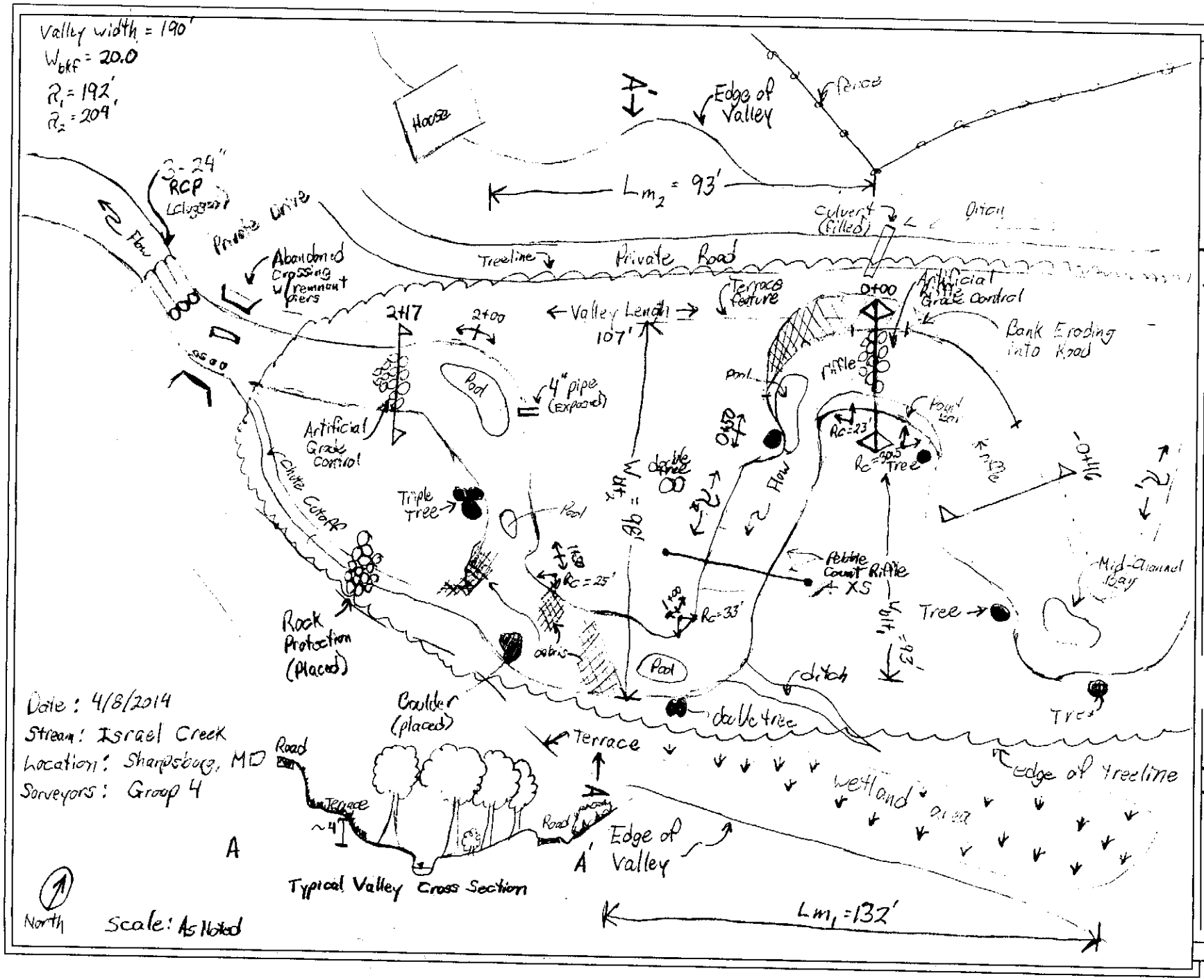
AREA-SITE LOCATION....REACH MAP

Stream/Drainage: Israel Run

