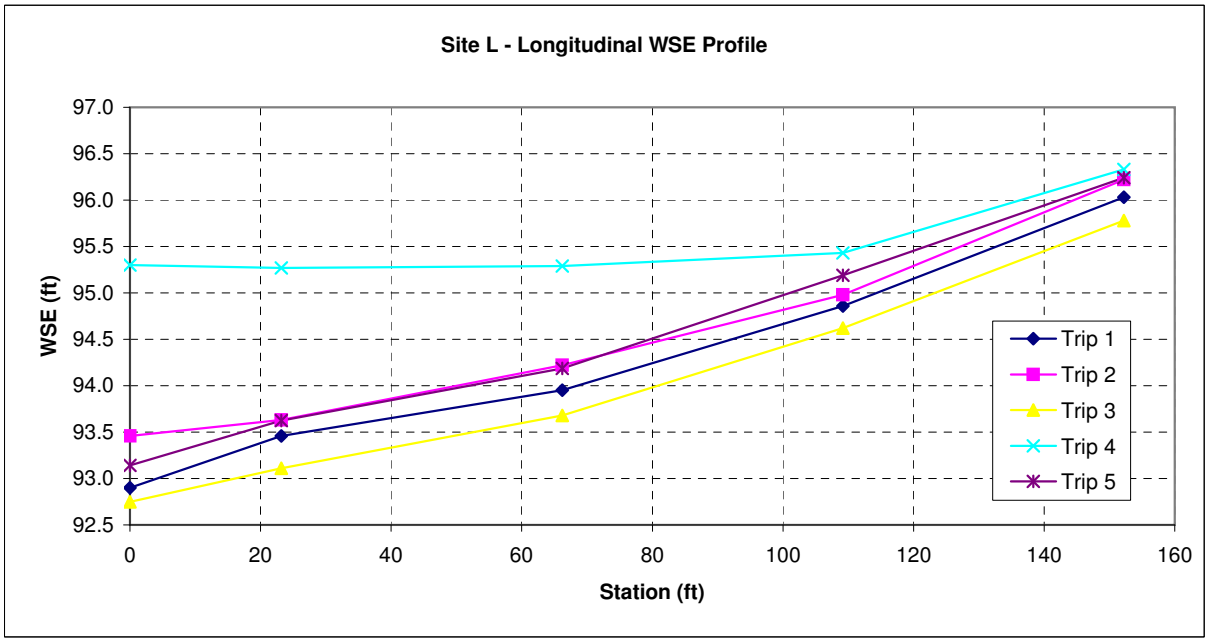
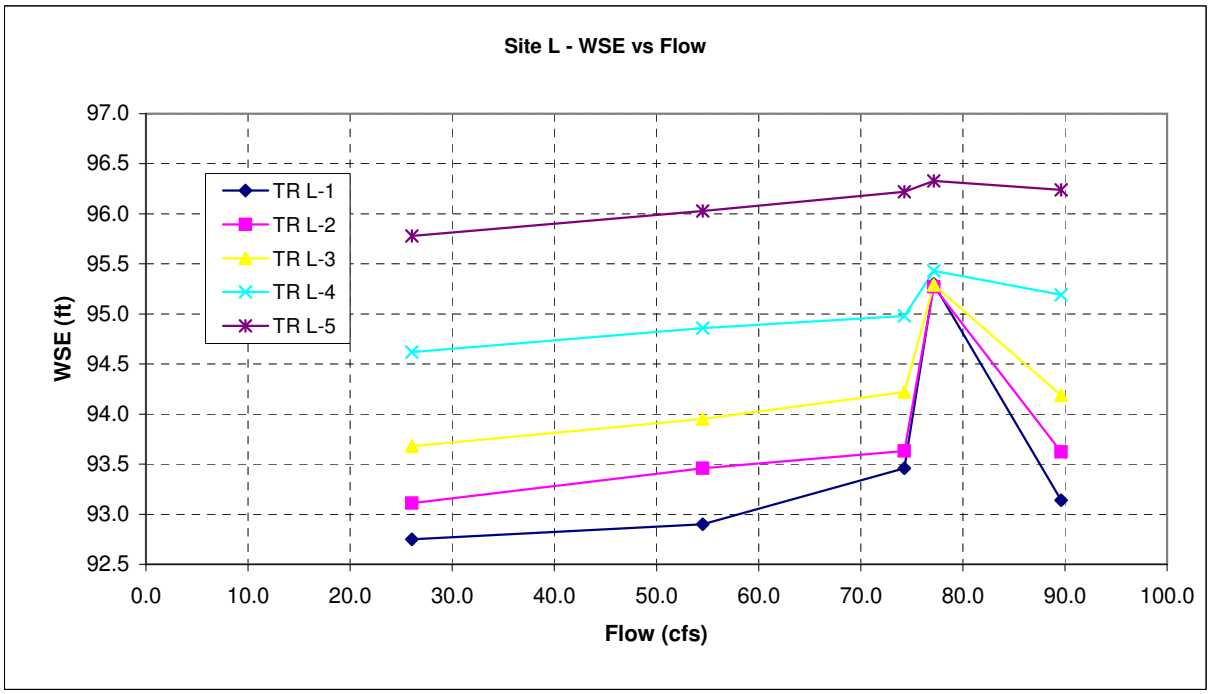
Reach: Alluvial Reach
Stream: Cooper Lake
Site: Site L
Habitat Type: Riffle

			Q(cfs)									
			26.0	54.5	74.3	77.2	89.6					
			Q (cfs) / WSE (ft)					Vel-Depth Survey				
TR	length	Sta	Trip 3	Trip 1	Trip 2	Trip 4	Trip 5	Trip 3	Trip 1	Trip 2	Trip 4	Trip 5
TR L-1	-	0.0	92.75	92.90	93.46	95.30	93.14		Y			
TR L-2	23.2	23.2	93.11	93.46	93.63	95.27	93.62		Y			
TR L-3	43	66.2	93.68	93.95	94.22	95.29	94.19		Y			
TR L-4	43	109.2	94.62	94.86	94.98	95.43	95.19		Y			
TR L-5	43	152.2	95.78	96.03	96.22	96.33	96.24		Y			
Average WSE slope			1.99%	2.06%	1.81%	0.68%	2.04%					



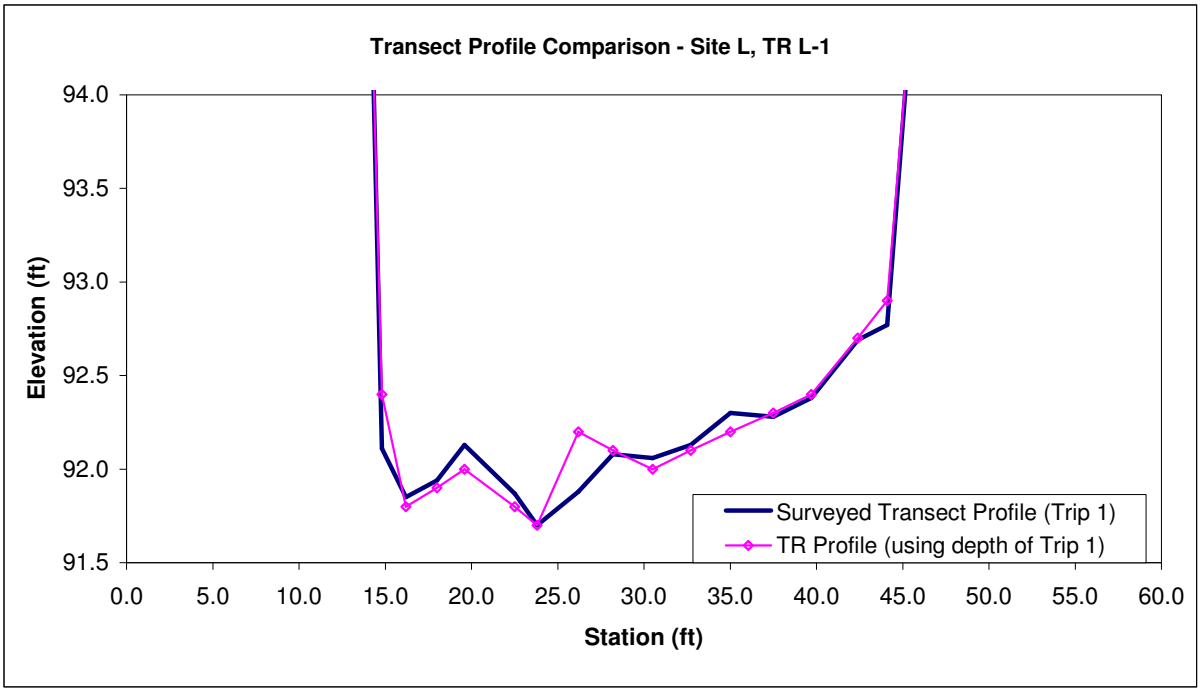


Transect Profile Comparison - Site L, TR L-1

Trip 1								Trip 5					
Sta (ft)	HI (ft)	FS (ft)	Elev (ft)	Depth (ft)	Velocity (ft/s)	q (cfs)	Bed Elev (ft)	Depth (ft)	Velocity (ft/s)	q (cfs)	Bed Elev (ft)	subs	code
10.0	98.660	1.880	96.780				96.78					sand	1
14.2	98.660	4.090	94.570				94.57					128	5
14.8	98.660	6.550	92.110	0.50	0.20	0.07	92.40					8	2
16.2	98.660	6.810	91.850	1.10	2.60	4.58	91.80					11	3
18.0	98.660	6.720	91.940	1.00	2.70	4.59	91.90					23	3
19.6	98.660	6.530	92.130	0.90	3.20	6.48	92.00					45	4
22.5	98.660	6.790	91.870	1.10	2.00	4.62	91.80					32	3
23.8	98.660	6.960	91.700	1.20	3.30	7.33	91.70					64	4
26.2	98.660	6.780	91.880	0.70	4.10	6.31	92.20					128	5
28.2	98.660	6.580	92.080	0.80	2.30	3.96	92.10					256	6
30.5	98.660	6.600	92.060	0.90	2.30	4.66	92.00					32	3
32.7	98.660	6.530	92.130	0.80	3.00	5.40	92.10					256	6
35.0	98.660	6.360	92.300	0.70	2.70	4.54	92.20					23	3
37.5	98.660	6.380	92.280	0.60	1.30	1.83	92.30					sand	1
39.7	98.660	6.280	92.380	0.50	0.30	0.37	92.40					23	3
42.4	98.660	5.970	92.690	0.20	0.30	0.13	92.70					sand	1
44.1	98.660	5.890	92.770	0.00	0.00	0.00	92.90					sand	1
45.8	98.660	3.860	94.800				94.80					silt	1
50.0	98.660	3.160	95.500				95.50					silt	1
57.9	98.660	0.530	98.130				98.13					silt	1

