LITTLE CONOCACHEAGUE CREEK REACH 4 3/31/2015

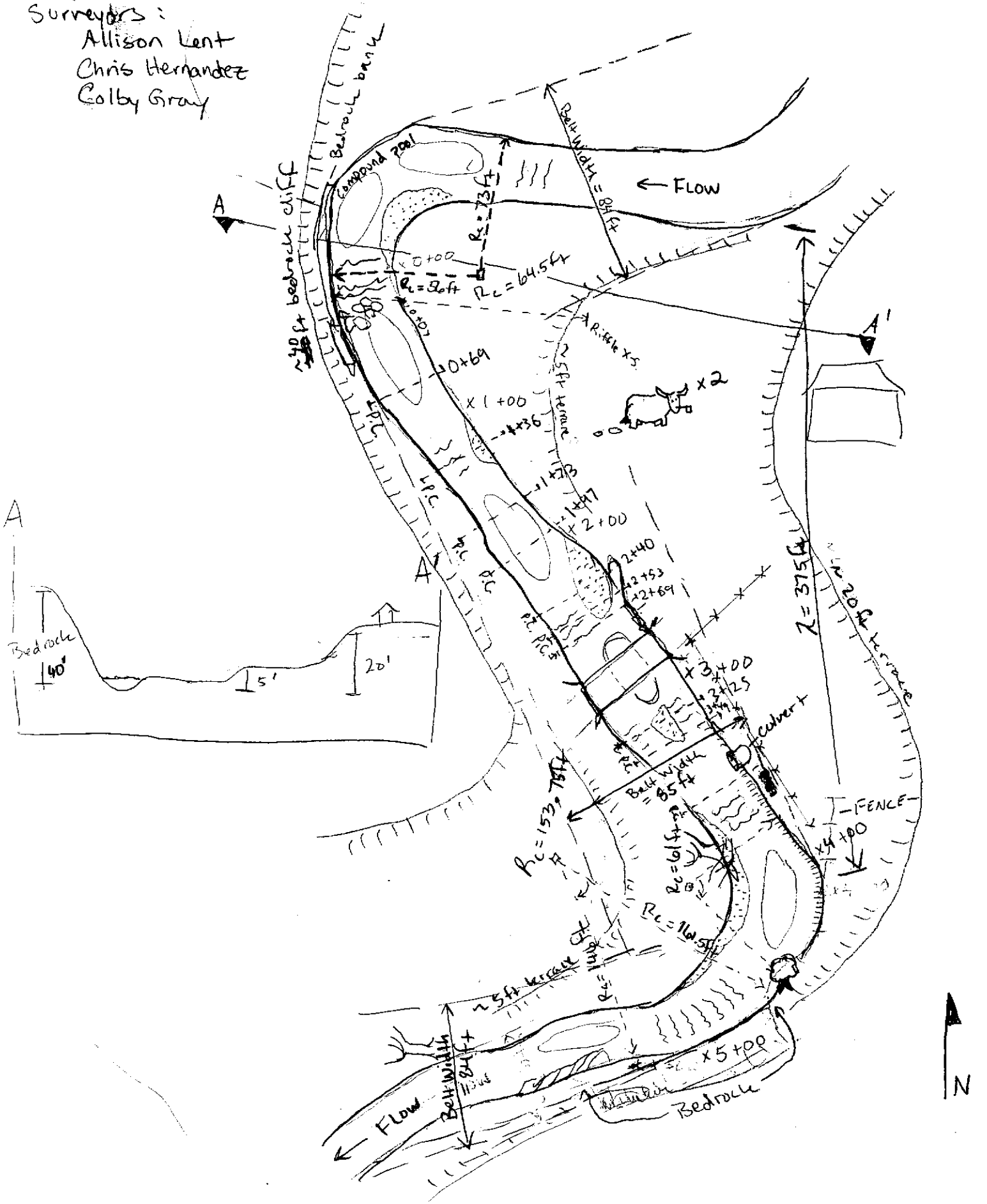
TEAM 4

Surveyors:

