

**Tick Creek Stream Restoration Project – Project # 379
Chatham County, North Carolina**

**Second Annual Monitoring Report - FINAL
February 2008**



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North Carolina Department of Environment and
Natural Resources

Ecosystem Enhancement Program

1652 Mail Service Center

Raleigh, NC 27699-1652

**TICK CREEK STREAM RESTORATION – Project # 379
2007 MONITORING REPORT**

CONDUCTED FOR THE NORTH CAROLINA DEPARTMENT OF ENVIRONMENT
AND NATURAL RESOURCES

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I. Executive Summary/Project Abstract

The Tick Creek stream restoration and preservation project is located southeast of Siler City, in Chatham County, North Carolina, southeast of the intersection of Rives Chapel Church Road and Jim Moody Road. The project design was completed by the North Carolina Department of Transportation (NCDOT) in 2002, and includes preservation of a 114 foot wide buffer along 3,733 feet of Tick creek (immediately downstream of the Rives Chapel Church Road Bridge), and restoration of 2,597 feet of an unnamed tributary to Tick Creek (UT). The entire project occupies 29 contiguous acres in USGS HUC 03030003070023 (NCDWQ Cape Fear River Subbasin 03-06-12). According to telephone conversations with Jamie Lancaster, PE (construction project manager, NCDOT), construction was completed on the Tick Creek site on 1 September 2005 and bare rootstock planting was completed during the week of 6 February 2006.

As-built qualitative evaluation was conducted by RJG&A during early February 2006. The First Annual Monitoring Report (2006) indicated that the project had met its geomorphologic and vegetation goals design by October 2007. The last 2006 visit to the Tick Creek site was on 1 November. No on-site evidence of bankfull events was observed during 2006.

The 2007 evaluation and monitoring of the Tick Creek stream restoration site indicates that the project has met all its design goals during the second year post-construction. As stated below, evidence of bankfull flow was observed during the April 2007 evaluation.

USGS hydrograph data indicate that at least one bankfull event was likely to have occurred during December 2006. At least one other was likely to have occurred during spring 2007. The project, therefore, has met its bankfull goals for two consecutive years.

For the second consecutive year average planted woody stem density (890 per acre) has exceeded the vegetation restoration goal.

II. Project Background

2.1. Project Objectives

The Tick Creek Stream Restoration Project was designed to achieve the following objectives:

- restore pre-agricultural water quality,
- improve aquatic habitat function and value,
- improve sediment transport capability,
- restore bank stability.

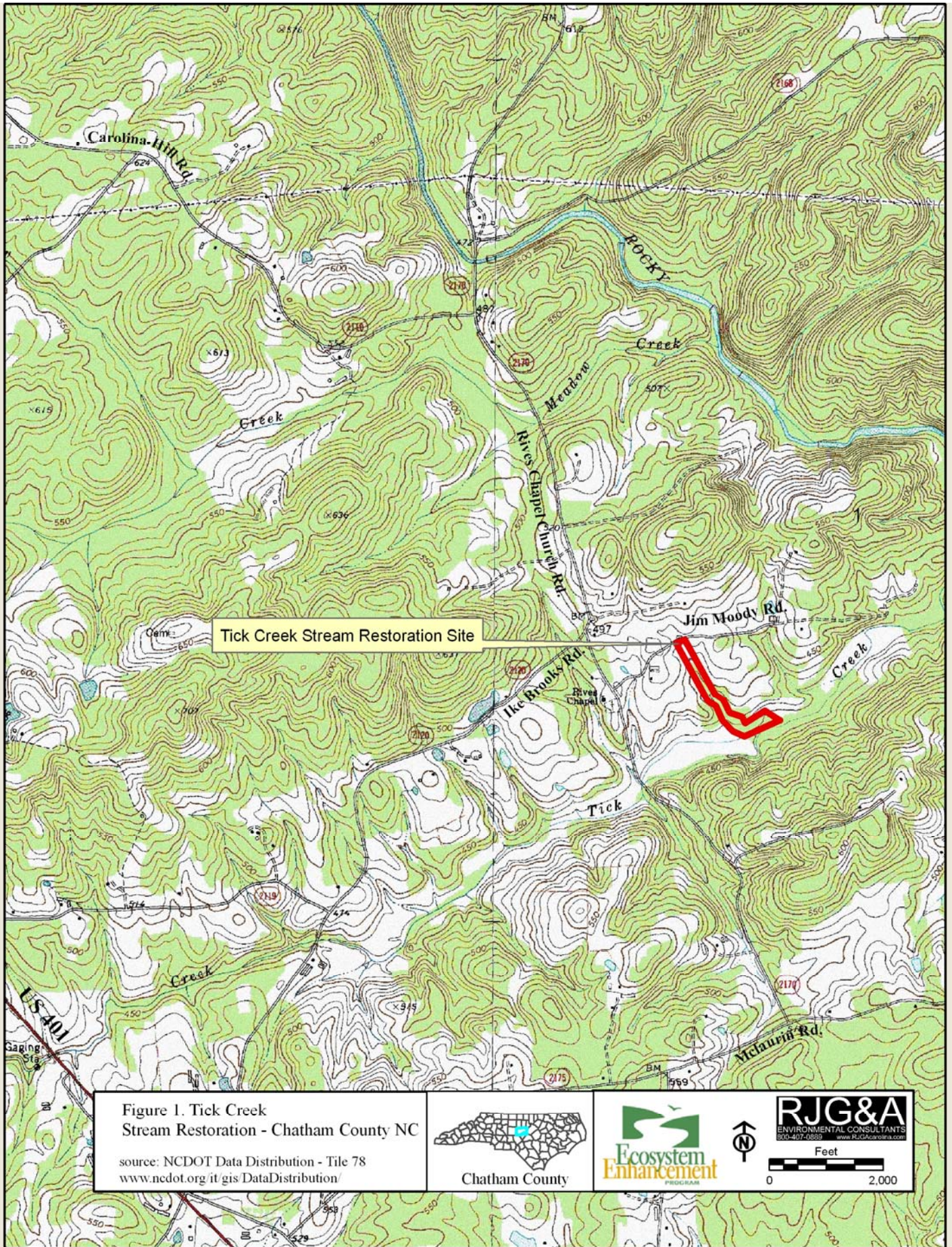
2.1. Project Objectives

The Tick Creek Stream Restoration Project involved the preservation of 3,733 linear feet of Tick Creek and a Priority I restoration of 2,946 linear feet of an unnamed tributary that flows into Tick Creek. The project involved bedform transformations, channel dimension adjustments, pattern alterations, structure installation (root wads, rock vanes, and woody debris), and riparian buffer restoration (woody vegetation planting and stock exclusion).

2.3. Location and Setting

To get to the Tick Creek restoration site from U.S. 64, turn south on Rives Chapel Church Road (~0.9 mile east of Siler City), travel 4.4 miles, turn left (east) onto Jim Moody Road. The upstream boundary of the unnamed tributary restoration site is 0.3 miles east of the intersection, on the right (south) side of the road. The project's western easement boundary (preservation) begins on the downstream side of the Rives Chapel Church Road Bridge over Tick Creek (south of the Jim Moody Rd. intersection) (Figure 1).

The 2002 Tick Creek Restoration Plan describes the site's pre-restoration land use as cattle pasture that involved agricultural clearing, stream ditching and straitening, and unrestricted cattle access to the stream. This land use caused bank instability, which increased sediment load. This caused the direct loss of aquatic habitat and caused the impairment and degradation of aquatic resources along the restoration project's entire reach (from the Jim Moody Road culvert, to the confluence with Tick Creek).



Tick Creek Stream Restoration Site

Figure 1. Tick Creek Stream Restoration - Chatham County NC

source: NCDOT Data Distribution - Tile 78
www.ncdot.org/it/gis/DataDistribution/



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2.4. History and Background

The project design was completed by the North Carolina Department of Transportation (NCDOT) in 2002, and includes preservation of a 114 foot wide buffer along 3,733 feet of Tick creek and restoration of 2,597 feet of an unnamed tributary to Tick Creek (UT). According to telephone conversations with Jamie Lancaster, PE (construction project manager, NCDOT), construction was completed on the Tick Creek site on 1 September 2005 and bare rootstock planting was completed during the week of 6 February 2006.

Exhibit Table I. Mitigation Structure and Objectives (from NCDOT Tick Creek Restoration Plan) Tick Creek Stream Restoration – EEP Project #379						
Reach ID	Mitigation Type	Approach	Linear Feet	Stationing	Mitigation Credits (ratio)	Comment
Tick Creek	Preservation		3,733		1,244 (3:1)	Protection of high quality aquatic habitat (rare mussels)
Reach 1	Restoration	Priority 1	2,946	10+00-14+50	2,946 (1:1)	Shallow pools, small meanders, and steep riffles
Reach 2	Restoration	Priority 1		20+00-35+00		Realigned, widened floodplain
Reach 3	Restoration	Priority 1		40+00-49+00		Realigned, reconnected to floodplain

Exhibit Table II. Activity and Reporting History Tick Creek Stream Restoration - EEP Project #379		
Activity or Report	Data Collection	Completion
Restoration Plan	February – May 2002	September 2002
Construction	NA	1 September 2005
Temporary S&E mix applied	NA	NA
Permanent seed mix applied	NA	NA
Bare Root Planting	NA	6 February 2006
Mitigation Plan	NA	NA
As-built	March 2006	
Year 1 Monitoring		November 2006
Vegetation	September 2006	
Geomorphologic	October 2006	
Year 2 Monitoring		October 2007
Qualitative Evaluation	April and October 2007	
Vegetation	July 2007	
Geomorphologic	July 2007	

Exhibit Table III. Project Contacts Tick Creek Stream Restoration - EEP Project #379