No flow (vel-depth) measurement during Trip 5

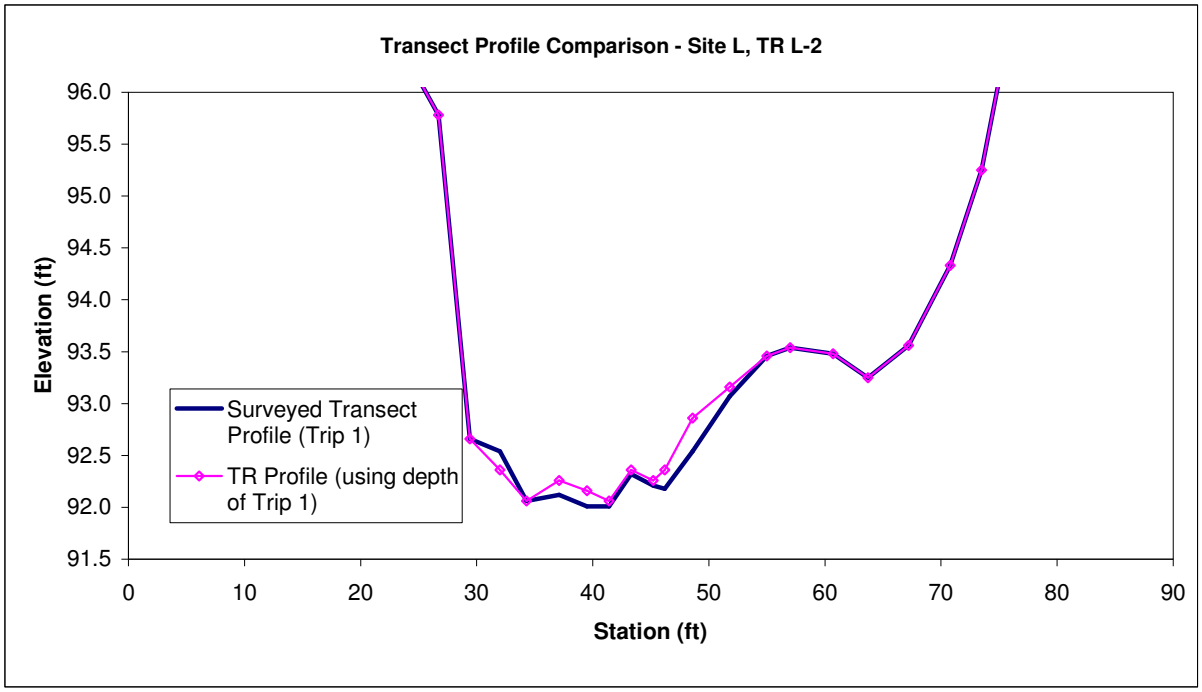
TR Q (cfs)= **54.9**



Transect Profile Comparison - Site L, TR L-2

Trip 1								Trip 5					
Sta (ft)	HI (ft)	FS (ft)	Elev (ft)	Depth (ft)	Velocity (ft/s)	q (cfs)	Bed Elev (ft)	Depth (ft)	Velocity (ft/s)	q (cfs)	Bed Elev (ft)	subs	code
10	98.66	0.06	98.6				98.60					org	0
16.9	98.66	0.90	97.76				97.76					silt	1
26.7	98.66	2.88	95.78				95.78					silt	1
29.4	98.66	6.00	92.66	0.80	0.00	0.00	92.66					sand	1
32	98.66	6.12	92.54	1.10	2.10	5.66	92.36					32	3
34.3	98.66	6.60	92.06	1.40	2.30	8.21	92.06					45	4
37.1	98.66	6.54	92.12	1.20	5.00	15.60	92.26					128	5
39.5	98.66	6.65	92.01	1.30	4.70	13.14	92.16					256	6
41.4	98.66	6.65	92.01	1.40	2.50	6.65	92.06					180	6
43.3	98.66	6.34	92.32	1.10	0.60	1.25	92.36					90	5
45.2	98.66	6.45	92.21	1.20	2.10	3.65	92.26					64	4
46.2	98.66	6.48	92.18	1.10	3.50	6.55	92.36					180	6
48.6	98.66	6.12	92.54	0.60	3.10	5.21	92.86					90	5
51.8	98.66	5.59	93.07	0.30	1.50	1.44	93.16					128	5
55	98.66	5.20	93.46	0.00	0.00	0.00	93.46					90	5
57	98.66	5.12	93.54				93.54					32	3
60.7	98.66	5.18	93.48				93.48					32	3
63.7	98.66	5.41	93.25				93.25					128	5
67.2	98.66	5.10	93.56				93.56					128	5
70.8	98.66	4.33	94.33				94.33					silt	1
73.5	98.66	3.41	95.25				95.25					silt	1
76.9	98.66	1.45	97.21				97.21					silt	1
83	98.66	0.67	97.99				97.99					org	0
				TR Q (cfs)=		67.4							

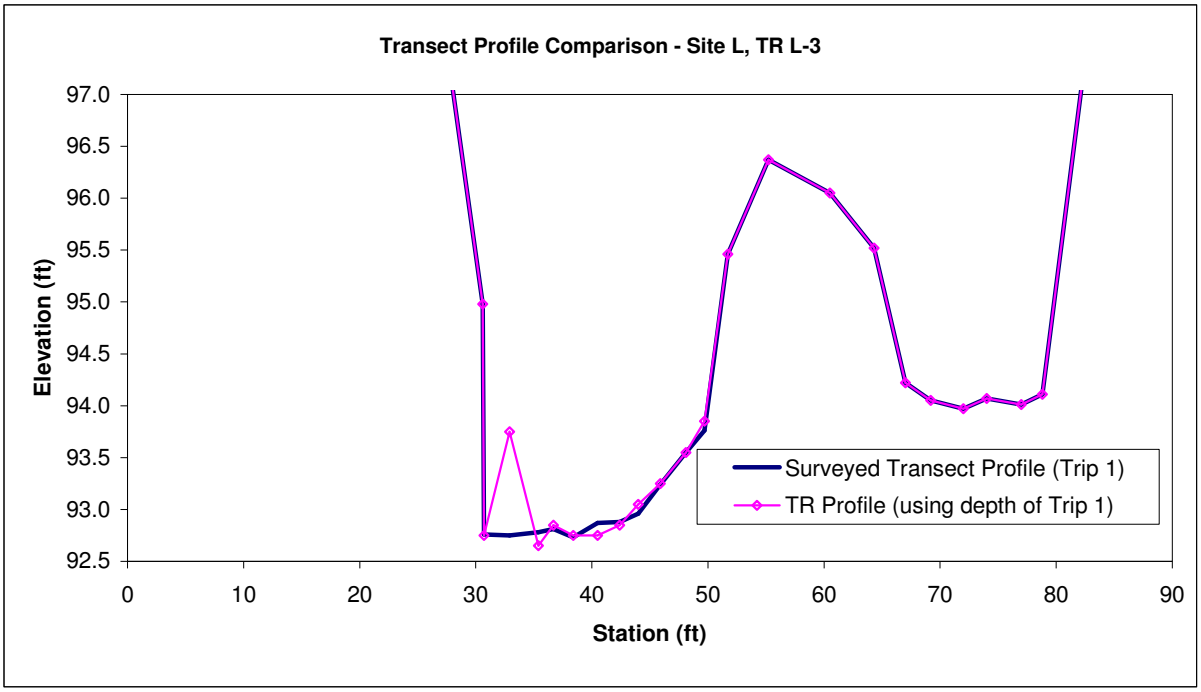
No flow (vel-depth) measurement during Trip 5



Transect Profile Comparison - Site L, TR L-3

Trip 1								Trip 5					
Sta (ft)	HI (ft)	FS (ft)	Elev (ft)	Depth (ft)	Velocity (ft/s)	q (cfs)	Bed Elev (ft)	Depth (ft)	Velocity (ft/s)	q (cfs)	Bed Elev (ft)	subs	code
10	101.99	3.11	98.88				98.88					silt	1
18.3	101.99	3.45	98.54				98.54					org	0
22.1	101.99	4.64	97.35				97.35					org	0
28	101.99	4.93	97.06				97.06					org	0
30.6	101.99	7.01	94.98				94.98					org	0
30.7	101.99	9.23	92.76	1.20	2.60	3.43	92.75					180	6
32.9	101.99	9.24	92.75	0.20	3.50	1.65	93.75					45	4
35.4	101.99	9.21	92.78	1.30	2.20	5.43	92.65					256	6
36.7	101.99	9.18	92.81	1.10	3.50	5.78	92.85					180	6
38.4	101.99	9.26	92.73	1.20	3.20	7.30	92.75					23	3
40.5	101.99	9.12	92.87	1.20	3.50	8.40	92.75					256	6
42.4	101.99	9.11	92.88	1.10	2.90	5.58	92.85					45	4
44	101.99	9.03	92.96	0.90	2.80	4.41	93.05					11	3
45.9	101.99	8.75	93.24	0.70	1.80	2.58	93.25					3	2
48.1	101.99	8.44	93.55	0.40	0.40	0.30	93.55					180	6
49.7	101.99	8.23	93.76	0.10	0.00	0.00	93.85					sand	1
51.7	101.99	6.53	95.46				95.46					org	0
55.2	101.99	5.62	96.37				96.37					org	0
60.5	101.99	5.94	96.05				96.05					org	0
64.3	101.99	6.47	95.52				95.52					silt	1
67	101.99	7.77	94.22				94.22					32	3
69.2	101.99	7.94	94.05				94.05					180	6
72	101.99	8.02	93.97				93.97					180	6
74	101.99	7.92	94.07				94.07					128	5
77	101.99	7.98	94.01				94.01					silt	1
78.8	101.99	7.88	94.11				94.11					silt	1
82.9	101.99	4.30	97.69				97.69					org	0
				TR Q (cfs)=		44.9							