Allison Lent

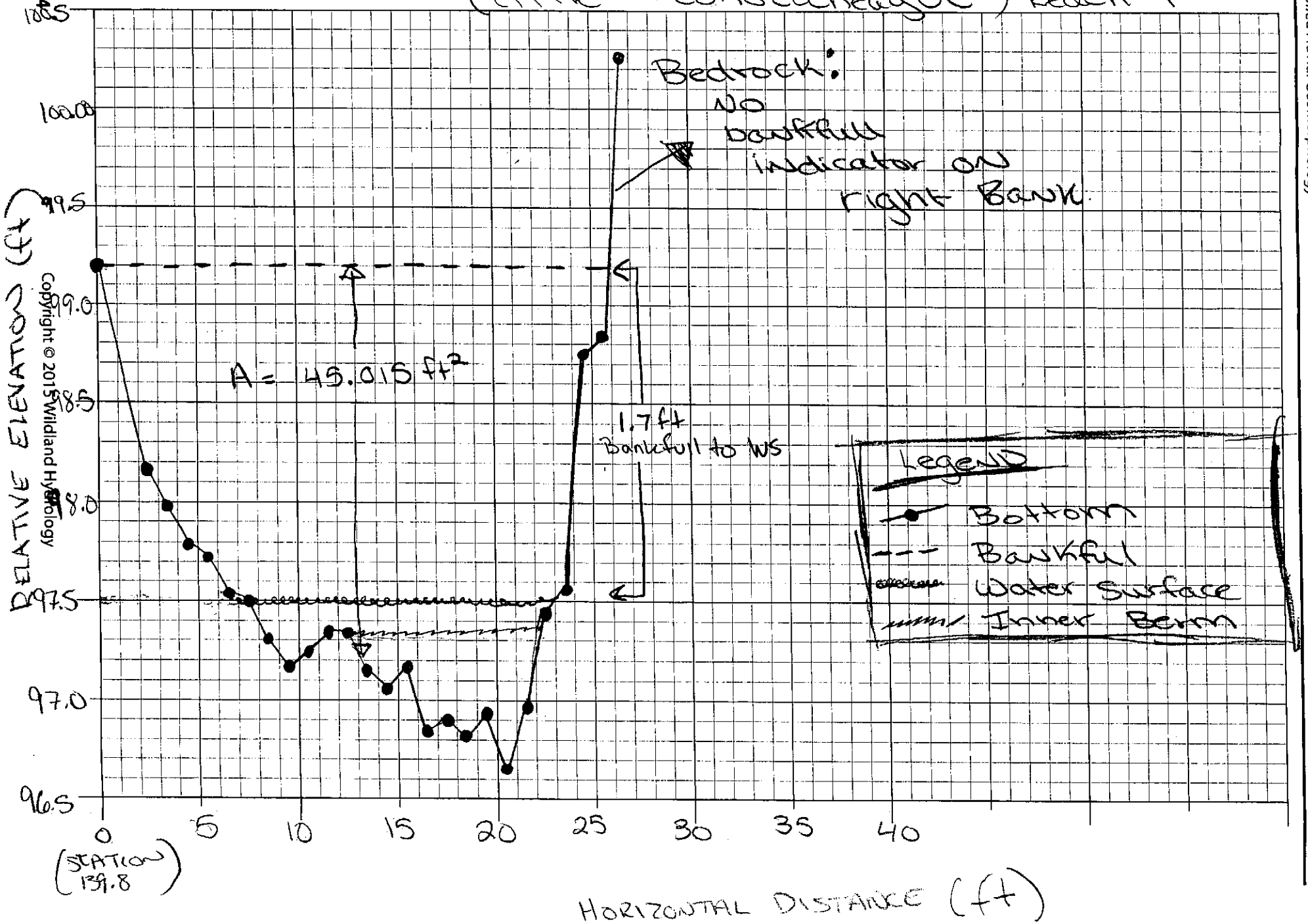
Chris Hernandez

Colby Gray



3-31-15

Team 4, Channel Cross-Sectional Area (Little Conococheague) Reach 4



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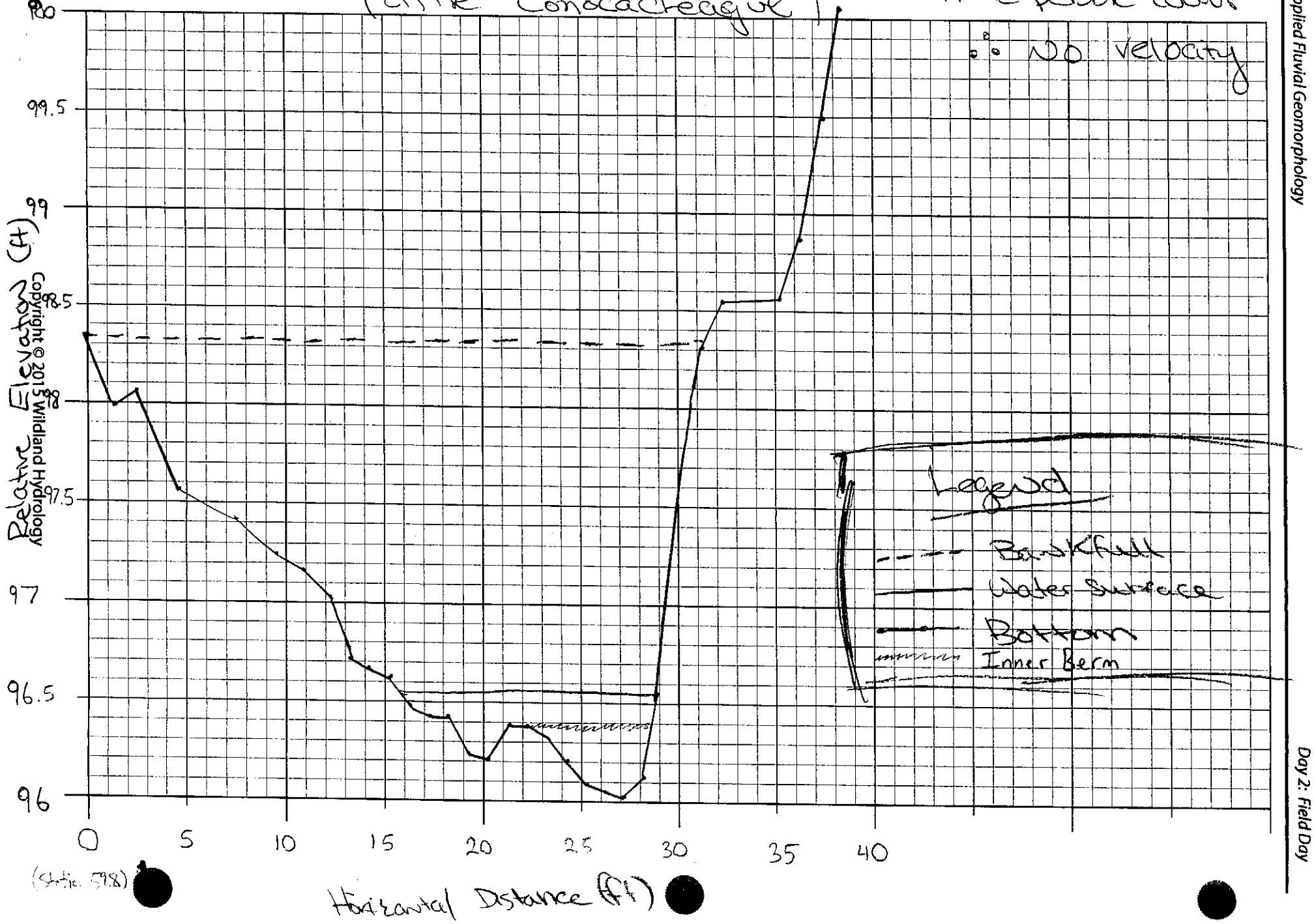
Cross-Section #2 - Reach 4 (Little Conococheague)

* No active riffle pebble count

∴ No velocity



(Station 598)