<p>Design: Earth Tech 701 Corporation Center Drive, Suite 475 Raleigh, NC 27607 Mr. Ron Johnson (919) 854-6210</p> <p>North Carolina Department of Transportation Natural Environment Unit Natural Environment Engineering Group 1598 Mail Service Center, Raleigh, NC 27699-1598 Mr. Jamie Lancaster, Supervisor (919) 715-1441</p>
<p>Construction Contractor: NA</p>
<p>Monitoring Performers: RJG&A 1221 Corporation Parkway, Suite 100 Raleigh, NC 27616 Mr. Sean Doig (919) 872-1174</p>

Exhibit Table IV. Project Background - Tick Creek Stream Restoration - EEP Project #379

County	Chatham
Drainage Area	96 acres (0.15 square miles)
Drainage Impervious Cover Estimate (%)	
Stream Order	First Order
Physiographic Region	Piedmont
Ecoregion	Carolina Slate Belt
Rosgen Classification of As-built	
Reach 1	B6
Reach 2	C5b
Reach 3	E6
Dominant Soil Types	
Reach 1	Georgeville silt loam
Reach 2	Georgeville silt loam
Reach 3	Nanford Badin complex (upper ~1,000 feet), Riverview (lower ~400 feet, to confluence with Tick Creek)
Reference Site ID	Spencer Creek
USGS HUC for Project and Reference	03030003070023, 03040103050090

Exhibit Table IV. Project Background - Tick Creek Stream Restoration - EEP Project #379	
NCDWQ Sub-basin for Project and Reference	03-06-12, 03-07-09
NCDWQ Classification for Project and Reference	C
Any portion of the project segment 303d listed?	No
Any portion of the project segment upstream of a 303d listed segment?	No – not in NCDWQ 30-06-12
Reasons for 303d Listing or Stressor	NA
% of Project Easement Fenced	0%

2.5. Monitoring Plan View

See Figure 2 for Monitoring Plan View.

Figure 2-1 - Monitoring Plan View -
 2007 Monitoring, Tick Creek
 Stream Restoration
 EEP Project #379 - Chatham Co., NC

LEGEND
Thalweg (Fall 07)

Reach
 1 (Red line) 2 (Blue line) 3 (Green line)

★ Photo Points — Cross Sections

■ Vegetation Monitoring Plots
 (Supplied by EarthTec)

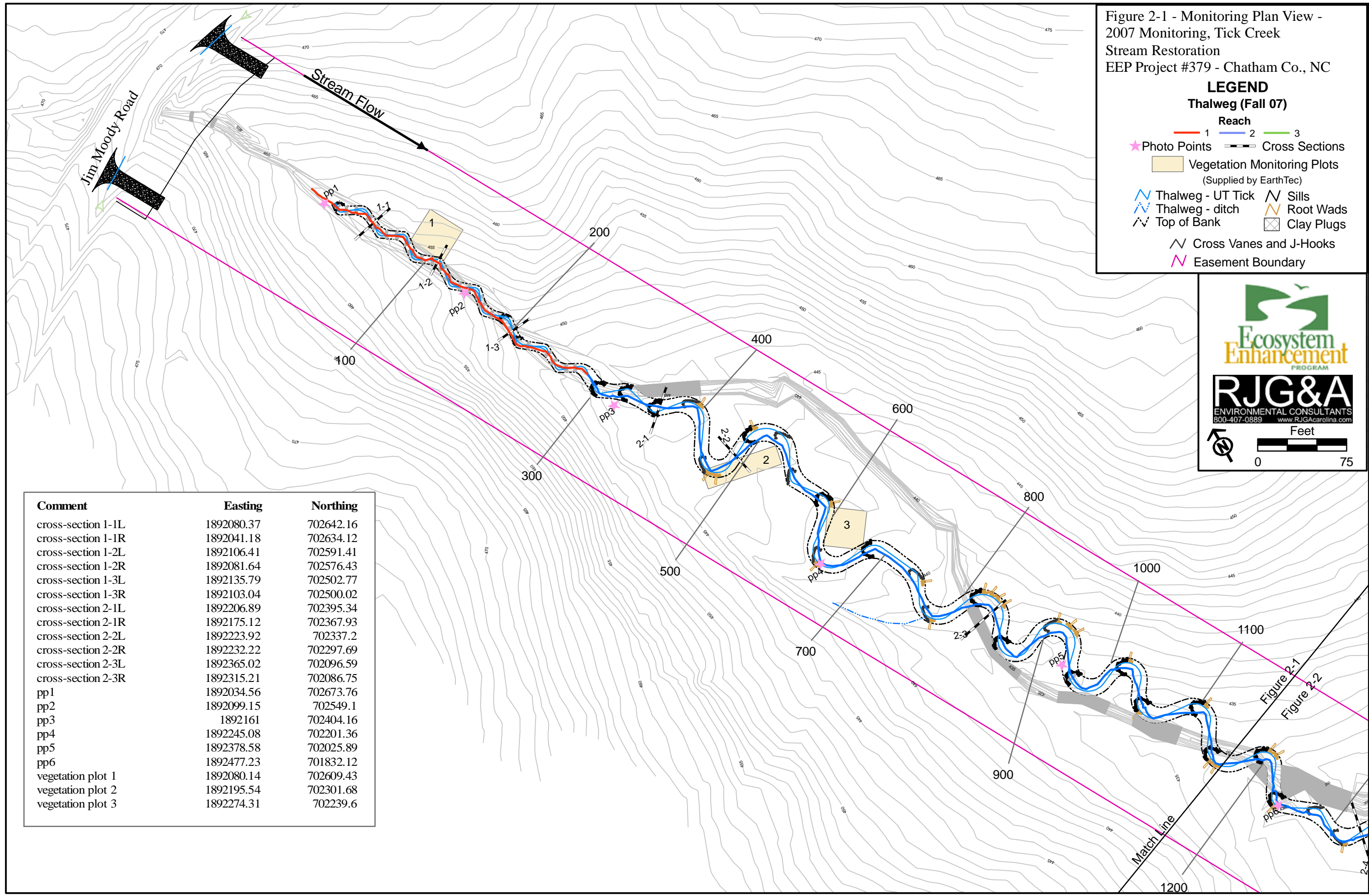
∩ Thalweg - UT Tick ∩ Sills
 ∩ Thalweg - ditch ∩ Root Wads
 ∩ Top of Bank ∩ Clay Plugs

∩ Cross Vanes and J-Hooks
 ∩ Easement Boundary



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Comment	Easting	Northing
cross-section 1-1L	1892080.37	702642.16
cross-section 1-1R	1892041.18	702634.12
cross-section 1-2L	1892106.41	702591.41
cross-section 1-2R	1892081.64	702576.43
cross-section 1-3L	1892135.79	702502.77
cross-section 1-3R	1892103.04	702500.02
cross-section 2-1L	1892206.89	702395.34
cross-section 2-1R	1892175.12	702367.93
cross-section 2-2L	1892223.92	702337.2
cross-section 2-2R	1892232.22	702297.69
cross-section 2-3L	1892365.02	702096.59
cross-section 2-3R	1892315.21	702086.75
pp1	1892034.56	702673.76
pp2	1892099.15	702549.1
pp3	1892161	702404.16
pp4	1892245.08	702201.36
pp5	1892378.58	702025.89
pp6	1892477.23	701832.12
vegetation plot 1	1892080.14	702609.43
vegetation plot 2	1892195.54	702301.68
vegetation plot 3	1892274.31	702239.6

Figure 2-2 - Monitoring Plan View -
 2007 Monitoring, Tick Creek
 Stream Restoration
 EEP Project #379 - Chatham Co., NC

