upper Section - Riffle
Percent Retained
20
15
10
5
0
0 - 0.062
0.50 - 1.0
11.3 - 16.0
16.0 - 22.6
22.6 - 32.0
32 - 45
45 - 64
64 - 90
128 - 180
180 - 256
256 - 362
362 - 512
512 - 1024
1024 - 2048
Bedrock
Particle Size (mm)


Upper Section - Riffle
Percent Finer
100
80
60
40
20
0
0.01
0.1
1
10
100
1000
10000
Particle Size (mm)

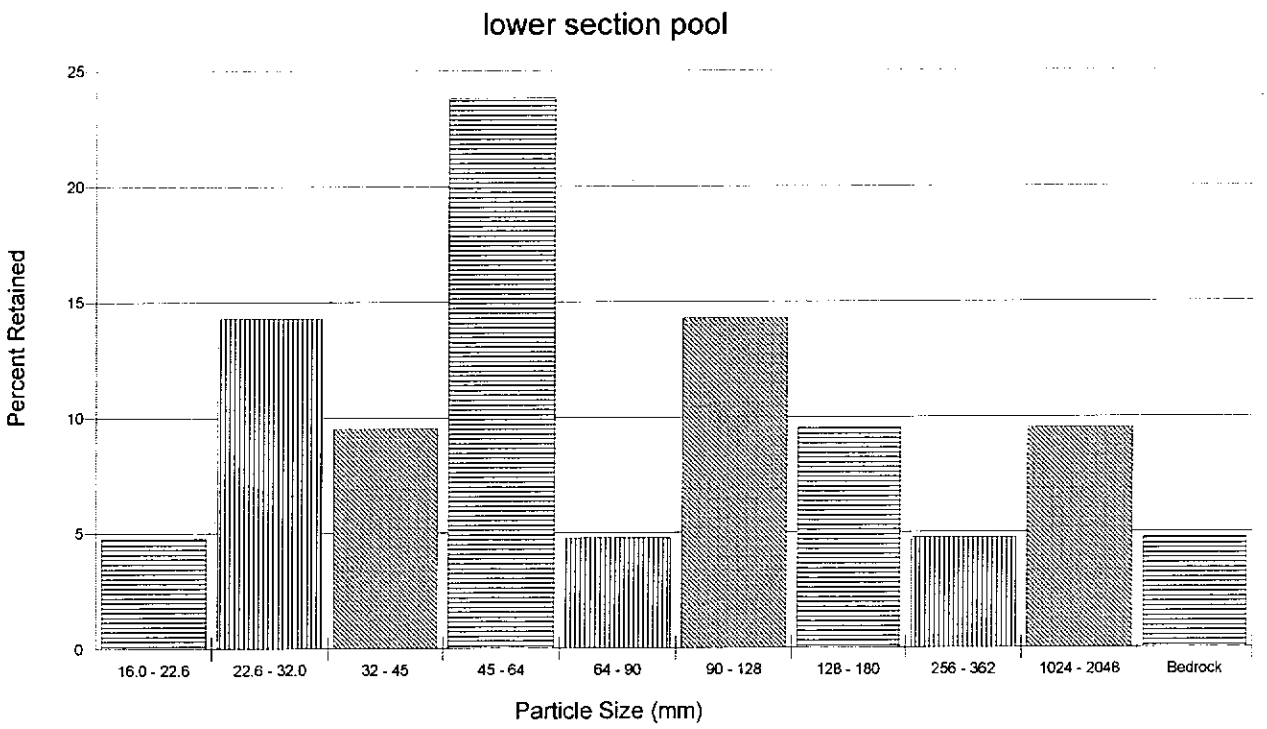
RIVERMORPH PARTICLE SUMMARY

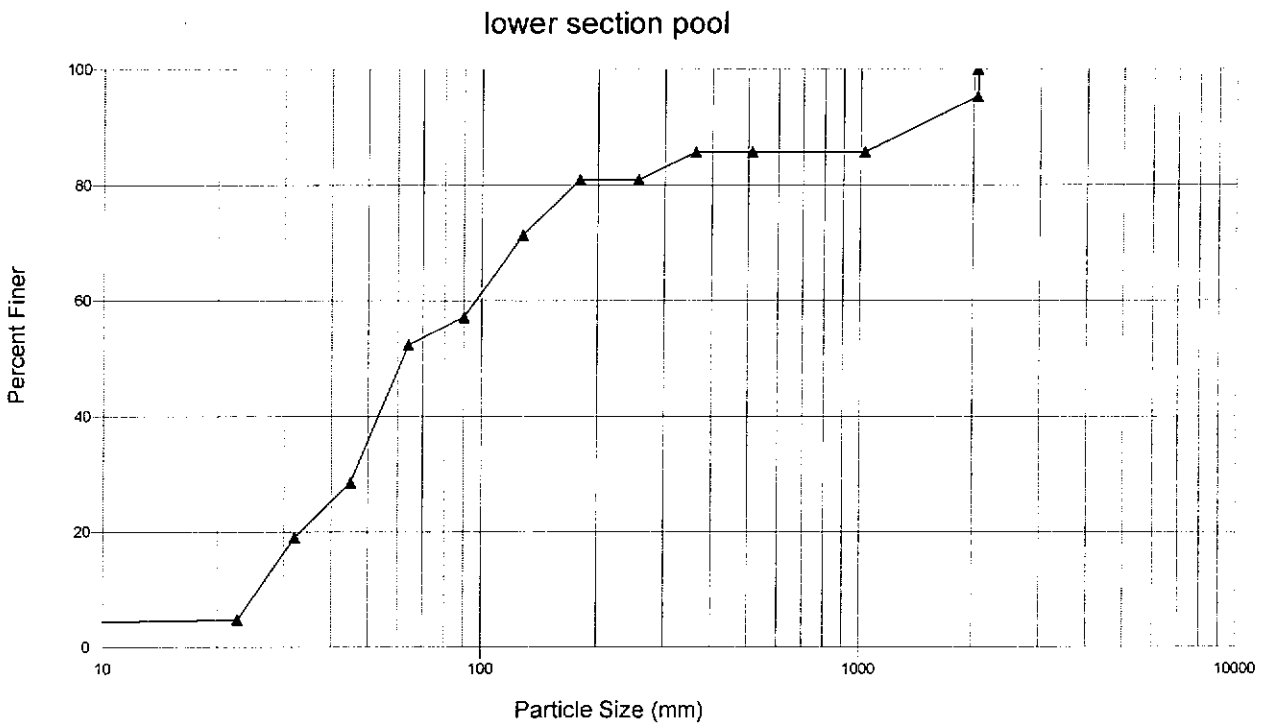
River Name: Sharman Branch
Reach Name: Reach 1
Sample Name: lower section pool
Survey Date: 04/15/2014

Size (mm)	TOT #	ITEM %	CUM %
0 - 0.062	0	0.00	0.00
0.062 - 0.125	0	0.00	0.00
0.125 - 0.25	0	0.00	0.00
0.25 - 0.50	0	0.00	0.00
0.50 - 1.0	0	0.00	0.00
1.0 - 2.0	0	0.00	0.00
2.0 - 4.0	0	0.00	0.00
4.0 - 5.7	0	0.00	0.00
5.7 - 8.0	0	0.00	0.00
8.0 - 11.3	0	0.00	0.00
11.3 - 16.0	0	0.00	0.00
16.0 - 22.6	1	4.76	4.76
22.6 - 32.0	3	14.29	19.05
32 - 45	2	9.52	28.57
45 - 64	5	23.81	52.38
64 - 90	1	4.76	57.14
90 - 128	3	14.29	71.43
128 - 180	2	9.52	80.95
180 - 256	0	0.00	80.95
256 - 362	1	4.76	85.71
362 - 512	0	0.00	85.71
512 - 1024	0	0.00	85.71
1024 - 2048	2	9.52	95.24
Bedrock	1	4.76	100.00

D16 (mm)	29.99
D35 (mm)	50.13
D50 (mm)	62.1
D84 (mm)	323.92
D95 (mm)	2022.21
D100 (mm)	Bedrock
Silt/Clay (%)	0
Sand (%)	0
Gravel (%)	52.38
Cobble (%)	28.57
Boulder (%)	14.29
Bedrock (%)	4.76

Total Particles = 21 (need at least 60).