Site/Reach: Group 4

Drawn By: Group 4

Date: 4/8/14



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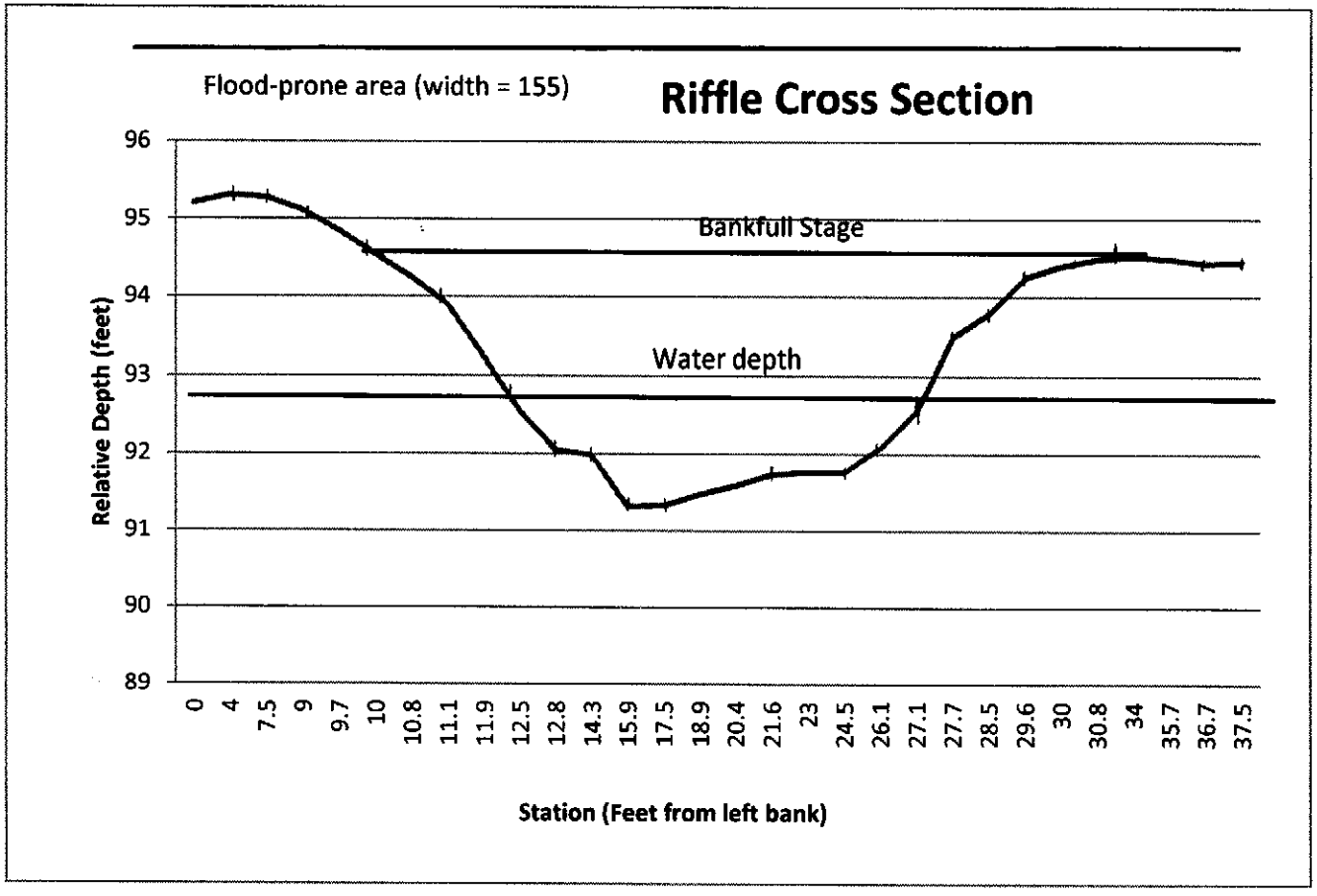
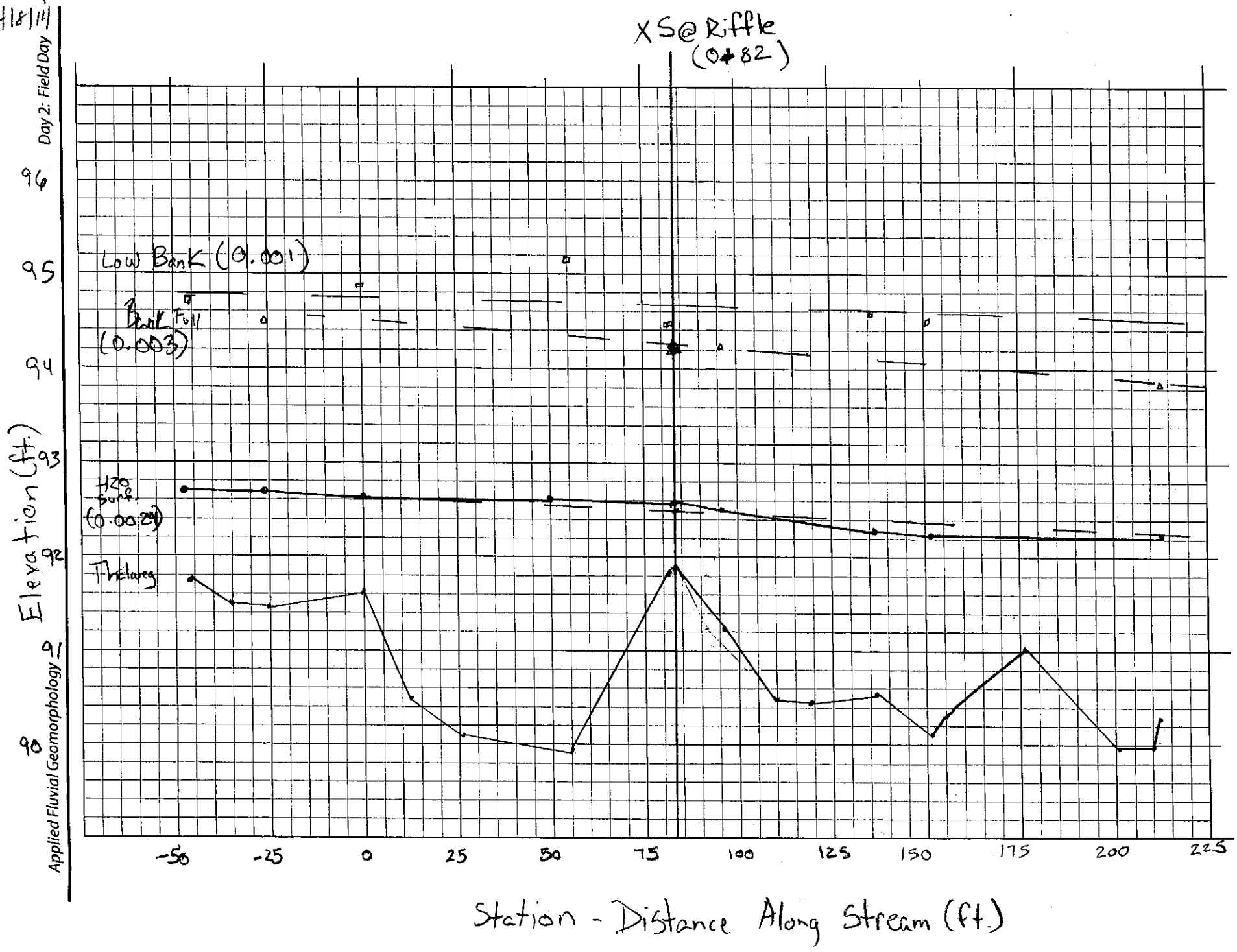
Little Bear Group 4 4/8/14