No flow (vel-depth) measurement during Trip 5

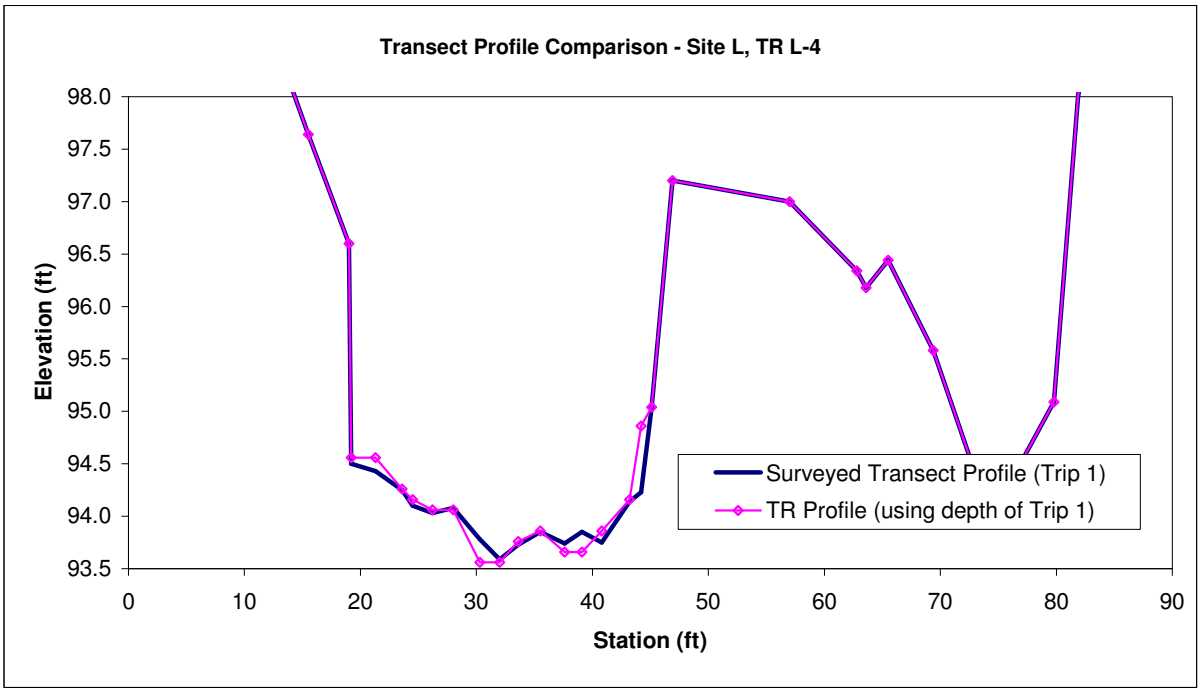


Transect Profile Comparison - Site L, TR L-4

Trip 1								Trip 5					
Sta (ft)	HI (ft)	FS (ft)	Elev (ft)	Depth (ft)	Velocity (ft/s)	q (cfs)	Bed Elev (ft)	Depth (ft)	Velocity (ft/s)	q (cfs)	Bed Elev (ft)	subs	code
10	101.99	2.64	99.35				99.35					org	0
15.5	101.99	4.35	97.64				97.64					org	0
19	101.99	5.39	96.6				96.60					128	5
19.2	101.99	7.49	94.5	0.30	0.30	0.09	94.56					128	5
21.3	101.99	7.56	94.43	0.30	1.20	0.79	94.56					32	3
23.6	101.99	7.74	94.25	0.60	1.00	0.96	94.26					11	3
24.5	101.99	7.89	94.1	0.70	1.50	1.37	94.16					45	4
26.2	101.99	7.96	94.03	0.80	2.70	3.78	94.06					90	5
28	101.99	7.91	94.08	0.80	3.40	5.58	94.06					90	5
30.3	101.99	8.21	93.78	1.30	2.30	5.98	93.56					256	6
32	101.99	8.40	93.59	1.30	4.20	9.01	93.56					32	3
33.6	101.99	8.26	93.73	1.10	3.80	7.32	93.76					256	6
35.5	101.99	8.14	93.85	1.00	3.20	6.40	93.86					90	5
37.6	101.99	8.25	93.74	1.20	2.60	5.62	93.66					90	5
39.1	101.99	8.14	93.85	1.20	2.60	4.99	93.66					128	5
40.8	101.99	8.24	93.75	1.00	2.80	5.74	93.86					128	5
43.2	101.99	7.85	94.14	0.70	1.00	1.19	94.16					3	2
44.2	101.99	7.76	94.23	0.00	0.00	0.00	94.86					23	3
45.1	101.99	6.95	95.04				95.04					org	0
46.9	101.99	4.79	97.2				97.20					org	0
57	101.99	4.99	97				97.00					org	0
62.8	101.99	5.65	96.34				96.34					org	0
63.6	101.99	5.81	96.18				96.18					org	0
65.5	101.99	5.55	96.44				96.44					sand	1
69.4	101.99	6.41	95.58				95.58					org	0
72.7	101.99	7.48	94.51				94.51					180	6
74.8	101.99	7.71	94.28				94.28					256	6
76.7	101.99	7.53	94.46				94.46					sand	1
79.8	101.99	6.90	95.09				95.09					org	0
81.9	101.99	3.97	98.02				98.02					org	0
83.2	101.99	3.29	98.7				98.70					org	0

No flow (vel-depth) measurement during Trip 5

TR Q (cfs)= **58.8**

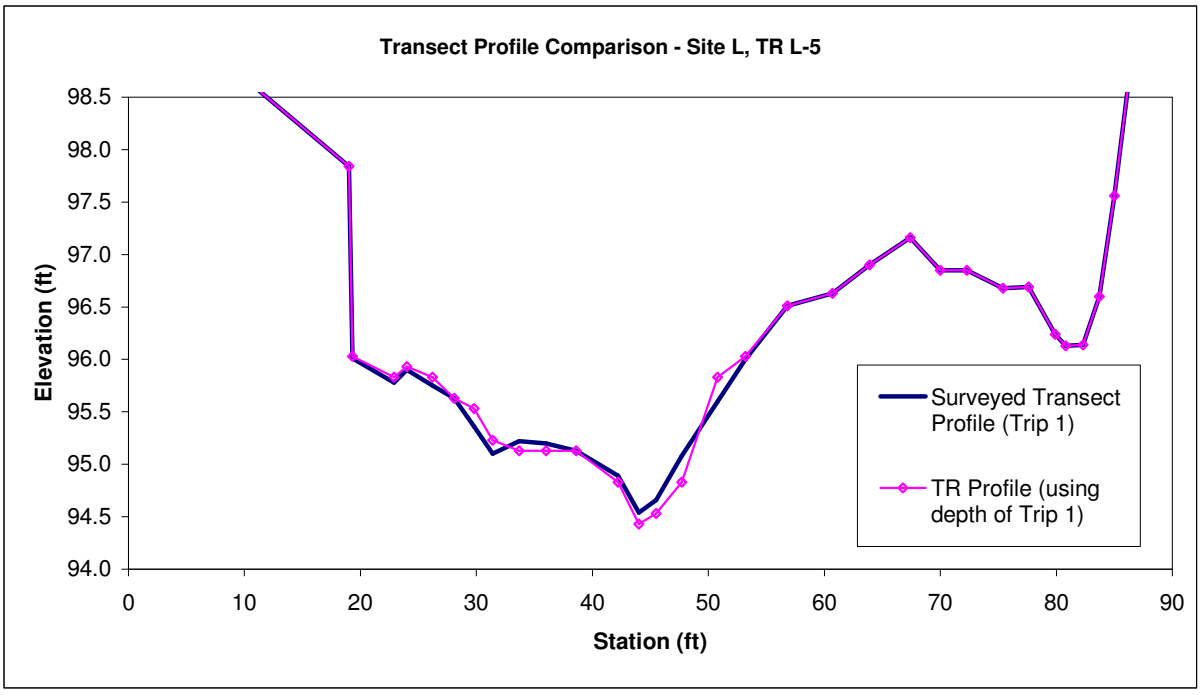


Transect Profile Comparison - Site L, TR L-5

Trip 1								Trip 5					
Sta (ft)	HI (ft)	FS (ft)	Elev (ft)	Depth (ft)	Velocity (ft/s)	q (cfs)	Bed Elev (ft)	Depth (ft)	Velocity (ft/s)	q (cfs)	Bed Elev (ft)	subs	code
0.0	101.94	2.33	99.61				99.61					silt	1
19.0	101.94	4.10	97.84				97.84					silt	1
19.3	101.94	5.93	96.01	0.00	0.00	0.00	96.03					180	6
22.9	101.94	6.16	95.78	0.20	0.40	0.19	95.83					16	3
24.0	101.94	6.04	95.9	0.10	0.40	0.07	95.93					16	3
26.2	101.94	6.19	95.75	0.20	1.40	0.57	95.83					128	5
28.1	101.94	6.31	95.63	0.40	0.10	0.07	95.63					8	2
29.8	101.94	6.58	95.36	0.50	1.70	1.40	95.53					16	3
31.4	101.94	6.84	95.1	0.80	3.40	5.30	95.23					32	3
33.7	101.94	6.72	95.22	0.90	4.30	8.90	95.13					180	6
36.0	101.94	6.74	95.2	0.90	4.10	9.04	95.13					180	6
38.6	101.94	6.81	95.13	0.90	2.80	7.81	95.13					128	5
42.2	101.94	7.05	94.89	1.20	2.10	6.80	94.83					45	4
44.0	101.94	7.40	94.54	1.60	3.00	7.92	94.43					128	5
45.5	101.94	7.28	94.66	1.50	2.40	6.66	94.53					256	6
47.7	101.94	6.86	95.08	1.20	1.20	3.82	94.83					180	6
50.8	101.94	6.34	95.6	0.20	1.90	1.05	95.83					128	5
53.2	101.94	5.94	96	0.00	0.00	0.00	96.03					90	5
56.8	101.94	5.43	96.51				96.51					256	6
60.7	101.94	5.31	96.63				96.63					45	4
63.9	101.94	5.04	96.9				96.90					32	3
67.4	101.94	4.78	97.16				97.16					org	0
70.0	101.94	5.09	96.85				96.85					23	3
72.3	101.94	5.09	96.85				96.85					16	3
75.4	101.94	5.26	96.68				96.68					6	2
77.6	101.94	5.25	96.69				96.69					sand	1
79.9	101.94	5.70	96.24				96.24					16	3
80.8	101.94	5.81	96.13				96.13					16	3
82.3	101.94	5.80	96.14				96.14					sand	1
83.7	101.94	5.34	96.6				96.60					sand	1
85.0	101.94	4.38	97.56				97.56					org	0
88.6	101.94	1.21	100.73				100.73					org	0

No flow (vel-depth) measurement during Trip 5

TR Q (cfs)= **59.6**



Reach: **Alluvial Reach**
Stream **Cooper Lake**
Site: **Site L**
Habitat Type: **Riffle**

(1) Field Data

(a) Field data were collected in five trips between 5/2003 and 5/2004.
(b) Flow data were only collected in Trip 1 on 5/13/2003 and in Trip 5 on 5/4/2004.
(c) WSE data were collected in all five trips.
(d) Because no flows were measured in Trip 2 to Trip 4, flows of these three trips were estimated. The estimated flows are plotted along with the measured WSE and flows in worksheet "Measured hydraulics". The graphs showed WSE vs flow relationships were inconsistent, probably caused by the backwater from Kenai River.