lower section pool
Percent Retained
25
20
15
10
5
0
16.0 - 22.6
22.6 - 32.0
32 - 45
45 - 64
64 - 90
90 - 128
128 - 180
256 - 362
1024 - 2048
Bedrock
Particle Size (mm)


lower section pool
Percent Finer
100
80
60
40
20
0
10
100
1000
10000
Particle Size (mm)

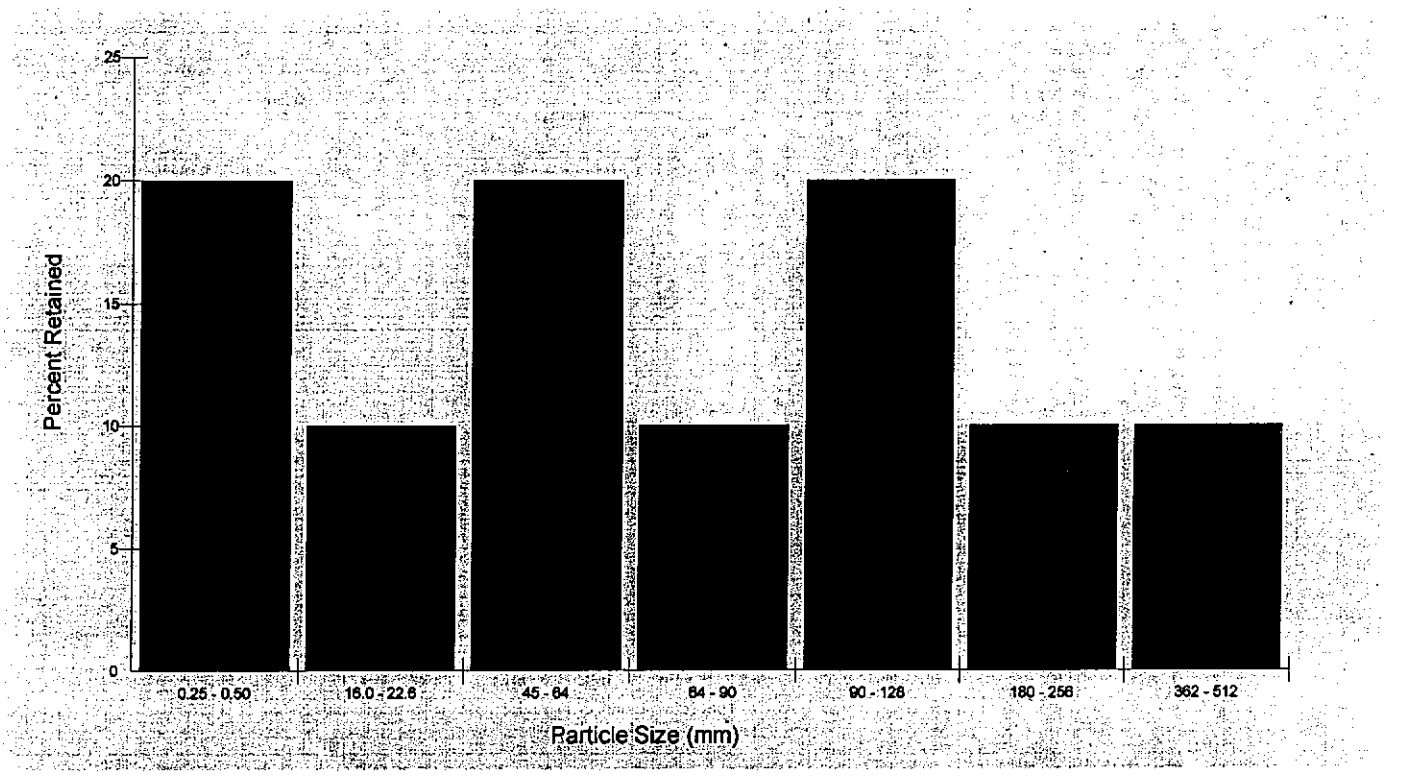
RIVERMORPH PARTICLE SUMMARY

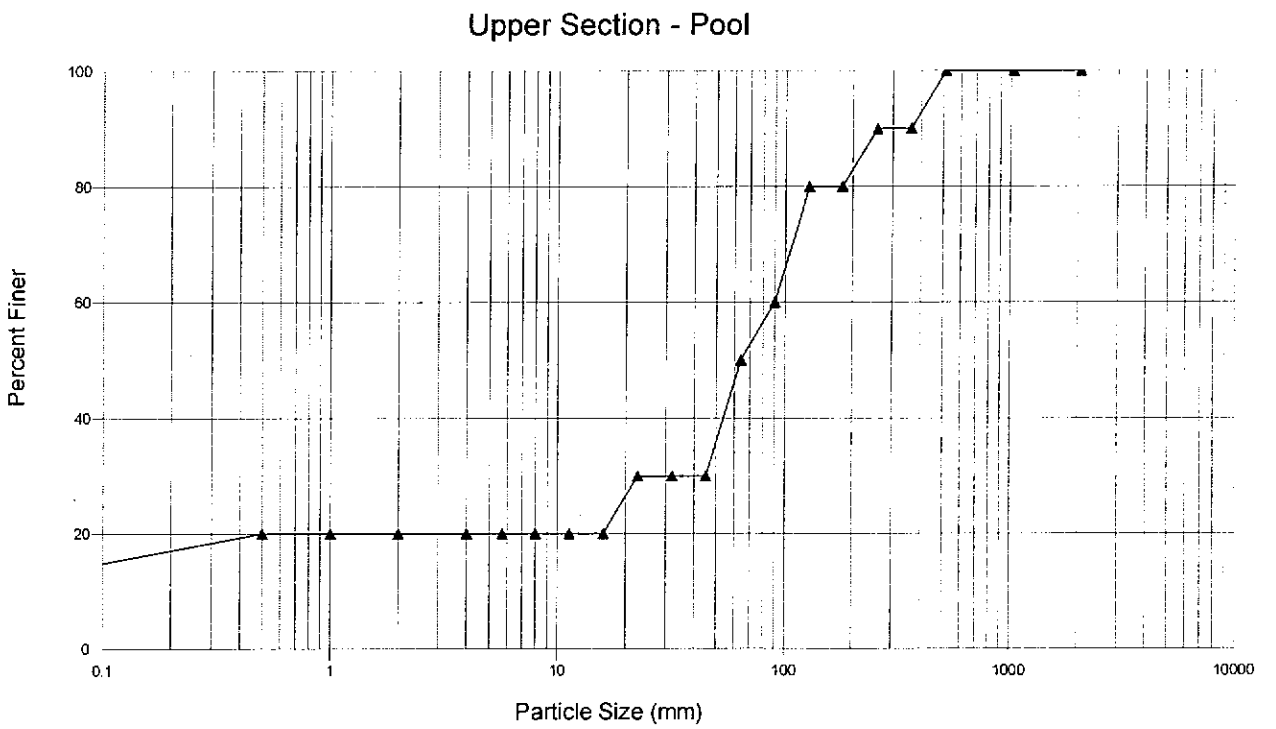
River Name: Sharman Branch
Reach Name: Reach 1
Sample Name: Upper Section - Pool
Survey Date: 04/15/2014

Size (mm)	TOT #	ITEM %	CUM %
0 - 0.062	0	0.00	0.00
0.062 - 0.125	0	0.00	0.00
0.125 - 0.25	0	0.00	0.00
0.25 - 0.50	2	20.00	20.00
0.50 - 1.0	0	0.00	20.00
1.0 - 2.0	0	0.00	20.00
2.0 - 4.0	0	0.00	20.00
4.0 - 5.7	0	0.00	20.00
5.7 - 8.0	0	0.00	20.00
8.0 - 11.3	0	0.00	20.00
11.3 - 16.0	0	0.00	20.00
16.0 - 22.6	1	10.00	30.00
22.6 - 32.0	0	0.00	30.00
32 - 45	0	0.00	30.00
45 - 64	2	20.00	50.00
64 - 90	1	10.00	60.00
90 - 128	2	20.00	80.00
128 - 180	0	0.00	80.00
180 - 256	1	10.00	90.00
256 - 362	0	0.00	90.00
362 - 512	1	10.00	100.00
512 - 1024	0	0.00	100.00
1024 - 2048	0	0.00	100.00
Bedrock	0	0.00	100.00

D16 (mm)	0.45
D35 (mm)	49.75
D50 (mm)	64
D84 (mm)	210.4
D95 (mm)	437
D100 (mm)	512
Silt/Clay (%)	0
Sand (%)	20
Gravel (%)	30
Cobble (%)	40
Boulder (%)	10
Bedrock (%)	0

Total Particles = 10 (need at least 60).