Little Bear
Group 4
4/8/11



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SURVEY DATA ⟶ **LONGITUDINAL PROFILE 2**

SITE: Little Isreal - Reach 4 Date: 4/8/14

Location:

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 Hl Fore-Sight FS ft	Low Bank Hl Elevation Elev. ft	NOTES e.g. Riffle Run Pool Glide	
28	-46	100		8.21	91.79	7.31	92.69			5.31	94.69	Start Riffle	
29	-36			8.56	91.44							Begin Run	
30	-26			8.58	91.42	7.31	92.69	5.5	94.50			Mid Run	
31	0			8.38	91.62	7.34	92.66			5.16	94.84	Begin Riffle	
32	12			9.5	90.50							Begin Pool	
33	26			9.85	90.15							Pool	
34	55			10.11	89.89	7.39	92.61			4.81	95.19	Max D Pool	
35	80.7			8.19	91.81	7.41	92.59			5.47	94.53	Begin Riffle	
36	82			8.17	91.83	7.46	92.54	5.60	94.40	5.42	94.58	Mid Riffle XS	
37	96			8.79	91.21	7.46	92.54	5.75	94.25			Begin Run	
38	110			9.47	90.53							Pool	
39	119			9.56	90.44							Glide	Downstream Debris
40	136			9.42	90.58	7.74	92.26			5.41	94.59	Begin Run	
41	152			9.89	90.11	7.89	92.11			5.60	94.40	Begin Pool	
42	155			9.67	90.33							Begin Glide	
43	177			8.92	91.08							Begin Pool	
44	201			10.15	89.85							D Max Pool	
45	210			10.04	89.96							Begin Glide	
46	212			9.75	90.25	7.93	92.07	6.14	93.86			Begin Riffle	
47													
48													
49													
50													
51													
52													
53													
54													

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Little Isreal, Group 4
4/8/14

Rep pebble count

Site: Isral Creek | Date:
Location: | HUC:
Party:

Inches	PARTICLE	Millimeters		Dot Count for RIFFLE	POOL 2	COMP. 3	RIFFLE (1) TOT #	ITEM %	% CUM	POOL (2) TOT #	ITEM %	% CUM	COMPOSITE (3) TOT #	ITEM %	% CUM
	Silt / Clay	< .062	S/C				4	.2	.2	9	.1125	.1125	13	.13	.13
	Very Fine	.062 - .125	SAND				1	.05	.25	6	.075	.1875	7	.07	.2
	Fine	.125 - .25					1	.05	.3	4	.05	.2375	5	.05	.25
	Medium	.25 - .50								3	.0375	.275	3	.03	~~.28~~
	Coarse	.50 - 1.0					1	.05	.35	18	.225	.5	19	.19	.47
* .04 - .08	Very Coarse	1.0 - 2 (1.5)					1	.05	.4	6	.075	.575	7	.07	.54
.08 - .16	Very Fine	2 - 4	GRAVEL				1	.05	.45	8	.1	.675	9	.09	.63
.16 - .22	Fine	4 - 5.7								5	.0625	.7375	5	.05	.68
.22 - .31	Fine	5.7 - 8					5	.25	.7	11	.1375	.875	16	.16	.84
.31 - .44	Medium	8 - 11.3					4	.2	.9	4	.05	.925	8	.08	.92
.44 - .63	Medium	11.3 - 16								2	.025	.95	2	.02	.94
.63 - .89	Coarse	16 - 22.6					1	.05	.95	2	.025	.975	3	.03	.97
.89 - 1.3	Coarse	22.6 - 32					1	.05	1	1	.0125	.9875	2	.02	.99
1.3 - 1.8	Very Coarse	32 - 45													
1.8 - 2.5	Very Coarse	45 - 64													
2.5 - 3.5	Small	64 - 90	COBBLE							1	.0125	1	1	.01	100
3.5 - 5.0	Small	90 - 128													
5.0 - 7.1	Large	128 - 180													
7.1 - 10.1	Large	180 - 256													
10.1 - 14.3	Small	256 - 362	BOULDER												
14.3 - 20	Small	362 - 512													
20 - 40	Medium	512 - 1024													
40 - 80	Large-Vry Large	1024 - 2048													
	Bedrock		BDRK												
Stream Type:			**Valley Type:**			TOTAL→									