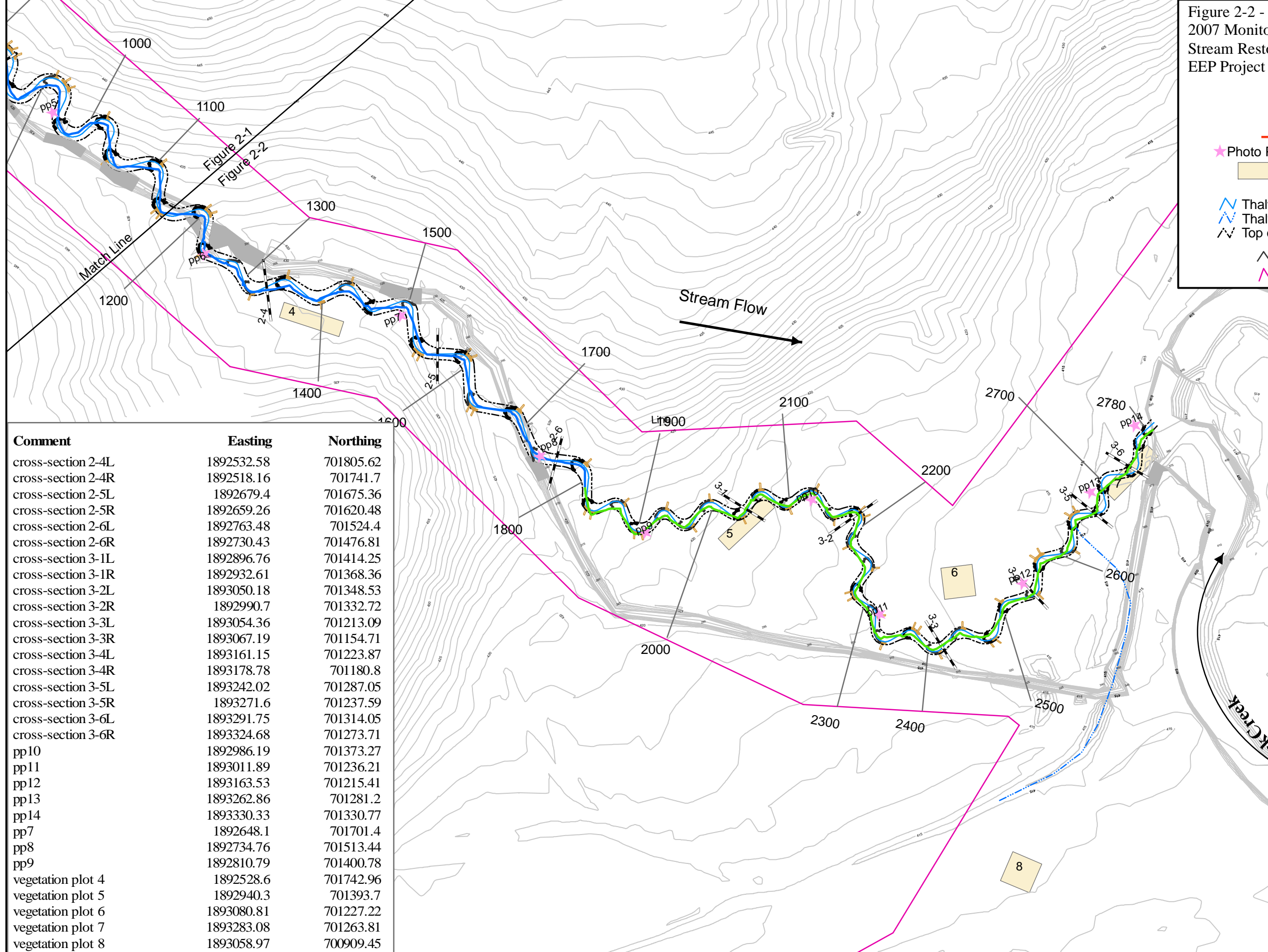
LEGEND

- Thalweg (Fall 07)**
- Reach**
 1 (Red line) 2 (Blue line) 3 (Green line)
- ★ Photo Points
 - Cross Sections
 - Vegetation Monitoring Plots (Supplied by EarthTec)
 - ~ Thalweg - UT Tick
 - ~ Thalweg - ditch
 - ~ Top of Bank
 - ~ Sills
 - ~ Root Wads
 - ~ Clay Plugs
 - ~ Cross Vanes and J-Hooks
 - ~ Easement Boundary

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Comment	Easting	Northing
cross-section 2-4L	1892532.58	701805.62
cross-section 2-4R	1892518.16	701741.7
cross-section 2-5L	1892679.4	701675.36
cross-section 2-5R	1892659.26	701620.48
cross-section 2-6L	1892763.48	701524.4
cross-section 2-6R	1892730.43	701476.81
cross-section 3-1L	1892896.76	701414.25
cross-section 3-1R	1892932.61	701368.36
cross-section 3-2L	1893050.18	701348.53
cross-section 3-2R	1892990.7	701332.72
cross-section 3-3L	1893054.36	701213.09
cross-section 3-3R	1893067.19	701154.71
cross-section 3-4L	1893161.15	701223.87
cross-section 3-4R	1893178.78	701180.8
cross-section 3-5L	1893242.02	701287.05
cross-section 3-5R	1893271.6	701237.59
cross-section 3-6L	1893291.75	701314.05
cross-section 3-6R	1893324.68	701273.71
pp10	1892986.19	701373.27
pp11	1893011.89	701236.21
pp12	1893163.53	701215.41
pp13	1893262.86	701281.2
pp14	1893330.33	701330.77
pp7	1892648.1	701701.4
pp8	1892734.76	701513.44
pp9	1892810.79	701400.78
vegetation plot 4	1892528.6	701742.96
vegetation plot 5	1892940.3	701393.7
vegetation plot 6	1893080.81	701227.22
vegetation plot 7	1893283.08	701263.81
vegetation plot 8	1893058.97	700909.45

III. Project Conditions and Monitoring Results

The first qualitative project evaluation in the second growing season was conducted on 6 April 2007. Second annual quantitative geomorphologic and vegetation data were collected during July 2007. The site was again qualitatively assessed on 28 October 2007.

Flowing water was observed in the channel in 2007 only during the April site visit. No water was observed during the July site visit. Pools were full, but no flowing water was observed during the October evaluation.

Several relatively minor geomorphologic problem areas were observed during April 2007. Fewer problem areas were observed in October, but the lack of flow, at the time of the visit and for several months previously, reduced the ability to identify and accurately assess flow patterns.

3.1. Vegetation Assessment

Vegetation monitoring data for Year 2 can be found in Appendix A, Tables 1 through 5. Vegetation plot photos are also in Appendix A.

3.1.1. Vegetation Problem Areas

Overall, planted woody vegetation was successful in 2007. Planted woody stem success was almost triple the required 320 stems, when averaged for all reaches (890.34/acre).

As was observed in Reach 1 in 2006, woody stem planting in the areas furthest from the stream banks was sporadic, minimal, and absent in some places. Because of the lack of overstory from mature trees, which are present in Reach 2 and most of Reach 3, early successional herbaceous volunteer density and relative cover was again high (dog fennel (*Eupatorium capillofolium*), and horseweed (*Conyza canadensis*)). Natural succession of invasive perennials, primarily blackberry (*Rubus argutus*) has begun throughout Reach 1. This type of early successional herbaceous density is common in recently disturbed areas and can be beneficial to the planted stems by prolonging soil moisture in upland areas and reducing early evapotranspiration, provided invasive woody species don't also colonize, and the newly planted *understory* of woody stems remains successful, which it has after its second growing season. Invasive woody volunteers were not quantitatively observed in Reach 1's monitoring plot (plot 1). They are relatively sparse outside the plots.

Reach 2 had good success rates for planted individuals, but, invasion from autumn olive (*Eleagnus umbellata*), mimosa (*Albizia julibrissin*), and Chinese and Japanese privet (*Ligustrum sinense* and *L. japonicum*, respectively) appears to have increased since 2006. Similarly, native early-successional woody species density, particularly sweet gum (*Liquidambar styraciflua*), has significantly increased in Reach 2 since 2006. Because of

the abundance of these species in adjacent forests, their successful management within the restoration area may be difficult. Similarly, the invasive herbaceous Chinese lespedeza's (*Lespedeza cuneata*) density has also increased since 2006 in Reach 2, especially where groundwater is closer to the surface (during typical, not record drought, years). The planted woody stem success under these invasive herbaceous stands is relatively high, so, like in 2006, continued observation, without remedial action, is appropriate.

As in 2006, Reach 3 had planted woody stem density well above the targeted 320 stems per acre, and relatively minimal invasive species problems. Invasive individuals were present, but much less dense than in either Reach 1 or Reach 2. A suspected cause of the relatively high mortality inside this large bend is substrate compaction. The Restoration Design Plan View map indicates that a relatively large *staging area* was located here during construction. Because of the adequate live planted stem density in plot 6 no remedial action is recommended at this time. Like in the Reach 1 and Reach 2 problem areas, continued observation is appropriate.

3.1.2. Vegetation Problem Areas

See Figures A1-2 in Appendix A for the Current Conditions Plan View for vegetation.

3.2. Stream Assessment

3.2.1. Procedural Items

3.2.1.1. Morphometric Criteria

RJG&A staff evaluated the condition and success of the Tick Creek Stream Restoration project during April, July, and October 2007. Overall, the site is maintaining its as-built dimension, pattern, and profile, and planted woody stem success is high. During July 2007 the third annual cross section, pattern, and longitudinal profile data were collected based on the 2003 Stream Mitigation Guidelines (USACE 2003). Fifteen cross-sections were surveyed and a longitudinal profile of the entire UT was conducted. Photographs were taken at all cross sections, and at the 14 permanent photo locations (established by NCDOT during February 2006) during the July survey.

3.1.1.2. Hydrologic Criteria

No crest gauges are installed on the Tick Creek site and on-site quantitative hydrologic evaluation is therefore not possible. As reported in the spring 2007 Initial Assessment, on-site qualitative evidence of at least one bankfull event (rack and drift lines and downed vegetation/stems above the bankfull elevation) was observed on 6 April 2007 at several cross vanes and on the inside of meanders below station 1,700. The previous site visit/observation was on 1 November 2006.

The USGS stream gauge on Tick Creek near Mount Vernon Springs (USGS 02101800) is located on Tick Creek, approximately 3 miles upstream from the restoration site's confluence. It has a drainage area of 15.5 square miles. Bankfull discharge at this gauge is 655.3 cubic feet per second (cfs) (Harmen, 1999). Based on USGS data for 2007 (Figure 3), there have been five bankfull events since 1 November 2006 (Figure 3 and Exhibit Table VIII).

Based on the dates of occurrence, the Tick Creek stream restoration site has received at least one bankfull event during both its first and second monitoring years.