Percent Retained
25
20
15
10
5
0
0.25 - 0.50
16.0 - 22.6
45 - 64
64 - 90
90 - 128
180 - 256
362 - 512
Particle Size (mm)


Upper Section - Pool
Percent Finer
100
80
60
40
20
0
0.1
1
10
100
1000
10000
Particle Size (mm)

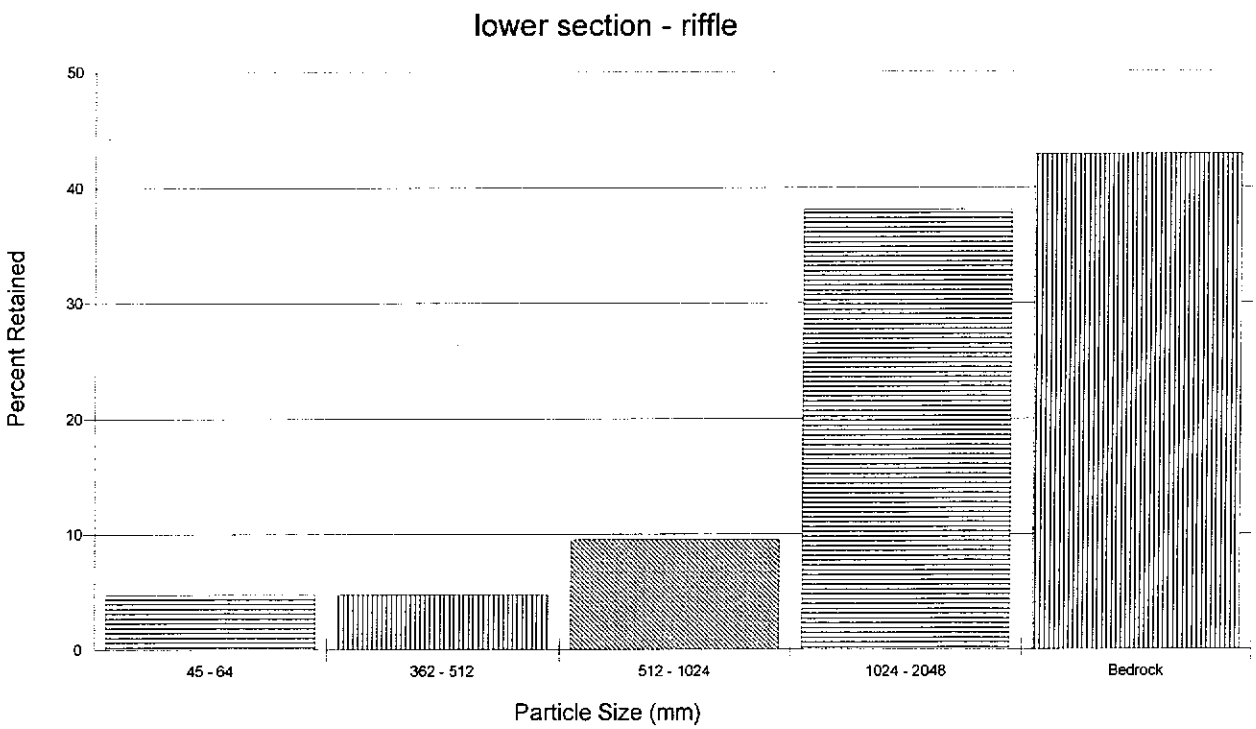
RIVERMORPH PARTICLE SUMMARY

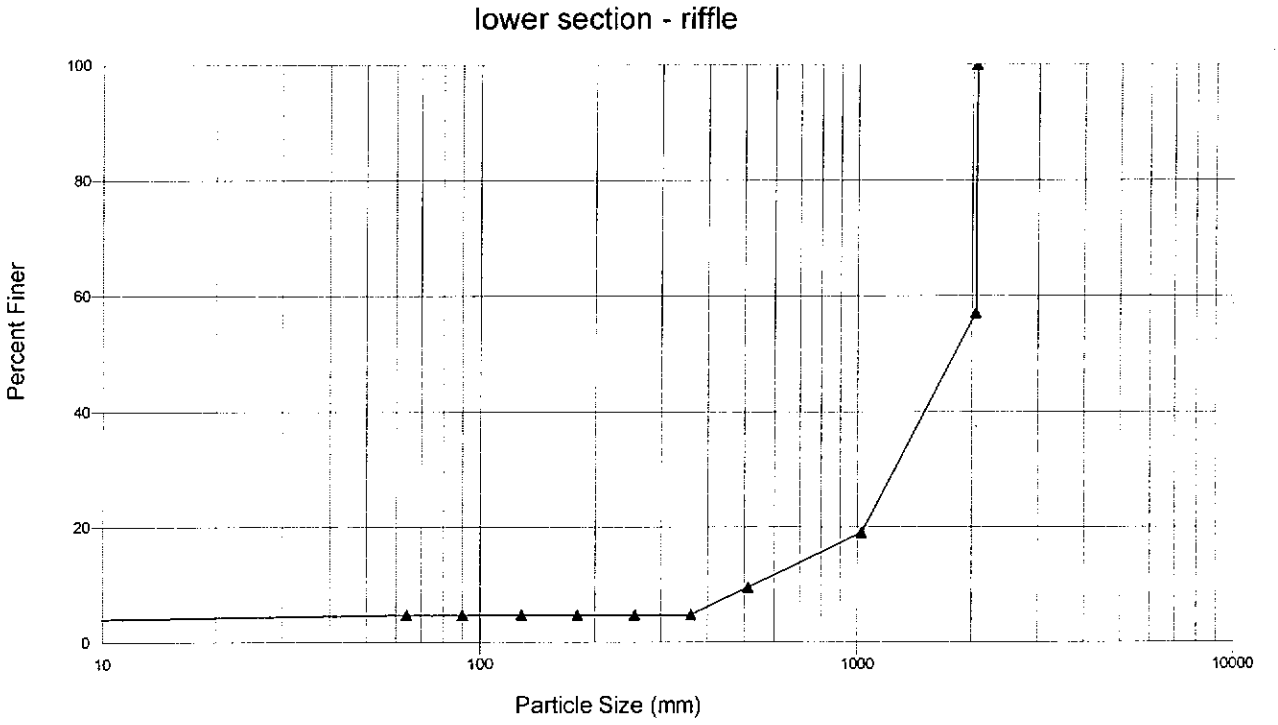
River Name: Sharman Branch
Reach Name: Reach 1
Sample Name: lower section - riffle
Survey Date: 04/15/2014

Size (mm)	TOT #	ITEM %	CUM %
0 - 0.062	0	0.00	0.00
0.062 - 0.125	0	0.00	0.00
0.125 - 0.25	0	0.00	0.00
0.25 - 0.50	0	0.00	0.00
0.50 - 1.0	0	0.00	0.00
1.0 - 2.0	0	0.00	0.00
2.0 - 4.0	0	0.00	0.00
4.0 - 5.7	0	0.00	0.00
5.7 - 8.0	0	0.00	0.00
8.0 - 11.3	0	0.00	0.00
11.3 - 16.0	0	0.00	0.00
16.0 - 22.6	0	0.00	0.00
22.6 - 32.0	0	0.00	0.00
32 - 45	0	0.00	0.00
45 - 64	1	4.76	4.76
64 - 90	0	0.00	4.76
90 - 128	0	0.00	4.76
128 - 180	0	0.00	4.76
180 - 256	0	0.00	4.76
256 - 362	0	0.00	4.76
362 - 512	1	4.76	9.52
512 - 1024	2	9.52	19.05
1024 - 2048	8	38.10	57.14
Bedrock	9	42.86	100.00

D16 (mm)	860.14
D35 (mm)	1452.79
D50 (mm)	1856.05
D84 (mm)	Bedrock
D95 (mm)	Bedrock
D100 (mm)	Bedrock
Silt/Clay (%)	0
Sand (%)	0
Gravel (%)	4.76
Cobble (%)	0
Boulder (%)	52.38
Bedrock (%)	42.86