(2) WSE Calibration

WSE: Average WSE is used as the representative transect WSE.

Dischrage: Trip 1 Q = Average discharge of TR L-1, TR L-3, TR L-4, and TR L-5. TR L-2 was consudered as outliers.
Trip 5 Q = Use USGS gage flow.

Slope: Use Trip 5's average WSE slope (from TR L-1 to TR L-5) = 2.04%

SZF:

TR	channel Invert (ft) Trip 1	Trip 5	SZF (ft)
TR L-1	91.70	-	91.70
TR L-2	92.06	-	92.06
TR L-3	92.65	-	92.65
TR L-4	93.56	-	93.56
TR L-5	94.43	-	94.43

Note: Invert is the lowest elevation of the transect.
SZF of upstream transect must be equal or greater than the SZF of downstream transect.

Level Loop and Headpins:

Date	Trip	BM-A	BM-B
5/13/2003	1	100.00	99.30
6/24/2003	2		99.30
9/17/2003	3		99.30
10/8/2003	4	100.00	
5/4/2004	5		99.30

(a) Level loop survey was only conducted in the first trip on 5/13/03, no level loop was setup for the next 4 trips. The HIs of the last four trips were based on the control pin elevation surveyed in the first trip. Due to lack of relative pin elevation change between BM-A and BM-B, we are not able to determine the stability of the control pins, and thus the WSE survey results in all of the five trips may not reference to the same datum. As a result, the reliablility of the surveyed WSEs for this site are questionable.

Calibration Flow:

This site has five sets of measured WSEs and one set of velocity-depth survey.
Flows were estimated based on gages CCA and CCB for Trip 2 to Trip 4.
The Q vs WSE relationships were inconsistent (see plots in worksheet "Measured hydraulics".)
Due to the inconsistency, it was decided to only use flows taken in Trip 1 and Trip 5 for calibration. Flows estimated for Trip 2 to Trip 4 will be not be included for calibration, and will be used for comparison only

WSE Calibration Method:

(1) MANSQ was used to calibrate WSE for TR L-1.
(2) WSP was selected to calibrate WSEs for TR L-2 to TR L-5. MANSQ results of TR L-1 were used as the boundary condition for WSP.

WSE Calibration Result:

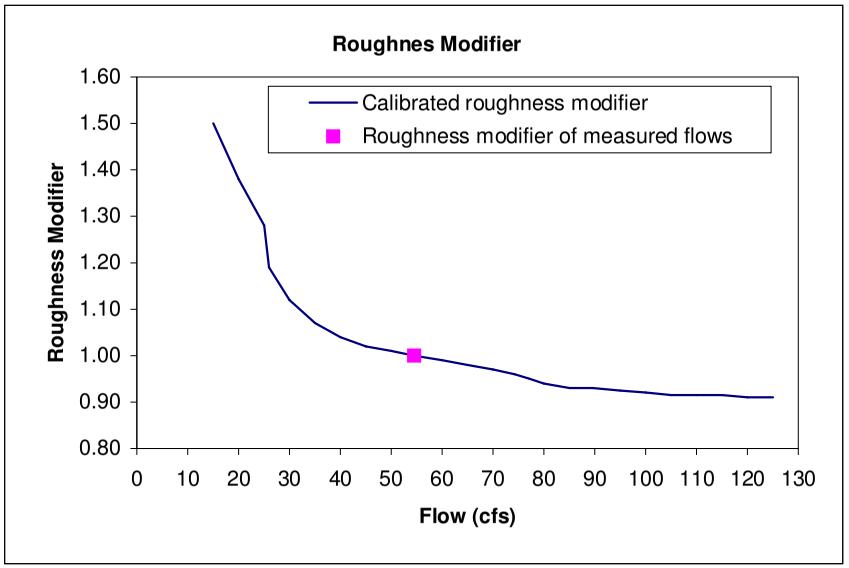
Trip	Survey Date	Q (cfs)	Modeling WSE(ft)					Calibrated WSE(ft)					ΔWSE (ft, measured-calib.)				
			TR-1	TR-2	TR-3	TR-4	TR-5	TR-1	TR-2	TR-3	TR-4	TR-5	TR-1	TR-2	TR-3	TR-4	TR-5
1	5/13/2003	54.5	92.90	93.46	93.95	94.86	96.03	92.90	93.44	93.95	94.87	96.03	0.00	0.02	0.00	-0.01	0.00
2	6/24/2003	74.3	93.46	93.63	94.22	94.98	96.22	93.01	93.61	94.10	95.04	96.19					
3	9/17/2003	26.0	92.75	93.11	93.68	94.62	95.78	92.68	93.17	93.68	94.59	95.77					
4	10/8/2003	77.2	95.30	95.27	95.29	95.43	96.33	93.02	93.62	94.12	95.06	96.21					
5	5/4/2004	89.6	93.14	93.62	94.19	95.19	96.24	93.08	93.71	94.20	95.15	96.29	0.06	-0.09	-0.01	0.04	-0.05

Note: (a) WSEs of Trip 2 to Trip 4 are listed in the table only for comparison, not for calibration error calculation.

WSP Roughness Modifier

Flow	RAF
15	1.50
20	1.38
25	1.28
26.0	1.19
30	1.12
35	1.07
40	1.04
45.0	1.02
50	1.01
54.5	1.00
60	0.99
65	0.98
70	0.97
74.3	0.96
77.2	0.95
80.0	0.94
85	0.93
89.6	0.93
95	0.93
100	0.92
105	0.92

(*) The table on the left lists the Roughness Modifier used in the WSE calibration.



110	0.92
115	0.92
120	0.91
125	0.91

(2) Calibrated Hydraulics

(a) For MANSQ WSE calibration, β_{TR1}=0.30 and Trip 1 flow (54.5cfs) was used as the calibration flow.
(b) For velocity calibration, Trip 1 velocity profiles were used as the templates for calibration.
(c) Hydraulic calibration results are summarized in worksheets cTR L-y, where y=1, 2, 3, 4, and 5
(d) WSE Calibration errors for TR L-2 are slightly big (0.09ft), but still within acceptable range for this type of stream with high velocity and large slope.
(e) TR L-1, TR L-2, TR L-4, and TR L-5 : WSE, Froude number (Fr), Cross-sectional Manning's n, transect average velocity (V), wetted perimeter, and Velocity Adjustment Factor (VAF) all are acceptable and within reasonable ranges.
(f) TR L-3 : There is a side channel on the right side of Cooper Creek, causing Manning's n to rise slightly at flows greater than 80cfs.
(g) Comparison of modeling and calibrated WSEs are shown in worksheet "SimWSE".
(h) PHABSIM model did not calculate wetted perimeter and Manning's, both of which were calculated outside the model.

(3) Velocity calibration

TR L-1: Trip 1's velocity profile was used as template for calibration.
Predicted velocity profile was reasonable, and no changes to the Manning's n calculated by PHABSIM were made.

TR L-2: Trip 1's velocity profile was used as template for calibration.
Slightly adjusted Manning's n values calculated by PHABSIM to make the simulated velocity near the water edge more reasonable.

TR L-3: Trip 1's velocity profile was used as template for calibration.
Predicted velocity profile was reasonable, and no changes to the Manning's n calculated by PHABSIM were made.

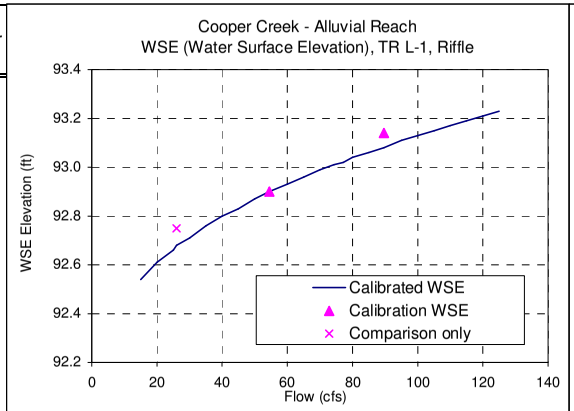
TR L-4: Trip 1's velocity profile was used as template for calibration.
Slightly adjusted Manning's n values calculated by PHABSIM to make the simulated velocity near the water edge more reasonable.

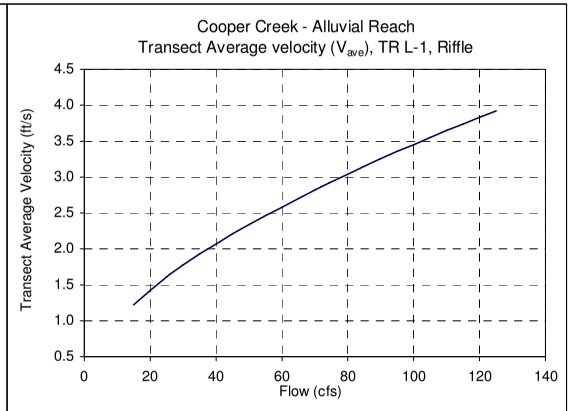
TR L-5: Trip 1's velocity profile was used as template for calibration.
Predicted velocity profile was reasonable, and no changes to the Manning's n calculated by PHABSIM were made.

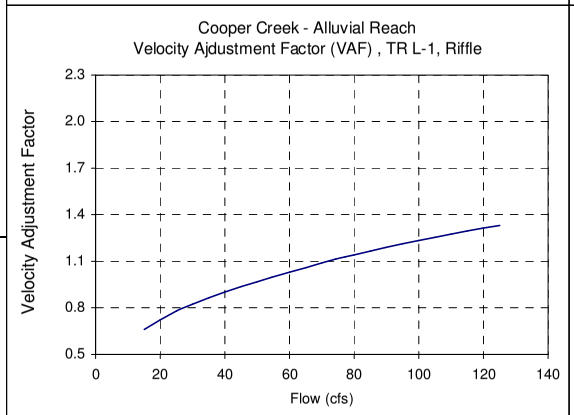
The comparison of simulated and measured velocity profiles are included in worksheet "VelComp", which shows the simulated and measured velocity profiles have good match for TR L-1, TR L-4, and TR L-5, while simulated profiles of TR L-2 and TR L-3 did not completely match the measured velocity profiles. This is due to TR L-2's measured flow (67.4 cfs) was much greater than the site flow (54.5cfs) and TR L-3's flow (44.9 cfs) was much lower than the site flow.