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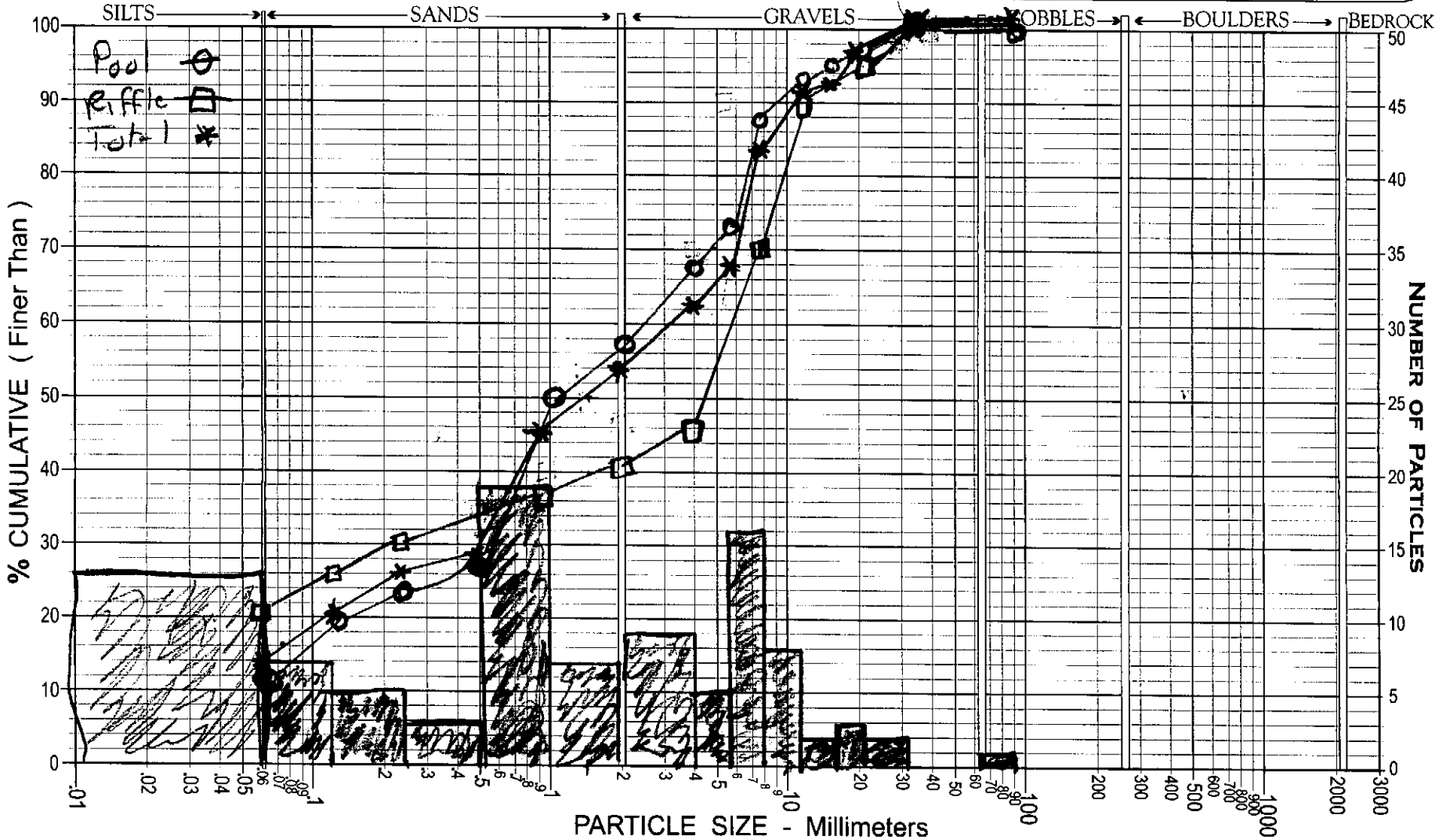
Representative Pebble Count.