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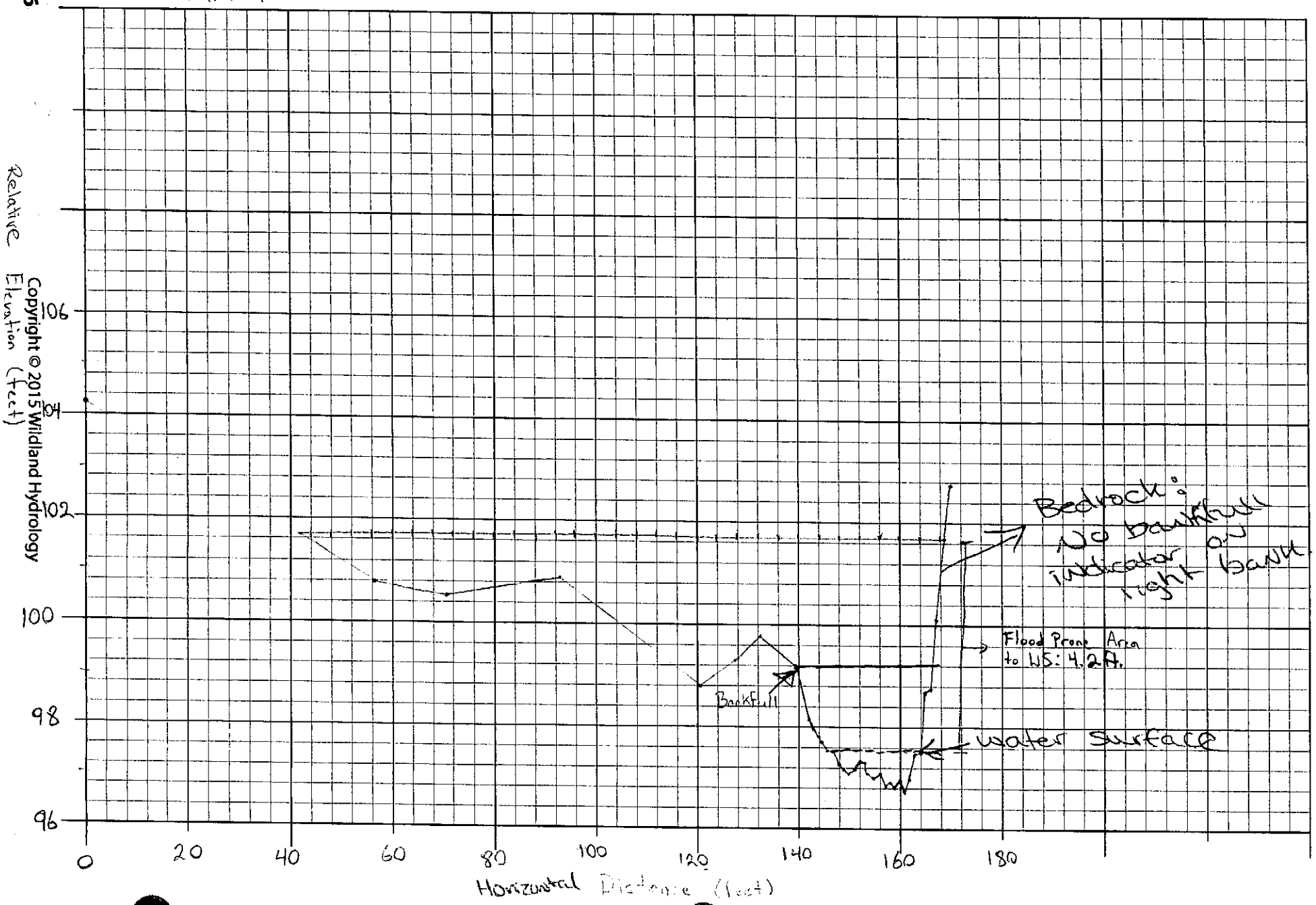
Legend
- Water
- Flood prone area
- Bottom

Little Conococheague Reach 4 Cross-Section 1

3-31-15

Team 4



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Team 4- X Section 2

STATION	(ft) BS	(ft) HI	(ft) FS	(ft) Elev	NOTES
BM I	5.59	105.59	—	100.00	Fence/Concrete.
0+00	—		4.18	101.41	Left Pin
9.8			4.95	100.64	flat terrace
19.0			5.28	100.31	"
26.0			5.45	100.14	"
35.0			6.42	99.17	"
44.0			6.50	99.09	
51.5			6.60	98.99	
58.0			6.90	98.69	
59.8			7.24	98.35	
61.2			7.60	97.99	
62.3			7.84	98.06	
64.5			8.03	97.56	
67.3			8.17	97.42	
69.4			8.33	97.26	
70.7			8.41	97.18	
72.0			8.56	97.03	edge water
73.0			8.88	96.71	in channel
74.0			8.92	96.67	"
75.0			8.97	96.62	"
76.0			9.11	96.48	"
77.0			9.16	96.43	"
78.0			9.16	96.43	
79.0			9.35	96.24	
80.0			9.38	96.21	
81.0			9.20	96.39	
82.0			9.20	96.39	
83.0			9.27	96.32	
84.0			9.39	96.20	
85.0			9.50	96.09	
86.0			9.54	96.05	
87.0			9.56	96.03	thalweg
88.0			9.46	96.13	Channel

1	140	99.2	0	X Section #1		
2	142	98.17	1.03	2	0.515	1.03
3	143	97.99	1.21	1	1.12	1.12
4	144	97.79	1.41	1	1.31	1.31
5	145	97.72	1.48	1	1.445	" "
6	146	97.53	1.67	1	1.575	
7	147	97.50	1.70	1	1.685	
8	148	97.31	1.89	1	1.795	
9	149	97.17	2.03	1	1.96	
10	150	97.23	1.97	1	2.00	
11	151	97.27	1.93	1	1.95	
12	152	97.37	1.83	1	1.88	
13	153	97.35	1.85	1	1.84	19.5
14	154	97.16	2.04	1	1.945	
15	155	97.07	2.13	1	2.085	
16	156	97.18	2.02	1	2.075	
17	157	96.85	2.35	1	2.185	
18	158	96.90	2.30	1	2.325	
19	159	96.83	2.38	1	2.34	MAX BANKFULL = 2.5
20	160	96.92	2.28	1	2.33	2x = 5.08 ELEV = 101.74
21	161	96.66	2.54 MAX	1	2.41	STA 1: 40.96 = 101.7 STA 2: 168.5 ~ 101.7
22	162	96.97	2.23	1	2.385	
23	163	97.47	1.73	1	1.98	
24	164	97.55	1.65	1	1.69	
25	165	98.73	0.47	1	1.06	
26	166	98.82	0.38	1	0.425	
27	167	100.26	0	1	0.19	