Total Particles = 21 (need at least 60).


lower section - riffle
Percent Retained
50
40
30
20
10
0
45 - 64
362 - 512
512 - 1024
1024 - 2048
Bedrock
Particle Size (mm)


lower section - riffle
Percent Finer
100
80
60
40
20
0
10
100
1000
10000
Particle Size (mm)

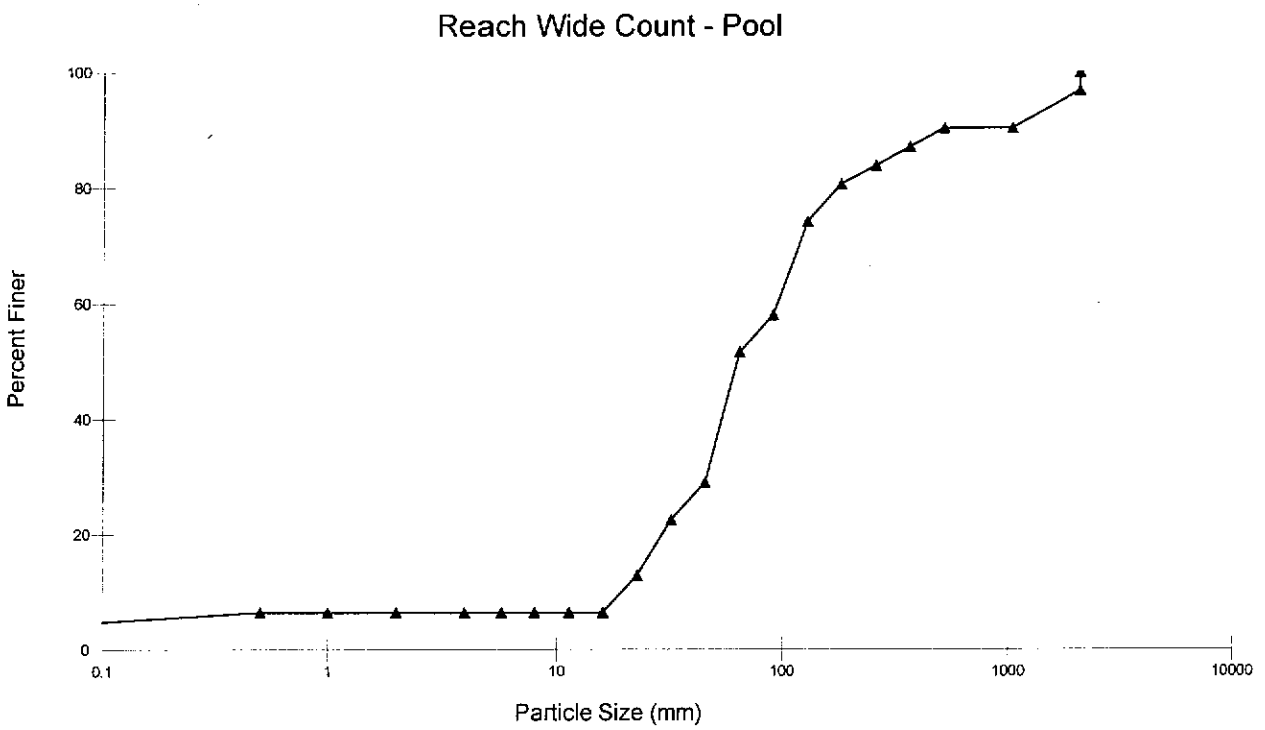
RIVERMORPH PARTICLE SUMMARY

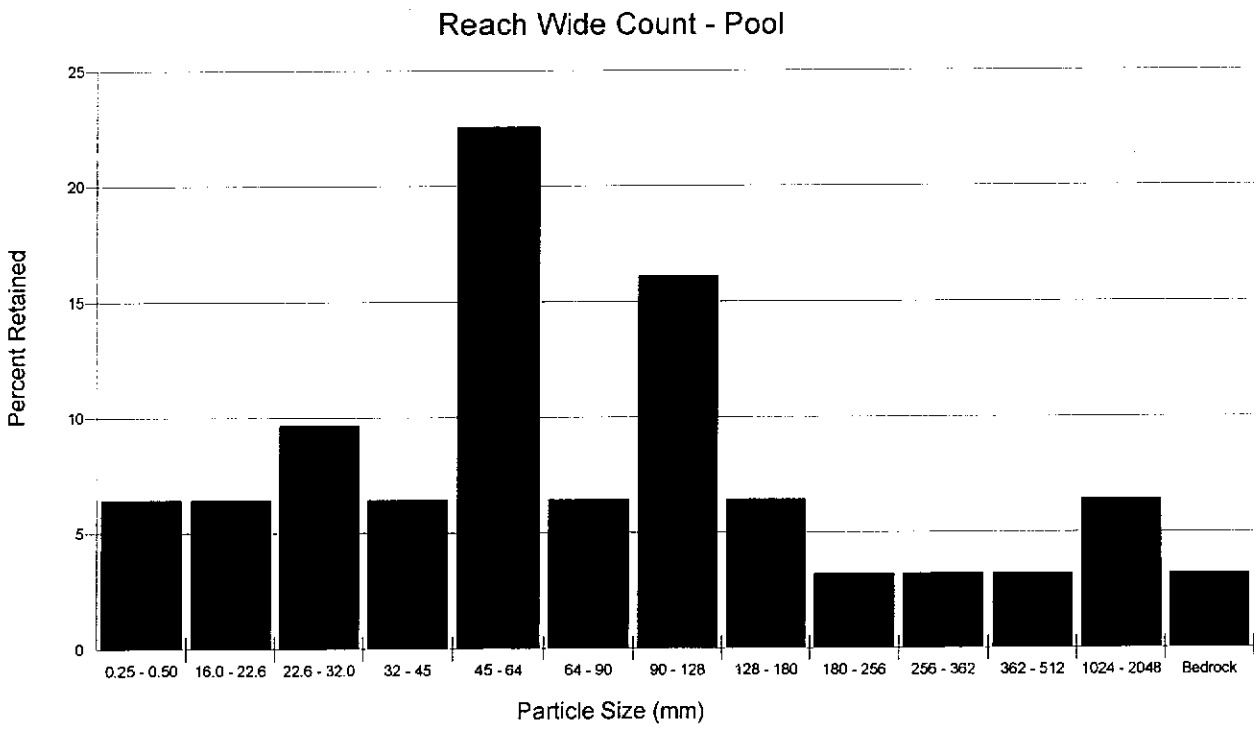
River Name: Sharman Branch
Reach Name: Reach 1
Sample Name: Reach Wide Count - Pool
Survey Date: 04/15/2014

Size (mm)	TOT #	ITEM %	CUM %
0 - 0.062	0	0.00	0.00
0.062 - 0.125	0	0.00	0.00
0.125 - 0.25	0	0.00	0.00
0.25 - 0.50	2	6.45	6.45
0.50 - 1.0	0	0.00	6.45
1.0 - 2.0	0	0.00	6.45
2.0 - 4.0	0	0.00	6.45
4.0 - 5.7	0	0.00	6.45
5.7 - 8.0	0	0.00	6.45
8.0 - 11.3	0	0.00	6.45
11.3 - 16.0	0	0.00	6.45
16.0 - 22.6	2	6.45	12.90
22.6 - 32.0	3	9.68	22.58
32 - 45	2	6.45	29.03
45 - 64	7	22.58	51.61
64 - 90	2	6.45	58.06
90 - 128	5	16.13	74.19
128 - 180	2	6.45	80.65
180 - 256	1	3.23	83.87
256 - 362	1	3.23	87.10
362 - 512	1	3.23	90.32
512 - 1024	0	0.00	90.32
1024 - 2048	2	6.45	96.77
Bedrock	1	3.23	100.00

D16 (mm)	25.61
D35 (mm)	50.02
D50 (mm)	62.65
D84 (mm)	260.27
D95 (mm)	1767
D100 (mm)	Bedrock
Silt/Clay (%)	0
Sand (%)	6.45
Gravel (%)	45.16
Cobble (%)	32.26
Boulder (%)	12.9
Bedrock (%)	3.23

Total Particles = 31 (need at least 60).