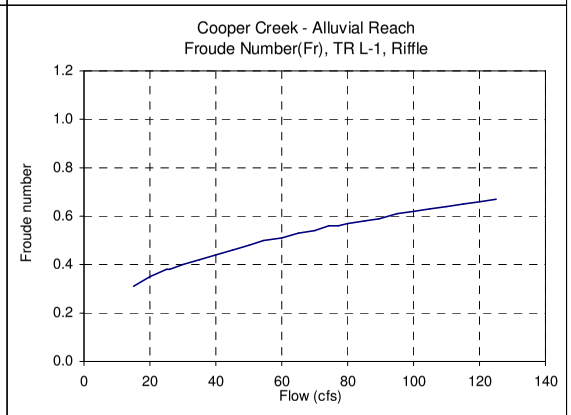
Reach Alluvial Reach
Stream: Cooper Lake
Transect : L-1
Habitat: Riffle

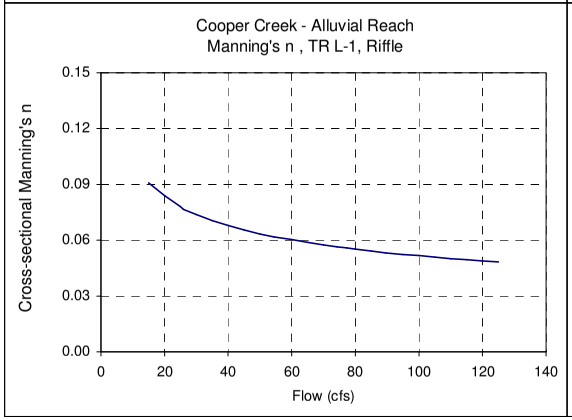
Modeling Q (cfs)	Modeling WSE (ft)	Simul. Q (cfs)	Cal'd WSE (ft)	VAF	Froude Number	Velocity (ft/s)	Manning's n	wetted perimeter (ft)
54.5	92.90	15	92.54	0.66	0.31	1.22	0.091	26.5
74.3	93.46	20	92.61	0.72	0.35	1.42	0.084	27.2
26.0	92.75	25	92.66	0.78	0.38	1.61	0.078	27.7
77.2	95.30	26	92.68	0.79	0.38	1.65	0.077	27.9
89.6	93.14	30	92.71	0.82	0.40	1.78	0.074	28.2
		35	92.76	0.87	0.42	1.93	0.071	28.7
		40	92.80	0.90	0.44	2.07	0.068	29.1
		45	92.83	0.94	0.46	2.21	0.066	29.4
		50	92.87	0.97	0.48	2.34	0.063	29.8
		54.5	92.90	1.00	0.50	2.45	0.062	30.1
		60	92.93	1.03	0.51	2.58	0.060	30.1
		65	92.96	1.06	0.53	2.70	0.059	30.2
		70	92.99	1.09	0.54	2.82	0.057	30.3
		74.3	93.01	1.11	0.56	2.92	0.056	30.3
		77.2	93.02	1.13	0.56	2.98	0.056	30.3
		80	93.04	1.14	0.57	3.04	0.055	30.4
		85	93.06	1.17	0.58	3.15	0.054	30.4
		89.6	93.08	1.19	0.59	3.25	0.053	30.5
		95	93.11	1.21	0.61	3.36	0.052	30.6
		100	93.13	1.23	0.62	3.45	0.052	30.6
		105	93.15	1.25	0.63	3.55	0.051	30.6
		110	93.17	1.27	0.64	3.65	0.050	30.7
		115	93.19	1.30	0.65	3.74	0.050	30.7
		120	93.21	1.32	0.66	3.83	0.049	30.8
		125	93.23	1.33	0.67	3.92	0.048	30.8

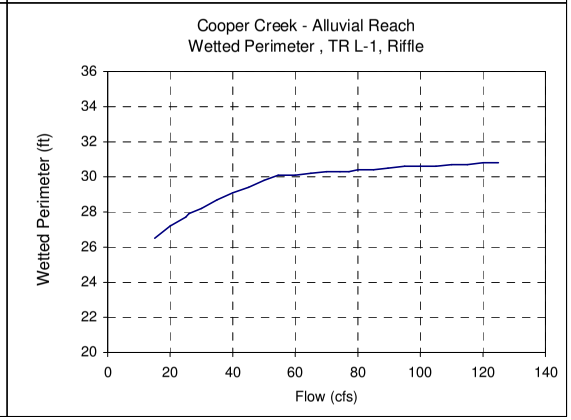






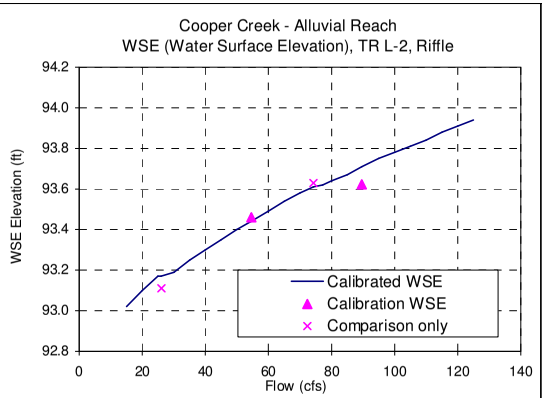


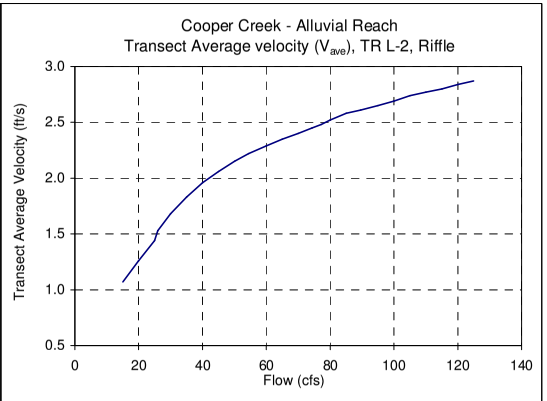


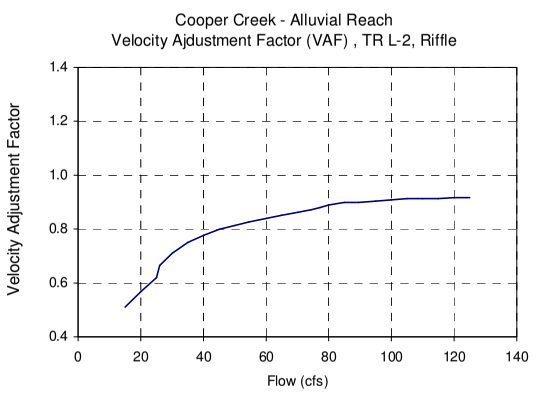


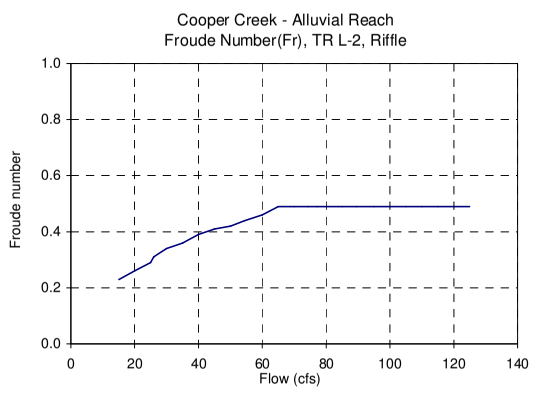
Reach **Alluvial Reach**
Stream: **Cooper Lake**
Transect : **L-2**
Habitat: **Riffle**

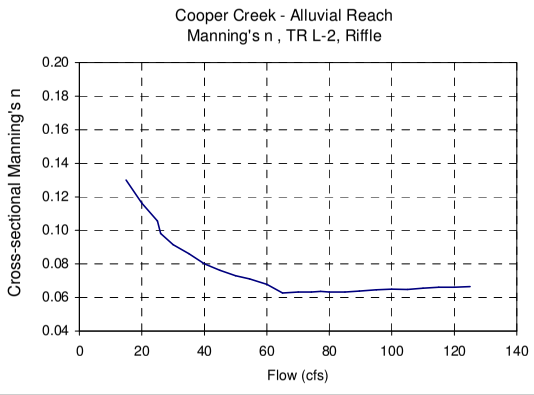
Modeling Q (cfs)	Modeling WSE (ft)	Simul. Q (cfs)	Cal'd WSE (ft)	VAF	Froude Number	Velocity (ft/s)	Manning's n	wetted perimeter (ft)
54.5	93.46	15	93.02	0.51	0.23	1.07	0.130	21.5
74.3	93.63	20	93.10	0.57	0.26	1.26	0.116	22.5
26.0	93.11	25	93.17	0.62	0.29	1.44	0.106	23.3
77.2	95.27	26	93.17	0.66	0.31	1.53	0.098	23.2
89.6	93.62	30	93.19	0.71	0.34	1.68	0.091	23.6
		35	93.25	0.75	0.36	1.83	0.086	24.3
		40	93.30	0.78	0.39	1.96	0.080	26.1
		45	93.35	0.80	0.41	2.06	0.076	27.9
		50	93.40	0.81	0.42	2.15	0.073	29.8
		54.5	93.44	0.83	0.44	2.22	0.071	31.2
		60	93.49	0.84	0.46	2.29	0.068	34
		65	93.54	0.85	0.49	2.35	0.063	38.9
		70	93.58	0.86	0.49	2.40	0.063	39.3
		74.3	93.61	0.87	0.49	2.45	0.063	39.5
		77.2	93.62	0.88	0.49	2.48	0.064	39.5
		80	93.64	0.89	0.49	2.52	0.063	39.7
		85	93.67	0.90	0.49	2.58	0.063	39.8
		89.6	93.71	0.90	0.49	2.61	0.064	40.1
		95	93.75	0.90	0.49	2.65	0.065	40.3
		100	93.78	0.91	0.49	2.69	0.065	40.5
		105	93.81	0.91	0.49	2.74	0.065	40.7
		110	93.84	0.91	0.49	2.77	0.065	40.9
		115	93.88	0.91	0.49	2.80	0.066	41.1
		120	93.91	0.92	0.49	2.84	0.066	41.3
		125	93.94	0.92	0.49	2.87	0.067	41.5