AREA	WIDTH	MEAN DEPTH	W/D RATIO	WIDTH FLOODPLANE	ENTRENCH	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	45.02

1	60	98.35	0		X Section H2	
2	61	97.99	0.36	1	0.18	0.18
3	62	98.06	0.29	1	0.325	0.325
4	65	97.56	0.79	3	0.54	1.62
5	67	97.42	0.93	2	0.86	1.72
6	69	97.26	1.09	2	1.01	2.02
7	71	97.18	1.17	2	1.03	2.06
8	72	97.03	1.32	1	1.245	1.245
9	73	96.71	1.64	1	1.48	1.48
10	74	96.67	1.68	1	1.66	" "
11	75	96.62	1.73	1	1.605	" "
12	76	96.48	1.87	1	1.80	
13	77	96.43	1.92	1	1.895	
14	78	96.43	1.92	1	1.92	
15	79	96.24	2.11	1	2.015	
16	80	96.21	2.14	1	2.125	
17	81	96.39	1.96	1	2.05	
18	82	96.39	1.96	1	1.96	MAX = 2.32
19	83	96.32	2.07	1	2.015	2x = 4.64
20	84	96.20	2.15	1	2.11	ELEV = 100.67
21	85	96.09	2.26	1	2.205	STA1:
22	86	96.05	2.30	1	2.28	STA2:
23	87	96.03	2.32 MAX	1	2.31	
24	88	96.13	2.22	1	2.27	
25	89	96.55	1.80	1	2.01	
26	91	98.32	0.03	1	0.915	
					43.80	

AREA	WIDTH	DEPTH	W/D	WIDTH FLOOD	ENVELENCH
43.80	31	1.41	22.0	~ 95	3.06.

SURVEY DATA ⟹ **CROSS - SECTION 1**

SITE: Level I - Team 4 Date: 3-31-15

Location: Long Pro Station 7.0

Party / Notes: LB to RB HUC:

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	BM I	5.59	105.59		100	Fence / concrete
2	0+00		↓	1.29	104.3	left pin.
3	—				—	
4	56.6		105.59	4.79	100.8	flat surface
5	70.0			5.08	100.51	" "
6	93.9			4.49	101.1	" " w/ bedrock
7	120.4			6.76	98.83	low terrace
8	127.5			6.30	99.29	" "
9	133.0			5.97	99.62	" "
10	139.8			6.39	99.20	Bankfull
11	142.0			7.42	98.17	LB Bank
12	143.0			7.60	97.99	"
13	144.0			7.80	97.79	"
14	145.0			7.87	97.72	"
15	146.0			8.06	97.53	"
16	146.6			8.09	97.50	Left water edge
17	148.0			8.28	97.31	in channel
18	149.0			8.42	97.17	"
19	150.0			8.36	97.23	"
20	151.0			8.32	97.27	"
21	152.0			8.22	97.37	"
22	153.0			8.24	97.35	"
23	154.0			8.43	97.16	"
24	155.0			8.57	97.07	"
25	156.0			8.41	97.18	"
26	157.0			8.74	96.85	"
27	158.0			8.69	96.90	"
28	159.0		↓	8.77	96.82	"

LONG PRO: Bankfull 7.59

Second LEW Reading = 8.28'

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SURVEY DATA ⟹ **CROSS - SECTION** 1

SITE: Team 4 **Date:**

Item	STATION ft	B S ft	H I ft	F S ft	Elevation ft	NOTES COMMENTS REMARKS
29	160.0		105.59	8.67	96.92	"
30	161.0			8.93	96.66	thalweg
31	162.0			8.62	96.97	" in bedrock
32	163.0			8.12	97.47	Right
33	164.0			8.04	97.55	edge of water
34	165.0			6.86	98.73	bedrock
35	166.0			6.77	98.82	"
36	167.0			5.33	100.26	
37	169.5			2.77	102.82	Right Pin.
38						
39						
40						
41						
42						
43						
44						
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58						
59						

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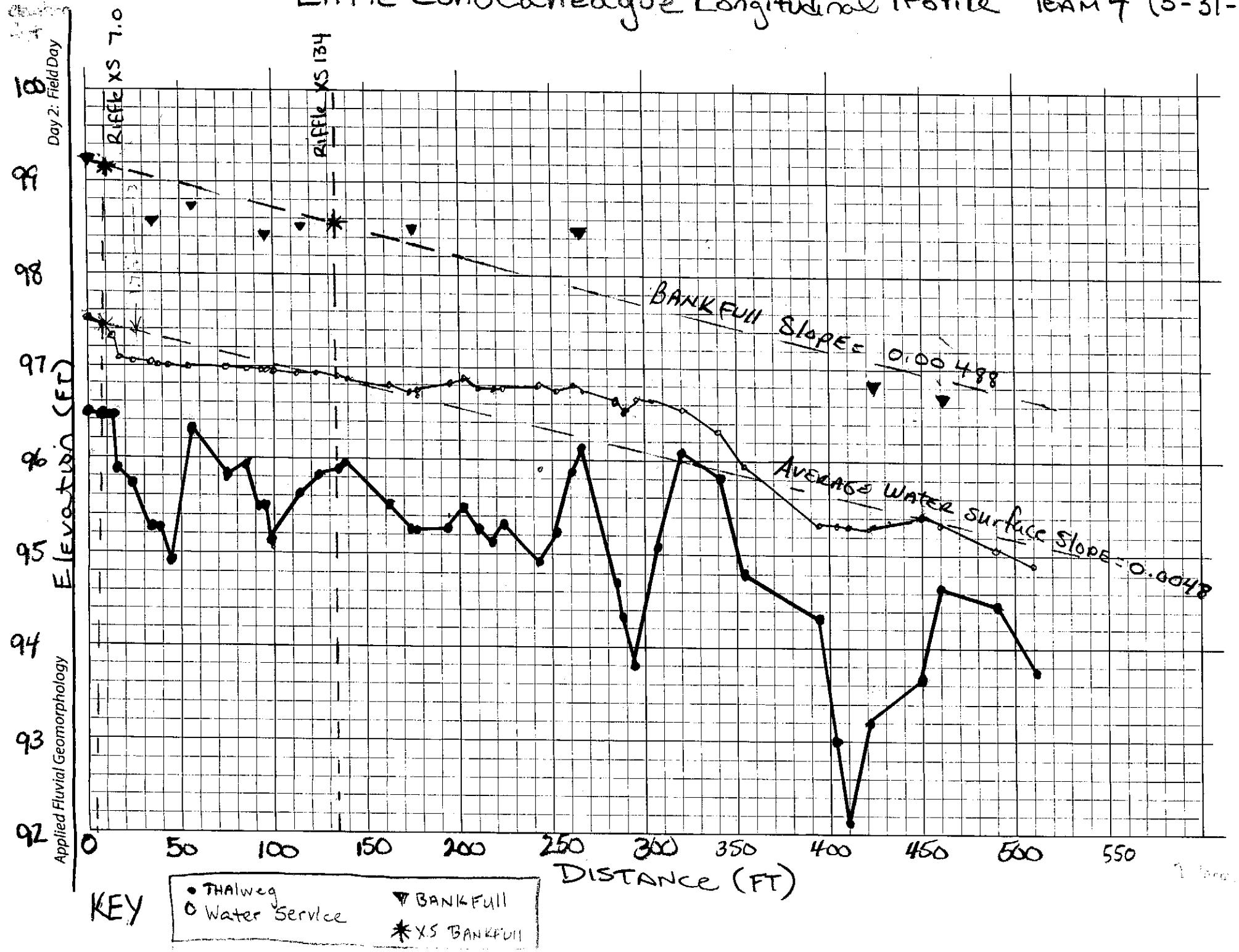
Little Conocaheague Longitudinal Profile Team 4 (3-31-2015)