Reach Wide Count - Pool
Percent Finer
100
80
60
40
20
0
0.1
1
10
100
1000
10000
Particle Size (mm)


Reach Wide Count - Pool
Percent Retained
25
20
15
10
5
0
0.25 - 0.50
16.0 - 22.6
22.6 - 32.0
32 - 45
45 - 64
64 - 90
90 - 128
128 - 180
180 - 256
256 - 362
362 - 512
1024 - 2048
Bedrock
Particle Size (mm)

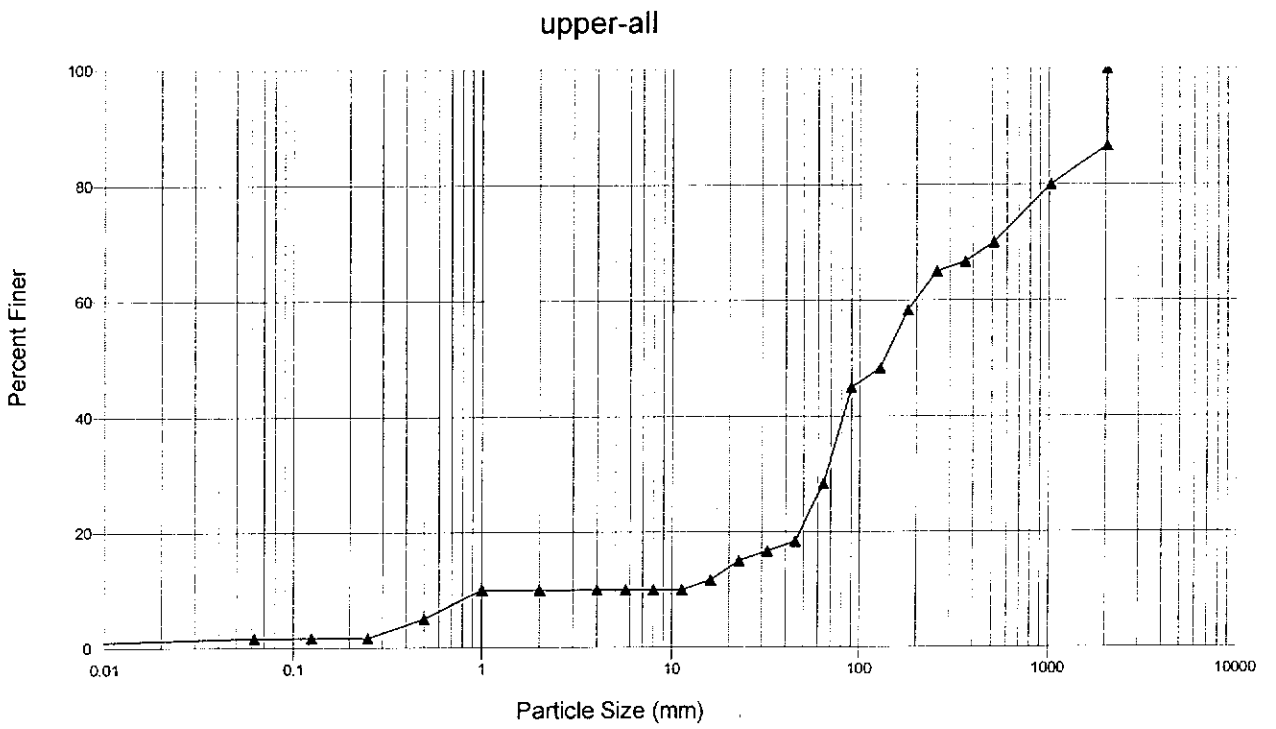
RIVERMORPH PARTICLE SUMMARY

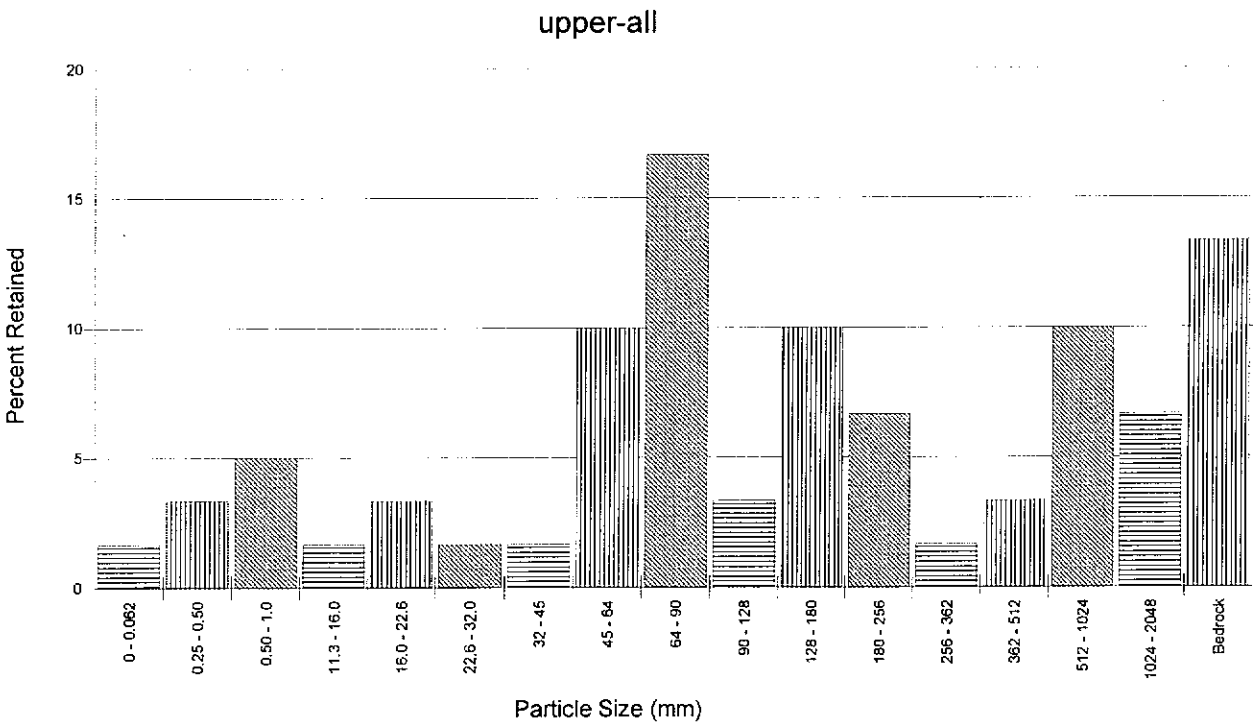
River Name: Sharman Branch
Reach Name: Reach 1
Sample Name: upper-all
Survey Date: 04/15/2014

Size (mm)	TOT #	ITEM %	CUM %
0 - 0.062	1	1.67	1.67
0.062 - 0.125	0	0.00	1.67
0.125 - 0.25	0	0.00	1.67
0.25 - 0.50	2	3.33	5.00
0.50 - 1.0	3	5.00	10.00
1.0 - 2.0	0	0.00	10.00
2.0 - 4.0	0	0.00	10.00
4.0 - 5.7	0	0.00	10.00
5.7 - 8.0	0	0.00	10.00
8.0 - 11.3	0	0.00	10.00
11.3 - 16.0	1	1.67	11.67
16.0 - 22.6	2	3.33	15.00
22.6 - 32.0	1	1.67	16.67
32 - 45	1	1.67	18.33
45 - 64	6	10.00	28.33
64 - 90	10	16.67	45.00
90 - 128	2	3.33	48.33
128 - 180	6	10.00	58.33
180 - 256	4	6.67	65.00
256 - 362	1	1.67	66.67
362 - 512	2	3.33	70.00
512 - 1024	6	10.00	80.00
1024 - 2048	4	6.67	86.67
Bedrock	8	13.33	100.00

D16 (mm)	28.23
D35 (mm)	74.4
D50 (mm)	136.68
D84 (mm)	1638.09
D95 (mm)	Bedrock
D100 (mm)	Bedrock
Silt/Clay (%)	1.67
Sand (%)	8.33
Gravel (%)	18.33
Cobble (%)	36.67
Boulder (%)	21.67
Bedrock (%)	13.33

Total Particles = 60.