PEBBLE COUNT DATA

LOCATION: Isreal Creek
Date: 4/8/14
REACH: Team 4
PARTY: Team 4
Stream Type:
Valley Type:
HUC:



D_{50} - 1.5

D_{84} - 7.5

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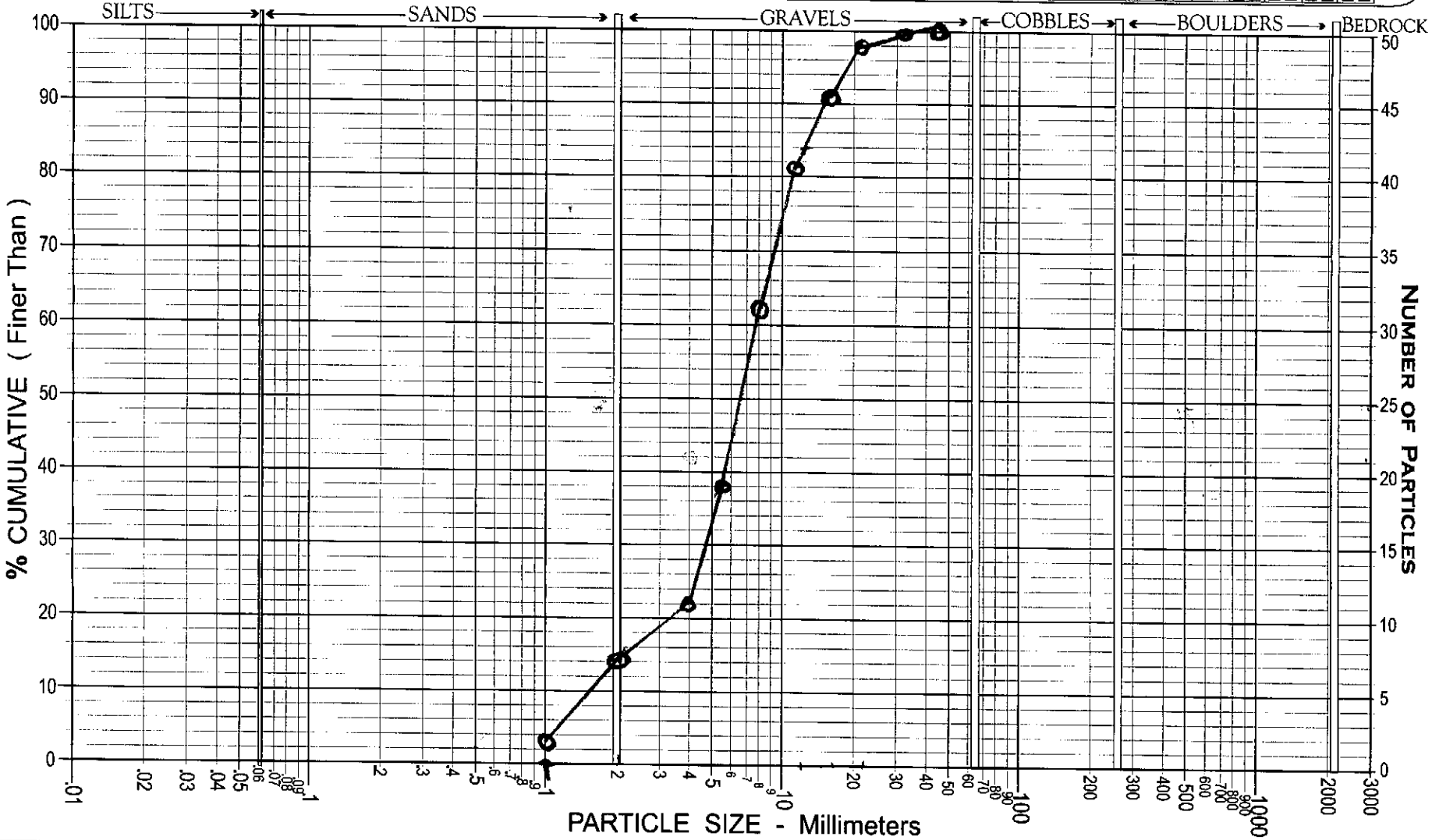
Active Bed.