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TEAM 4 Neal Eshleman

Applied Fluvial Geomorphology Kim Faulds KEVIN Cheung Day 2: Field Day

SURVEY DATA ⟶ LONGITUDINAL PROFILE 1

SITE: Reach 4 Little Conococheague Date: 3/31/15

Location: — STATION 0 Thr u 511

Party / Notes: Page 1 of 2 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	BM1	6.74	106.74									
2	0.0			10.21	96.53	9.18	97.56	7.53	99.21	7.12	99.62	Riffle
3	7.0			10.24	96.50	9.32	97.42	7.59	99.15			XS1
4	11.0			10.18	96.56	9.41	97.33			7.22	99.52	
5	16.0			10.89	95.85	9.64	97.1					
6	26.0			10.95	95.79	9.71	97.03					
7	36.0			11.41	95.33	9.72	97.02	8.15	98.59			
8	39.0			11.41	95.33	9.74	97			7.35	99.39	Pool
9	43.0			11.77	94.97	9.74	97					
10	57.0			10.50	96.24	9.74	97	8.01	98.73	7.67	99.07	Riffle
11	73.0			10.83	95.91	9.73	97.01					
12	83.0			10.75	95.99	9.76	96.98			8.07	98.67	
13	92.0			11.20	95.54	9.77	96.97			8.30	98.44	Pool
14	94.0			11.23	95.51	9.77	96.97	8.33	98.41			
15	99.0			11.67	95.07	9.78	96.96					
16	114.0			11.12	95.62	9.82	96.92	8.28	98.46			
17	126.0			10.94	95.80	9.82	96.92			8.93	97.81	
18	134.0			10.84	95.90	9.85	96.89	8.21	98.53			XS#2
19	137.0			10.76	95.98	9.90	96.84					
20	161.0			11.22	95.52	9.94	96.8			8.18	98.56	
21	172.5			11.49	95.25	10.02	96.72					
22	174.0			11.52	95.22	9.93	96.81	8.26	98.48			Pool
23	195.0			11.44	95.30	9.92	96.82					
24	201.0			11.21	95.53	9.88	96.86					Riffle
25	210.0			11.46	95.28	9.95	96.79					
26	219.0			11.56	95.18	9.95	96.79					Pool
27	226.0			11.37	95.37	9.95	96.79			8.44	98.3	

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SURVEY DATA ⟹ LONGITUDINAL PROFILE 2

SITE: Reach 4 L Date: 3/31/15

Location: Little Conococheaguea Creek Station - 0 thru 511

Party / Notes: Page 2 of 2 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
28	242.0		106.74	11.76	94.98	9.93	96.81					
29	252.0			11.53	95.21	9.97	96.77					
30	261.0			10.76	95.98	9.94	96.80					Riffle
31	267.0			10.59	96.18	10.02	96.72	8.27	98.47	8.13	98.61	
32	282.0			11.96	94.78	10.13	96.61					
33	286.0			12.36	94.38	10.21	96.53					Pool
34	295.0			12.93	93.81	10.13	96.61					
35	309.0			11.64	95.10	10.11	96.63					
36	320.0			10.60	96.14	10.17	96.57					Riffle
37	340.0			10.93	95.81	10.41	96.33					
38	354.0			11.85	94.89	10.79	95.95					
39	396.0			12.36	94.38	11.38	95.36					
40	402.0			13.74	93.00	11.35	95.39					Pool
41	410.0			14.62	92.12	11.40	95.34					
42	422.0			13.54	93.20	11.43	95.31	9.94	96.80	8.58	98.16	
43	450.0			13.07	93.67	11.32	95.42					
44	460.0			12.09	94.65	11.37	95.37	9.77	96.97	9.20	97.54	Riffle
45	497.0			12.27	94.47	11.70	95.04					
46	511.0			12.98	93.76	11.85	94.89			9.48	97.26	
47												
48												
49												
50												
51												
52												
53												
54												