upper-all
Percent Finer
100
80
60
40
20
0
0.01
0.1
1
10
100
1000
10000
Particle Size (mm)


upper-all
Percent Retained
20
15
10
5
0
0 - 0.062
0.25 - 0.50
0.50 - 1.0
11.3 - 16.0
16.0 - 22.6
22.6 - 32.0
32 - 45
45 - 64
64 - 90
90 - 128
128 - 180
180 - 256
256 - 362
362 - 512
512 - 1024
1024 - 2048
Bedrock
Particle Size (mm)

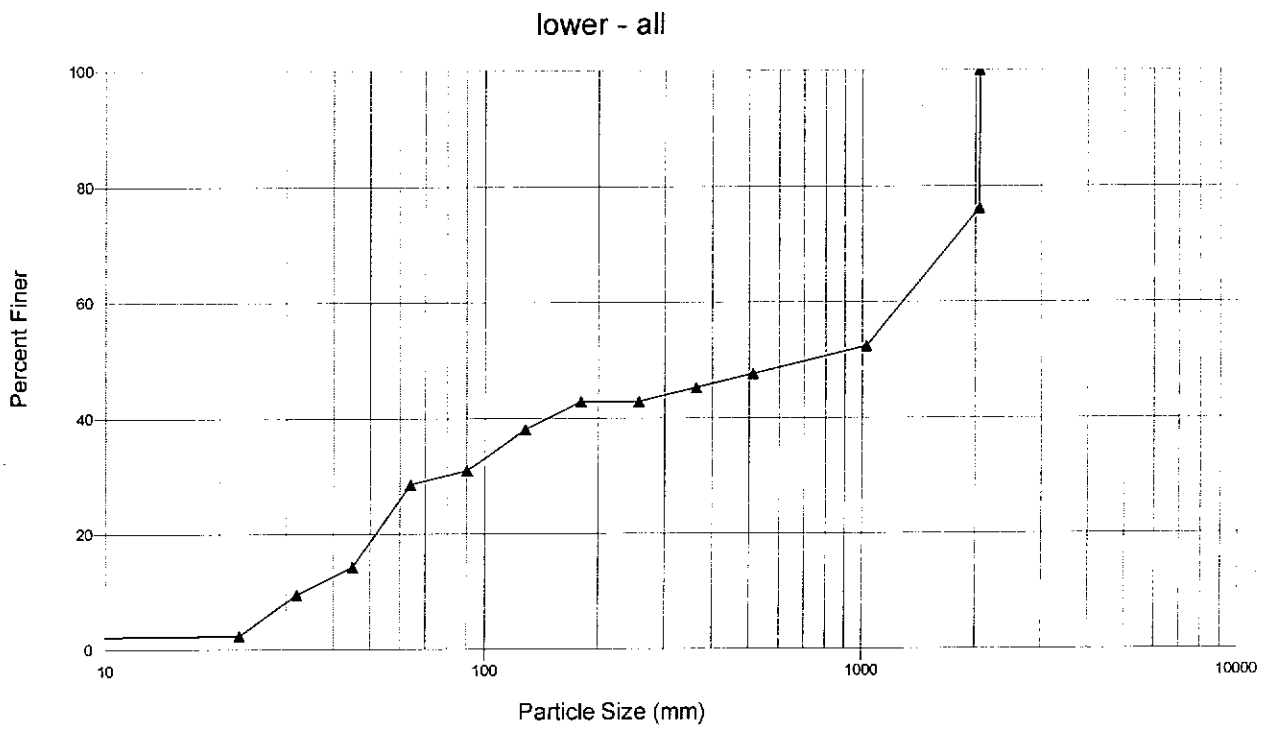
RIVERMORPH PARTICLE SUMMARY

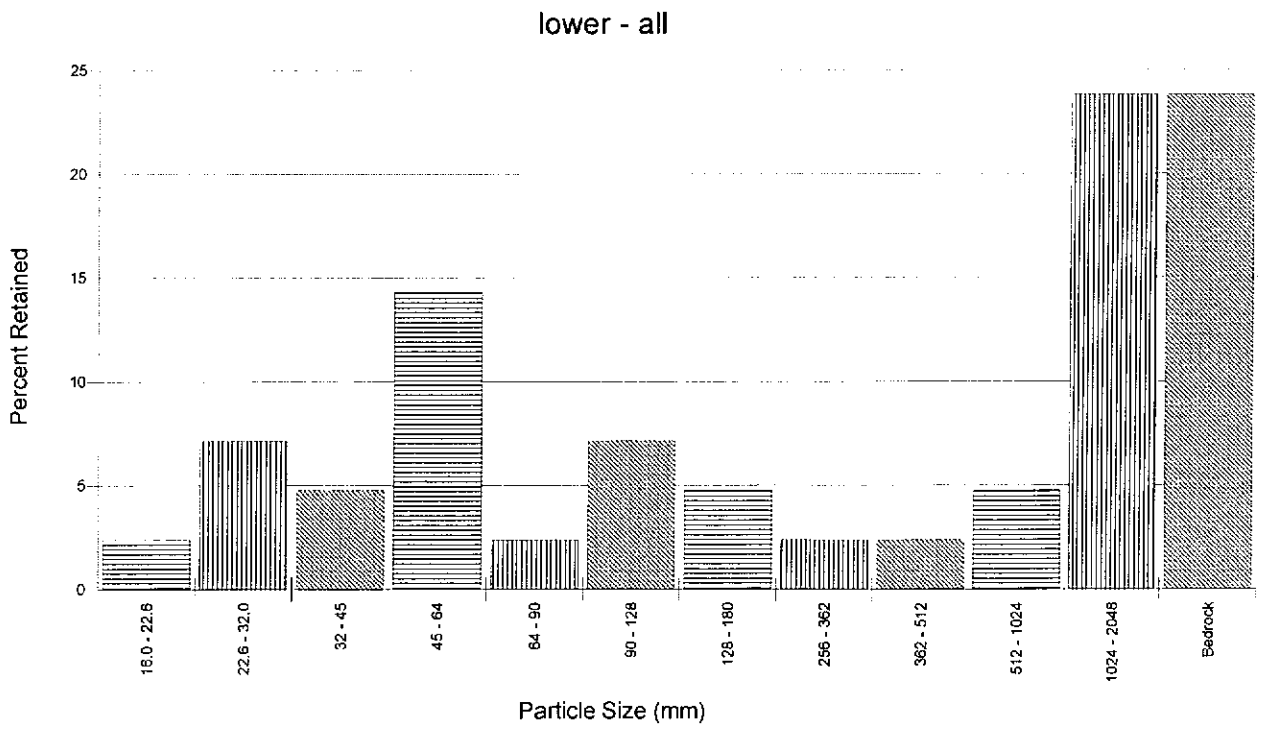
River Name: Sharman Branch
Reach Name: Reach 1
Sample Name: lower - all
Survey Date: 04/15/2014

Size (mm)	TOT #	ITEM %	CUM %
0 - 0.062	0	0.00	0.00
0.062 - 0.125	0	0.00	0.00
0.125 - 0.25	0	0.00	0.00
0.25 - 0.50	0	0.00	0.00
0.50 - 1.0	0	0.00	0.00
1.0 - 2.0	0	0.00	0.00
2.0 - 4.0	0	0.00	0.00
4.0 - 5.7	0	0.00	0.00
5.7 - 8.0	0	0.00	0.00
8.0 - 11.3	0	0.00	0.00
11.3 - 16.0	0	0.00	0.00
16.0 - 22.6	1	2.38	2.38
22.6 - 32.0	3	7.14	9.52
32 - 45	2	4.76	14.29
45 - 64	6	14.29	28.57
64 - 90	1	2.38	30.95
90 - 128	3	7.14	38.10
128 - 180	2	4.76	42.86
180 - 256	0	0.00	42.86
256 - 362	1	2.38	45.24
362 - 512	1	2.38	47.62
512 - 1024	2	4.76	52.38
1024 - 2048	10	23.81	76.19
Bedrock	10	23.81	100.00

D16 (mm)	47.28
D35 (mm)	111.52
D50 (mm)	768
D84 (mm)	Bedrock
D95 (mm)	Bedrock
D100 (mm)	Bedrock
Silt/Clay (%)	0
Sand (%)	0
Gravel (%)	28.57
Cobble (%)	14.29
Boulder (%)	33.33
Bedrock (%)	23.81

Total Particles = 42 (need at least 60).