Figure 3. USGS Stream gauge data for Tick Creek upstream of US 421 - Tick Creek Stream Restoration - EEP Project #379

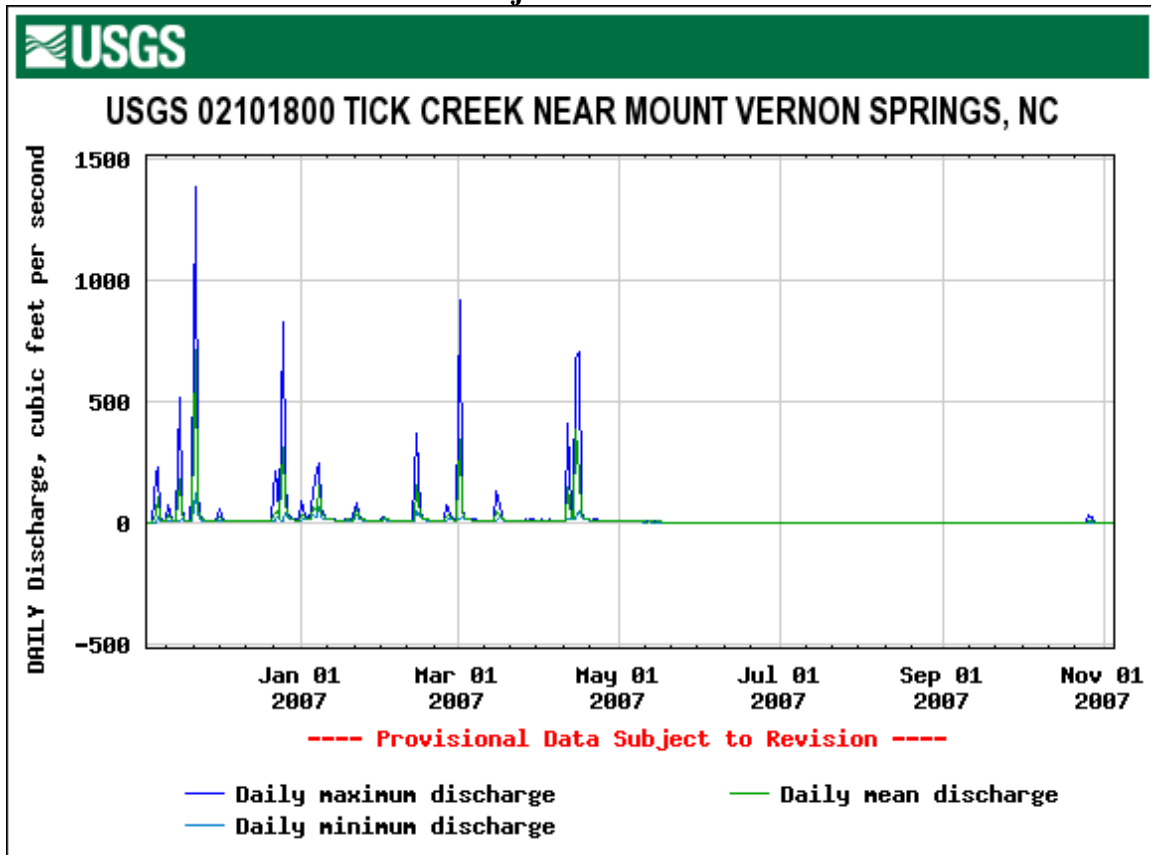


Exhibit Table V. Verification of Bankfull Events – Tick Creek Stream Restoration - EEP Project #379

Date of Data Collection	Date of Occurrence (mm/dd/yy)	Method	CFS
NA	22 November 2006	Proximal USGS gauge resource	1,390
NA	25 December 2006	Proximal USGS gauge resource	832
NA	2 May 2007	Proximal USGS gauge resource	919
NA	15 April 2007	Proximal USGS gauge resource	670
NA	16 April 2007	Proximal USGS gauge resource	704

3.2.1.3. Bank Stability Assessments

A detailed BEHI only applies to Monitoring year 5 and was, therefore, not performed during 2007 (monitoring year 2).

3.2.2. Stream Problem Areas

The quantitative data and qualitative evaluations indicate that the structure and function of the entire restoration project closely match the as built conditions during the second monitoring year, (i.e. little change has occurred)

As shown in Appendix B2, 16 structural and substrate problem areas were identified during the 28 October 2007 qualitative evaluation. Two of these, as illustrated in B1 (Current Conditions Plan View (Streams)), have obviously worsened. They are both located in the final series of step pools above restoration Reach 3's confluence with Tick Creek. They warrant close and frequent observation to prevent them from becoming undermined, which could eliminate grade control.

With the exception of the channel headcut (station 396) and the lateral bank cut between rootwads (station 1203), the remaining 12 problem areas identified had been previously observed. Because of the lack of flowing water inside the restored channel, the condition of five of them (stations 290, 545,760, and 2,373) was not clear. Several problem areas identified as locations with moderate piping during April 2007 appeared to have stabilized.

No significant aggradation in pools was observed during October 2007. Special attention was given to evaluation of the three pools in Reach 3, and the one in Reach 2 that were cited in the 2007 Initial Assessment and the associated Problem Area Plan View Map 3.2. Since the April 2007 evaluation, all four pools appear to have been scoured during subsequent storm events and are functioning as designed.

3.2.3. Fixed Photo Station Photos

Appendix B4 contains the 16 photo station photos.

3.2.4. Stability Assessment

Exhibit Table VI. Categorical Stream Feature Visual Stability Assessment Tick Creek Stream Restoration - EEP Project #379				
Reach 1(286 feet)				
Feature	Initial	MY-01	MY-02	MY-03
A. Riffles	100%	100%	100%	
B. Pools	100%	100%	100%	
C. Thalweg	100%	100%	100%	
D. Meanders	100%	100%	100%	
E. Bed General	NA	NA	NA	
F. Vanes/J Hooks, etc.	100%	100%	100%	
G. Wads and Boulders	NA	NA	NA	
Reach 2 (1,521 feet)				
A. Riffles	100%	100%	100%	
B. Pools	100%	100%	100%	
C. Thalweg	100%	100%	82%	
D. Meanders	100%	100%	100%	
E. Bed General	NA	NA	NA	
F. Vanes/J Hooks, etc.	100%	93%	95%	
G. Wads and Boulders	100%	100%	99%	
Reach 3 (974 feet)				
A. Riffles	100%	100%	100%	
B. Pools	100%	99%	100%	
C. Thalweg	100%	100%	100%	
D. Meanders	100%	100%	100%	
E. Bed General	NA	NA	NA	
F. Vanes/J Hooks, etc.	100%	92%	92%	
G. Wads and Boulders	100%	100%	100%	

Exhibit Table VII. Baseline Morphology and Hydraulic Summary - Tick Creek Stream Restoration Project – Project #379
Reach 1 (285 feet)

Parameter Dimension	USGS Data	Regional Curve Interval	Pre-Existing Condition	Reference Reach		Design	As-Built		
				UT Cane Creek	Spencer's Creek		min	max	average
Bankfull Width (ft)		7.33	7.30	13.0-13.1	8.7-12.3	6.90	10.38	14.61	11.80
Floodprone Width (ft)			33.00	26-36	229.00	>19	5.95	30.63	21.86
Bankfull Area (sq ft)		6.17	6.30	11.6-12.2	10.3-10.8	6.00	6.40	9.91	8.56
Mean Depth (ft)		0.95	0.90	0.90	0.9-1.2	0.87	0.61	0.90	0.71
Maximum Depth (ft)			1.50	1.40	1.8-1.9	1.40	1.22	1.65	1.37
Width/Depth Ratio			8.50	14-14.5	7.2-14	8.00	11.52	23.93	17.44
Entrenchment Ratio			4.50	2.40	22.40	>2.6	0.57	2.95	1.84
Bank Height Ration									
Wetted Perimeter (ft)			NA	NA	NA	NA	10.91	14.85	12.28
Hydraulic Radius (ft)			NA	NA	NA	NA	0.59	0.84	0.68
Substrate									
d50 (mm)			NA	NA	NA	NA			
d84 (mm)			NA	NA	NA	NA			
Pattern									
Channel Beltwidth (ft)			0	14-30	24-52	8.0-17.0	5.03	10.44	7.65
Radius of Curvature (ft)			0	16-25	5.4-22.1	9.5-17	5.98	17.01	9.85
Meander Wavelength			0	32-58	54-196	17-39	32.13	49.67	38.69
Meander Width ratio			0	1.2-2.3	4.2-13.3	1.1-2.4	0.48	0.71	0.65
Profile									
Riffle length (ft)			NA	NA	NA	NA	7.00	40.00	19.86
Riffle slope (ft/ft)			0.022-0.20	0.0043-0.041	0.01-0.067	0.040-0.053	0.019	0.082	0.042
Pool length (ft)			NA	NA	NA	NA	7.00	20.00	14.04
Pool spacing (ft)			8.5-68	37-81	13-47	13-22	1.00	45.00	16.13
Additional Reach Parameters									
Valley Length (ft)			NA	NA	NA	NA			255
Channel Length (ft)			NA	NA	NA	NA			286
Sinuosity			1.00	1.20	1.10	1.10			1.12
Water Surface Slope (ft/ft)			NA	NA	NA	NA			0.029
BF slope (ft/ft)			NA	NA	NA	NA			0.028
Rosgen Classification			E4b	C4	E4	E4b			B6
Macrobenthos			NA	NA	NA	NA			
Habitat Index			NA	NA	NA	NA			

**Exhibit Table VII. Baseline Morphology and Hydraulic Summary - Tick Creek Stream Restoration Project – Project #379
Reach 1 (285 feet)**