HI = 106.74

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Team 4

Active Riffle Pebble Count

LOCATION: Little Conococheague Ck

PEBBLE COUNT DATA

Date: 3/31/2015

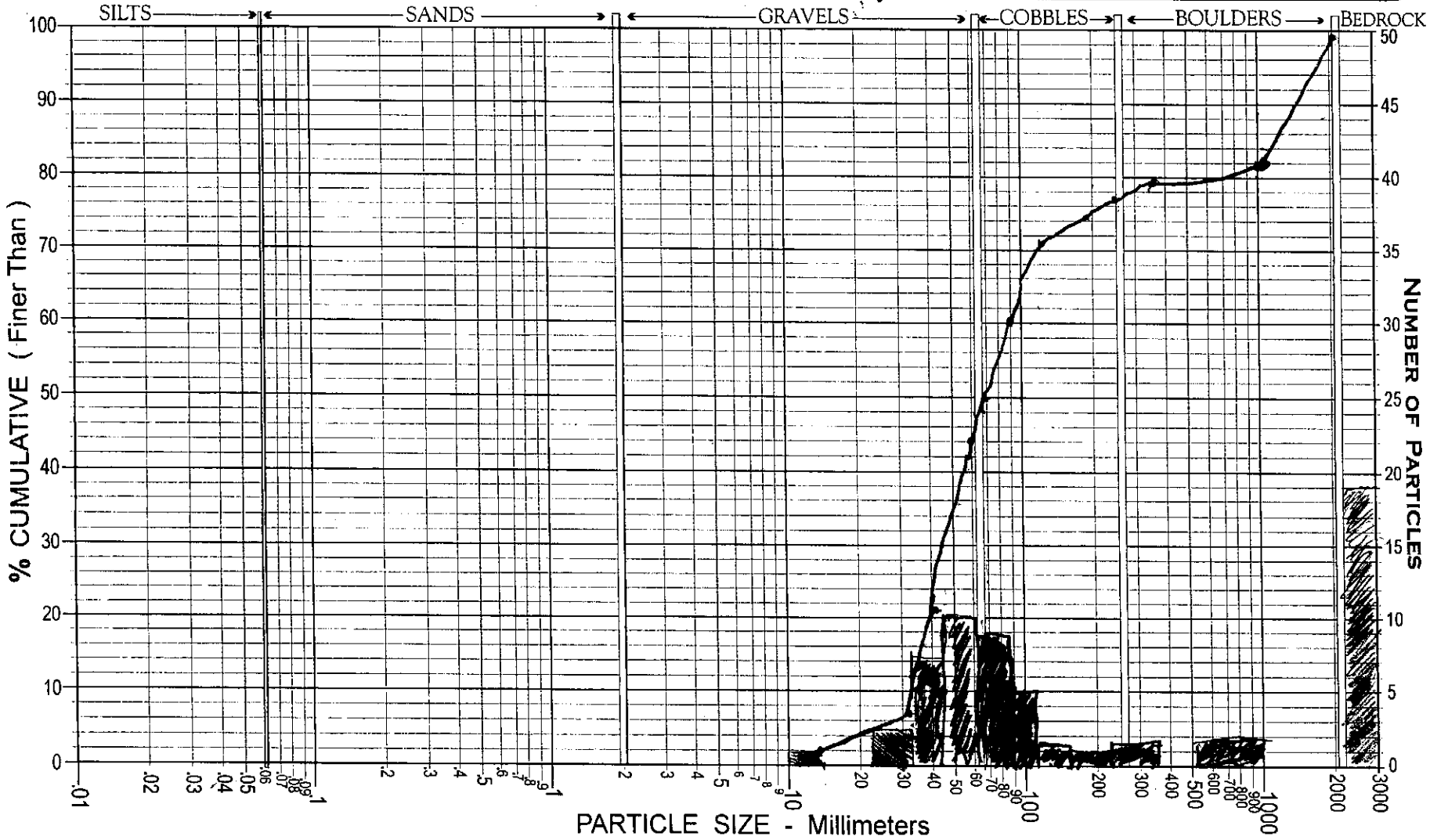
REACH: 4

PARTY: John G & Sarah

Stream Type: C4

Valley Type: Alluvial VIII (G-AL-RR)

HUC:



D_{84} = 1100 mm (Boulder).

D_{50} = 70 mm (Gravel) small cobble

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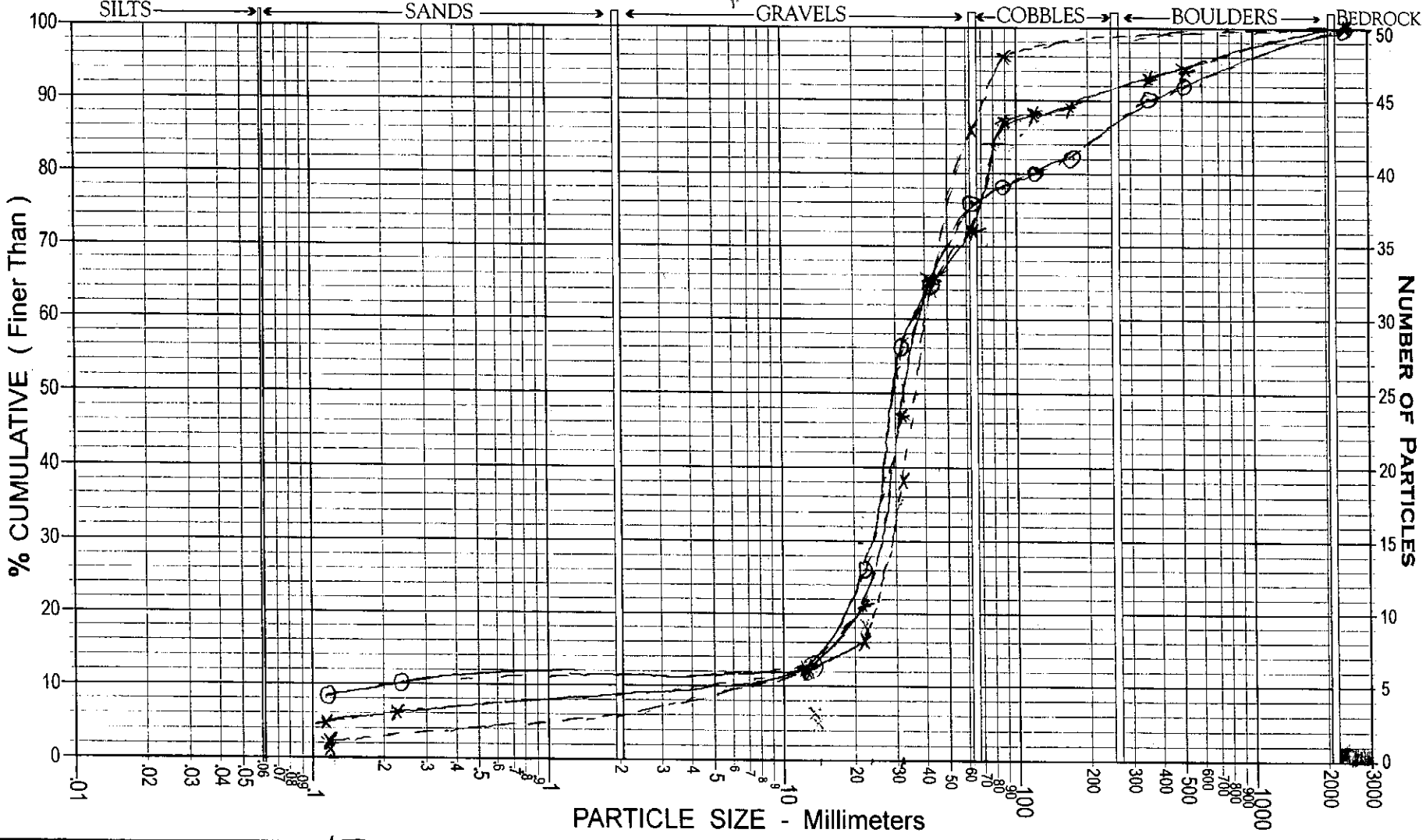
TEAM 4