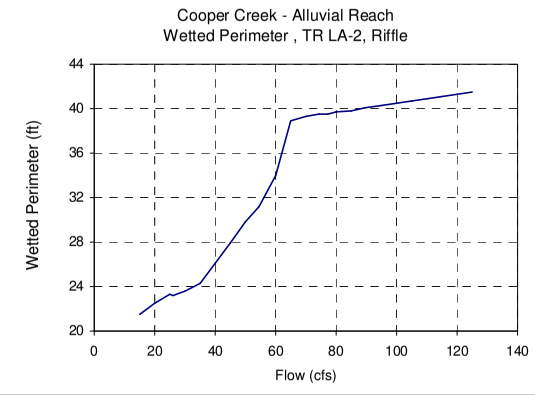






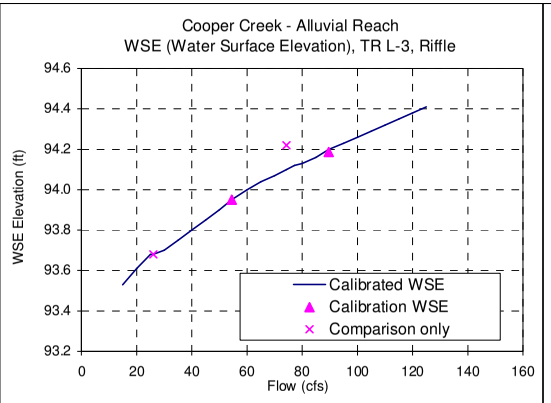


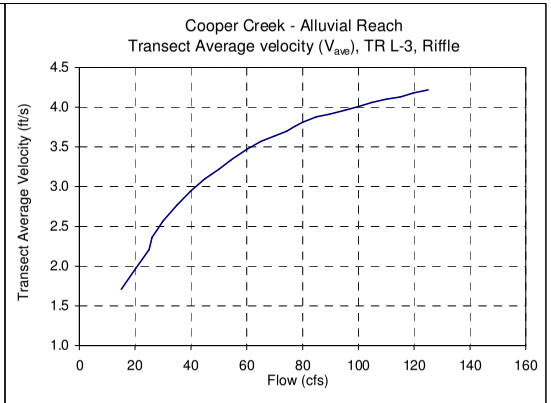


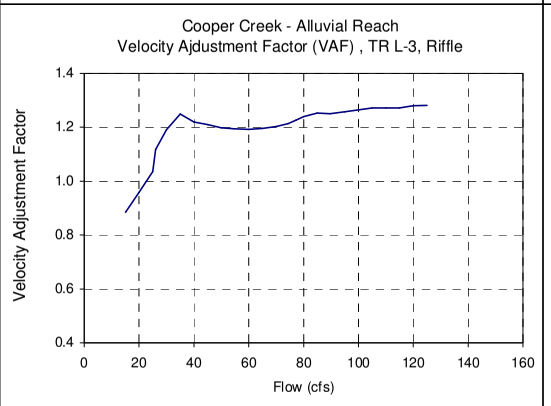


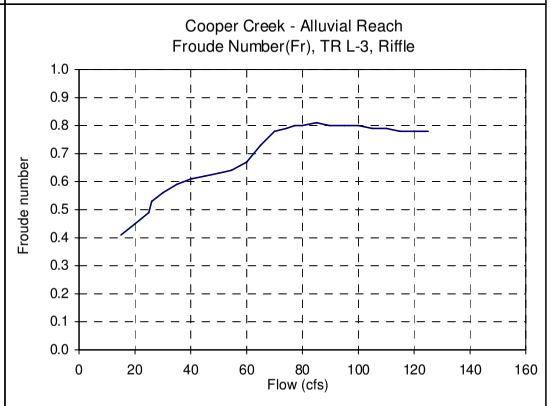
Reach **Alluvial Reach**
Stream: **Cooper Lake**
Transect : **L-3**
Habitat: **Riffle**

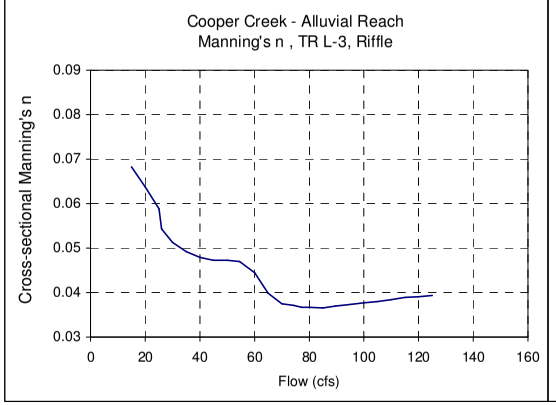
Modeling		Simul.	Cal'd					wetted
Q	WSE	Q	WSE	VAF	Froude	Velocity	Manning's	perimeter
(cfs)	(ft)	(cfs)	(ft)		Number	(ft/s)	n	(ft)
54.5	93.95	15	93.53	0.88	0.41	1.71	0.068	17.5
74.3	94.22	20	93.61	0.96	0.45	1.96	0.064	18.4
26.0	93.68	25	93.68	1.03	0.49	2.21	0.059	19.2
77.2	95.29	26	93.68	1.12	0.53	2.36	0.054	19.1
89.6	94.19	30	93.70	1.19	0.56	2.57	0.051	19.4
		35	93.75	1.25	0.59	2.77	0.049	20
		40	93.80	1.22	0.61	2.95	0.048	20.3
		45	93.85	1.21	0.62	3.10	0.047	20.6
		50	93.90	1.20	0.63	3.22	0.047	20.8
		54.5	93.95	1.19	0.64	3.34	0.047	20.9
		60	94.00	1.19	0.67	3.47	0.044	22.7
		65	94.04	1.20	0.73	3.57	0.040	27
		70	94.07	1.20	0.78	3.64	0.037	30.4
		74.3	94.10	1.21	0.79	3.70	0.037	31.4
		77.2	94.12	1.23	0.80	3.76	0.037	31.9
		80	94.13	1.24	0.80	3.81	0.037	32
		85	94.16	1.25	0.81	3.88	0.037	32.6
		89.6	94.20	1.25	0.80	3.91	0.037	33.2
		95	94.23	1.26	0.80	3.96	0.037	33.6
		100	94.26	1.26	0.80	4.01	0.038	33.8
		105	94.29	1.27	0.79	4.06	0.038	34
		110	94.32	1.27	0.79	4.10	0.038	34.2
		115	94.35	1.27	0.78	4.13	0.039	34.4
		120	94.38	1.28	0.78	4.18	0.039	34.6
		125	94.41	1.28	0.78	4.22	0.039	34.8

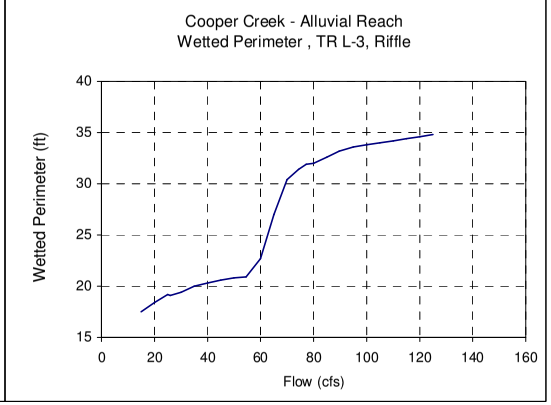






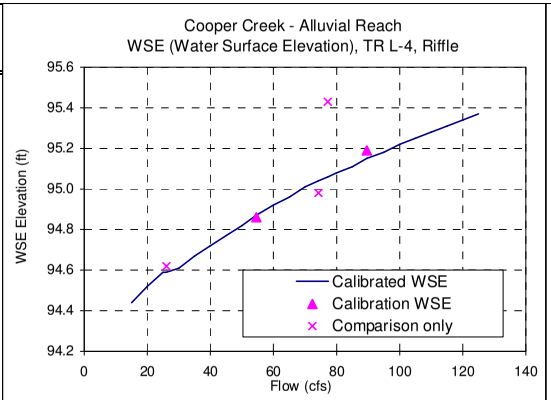


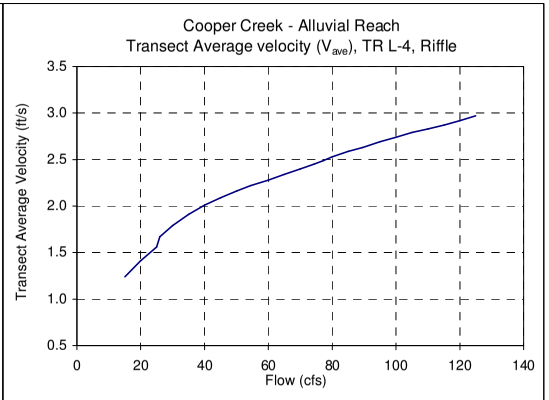


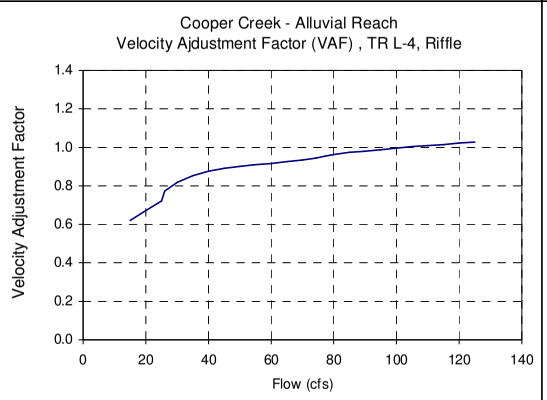


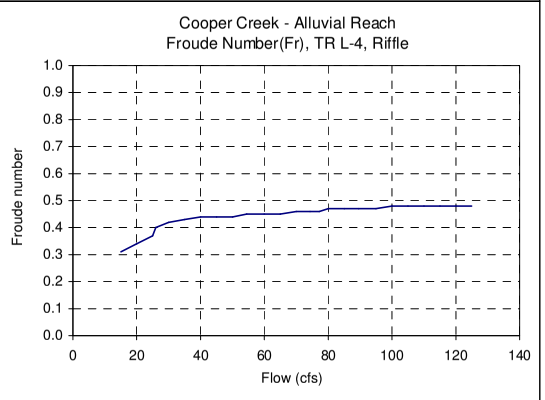
Reach **Alluvial Reach**
Stream: **Cooper Lake**
Transect : **L-4**
Habitat: **Riffle**