PEBBLE COUNT DATA

LOCATION: Isreal creek
Date: 4/8/14
REACH: Team 4
PARTY: Team 4
Stream Type:
Valley Type:
HUC:



D_{50} - 6.5

D_{84} - 12.5

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Worksheet A-1. Field Form for Level II Stream Classification.

Stream: Little Israel		Team 4	
Basin:	Drainage Area:	acres 5.45	mi^2
Location: Sharpsburg			
Twp.&Rge:	Sec.&Qtr.:		
Cross-Section Monuments (Lat./Long.):		Date: 4/8/14	
Observers:		Valley Type: UAL FD	

Bankfull WIDTH (W_{bkf}) WIDTH of the stream channel at bankfull stage elevation, in a riffle section.	20.0	ft
Bankfull DEPTH (d_{bkf}) Mean DEPTH of the stream channel cross-section, at bankfull stage elevation, in a riffle section ($d_{bkf} = A_{bkf} / W_{bkf}$).	1.84	ft
Bankfull X-Section AREA (A_{bkf}) AREA of the stream channel cross-section, at bankfull stage elevation, in a riffle section.	36.0	ft^2
Width/Depth Ratio (W_{bkf} / d_{bkf}) Bankfull WIDTH divided by bankfull mean DEPTH, in a riffle section.	11.11	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.	3.23	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.	155	ft
Entrenchment Ratio (ER) The ratio of flood-prone area WIDTH divided by bankfull channel WIDTH (W_{fpa} / W_{bkf}) (riffle section).	7.75	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.	1.5	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.	0.0024	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).	2.0	

Stream Type C4/5 **See Classification Key (Figure A-2)**

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

Bankfull VELOCITY & DISCHARGE Estimates

Stream:	Little Isreal	Location:	Sharpsburg
Date: 4/8/14	Stream Type: C4/5	Valley Type:	U-AL-FD
Observers:	Team 4	HUC:	-- -- -- -- -- -- -- -- -- -- --

INPUT VARIABLES			OUTPUT VARIABLES		
Bankfull Riffle Cross-Sectional AREA	36.0	A_{bkf} (ft^2)	Bankfull Riffle Mean DEPTH	1.84	d_{bkf} (ft)
Bankfull Riffle WIDTH	20.0	W_{bkf} (ft)	Wetted PERIMETER ~ $(2 * d_{bkf}) + W_{bkf}$	23.68	W_p (ft)
D_{84} at Riffle	12.5	Dia. (mm)	D_{84} (mm) / 304.8	0.04	D_{84} (ft)
Bankfull SLOPE	0.0024 / 0.003	S_{bkf} (ft / ft)	Hydraulic RADIUS A_{bkf} / W_p	1.52	R (ft)
Gravitational Acceleration	32.2	g (ft / sec^2)	Relative Roughness R(ft) / D_{84} (ft)	38	R / D_{84}
Drainage Area	5.45	DA (mi^2)	Shear Velocity $u^* = (gRS)^{1/2}$	0.34	u^* (ft/sec)