REPRESENTATIVE REACH PEBBLE COUNT

PEBBLE COUNT DATA

LOCATION: Little Conococheague Creek
Date: 3/31/2015
REACH: 4
PARTY: JOHN G. & SAJAN P.
Stream Type: C4
Valley Type: Alluvial VIII (C-AL-AD) HUC:



$D_{50} = 32$
$D_{84} = 80$
gravel bed stream

× – Riffle
⊙ – pool
✳ – composite

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TEAM 4

Active Riffle Pebble Count (3-31-2015)

170
135
3'6"
B:55
1:1

Site: Reach 4 Date:

Location: Little Conococheague CK HUC:

Party: JOHN G SAJAN

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												
	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													
.44 - .63	Medium	11.3 - 16					2	2	2						
.63 - .89	Coarse	16 - 22.6													
.89 - 1.3	Coarse	22.6 - 32					5	5	7						
1.3 - 1.8	Very Coarse	32 - 45					15	15	22						
1.8 - 2.5	Very Coarse	45 - 64					22	22	44						
2.5 - 3.5	Small	64 - 90	COBBLE				17	17	61						
3.5 - 5.0	Small	90 - 128					10	10	71						
5.0 - 7.1	Large	128 - 180					3	3	74						
7.1 - 10.1	Large	180 - 256					2	2	76						
10.1 - 14.3	Small	256 - 362	BOULDER				3	3	79						
14.3 - 20	Small	362 - 512													
20 - 40	Medium	512 - 1024					3	3	82						
40 - 80	Large-Vry Large	1024 - 2048													
	Bedrock		BDRK				18	18	100						
						TOTAL →	100								

Reach: Date:

Reach: Date:

Reach: Date:

Stream Type: **Valley Type:** 35

1 00+02
2 00+05
3 00+12

00+02 32 | 00+05 33 | 34 00+12

Bedrock

0+00

0+12

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R 50 / P 50

John G
SANJAN

Active

Representative Pebble Count TEAM 4 (3-31-2015)

Site: Reach 4 Date:
Location: HUC:
Party: JOHN G / SAJAN

Dot Count for RIFFLE 1 | POOL 2 | COMP. 3

Inches	PARTICLE	Millimeters		RIFFLE (1) X TOT #	RIFFLE ITEM %	RIFFLE % CUM	POOL (2) O TOT #	POOL ITEM %	POOL % CUM	COMPOSITE (3) * TOT #	COMPOSITE ITEM %	COMPOSITE % CUM
				Reach: 4			Reach: 4			Reach:		
				Date:			Date:			Date:		
	Silt / Clay	< .062	S/C									
	Very Fine	.062 - .125	SAND	1	2	2	4	8	8	5	5	5
	Fine	.125 - .25					1	2	10	1	1	6
	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										
.44 - .63	Medium	11.3 - 16		5	10	12	1	2	12	6	6	12
.63 - .89	Coarse	16 - 22.6		2	4	16	7	14	26	9	9	21
.89 - 1.3	Coarse	22.6 - 32		11	22	38	15	30	56	26	26	47
1.3 - 1.8	Very Coarse	32 - 45		14	28	64	4	8	64	18	18	65
1.8 - 2.5	Very Coarse	45 - 64		11	22	86	6	12	76	17	17	82
2.5 - 3.5	Small	64 - 90	COBBLE	4	8	96	1	2	78	5	5	87
3.5 - 5.0	Small	90 - 128					1	2	80	1	1	88
5.0 - 7.1	Large	128 - 180					1	2	82	1	1	89
7.1 - 10.1	Large	180 - 256										
10.1 - 14.3	Small	256 - 362	BOULDER				4	8	90	4	4	93
14.3 - 20	Small	362 - 512					1	2	92	1	1	94
20 - 40	Medium	512 - 1024										
40 - 80	Large-Vry Large	1024 - 2048										
	Bedrock		BDRK	2	4	100	4	8	100	6	6	100
			TOTAL→	50			50			100		

Stream Type: **Valley Type:**

R (1) 3+69 (2) 2+53 (3) 2+69 (4) 1+36 (5) 0+69

Pool: (1) 3+49 (2) 1+97 (3) 1+73 (4) 2+40 (5) 3+25

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Using D_{50} for Relative Roughness

Worksheet A-2. Computations of velocity and discharge using various methods.