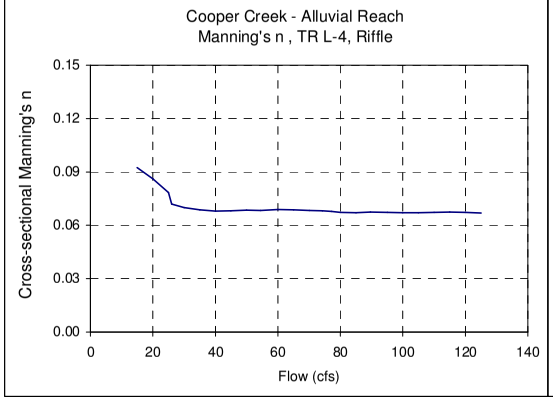
Modeling		Simul.	Cal'd					wetted
Q	WSE	Q	WSE	VAF	Froude	Velocity	Manning's	perimeter
(cfs)	(ft)	(cfs)	(ft)		Number	(ft/s)	n	(ft)
54.5	94.86	15	94.44	0.62	0.31	1.24	0.092	24.8
74.3	94.98	20	94.52	0.672	0.34	1.41	0.086	26.7
26.0	94.62	25	94.59	0.722	0.37	1.56	0.078	29.8
77.2	95.43	26	94.59	0.773	0.4	1.67	0.072	29.7
89.6	95.19	30	94.61	0.818	0.42	1.79	0.070	30.1
		35	94.67	0.853	0.43	1.91	0.069	30.7
		40	94.72	0.876	0.44	2.01	0.068	31.3
		45	94.77	0.892	0.44	2.09	0.068	31.8
		50	94.82	0.901	0.44	2.16	0.068	32.4
		54.5	94.87	0.91	0.45	2.22	0.068	33
		60	94.92	0.917	0.45	2.28	0.069	33.7
		65	94.96	0.925	0.45	2.34	0.069	34.3
		70	95.01	0.935	0.46	2.4	0.068	35
		74.3	95.04	0.945	0.46	2.45	0.068	35.4
		77.2	95.06	0.954	0.46	2.49	0.068	35.6
		80	95.08	0.963	0.47	2.53	0.067	35.8
		85	95.11	0.975	0.47	2.59	0.067	36.1
		89.6	95.15	0.979	0.47	2.63	0.067	36.3
		95	95.18	0.987	0.47	2.69	0.067	36.5
		100	95.22	0.996	0.48	2.74	0.067	36.8
		105	95.25	1.005	0.48	2.79	0.067	37
		110	95.28	1.009	0.48	2.83	0.067	37.2
		115	95.31	1.014	0.48	2.87	0.067	37.4
		120	95.34	1.022	0.48	2.92	0.067	37.6
		125	95.37	1.027	0.48	2.97	0.067	37.8

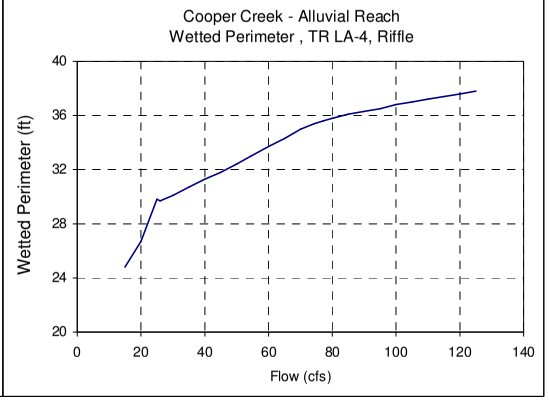






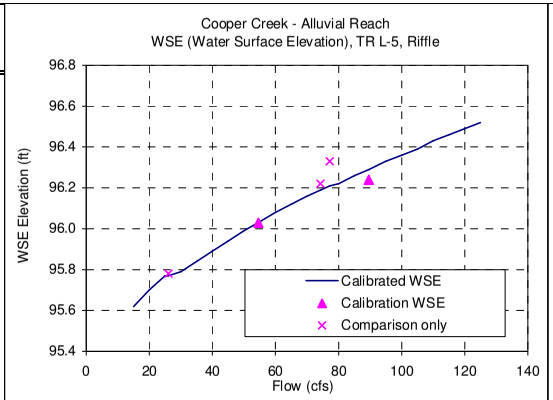


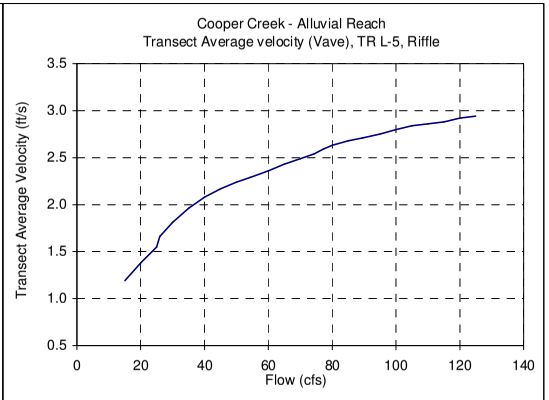


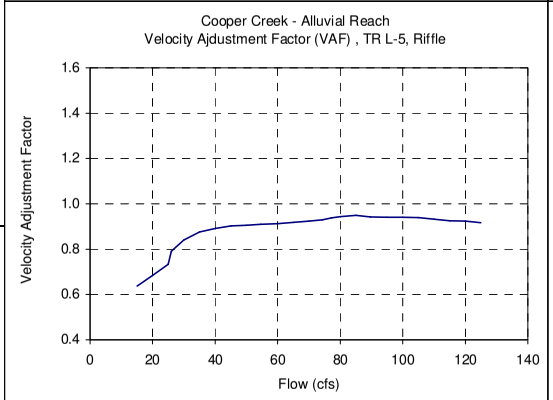


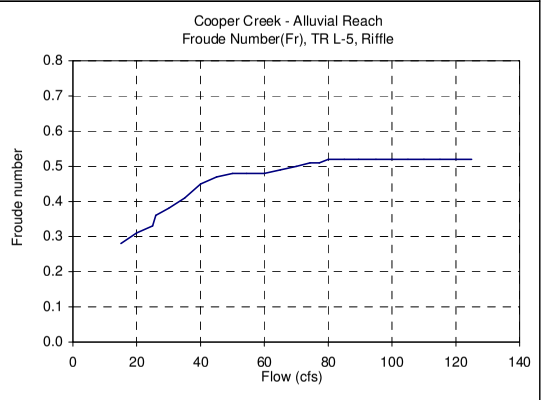
Reach **Alluvial Reach**
Stream: **Cooper Lake**
Transect : **L-5**
Habitat: **Riffle**

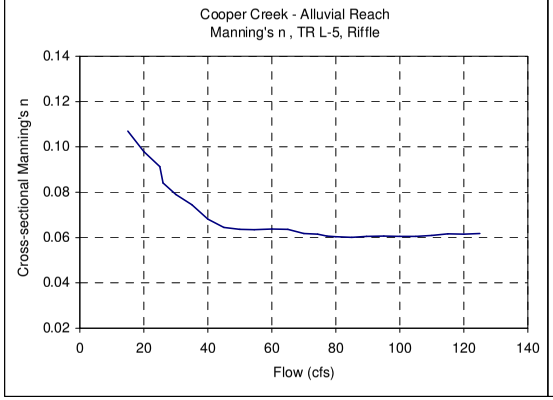
Modeling		Simul.	Cal'd					wetted
Q	WSE	Q	WSE	VAF	Froude	Velocity	Manning's	perimeter
(cfs)	(ft)	(cfs)	(ft)		Number	(ft/s)	n	(ft)
54.5	96.03	15	95.62	0.64	0.28	1.19	0.107	22.1
74.3	96.22	20	95.70	0.68	0.31	1.38	0.098	23.2
26.0	95.78	25	95.77	0.73	0.33	1.55	0.091	24.1
77.2	96.33	26	95.77	0.79	0.36	1.66	0.084	23.9
89.6	96.24	30	95.79	0.84	0.38	1.81	0.079	24.4
		35	95.84	0.88	0.41	1.96	0.074	25.5
		40	95.89	0.89	0.45	2.08	0.068	28.7
		45	95.94	0.90	0.47	2.17	0.065	31.5
		50	95.99	0.91	0.48	2.24	0.064	33
		54.5	96.03	0.91	0.48	2.29	0.063	34.2
		60	96.08	0.91	0.48	2.36	0.064	34.6
		65	96.12	0.92	0.49	2.43	0.064	35
		70	96.16	0.92	0.50	2.49	0.062	37.1
		74.3	96.19	0.93	0.51	2.54	0.062	37.7
		77.2	96.21	0.94	0.51	2.59	0.061	38.1
		80	96.22	0.94	0.52	2.63	0.060	38.3
		85	96.26	0.95	0.52	2.68	0.060	39.1
		89.6	96.29	0.94	0.52	2.71	0.061	39.6
		95	96.33	0.94	0.52	2.75	0.061	40.3
		100	96.36	0.94	0.52	2.80	0.060	40.8
		105	96.39	0.94	0.52	2.84	0.061	41.3
		110	96.43	0.93	0.52	2.86	0.061	42
		115	96.46	0.92	0.52	2.88	0.062	42.5
		120	96.49	0.92	0.52	2.92	0.061	43
		125	96.52	0.92	0.52	2.94	0.062	43.7