Parameter Dimension	USGS Data	Regional Curve Interval	Pre-Existing Condition	Reference Reach		Design	As-Built		
				UT Cane Creek	Spencer's Creek		min	max	average
Bankfull Width (ft)		7.33	7-8.6	13.0-13.1	8.7-12.3	12.00	17.92	34.17	21.50
Floodprone Width (ft)			11-50.	26-36	229.00	>19	40.40	70.00	53.32
Bankfull Area (sq ft)		6.17	7.9-9.7	11.6-12.2	10.3-10.8	9.00	14.15	56.89	26.26
Mean Depth (ft)		0.95	0.9-1.3	0.90	0.9-1.2	0.75	0.79	1.66	1.16
Maximum Depth (ft)			1.5-1.9	1.40	1.8-1.9	1.20	1.58	3.80	2.45
Width/Depth Ratio			5.5-7.0	14-14.5	7.2-14	16.00	14.68	22.70	18.64
Entrenchment Ratio			4.10	2.40	22.40	>1.6	1.69	3.90	2.59
Bank Height Ration									
Wetted Perimeter (ft)			NA	NA	NA	NA	18.37	35.44	22.49
Hydraulic Radius (ft)			NA	NA	NA	NA	0.77	1.61	1.11
Substrate									
d50 (mm)			NA	NA	NA	NA			
d84 (mm)			NA	NA	NA	NA			
Pattern									
Channel Beltwidth (ft)			0-22	14-30	24-52	13-29	9.59	55.69	25.99
Radius of Curvature (ft)			7-10.	16-25	5.4-22.1	16-29	24.51	42.96	16.58
Meander Wavelength			25-31	32-58	54-196	29-68	41.26	130.14	70.17
Meander Width ratio			1.3-2.8	1.2-2.3	4.2-13.3	1.1-2.4	0.53	1.63	1.21
Profile									
Riffle length (ft)			NA	NA	NA	NA	4.80	38.00	22.64
Riffle slope (ft/ft)			0.0072-0.078	0.0043-0.041	0.01-0.067		0.002	0.070	0.024
Pool length (ft)			NA	NA	NA	NA	6.00	48.70	20.86
Pool spacing (ft)			11-72.	37-81	13-47	36-61	0.5	17.5	6.1
Additional Reach Parameters									
Valley Length (ft)			NA	NA	NA	NA			1,150
Channel Length (ft)			NA	NA	NA	NA			1,535
Sinuosity			1.00	1.20	1.10	1.30			1.33
Water Surface Slope (ft/ft)			NA	NA	NA	NA			0.018
BF slope (ft/ft)			NA	NA	NA	NA			0.015
Rosgen Classification			E4-G4	C4	E4	C4			C5b
Macrobenthos			NA	NA	NA	NA			
Habitat Index			NA	NA	NA	NA			

**Exhibit Table VII. Baseline Morphology and Hydraulic Summary - Tick Creek Stream Restoration Project – Project #379
Reach 3 (975 feet)**

Parameter Dimension	USGS Data	Regional Curve Interval	Pre-Existing Condition	Reference Reach		Design	As-Built		
				UT Cane Creek	Spencer's Creek		min	max	average
Bankfull Width (ft)		7.33	5.6-7.9	13.0-13.1	8.7-12.3	12.00	17.01	27.06	22.17
Floodprone Width (ft)			50.00	26-36	229.00	>19	2.41	64.80	37.17
Bankfull Area (sq ft)		6.17	9.3-9.5	11.6-12.2	10.3-10.8	9.00	11.15	29.22	19.22
Mean Depth (ft)		0.95	1.2-1.7	0.90	0.9-1.2	0.75	0.54	1.19	0.86
Maximum Depth (ft)			1.9-2.1	1.40	1.8-1.9	1.20	1.47	2.99	2.18
Width/Depth Ratio			3.30	14-14.5	7.2-14	16.00	20.20	49.71	27.68
Entrenchment Ratio			7.40	2.40	22.40	>1.6	0.09	3.45	1.74
Bank Height Ration									
Wetted Perimeter (ft)			NA	NA	NA	NA	18.09	27.41	22.93
Hydraulic Radius (ft)			NA	NA	NA	NA	0.54	1.15	0.82
Substrate									
d50 (mm)			NA	NA	NA	NA			
d84 (mm)			NA	NA	NA	NA			
Pattern							min	max	average
Channel Beltwidth (ft)			26	14-30	24-52	13-29	8.77	28.65	16.67
Radius of Curvature (ft)			8.0-9.0	16-25	5.4-22.1	16-29	6.32	23.07	12.91
Meander Wavelength			-	32-58	54-196	29-68	35.83	84.30	51.31
Meander Width ratio			3.8	1.2-2.3	4.2-13.3	1.1-2.4	0.52	1.06	0.75
Profile									
Riffle length (ft)			NA	NA	NA	NA	6.50	17.50	10.96
Riffle slope (ft/ft)			0.0006-0.053	0.0043-0.041	0.01-0.067		0.002	0.055	0.028
Pool length (ft)			NA	NA	NA	NA	6.00	46.00	27.16
Pool spacing (ft)			18-50	37-81	13-47	36-61	0.5	17.5	6.1
Additional Reach Parameters									
Valley Length (ft)			NA	NA	NA	NA			635
Channel Length (ft)			NA	NA	NA	NA			963
Sinuosity			1.00	1.20	1.10	1.30			1.52
Water Surface Slope (ft/ft)			NA	NA	NA	NA			0.011
BF slope (ft/ft)			NA	NA	NA	NA			0.010
Rosgen Classification			E4	C4	E4	C4			E6
Macrobenthos			NA	NA	NA	NA			
Habitat Index			NA	NA	NA	NA			

Exhibit Table VIII. Morphology and Hydraulic Monitoring Summary – Tick Creek Stream Restoration – EEP Project #379									
Reach 1 (235 ft)									
	XS 1-1			XS 1-2			XS 1-3		
Dimension	As-built	Mon 01	Mon 02	As-built	Mon 01	Mon 02	As-built	Mon 01	Mon 02
Bankfull Width (ft)	14.61	13.51	15.46	10.38	10.04	9.75	10.40	11.09	12.72
Floodprone Width (ft)	29.01	27.49	42.00	5.95	24.74	44.00	30.63	33.05	56.00
Bankfull Area (sq ft)	9.91	7.72	9.88	9.36	8.14	8.38	6.40	7.10	8.79
Mean Depth (ft)	0.61	0.57	0.64	0.90	0.81	0.86	0.62	0.64	0.69
Maximum Depth (ft)	1.22	1.17	1.30	1.65	1.48	1.62	1.25	1.36	1.44
Width/Depth Ratio	23.93	23.64	24.16	11.52	12.39	11.35	16.88	17.34	18.40
Entrenchment Ratio	1.99	2.03	2.72	0.57	2.47	4.51	2.95	2.98	4.40
Bank Height Ratio			1.54			1.25			1.24
Wetted Perimeter (ft)	14.85	13.73	15.70	11.07	10.67	10.44	10.91	11.63	13.27
Hydraulic Radius (ft)	0.60	0.56	0.63	0.84	0.76	0.76	0.59	0.61	0.66
Substrate									
d50 (mm)		0.04	0.04		0.04	0.05		0.05	0.05
d84 (mm)		8.00	12.34		0.06	13.65		16.0	16.0

Parameter	Reach 1				
Pattern	Mon 01	Mon 02	Mon 03	Mon 04	Mon 05
Channel Beltwidth (ft)	6.17	6.84			
Radius of Curvature (ft)	8.04	7.36			
Meander Wavelength	23.34	38.08			
Meander Width ratio	0.53	0.52			
Profile					
Riffle length (ft)	12.45	9.43			
Riffle slope (ft/ft)	0.086	0.033			
Pool length (ft)	10.21	8.09			
Pool spacing (ft)	18.59	19.88			

Additional Reach Parameters

Valley Length (ft)	255	255
Channel Length (ft)	285	286
Sinuosity	1.12	1.12
Water Surface Slope (ft/ft)	0.037	NA*
BF slope (ft/ft)	0.038	0.039
Rosgen Classification	B6	B6
Habitat Index	NA	NA
Macrobenthos	NA	NA

Exhibit Table VIII . Morphology and Hydraulic Monitoring Summary – Tick Creek Stream Restoration – EEP Project #379									
Reach 2 (1,521 ft)									
	XS 2-1			XS 2-2			XS 2-3		
Dimension	As-built	Mon 01	Mon 02	As-built	Mon 01	Mon 02	As-built	Mon 01	Mon 02
Bankfull Width (ft)	18.22	18.77	19.23	17.92	18.02	19.77	20.96	18.35	14.99
Floodprone Width (ft)	42.00	42.00	105.00	40.40	40.50	40.5	51.00	51.00	51.00
Bankfull Area (sq ft)	22.61	23.53	22.80	14.15	14.53	15.53	23.28	23.58	17.89
Mean Depth (ft)	1.24	1.25	1.19	0.79	0.81	0.79	1.11	1.29	1.19
Maximum Depth (ft)	2.37	2.37	2.20	1.58	1.59	1.64	2.78	2.77	2.34
Width/Depth Ratio	14.68	14.98	16.22	22.70	22.35	25.17	18.87	14.28	12.55
Entrenchment Ratio	2.30	2.24	5.46	2.25	2.25	2.05	2.43	2.78	3.40
Bank Height Ratio			1.54			1.22			1.59
Wetted Perimeter (ft)	19.17	19.60	19.98	18.37	18.46	20.39	22.90	20.58	16.64
Hydraulic Radius (ft)	1.18	1.20	1.14	0.77	0.79	0.76	1.02	1.15	1.08
Substrate									
d50 (mm)		0.04	0.04		0.04	0.03		0.03	0.03
d84 (mm)		0.06	0.06		0.62	0.05		0.05	0.05

Parameter	Reach 2				
Pattern	Mon 01	Mon 02	Mon 03	Mon 04	Mon 05
Channel Beltwidth (ft)	25.81	26.01			
Radius of Curvature (ft)	24.74	15.95			
Meander Wavelength	70.53	78.43			
Meander Width ratio	0.19	0.21			
Profile					
Riffle length (ft)	23.02	15.45			
Riffle slope (ft/ft)	0.031	0.015			
Pool length (ft)	15.61	19.46			
Pool spacing (ft)	22.86	22.46			

Additional Reach Parameters

Valley Length (ft)	1,150	1,150
Channel Length (ft)	1,521	1,506
Sinuosity	1.32	1.31
Water Surface Slope (ft/ft)	0.022	NA
BF slope (ft/ft)	0.022	0.016
Rosgen Classification	C5b	C5b
Habitat Index	NA	NA
Macrobenthos	NA	NA