lower - all
Percent Finer
100
80
60
40
20
0
10
100
1000
10000
Particle Size (mm)


lower - all
Percent Retained
25
20
15
10
5
0
18.0 - 22.6
22.6 - 32.0
32 - 45
45 - 64
64 - 90
90 - 128
128 - 180
256 - 362
362 - 512
512 - 1024
1024 - 2048
Bedrock
Particle Size (mm)

RIVERMORPH CROSS SECTION SUMMARY

River Name: Sharman Branch
Reach Name: Reach 1
Cross Section Name: rep riffle- 1+49
Survey Date: 04/15/2014

Cross Section Data Entry

BM Elevation: 0 ft
Backsight Rod Reading: 0 ft

TAPE	FS	ELEV	NOTE
0	0	93.57	
2	0	91.84	
5.5	0	90.57	
6.5	0	89.24	LEW
9	0	88.83	
10	0	88.56	
12	0	88.71	
14	0	88.9	
16	0	88.46	
18	0	88.57	
20	0	89.24	
22	0	89.3	
24	0	89.56	
25.5	0	89.5	REW
26.3	0	90.53	
28	0	90.82	BKF
30	0	91.15	
32	0	91.54	
34	0	91.93	
36	0	92.18	
38	0	91.63	
40	0	93.08	
42	0	93.57	
44	0	93.93	
45.5	0	94.17	

Cross Sectional Geometry

	Channel	Left	Right
Floodprone Elevation (ft)	93.18	93.18	93.18
Bankfull Elevation (ft)	90.82	90.82	90.82
Floodprone Width (ft)	39.96	-----	-----
Bankfull Width (ft)	23.19	11.6	11.59
Entrenchment Ratio	1.72	-----	-----
Mean Depth (ft)	1.61	1.83	1.4
Maximum Depth (ft)	2.36	2.36	2.34
Width/Depth Ratio	14.4	6.34	8.28
Bankfull Area (sq ft)	37.41	21.23	16.18
Wetted Perimeter (ft)	24.69	14.78	14.59
Hydraulic Radius (ft)	1.52	1.44	1.11
Begin BKF Station	4.81	4.81	16.41
End BKF Station	28	16.41	28

Entrainment Calculations

Entrainment Formula: Rosgen Modified Shields Curve

	Channel	Left Side	Right Side
Slope	0	0	0
Shear Stress (lb/sq ft)			
Movable Particle (mm)			

RIVERMORPH CROSS SECTION SUMMARY

River Name: Sharman Branch
Reach Name: Reach 1
Cross Section Name: middle chute - 1+67
Survey Date: 04/15/2014

Cross Section Data Entry

BM Elevation: 0 ft
Backsight Rod Reading: 0 ft

TAPE	FS	ELEV	NOTE
0	0	91.435	
2	0	90.135	
4.4	0	89.355	LEW
4.4	0	89.275	
5.5	0	89.005	
7	0	88.945	
8.4	0	88.525	
9.4	0	88.375	
10.7	0	88.275	
11.7	0	88.985	
13	0	89.295	
14.5	0	88.565	
15.7	0	88.135	
16.9	0	89.045	
18.3	0	88.785	
19.8	0	88.845	
22.6	0	89.405	REW
24.6	0	90.475	BKF
31.3	0	92.045	
37.2	0	92.445	

Cross Sectional Geometry

	Channel	Left	Right
Floodprone Elevation (ft)	92.8	92.8	92.8
Bankfull Elevation (ft)	90.47	90.47	90.47
Floodprone Width (ft)	37.2	-----	-----
Bankfull Width (ft)	23.11	11.56	11.55
Entrenchment Ratio	1.61	-----	-----
Mean Depth (ft)	1.43	1.42	1.43
Maximum Depth (ft)	2.33	2.19	2.33
Width/Depth Ratio	16.16	8.15	8.08
Bankfull Area (sq ft)	32.93	16.39	16.55
Wetted Perimeter (ft)	24.68	13.43	13.64
Hydraulic Radius (ft)	1.33	1.22	1.21
Begin BKF Station	1.48	1.48	13.04
End BKF Station	24.59	13.04	24.59

Entrainment Calculations

Entrainment Formula: Rosgen Modified Shields Curve

	Channel	Left Side	Right Side
Slope	0	0	0

Shear Stress (lb/sq ft)
Movable Particle (mm)

RIVERMORPH CROSS SECTION SUMMARY

River Name: Sharman Branch
Reach Name: Reach 1
Cross Section Name: 2+76-riffle
Survey Date: 04/15/2014

Cross Section Data Entry

BM Elevation: 0 ft
Backsight Rod Reading: 0 ft

TAPE	FS	ELEV	NOTE
0	0	85.53	
2	0	85.43	
5	0	84.64	BKF
5.9	0	84.11	
7	0	83.8	
9.7	0	83.82	
12.4	0	83.96	
14.3	0	83.98	
15.2	0	83.8	
16.8	0	83.27	
17.6	0	83.52	
19	0	83.26	
20	0	83.12	
20.1	0	81.61	
21	0	81.49	
22.1	0	82.17	
23	0	82.58	
24.5	0	82.69	
24.9	0	83.12	
25.5	0	83.31	
27.2	0	83.03	
32.8	0	83.03	REW
34.4	0	83.22	
36	0	84.69	
36.5	0	83.14	
40.3	0	86.05	
41	0	84.65	
42.5	0	85.34	
44	0	86.07	
46.5	0	86.92	

Cross Sectional Geometry

	Channel	Left	Right
Floodprone Elevation (ft)	87.79	87.79	87.79
Bankfull Elevation (ft)	84.64	84.64	84.64
Floodprone Width (ft)	46.5	-----	-----
Bankfull Width (ft)	33.39	16.7	16.76
Entrenchment Ratio	1.39	-----	-----
Mean Depth (ft)	1.28	1.09	1.47
Maximum Depth (ft)	3.15	3.15	2.72
Width/Depth Ratio	26.09	15.3	11.4
Bankfull Area (sq ft)	42.73	18.23	24.5
Wetted Perimeter (ft)	37.87	21.33	21.97
Hydraulic Radius (ft)	1.13	0.85	1.12
Begin BKF Station	5	5	21.7

End BKF Station	38.46	21.7	38.46

Entrainment Calculations

Entrainment Formula: Rosgen Modified Shields Curve

	Channel	Left Side	Right Side
Slope	0	0	0
Shear Stress (lb/sq ft)			
Movable Particle (mm)			

RIVERMORPH CROSS SECTION SUMMARY

River Name: Sharman Branch
Reach Name: Reach 1
Cross Section Name: upper step - 0+72
Survey Date: 04/15/2014

Cross Section Data Entry

BM Elevation: 0 ft
Backsight Rod Reading: 0 ft

TAPE	FS	ELEV	NOTE
0	0	96.56	
2	0	95.42	
3.2	0	93.87	
5.2	0	92.65	
7.2	0	92.14	LEW
9.2	0	91.96	
11.6	0	91.75	
13.7	0	90.85	
15.8	0	91.96	
17.4	0	92.29	
18.7	0	92.46	
19.8	0	92.29	
21.6	0	92	
22.7	0	91.94	
24	0	91.8	
25	0	91.54	
26.4	0	92.04	
28	0	91.77	
30	0	91.7	
30.3	0	91.63	
32.3	0	91.96	
33.8	0	92.18	
34.8	0	92.54	REW
36.7	0	93.58	BKF
38.6	0	94.69	
43.2	0	95.64	
48.9	0	96.17	
55.1	0	96.96	

Cross Sectional Geometry

	Channel	Left	Right
Floodprone Elevation (ft)	96.31	96.31	96.31
Bankfull Elevation (ft)	93.58	93.58	93.58
Floodprone Width (ft)	49.56	-----	-----
Bankfull Width (ft)	33.02	16.52	16.5
Entrenchment Ratio	1.5	-----	-----
Mean Depth (ft)	1.54	1.54	1.54
Maximum Depth (ft)	2.73	2.73	2.04
Width/Depth Ratio	21.44	10.75	10.71
Bankfull Area (sq ft)	50.83	25.38	25.45
Wetted Perimeter (ft)	34.44	18.74	18.41
Hydraulic Radius (ft)	1.48	1.35	1.38
Begin BKF Station	3.68	3.68	20.2
End BKF Station	36.7	20.2	36.7