ESTIMATION METHODS	Bankfull VELOCITY		Bankfull DISCHARGE	
1. Friction Factor / Relative Roughness $\bar{u} = [\,2.83 + 5.66 * Log\{R / D_{84}\}\,]\,u^*$	4.00	ft / sec	144.08	cfs
2. Roughness Coefficient: a) Manning's n from Friction Factor / Relative Roughness (Figs. A-28, A-29) $\bar{u} = 1.49*R^{2/3}*S^{1/2}/n$ $n =$ 0.026	3.71	ft / sec	133.56	cfs
2. Roughness Coefficient: b) Manning's n from Stream Type (Fig. A-30) $\bar{u} = 1.49*R^{2/3}*S^{1/2}/n$ $n =$ 0.031	3.11	ft / sec	111.96	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 $n =$ 0.037	2.61	ft / sec	93.96	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 $\bar{u} = Q / A$	4.68	ft / sec	168.4	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-3. Summary of Morphological Variables.

Stream: Little Isreal		**Location:** Shampsburg	
Team: 4	**Date:** 4/8/14	**Drainage Area:** 5.45	

Riffle Channel Dimensions

1. Bankfull Width (W_{bkf}) (ft)	20.0	2. Bankfull Mean Depth (d_{bkf}) (ft)	1.85
3. Width/Depth Ratio (W_{bkf} / d_{bkf})	10.7	4. Bankfull Cross-Sectional Area (A_{bkf}) (ft^2)	36.0
5. Bankfull Maximum Depth (d_{max}) (ft)	2.5	6. Width of Flood-Prone Area (W_{fpa}) (ft)	155.0
7. Entrenchment Ratio (ER) (W_{fpa} / W_{bkf})	4.7		

Channel Pattern / *Dimensionless Ratios*

8. Belt Width (W_{blt}) (ft)	Mean	95.5	9. Meander Width Ratio (MWR) (W_{blt} / W_{bkf})	Mean	4.8
	Min	93		Min	4.7
	Max	98		Max	4.9
10. Stream Meander Length (L_m) (ft)	Mean	112.5	11. Meander Length Ratio (MLR) (L_m / W_{bkf})	Mean	9.9
	Min	93		Min	9.1
	Max	132		Max	10.2
12. Linear Wavelength (λ) (ft)	Mean	198	13. Linear Wavelength to Bankfull Width (λ / W_{bkf})	Mean	5.6
	Min	192		Min	4.7
	Max	204		Max	6.6
14. Radius of Curvature (R_c) (ft)	Mean	28	15. Radius of Curvature to Bankfull Width (R_c / W_{bkf})	Mean	1.4
	Min	23		Min	1.2
	Max	33		Max	1.7

Channel Particles

Representative Pebble Count

16. D_{16} (mm)	0.075	17. D_{35} (mm)	0.59	18. D_{50} (mm)	1.5
19. D_{84} (mm)	7.5	20. D_{95} (mm)	18.5	21. D_{100} (mm)	90

Active Bed Riffle Pebble Count

22. D_{16} (mm)	2.5	23. D_{35} (mm)	5.5	24. D_{50} (mm)	6.5
25. D_{84} (mm)	12.5	26. D_{95} (mm)	19.0	27. D_{100} (mm)	45.0

Classification

28. Sinuosity (k)	2.0	29. Average Water Surface Slope (S)	0.0024
30. Stream Type	C 4/5	31. Valley Type	U-AL-FO

Velocity & Discharge

32. Friction Factor ($\bar{u}$ / u*)	11.76	33. Relative Roughness (R / D_{84})	38
34. Manning's 'n' from Friction Factor / Relative Roughness	0.026	35. Manning's 'n' from Stream Type	0.031
36. Estimated Bankfull Mean Velocity ($\bar{u}_{bkf}$) (ft/sec)	4.00	37. Estimated Bankfull Discharge (cfs)	144.08
38. Estimation Method Selected for Velocity & Discharge	Friction Factor / Relative Roughness		

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