Exhibit Table VIII . Morphology and Hydraulic Monitoring Summary – Tick Creek Stream Restoration – EEP Project #379									
Reach 2 (1,521 ft)									
	XS 2-4			XS 2-5			XS 2-6		
Dimension	As-built	Mon 01	Mon 02	As-built	Mon 01	Mon 02	As-built	Mon 01	Mon 02
Bankfull Width (ft)	17.96	19.42	21.43	19.77	19.49	20.01	34.17	33.00	37.01
Floodprone Width (ft)	70.00	70.00	70.00	58.90	58.90	58.90	57.60	57.70	57.8
Bankfull Area (sq ft)	18.59	22.29	24.28	22.04	21.14	22.64	56.89	55.83	62.02
Mean Depth (ft)	1.03	1.15	1.13	1.12	1.08	1.13	1.66	1.69	1.68
Maximum Depth (ft)	1.97	2.15	2.32	2.18	2.16	2.28	3.80	4.00	4.18
Width/Depth Ratio	17.36	16.92	18.91	17.72	17.97	17.69	20.52	19.51	22.09
Entrenchment Ratio	3.90	3.60	3.27	2.98	3.02	2.94	1.69	1.75	1.56
Bank Height Ratio			1.42			1.72			2.34
Wetted Perimeter (ft)	18.56	20.11	22.02	20.48	20.18	20.91	35.44	35.25	38.60
Hydraulic Radius (ft)	1.00	1.11	1.10	1.08	1.05	1.08	1.61	1.58	1.61
Substrate									
d50 (mm)		3.50	0.04		0.09	0.03		0.03	0.03
d84 (mm)		16.00	15.22		0.48	0.06		0.05	0.05

Parameter	Reach 2				
Pattern	Mon 01	Mon 02	Mon 03	Mon 04	Mon 05
Channel Beltwidth (ft)	25.81	26.01			
Radius of Curvature (ft)	24.74	15.95			
Meander Wavelength	70.53	78.43			
Meander Width ratio	0.19	0.21			
Profile					
Riffle length (ft)	23.02	15.45			
Riffle slope (ft/ft)	0.031	0.015			
Pool length (ft)	15.61	19.46			
Pool spacing (ft)	22.86	22.46			

Additional Reach Parameters

Valley Length (ft)	1,150	1,150
Channel Length (ft)	1,521	1,506
Sinuosity	1.32	1.31
Water Surface Slope (ft/ft)	0.022	NA
BF slope (ft/ft)	0.022	0.016
Rosgen Classification	C5b	C5b
Habitat Index	NA	NA
Macrobenthos	NA	NA

Exhibit Table VIII . Morphology and Hydraulic Monitoring Summary – Tick Creek Stream Restoration – EEP Project #379									
Reach 3 (975 ft)									
	XS 3-1			XS 3-2			XS 3-3		
Dimension	As-built	Mon 01	Mon 02	As-built	Mon 01	Mon 02	As-built	Mon 01	Mon 02
Bankfull Width (ft)	27.06	34.84	40.00	18.80	19.46	17.76	17.01	17.13	18.14
Floodprone Width (ft)	2.41	61.00	61.00	64.80	64.80	64.80	12.81	54.08	53.84
Bankfull Area (sq ft)	14.73	17.93	28.23	17.49	16.22	15.08	11.15	12.60	12.51
Mean Depth (ft)	0.54	0.51	0.71	0.93	0.83	0.85	0.66	0.74	0.69
Maximum Depth (ft)	1.62	1.72	1.98	2.26	2.10	2.06	1.47	1.60	1.63
Width/Depth Ratio	49.71	67.70	56.68	20.20	23.34	20.91	25.95	23.30	26.30
Entrenchment Ratio	0.09	1.75	1.53	3.45	3.33	3.65	0.75	3.16	2.97
Bank Height Ratio			1.16			1.39			1.14
Wetted Perimeter (ft)	27.41	35.21	40.90	20.11	20.59	19.08	18.09	17.61	18.62
Hydraulic Radius (ft)	0.54	0.51	0.69	0.87	0.79	0.79	0.62	0.72	0.67
Substrate									
d50 (mm)		0.03	0.03		0.03	0.03		0.03	0.03
d84 (mm)		0.05	0.05		0.05	0.05		0.05	0.05

Parameter	Reach 3				
Pattern	Mon 01	Mon 02	Mon 03	Mon 04	Mon 05
Channel Beltwidth (ft)	16.44	15.31			
Radius of Curvature (ft)	16.62	13.88			
Meander Wavelength	53.97	53.96			
Meander Width ratio	0.30	0.46			
Profile	Mon 01	Mon 02			
Riffle length (ft)	16.17	13.27			
Riffle slope (ft/ft)	0.023	0.007			
Pool length (ft)	24.62	22.45			
Pool spacing (ft)	7.14	16.68			

Additional Reach Parameters	Mon 01	Mon 02
Valley Length (ft)	635	635
Channel Length (ft)	974	975
Sinuosity	1.53	1.53
Water Surface Slope (ft/ft)	0.016	NA
BF slope (ft/ft)	0.014	0.0101
Rosgen Classification	E6	E6
Habitat Index	NA	NA
Macrobenthos	NA	NA

Exhibit Table VIII . Morphology and Hydraulic Monitoring Summary – Tick Creek Stream Restoration – EEP Project #379									
Reach 3 (975 ft)									
	XS 3-4			XS 3-5			XS 3-6		
Dimension	As-built	Mon 01	Mon 02	As-built	Mon 01	Mon 02	As-built	Mon 01	Mon 02
Bankfull Width (ft)	26.00	26.65	26.67	24.51	22.84	24.59	19.65	17.00	17.38
Floodprone Width (ft)	45.50	46.50	46.5	57.90	57.60	57.6	39.57	39.68	39.65
Bankfull Area (sq ft)	27.09	30.06	29.90	29.22	26.64	29.92	15.62	14.79	14.80
Mean Depth (ft)	1.04	1.13	1.12	1.19	1.17	1.22	0.79	0.87	0.85
Maximum Depth (ft)	2.99	2.90	2.72	2.72	2.71	2.84	2.04	2.05	2.08
Width/Depth Ratio	24.95	23.63	23.78	20.55	19.57	20.21	24.72	19.55	20.40
Entrenchment Ratio	1.75	1.74	1.74	2.36	2.52	2.34	2.01	2.33	2.28
Bank Height Ratio			1.29			1.36			1.67
Wetted Perimeter (ft)	27.31	28.22	28.02	24.43	24.03	25.91	20.22	17.79	18.15
Hydraulic Radius (ft)	0.99	1.06	1.07	1.15	1.11	1.15	0.77	0.83	0.82
Substrate									
d50 (mm)		0.03	0.03		0.04	0.03		0.04	0.03
d84 (mm)		0.05	0.05		5.70	0.05		0.06	0.05

Parameter	Reach 3				
Pattern	Mon 01	Mon 02	Mon 03	Mon 04	Mon 05
Channel Beltwidth (ft)	16.44	15.31			
Radius of Curvature (ft)	16.62	13.88			
Meander Wavelength	53.97	53.96			
Meander Width ratio	0.30	0.46			
Profile	Mon 01	Mon 02			
Riffle length (ft)	16.17	13.27			
Riffle slope (ft/ft)	0.023	0.007			
Pool length (ft)	24.62	22.45			
Pool spacing (ft)	7.14	16.68			

Additional Reach Parameters	Mon 01	Mon 02
Valley Length (ft)	635	635
Channel Length (ft)	974	975
Sinuosity	1.53	1.53
Water Surface Slope (ft/ft)	0.016	NA
BF slope (ft/ft)	0.014	0.0101
Rosgen Classification	E6	E6
Habitat Index	NA	NA
Macrobenthos	NA	NA

IV. Methodology

Monitoring methodologies follow the current EEP-provided templates and guidelines (Lee *et al* 2006). Photographs were taken digitally. A Trimble Geo XT handheld mapping-grade unit was used to collect cross section, vegetation corner, photopoint, and problem area locations. Additional notations were written on the as-built plan sheets.

4.1. Stream Methodology

Methods employed were a combination those specified in the Mitigation Plan, the First Annual Monitoring Report, and standard regulatory guidance and procedures documents. Stream monitoring data was collected using the techniques described in US ACE Stream Mitigation Guidelines, US Forest Service's Stream Channel Reference Sites, and Applied River morphology (USACE, 2003; Harrelson et al., 1994; Rosgen, 1996). A South Total Station and Nikon automatic level were used for collecting all geomorphic data. Photographs facing downstream were taken at each cross section.

4.2. Vegetation Methodology

Eight representative vegetation survey plots were selected and installed in reaches 1, 2, and 3 during September 2006, pursuant to the EEP/CVS vegetation monitoring protocol (Lee *et al* 2006). All plots measure 100 square meters and are either 10 meters by 10 meters, or five meters by 20 meters. Pursuant to the guidelines, the four corners of each plot (0,0; 0,10; 10,0; and 10,10 were marked with 18 inch long one half inch diameter galvanized steel conduit.

Level 1 (planted woody stems) and Level 2 (volunteer woody stems) data collection was performed in all plots, pursuant to the most recent CVS/EEP protocol (Lee *et al* 2006). Within each plot, each planted woody stem location (x and y) was recorded, and height and live stem diameter were recorded for each stem location. All planted stems were identified with pink flagging. Vegetation was identified using Weakley (Weakley 2007). Photos were taken of each vegetation plot from the 0,0 corner.

Tables 1 through 5 in Appendix A contain the data from the vegetation monitoring. Monitoring plot photos can also be found in Appendix A.