Entrainment Calculations

Entrainment Formula: Rosgen Modified Shields Curve

	Channel	Left Side	Right Side
Slope	0	0	0
Shear Stress (lb/sq ft)			
Movable Particle (mm)			

RIVERMORPH CROSS SECTION SUMMARY

River Name: Sharman Branch
Reach Name: Reach 1
Cross Section Name: lower step - 2+41
Survey Date: 04/15/2014

Cross Section Data Entry

BM Elevation: 0 ft
Backsight Rod Reading: 0 ft

TAPE	FS	ELEV	NOTE
0	0	87.465	
4.5	0	87.675	
7.6	0	87.135	
10.5	0	86.865	
13.8	0	85.985	
16.4	0	85.665	
24.2	0	85.225	
25.2	0	85.875	
26.2	0	86.505	
29.6	0	88.255	
32.2	0	87.645	
34.5	0	86.785	
35.5	0	85.755	LEW
35.8	0	85.075	
36.7	0	84.675	
37.8	0	85.985	
38.9	0	85.955	
40	0	86.125	
41.5	0	85.065	
44	0	85.805	
45.5	0	85.605	
46.2	0	84.835	
48.4	0	84.945	REW
49	0	85.395	
50.8	0	85.645	
52	0	85.005	
54.7	0	84.705	
58	0	88.665	

Cross Sectional Geometry

	Channel	Left	Right
Floodprone Elevation (ft)	88.95	-----	-----
Bankfull Elevation (ft)	86.81	-----	-----
Floodprone Width (ft)	58	-----	-----
Bankfull Width (ft)	22.02	-----	-----
Entrenchment Ratio	2.63	-----	-----
Mean Depth (ft)	1.39	-----	-----
Maximum Depth (ft)	2.14	-----	-----
Width/Depth Ratio	15.84	-----	-----
Bankfull Area (sq ft)	30.57	-----	-----
Wetted Perimeter (ft)	25.74	-----	-----
Hydraulic Radius (ft)	1.19	-----	-----
Begin BKF Station	34.43	-----	-----
End BKF Station	56.45	-----	-----

Entrainment Calculations

Entrainment Formula: Rosgen Modified Shields Curve

	Channel	Left Side	Right Side
Slope	0	0	0
Shear Stress (lb/sq ft)			
Movable Particle (mm)			

RIVERMORPH CROSS SECTION SUMMARY

River Name: Sharman Branch
Reach Name: Reach 1
Cross Section Name: upper pool survey - 0+84
Survey Date: 04/15/2014

Cross Section Data Entry

BM Elevation: 0 ft
Backsight Rod Reading: 0 ft

TAPE	FS	ELEV	NOTE
0	0	95.92	
3	0	94.04	
5.4	0	92.7	
6.8	0	92.4	
7.6	0	91.84	LEW
7.6	0	91.3	
9	0	91.02	
10	0	91.02	
11	0	90.85	
12	0	90.7	
13.2	0	90.71	
14.3	0	91.43	
15.1	0	91.13	
16	0	91.18	
17	0	91	
18	0	90.88	
19.4	0	90.79	
20	0	90.59	
22	0	90.62	
24.8	0	90.82	
27	0	90.7	
30	0	90.06	
31	0	90.12	
32	0	89.79	
34	0	90.06	
36	0	90.44	
38	0	90.62	
38.7	0	90.94	REW
39	0	91.99	
40.7	0	92.06	
42.5	0	92.76	BKF
45.1	0	94.08	
47.5	0	95.34	
52	0	96.42	
57	0	96.58	
62.4	0	96.78	

Cross Sectional Geometry

	Channel	Left	Right
Floodprone Elevation (ft)	95.73	95.73	95.73
Bankfull Elevation (ft)	92.76	92.76	92.76
Floodprone Width (ft)	48.82	-----	-----
Bankfull Width (ft)	37.21	18.61	18.6
Entrenchment Ratio	1.31	-----	-----
Mean Depth (ft)	1.85	1.68	2.02

Maximum Depth (ft)	2.97	2.17	2.97
Width/Depth Ratio	20.11	11.09	9.21
Bankfull Area (sq ft)	68.82	31.23	37.59
Wetted Perimeter (ft)	39.54	21.76	21.79
Hydraulic Radius (ft)	1.74	1.43	1.73
Begin BKF Station	5.29	5.29	23.9
End BKF Station	42.5	23.9	42.5

Entrainment Calculations

Entrainment Formula: Rosgen Modified Shields Curve

	Channel	Left Side	Right Side
Slope	0	0	0
Shear Stress (lb/sq ft)			
Movable Particle (mm)			

RIVERMORPH CROSS SECTION SUMMARY

River Name: Sharman Branch
Reach Name: Reach 1
Cross Section Name: 1+94-pool
Survey Date: 04/15/2014

Cross Section Data Entry

BM Elevation: 0 ft
Backsight Rod Reading: 0 ft

TAPE	FS	ELEV	NOTE
0	0	84.04	
3	0	83.59	
4.2	0	83.14	
5.7	0	82.17	LEW
5.7	0	82.03	
6.9	0	81.51	
8.2	0	81.33	
9.9	0	81.31	
11.5	0	81.19	
13.4	0	80.97	
14.9	0	81.06	
16.5	0	81.07	
17.7	0	81.24	
19.2	0	81.21	
20.9	0	81.59	
22.7	0	81.2	
24.7	0	81.39	
26.9	0	81.76	
29.5	0	82.29	
32.5	0	83.2	BKF
32.8	0	83.03	
34.4	0	83.22	
36	0	84.69	
36.1	0	83.56	
39	0	84.41	

Cross Sectional Geometry

	Channel	Left	Right
Floodprone Elevation (ft)	85.43	85.43	85.43
Bankfull Elevation (ft)	83.2	83.2	83.2
Floodprone Width (ft)	39	-----	-----
Bankfull Width (ft)	30.19	15.1	15.09
Entrenchment Ratio	1.29	-----	-----
Mean Depth (ft)	1.51	1.8	1.22
Maximum Depth (ft)	2.23	2.23	2
Width/Depth Ratio	19.99	8.39	12.37
Bankfull Area (sq ft)	45.57	27.19	18.38
Wetted Perimeter (ft)	31.15	17.68	17.45
Hydraulic Radius (ft)	1.46	1.54	1.05
Begin BKF Station	4.04	4.04	19.14
End BKF Station	34.23	19.14	34.23

Entrainment Calculations

Entrainment Formula: Rosgen Modified Shields Curve

	Channel	Left Side	Right Side
Slope	0	0	0
Shear Stress (lb/sq ft)			
Movable Particle (mm)			

RIVERMORPH PARTICLE SUMMARY

River Name: Sharman Branch
Reach Name: Reach 1
Sample Name: Reach wide - all
Survey Date: 04/15/2014

Size (mm)	TOT #	ITEM %	CUM %
0 - 0.062	1	0.98	0.98
0.062 - 0.125	0	0.00	0.98
0.125 - 0.25	0	0.00	0.98
0.25 - 0.50	2	1.96	2.94
0.50 - 1.0	3	2.94	5.88
1.0 - 2.0	0	0.00	5.88
2.0 - 4.0	0	0.00	5.88
4.0 - 5.7	0	0.00	5.88
5.7 - 8.0	0	0.00	5.88
8.0 - 11.3	0	0.00	5.88
11.3 - 16.0	1	0.98	6.86
16.0 - 22.6	3	2.94	9.80
22.6 - 32.0	4	3.92	13.73
32 - 45	3	2.94	16.67
45 - 64	12	11.76	28.43
64 - 90	11	10.78	39.22
90 - 128	5	4.90	44.12
128 - 180	8	7.84	51.96
180 - 256	4	3.92	55.88
256 - 362	2	1.96	57.84
362 - 512	3	2.94	60.78
512 - 1024	8	7.84	68.63
1024 - 2048	14	13.73	82.35
Bedrock	18	17.65	100.00

D16 (mm)	42.04
D35 (mm)	79.83
D50 (mm)	167
D84 (mm)	Bedrock
D95 (mm)	Bedrock
D100 (mm)	Bedrock
Silt/Clay (%)	0.98
Sand (%)	4.9
Gravel (%)	22.55
Cobble (%)	27.45
Boulder (%)	26.47
Bedrock (%)	17.65

Total Particles = 102.