Bankfull VELOCITY & DISCHARGE Estimates

Stream:	Little Conococheague Creek	Location:	Washington County,
Date:	3/31/2015	Stream Type:	C4
Observers:	Team 4	Valley Type:	C - AL - AD
		HUC:	-- -- -- -- -- -- -- -- -- -- --

INPUT VARIABLES			OUTPUT VARIABLES		
Bankfull Riffle Cross-Sectional AREA	45	A_{bkf} (ft^2)	Bankfull Riffle Mean DEPTH	1.67	d_{bkf} (ft)
Bankfull Riffle WIDTH	27	W_{bkf} (ft)	Wetted PERMIMETER ~ $(2 * d_{bkf}) + W_{bkf}$	30.34	W_p (ft)
D_{84} (50) at Riffle	70	Dia. (mm)	D_{84} (50) (mm) / 304.8	0.23	D_{84} (ft)
Bankfull SLOPE	0.0048	S_{bkf} (ft / ft)	Hydraulic RADIUS A_{bkf} / W_p	1.67	R (ft)
Gravitational Acceleration	32.2	g (ft / sec^2)	Relative Roughness R(ft) / D_{84} (ft)	7.3	R / D_{84}
Drainage Area	12	DA (mi^2)	Shear Velocity $u^* = (gRS)^{1/2}$	0.502	u^* (ft/sec)

ESTIMATION METHODS	Bankfull VELOCITY		Bankfull DISCHARGE	
1. Friction Factor / Relative Roughness $u = [2.83 + 5.66 * Log\{R / D_{84}\}] u^*$	3.8	ft / sec	174	cfs
2. Roughness Coefficient: a) Manning's n from Friction Factor / Relative Roughness (Figs. A-27, A-28) $u = 1.49 * R^{2/3} * S^{1/2} / n$ $n =$ .035	4.1	ft / sec	184.9	cfs
2. Roughness Coefficient: b) Manning's n from Stream Type (Fig. A-29) $u = 1.49 * R^{2/3} * S^{1/2} / n$ $n =$ .031	4.62	ft / sec	208.3	cfs
2. Roughness Coefficient: c) Manning's n from Jarrett (USGS): $u = 1.49 * R^{2/3} * S^{1/2} / n$ $n = 0.39 * S^{0.38} * R^{-0.16}$ 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 $n =$ .047	3.05	ft / sec	137.4	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) Regional Curves $u = Q / A$ Return Period for Bankfull Discharge Q = 220 cfs year	4.88	ft / sec	220	cfs
4. Continuity Equations: b) USGS Gage Data $u = Q / A$		ft / sec		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 A-1. Field Form for Level II Stream Classification.

Stream: Little Conococheague Creek	
Basin:	Drainage Area: 7,680 acres 12 mi^2
Location: Reach 4	
Twp.&Rge:	Sec.&Qtr.:
Cross-Section Monuments (Lat./Long.):	Date: 3/31/2015
Observers: Team 4	Valley Type: C-AL-AD Vill

Bankfull WIDTH (W_{bkf}) WIDTH of the stream channel at bankfull stage elevation, in a riffle section.	27	ft
Bankfull DEPTH (d_{bkf}) Mean DEPTH of the stream channel cross-section, at bankfull stage elevation, in a riffle section ($d_{bkf} = A_{bkf} / W_{bkf}$).	1.67	ft
Bankfull X-Section AREA (A_{bkf}) AREA of the stream channel cross-section, at bankfull stage elevation, in a riffle section.	45.0	ft^2
Width/Depth Ratio (W_{bkf} / d_{bkf}) Bankfull WIDTH divided by bankfull mean DEPTH, in a riffle section.	16.2	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.	2.54	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.	127.5	ft
Entrenchment Ratio (ER) The ratio of flood-prone area WIDTH divided by bankfull channel WIDTH (W_{fpa} / W_{bkf}) (riffle section).	4.7	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.	38	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.	0.0048	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).	1.2	

Stream Type C4 **See Classification Key (Figure A-2)**

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Worksheet A-3. Summary of Morphological Variables.

Stream: Little CONOCACHEAGUE CK		Location: Washington County, MD	
Team: 4	Date: 3/31/2015	Drainage Area: 12 mi²	

Riffle Channel Dimensions

1. Bankfull Width (W_{bkf}) (ft)	27 ft	2. Bankfull Mean Depth (d_{bkf}) (ft)	1.67 ft
3. Width/Depth Ratio (W_{bkf} / d_{bkf})	16.17	4. Bankfull Cross-Sectional Area (A_{bkf}) (ft²)	45 ft²
5. Bankfull Maximum Depth (d_{max}) (ft)	2.54	6. Width of Flood-Prone Area (W_{fpa}) (ft)	127.5
7. Entrenchment Ratio (ER) (W_{fpa} / W_{bkf})	4.7		

27 / 1.67

Channel Pattern / Dimensionless Ratios

8. Belt Width (W_{blt}) (ft)	Mean	84.3	9. Meander Width Ratio (MWR) (W_{blt} / W_{bkf})	Mean	3.12
	Min	84		Min	3.11
	Max	85		Max	3.15
10. Stream Meander Length (L_m) (ft)	Mean	610	11. Meander Length Ratio (MLR) (L_m / W_{bkf})	Mean	22.6
	Min			Min	
	Max			Max	
12. Linear Wavelength (λ) (ft)	Mean	375	13. Linear Wavelength to Bankfull Width (λ / W_{bkf})	Mean	13.9
	Min	61		Min	
	Max	152.75		Max	
14. Radius of Curvature (R_c) (ft)	Mean	62.75	15. Radius of Curvature to Bankfull Width (R_c / W_{bkf})	Mean	2.32
	Min	61		Min	2.26
	Max	64.55		Max	2.39

Channel Particles

Representative Pebble Count

16. D_{16} (mm)	22	17. D_{35} (mm)	31	18. D_{50} (mm)	38
19. D_{84} (mm)	80	20. D_{95} (mm)	600	21. D_{100} (mm)	2100

Active Bed Riffle Pebble Count

22. D_{16} (mm)	36	23. D_{35} (mm)	52	24. D_{50} (mm)	70
25. D_{84} (mm)	1100	26. D_{95} (mm)	1900	27. D_{100} (mm)	2100

Classification

28. Sinuosity (k)	1.208	29. Average Water Surface Slope (S)	0.0048
30. Stream Type	C4	31. Valley Type	8-C-AL+AD

Velocity & Discharge

32. Friction Factor (ū / u*)	3.8	33. Relative Roughness (R / D_{84})	7.3
34. Manning's 'n' from Friction Factor / Relative Roughness	0.035	35. Manning's 'n' from Stream Type	.031
36. Estimated Bankfull Mean Velocity ($ū_{bkf}$) (ft/sec)	4.62	37. Estimated Bankfull Discharge (cfs)	208.3 cfs
38. Estimation Method Selected for Velocity & Discharge	Mannings n from stream type - we did not have appropriate D84 use		

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