References

- Harrelson, Cheryl, C. L. Rawlins, and John Potpondy. (1994). *Stream Channel Reference Sites: An Illustrated Guide to Field Technique*. USDA, Forest Service. General Technical Report RM-245.
- Lee, Michael T., Peet, Robert K., Roberts, Steven D., Wentworth, Thomas R. (2006). *CVS-EEP Protocol for Recording Vegetation Version 4.0*. Retrieved October 30, 2006, from: <http://www.nceep.net/business/monitoring/veg/datasheets.htm>.
- Radford, A.E., H.E. Ahles, and C.R. Bell (1968). *Manual of the Vascular Flora of the Carolinas*. University of North Carolina Press. Chapel Hill, NC.
- Rosgen, D L (1996) *Applied River Morphology*. Wildland Hydrology Books, Pagosa Springs, CO.
- Rosgen, DL. (1997). "A Geomorphological Approach to Restoration of Incised Rivers. In *Proceedings of the Conference on Management of Landscapes Disturbed by Channel Incision*, ed. S.S.Y. Wang, E.J. Langendoen and F.B. Shields, Jr. University of Mississippi Press, Oxford, MS.
- USACOE (2003) *Stream Mitigation Guidelines*. USACOE, USEPA, NCWRC, NCDENR-DWQ
- Weakley, Alan (2007). *Flora of the Carolinas, Virginia, Georgia, and Surrounding Areas*. Retrieved March 27, 2007 from: <http://www.herbarium.unc.edu/flora.htm>.

Appendix A Vegetation Data

A1. Vegetation Data Tables

Table 1. Vegetation Metadata

Table 2. Vegetation Vigor by Species

Table 3. Damage by Species

Table 4. Damage by Plot

Table 5. Stem Count by Plot and Species

Table 6. Vegetation Problem Areas

A2. Vegetation Problem Area Photo

A3 Vegetation Monitoring Plot Photos

Figures A1-2. Current Conditions Plan View

Table 1. Vegetation Metadata

Report Prepared By Sean Doig
Date Prepared 2/12/2008 14:35

database name Copy of Tick_CreekCVS_EEP_EntryTool_v210_9Sept07.mdb
database location K:\Ward\lap\RJGA\EEP\monitoring_06-07\Goldstein\Tick Creek\Mon07\veg

DESCRIPTION OF WORKSHEETS IN THIS DOCUMENT-----

Metadata This worksheet, which is a summary of the project and the project data.
Plots List of plots surveyed.
Vigor Frequency distribution of vigor classes.
Vigor by Spp Frequency distribution of vigor classes listed by species.
Damage List of most frequent damage classes with number of occurrences and percent of total stems impacted by each.
Damage by Spp Damage values tallied by type for each species.
Damage by Plot Damage values tallied by type for each plot.
Stem Count by Plot and Spp Count of living stems of each species for each plot; dead and missing stems are excluded.

PROJECT SUMMARY-----

Project Code Tick Creek
project Name Tck
Description Stream Restoration
length(ft)
stream-to-edge width (ft)
area (sq m)
Required Plots (calculated)
Sampled Plots

Table 2. Vegetation Vigor by Species

	Species	4	3	2	1	0	Missing
	Albizia julibrissin						
	Betula nigra	7	9	2	2	3	
	Carya ovata						
	Cephalanthus occidentalis						
	Cornus amomum	1	3			6	
	Fraxinus pennsylvanica	14	27	7	1		2
	Ligustrum japonicum						
	Ligustrum sinense						
	Liquidambar styraciflua						
	Nyssa sylvatica						
	Parthenocissus quinquefolia						
	Quercus acutissima					2	
	Quercus alba	23	17	15		2	5
	Quercus falcata	3	3	3		8	
	Quercus nigra	4	3				
	Quercus phellos	2	5	2		3	
	Rosa multiflora						
	Salix nigra	39	25	5		6	1
	Symphoricarpos orbiculatus						
	Ulmus alata	3	4				1
	Viburnum prunifolium						
	Ilex						
	Juniperus virginiana						
	Elaeagnus						
	Fagus						
	Quercus					10	
	Quercus rubra	10	8	1		4	
	Carya glabra						
	Liriodendron tulipifera	6	21	14	11	11	
	Platanus occidentalis	49	18	1		6	2
	Prunus serotina						
	Acer negundo						
	Acer rubrum						
	Ulmus americana		1				
TOT:	34	161	144	50	14	61	11

Table 3. Damage by Species

Species	All Damage Categories	(no damage)	Deer	Drought	Insects	Other/Unknown Animal	Site Too Dry	(other damage)	
Acer negundo	3	3							
Acer rubrum	5	5							
Albizia julibrissin	1	1							
Betula nigra	23	22	1						
Carya glabra	1	1							
Carya ovata	2	2							
Cephalanthus occidentalis	1	1							
Cornus amomum	10	9	1						
Elaeagnus	3	3							
Fagus	2	2							
Fraxinus pennsylvanica	56	55	1						
Ilex	1	1							
Juniperus virginiana	5	5							
Ligustrum japonicum	2	2							
Ligustrum sinense	6	6							
Liquidambar styraciflua	10	10							
Liriodendron tulipifera	68	62	2	1		1	1	1	
Nyssa sylvatica	1	1							
Parthenocissus quinquefolia	1	1							
Platanus occidentalis	78	53	1		21			3	
Prunus serotina	2	2							
Quercus	10	10							
Quercus acutissima	2	2							
Quercus alba	62	60			1			1	
Quercus falcata	17	17							
Quercus nigra	7	7							
Quercus phellos	14	14							
Quercus rubra	23	20	1	1				1	
Rosa multiflora	2	2							
Salix nigra	80	77	2		1				
Symphoricarpos orbiculatus	3	3							
Ulmus alata	13	13							
Ulmus americana	6	6							
Viburnum prunifolium	1	1							
TOT:	34	521	479	9	2	23	1	1	6

Table 4. Damage by Plot

	<i>Plot</i>	<i>All Damage Categories</i>	<i>(no damage)</i>	<i>Deer</i>	<i>Drought</i>	<i>Insects</i>	<i>Other/Unknown Animal</i>	<i>Site Too Dry</i>	<i>(other damage)</i>
	Tick Creek-wjs-0003	31	30	1					
	Tick Creek-wjs-0003-year:1	35	35						
	Tick Creek-wjs-0004	20	18			2			
	Tick Creek-wjs-0004-year:1	20	10		10				
	Tick Creek-wjs-0005	46	41	1	4				
	Tick Creek-wjs-0005-year:1	51	49	1			1		
	Tick Creek-wjs-0006	25	21				1	3	
	Tick Creek-wjs-0006-year:1	24	23		1				
	Tick Creek-wjs-0007	53	47	2		3			1
	Tick Creek-wjs-0007-year:1	48	44			4			
	Tick Creek-wjs-0008	32	29	2					1
	Tick Creek-wjs-0008-year:1	35	33		1				1
	Tick Creek-wjs-tck 1	18	18						
	Tick Creek-wjs-tck 1-year:1	20	18	2					
	Tick Creek-wjs-tckwjs2	32	32						
	Tick Creek-wjs-tckwjs2-year:1	31	31						
TOT:	16	521	479	9	2	23	1	1	6

Table 5. Stem Count by Plot and Species

Species	Total Stems	# plots	avg# stems	plot Tick Creek-wjs-0003	plot Tick Creek-wjs-0003-year:1	plot Tick Creek-wjs-0004	plot Tick Creek-wjs-0004-year:1	plot Tick Creek-wjs-0005	plot Tick Creek-wjs-0005-year:1	plot Tick Creek-wjs-0006	plot Tick Creek-wjs-0006-year:1	plot Tick Creek-wjs-0007	plot Tick Creek-wjs-0007-year:1	plot Tick Creek-wjs-0008	plot Tick Creek-wjs-0008-year:1	plot Tick Creek-wjs-tck 1	plot Tick Creek-wjs-tck 1-year:1	plot Tick Creek-wjs-tckwjs2	plot Tick Creek-wjs-tckwjs2-year:1
Betula nigra	20	4	5											9	9	1	1		
Cornus amomum	4	2	2											2	2				
Fraxinus pennsylvanica	49	7	7	9	13			1					5	5			9	7	
Liriodendron tulipifera	52	8	6.5	8	2			6	6	8	8		7	7					
Platanus occidentalis	68	6	11.33			10	10	10	10			14	14						
Quercus alba	55	4	13.75						10	10	20	15							
Quercus falcata	9	6	1.5					2	1				2	1			2	1	
Quercus nigra	7	3	2.33					2									2	3	
Quercus phellos	9	5	1.8			2		1					1				3	2	
Quercus rubra	19	3	6.33			1							9	9					
Salix nigra	69	10	6.9	7	6			10	14				6	6		6	6	5	3
Ulmus alata	7	2	3.5										4	3					
Ulmus americana	1	1	1	1															
TOT: 13	369	13		25	21	13	12	30	31	18	18	40	35	28	25	17	17	22	17

Table 6. Vegetation Problem Areas – Tick Creek Stream Restoration – EEP Project #379			
Feature/Issue	Station/Range	Suspected Cause	Photo #
No/Limited Planting	00-380	Planting Oversight	VP1
Dense herbaceous/increasing woody exotic invasives	565-1780	Abundant groundwater in spring	VP2
Lower planted woody stem success (relative to Reaches 1 and 2)	2220-2600	Soil Compaction During Construction	VP3

Appendix A2. Representative Vegetation Problem Area Photos - 2007 - Tick Creek Stream Restoration



VP1. Sparse Woody Stem Planting



VP2. Exotic Herbaceous and Woody Invasion



VP3. Relatively Low Planting Success

Appendix A3. Vegetation Monitoring Plot Photographs - 2006 & 2007 - Tick Creek Stream Restoration



Plot 1 (September 2006)



Plot 1 (August 2007)



Plot 2 (September 2006)



Plot 2 (August 2007)

Appendix A3. Vegetation Monitoring Plot Photographs - 2006 & 2007 - Tick Creek Stream Restoration



Plot 3 (September 2006)



Plot 3 (August 2007)



Plot 4 (September 2006)



Plot 4 (August 2007)