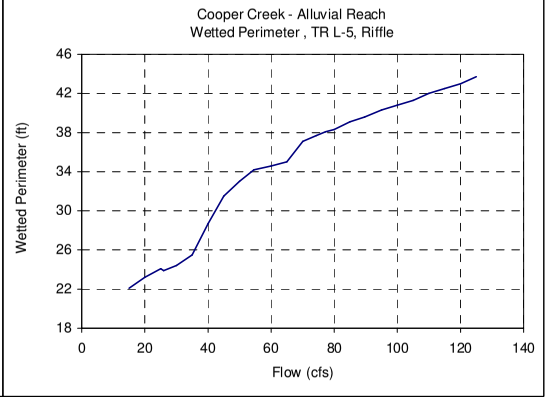


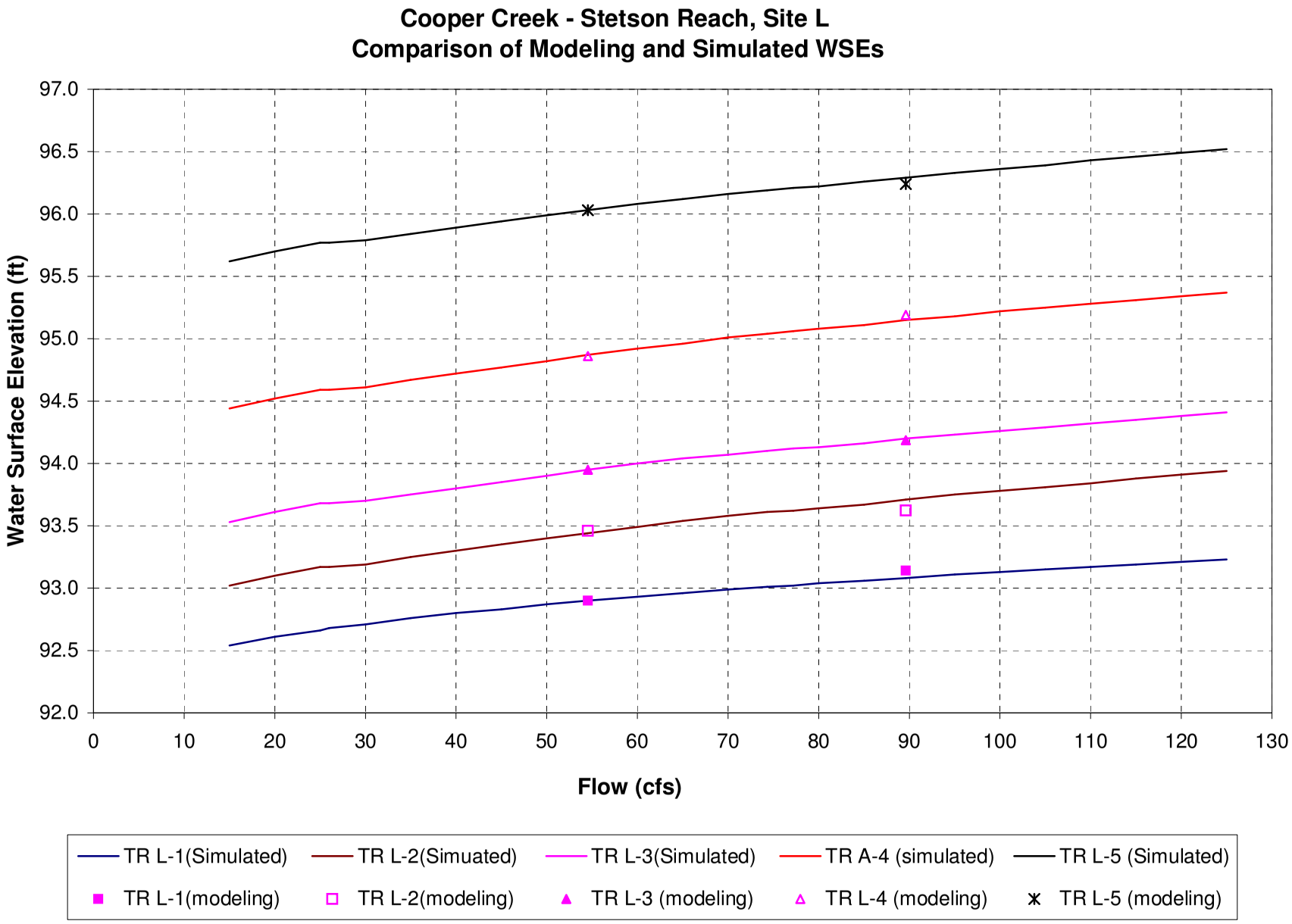






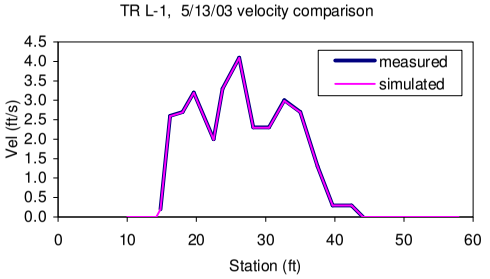


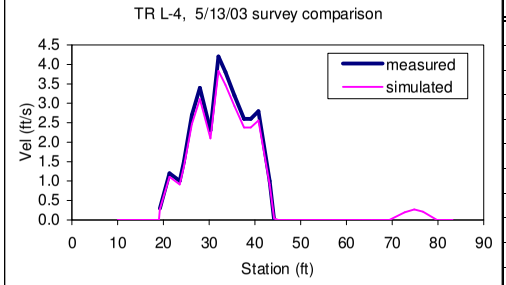


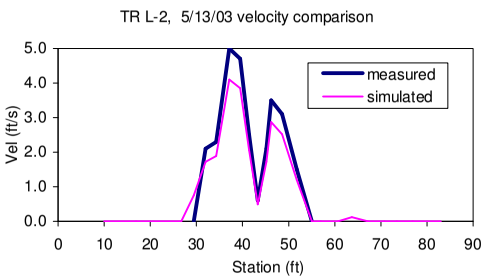

Cooper Creek - Stetson Reach, Site L
Comparison of Modeling and Simulated WSEs
Water Surface Elevation (ft)
97.0
96.5
96.0
95.5
95.0
94.5
94.0
93.5
93.0
92.5
92.0
0
10
20
30
40
50
60
70
80
90
100
110
120
130
Flow (cfs)
TR L-1(Simulated)
TR L-2(Simuated)
TR L-3(Simulated)
TR A-4 (simulated)
TR L-5 (Simulated)
TR L-1(modeling)
TR L-2(modeling)
TR L-3 (modeling)
TR L-4 (modeling)
TR L-5 (modeling)

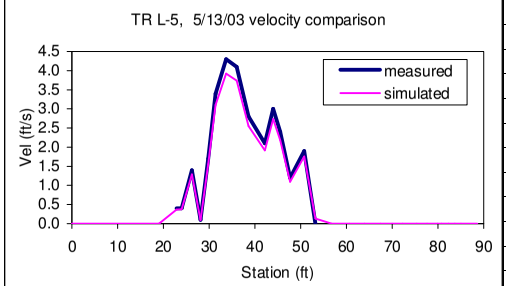
Reach:	**Alluvial Reach**
Stream:	**Cooper Lake**
Habitat	**Riffle**
Flow	**Trip 2, 5/13/03 (Q=40cfs)**

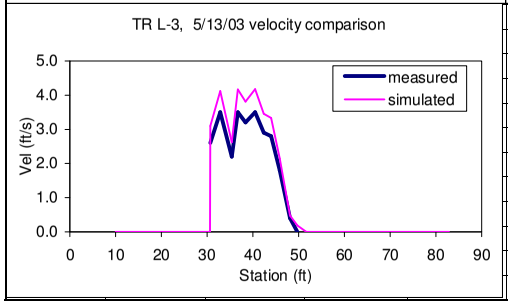
Comparison of Measured and Simulated Velocity Profile











TR L-1			TR L-2			TR L-3			TR L-4			TR L-5		
Sta	meas.	simul.	Sta	meas.	simul.	Sta	meas.	simul.	Sta	meas.	simul.	Sta	meas.	simul.
10.0		0.00	10.0		0.00	10.0		0.00	10.0		0.00	0.0		0.00
14.2		0.00	16.9		0.00	18.3		0.00	15.5		0.00	19.0		0.00
14.8	0.20	0.20	26.7		0.00	22.1		0.00	19.0		0.00	19.3		0.03
16.2	2.60	2.59	29.4	0.00	0.75	28.0		0.00	19.2	0.30	0.28	22.9	0.40	0.37
18.0	2.70	2.69	32.0	2.10	1.72	30.6		0.00	21.3	1.20	1.11	24.0	0.40	0.37
19.6	3.20	3.19	34.3	2.30	1.89	30.7	2.60	3.10	23.6	1.00	0.92	26.2	1.40	1.29
22.5	2.00	1.99	37.1	5.00	4.10	32.9	3.50	4.12	24.5	1.50	1.37	28.1	0.10	0.09
23.8	3.30	3.29	39.5	4.70	3.85	35.4	2.20	2.62	26.2	2.70	2.47	29.8	1.70	1.55
26.2	4.10	4.09	41.4	2.50	2.05	36.7	3.50	4.17	28.0	3.40	3.11	31.4	3.40	3.10
28.2	2.30	2.29	43.3	0.60	0.49	38.4	3.20	3.81	30.3	2.30	2.10	33.7	4.30	3.92
30.5	2.30	2.29	45.2	2.10	1.72	40.5	3.50	4.17	32.0	4.20	3.83	36.0	4.10	3.74
32.7	3.00	2.99	46.2	3.50	2.87	42.4	2.90	3.46	33.6	3.80	3.47	38.6	2.80	2.55
35.0	2.70	2.69	48.6	3.10	2.52	44.0	2.80	3.33	35.5	3.20	2.92	42.2	2.10	1.91
37.5	1.30	1.30	51.8	1.50	1.20	45.9	1.80	2.14	37.6	2.60	2.37	44.0	3.00	2.73
39.7	0.30	0.30	55.0	0.00	0.00	48.1	0.40	0.47	39.1	2.60	2.37	45.5	2.40	2.19
42.4	0.30	0.30	57.0		0.00	49.7	0.00	0.18	40.8	2.80	2.56	47.7	1.20	1.09
44.1	0.00	0.00	60.7		0.00	51.7		0.00	43.2	1.00	0.92	50.8	1.90	1.75
45.8		0.00	63.7		0.12	55.2		0.00	44.2	0.00	0.04	53.2	0.00	0.14
50.0		0.00	67.2		0.00	60.5		0.00	45.1		0.00	56.8		0.00
57.9		0.00	70.8		0.00	64.3		0.00	46.9		0.00	60.7		0.00
			73.5		0.00	67		0.00	57		0.00	63.9		0.00
			76.9		0.00	69.2		0.00	62.8		0.00	67.4		0.00
			83		0.00	72		0.00	63.6		0.00	70		0.00
						74		0.00	65.5		0.00	72.3		0.00
						77		0.00	69.4		0.00	75.4		0.00
						78.8		0.00	72.7		0.19	77.6		0.00
						82.9		0.00	74.8		0.27	79.9		0.00
									76.7		0.21	80.8		0.00
									79.8		0.00	82.3		0.00
									81.9		0.00	83.7		0.00
									83.2		0.00	85		0.00
												88.6		0.00