Appendix A3. Vegetation Monitoring Plot Photographs - 2006 & 2007 - Tick Creek Stream Restoration



Plot 5 (September 2006)



Plot 5 (August 2007)



Plot 6 (September 2006)



Plot 6 (August 2007)

Appendix A3. Vegetation Monitoring Plot Photographs - 2006 & 2007 - Tick Creek Stream Restoration



Plot 7 (September 2006)



Plot 7 (August 2007)



Plot 8 (September 2006)



Plot 8 (August 2007)

Figure A1 - Current Conditions
 Plan View - 2007 Monitoring, Tick Creek
 Stream Restoration - EEP Project #379
 Chatham Co., NC

LEGEND


Thalweg (Fall 07)
 Reach
 1 (Red line) 2 (Blue line) 3 (Green line)

Vegetation Problem Areas
 Dense Invasives (herbaceous and woody) (Pink shaded area)
 Lower Success (Light Green shaded area) Sparse/No Planting (Light Blue shaded area)

Design Drawings
 (Supplied by EarthTec)

- Thalweg - UT Tick (Blue line with 'u' symbol)
- Thalweg - ditch (Blue line with 'd' symbol)
- Top of Bank (Dashed black line)
- Sills (Pink line with 'S' symbol)
- Root Wads (Orange line with 'R' symbol)
- Clay Plugs (Cross-hatched symbol)
- Cross Vanes and J-Hooks (Red line with 'V' symbol)

Easement Boundary (Black line)



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Feet
 0 75


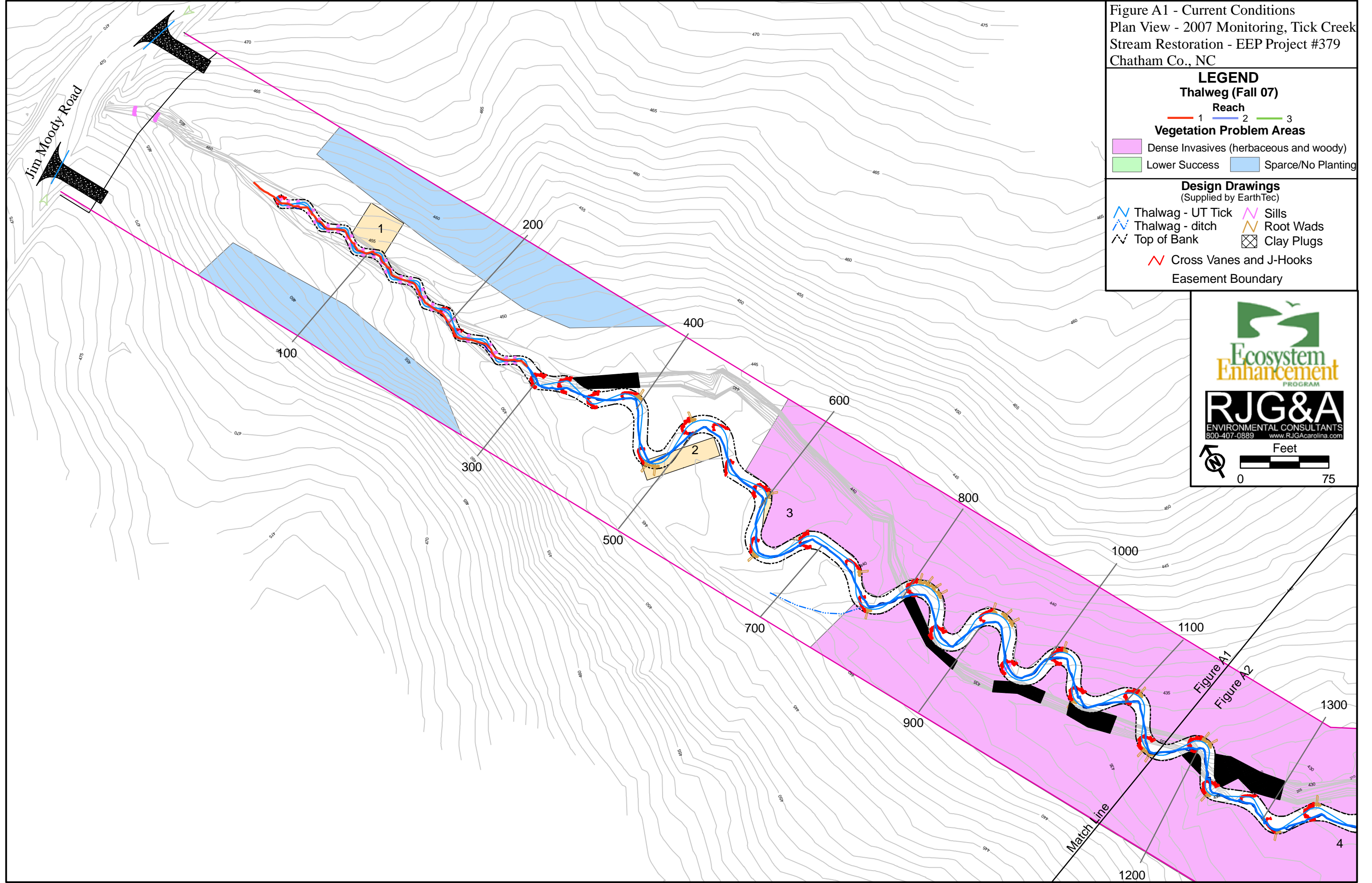



Figure A2 - Current Conditions
 Plan View - 2007 Monitoring, Tick Creek
 Stream Restoration - EEP Project #379
 Chatham Co., NC


LEGEND

Thalweg (Fall 07)
 Reach
 1 2 3

Vegetation Problem Areas
 Dense Invasives (herbaceous and woody)
 Lower Success Sparse/No Planting


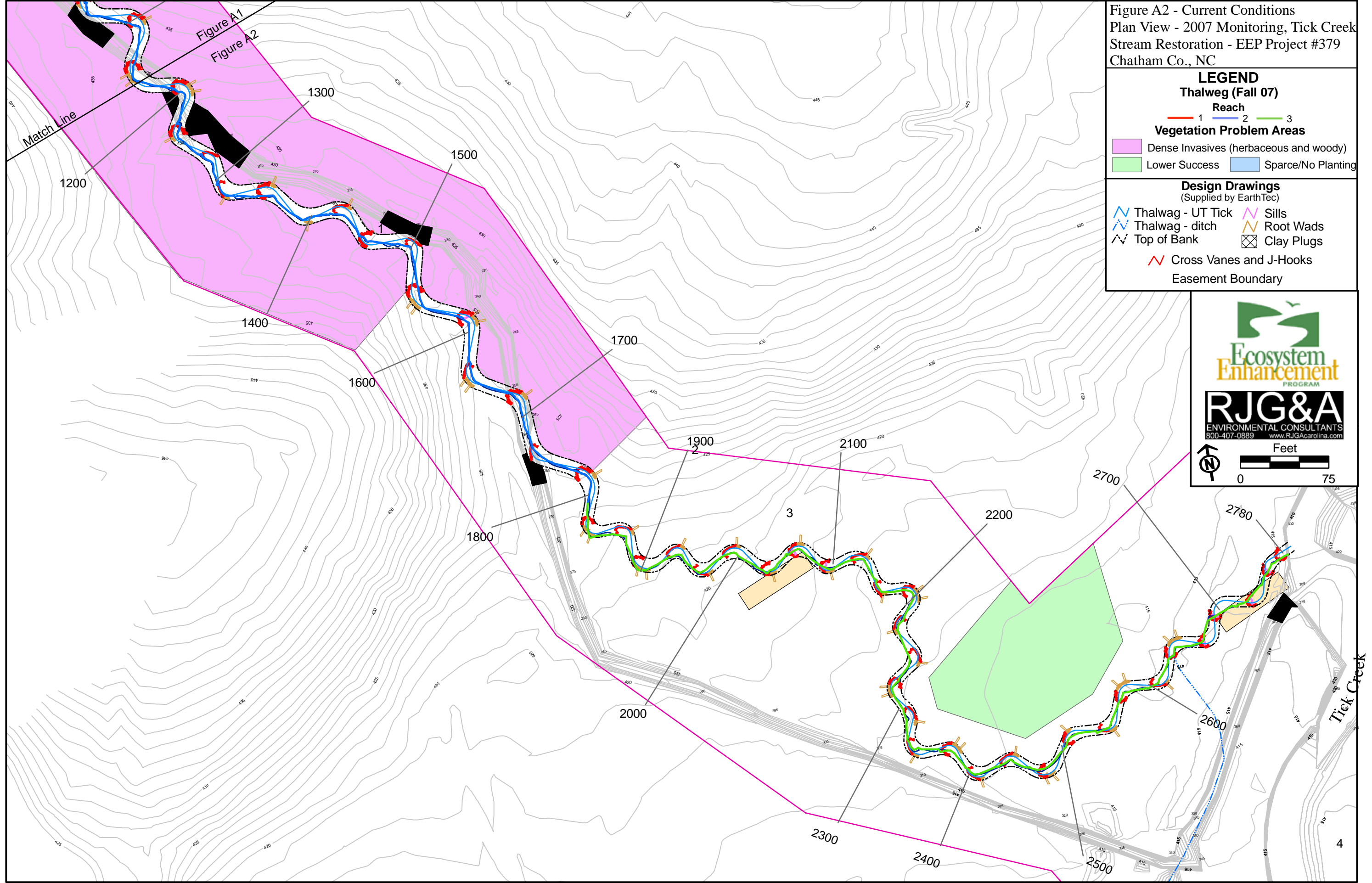
Design Drawings
 (Supplied by EarthTec)

Thalweg - UT Tick
 Thalweg - ditch
 Top of Bank
 Sills
 Root Wads
 Clay Plugs
 Cross Vanes and J-Hooks
 Easement Boundary



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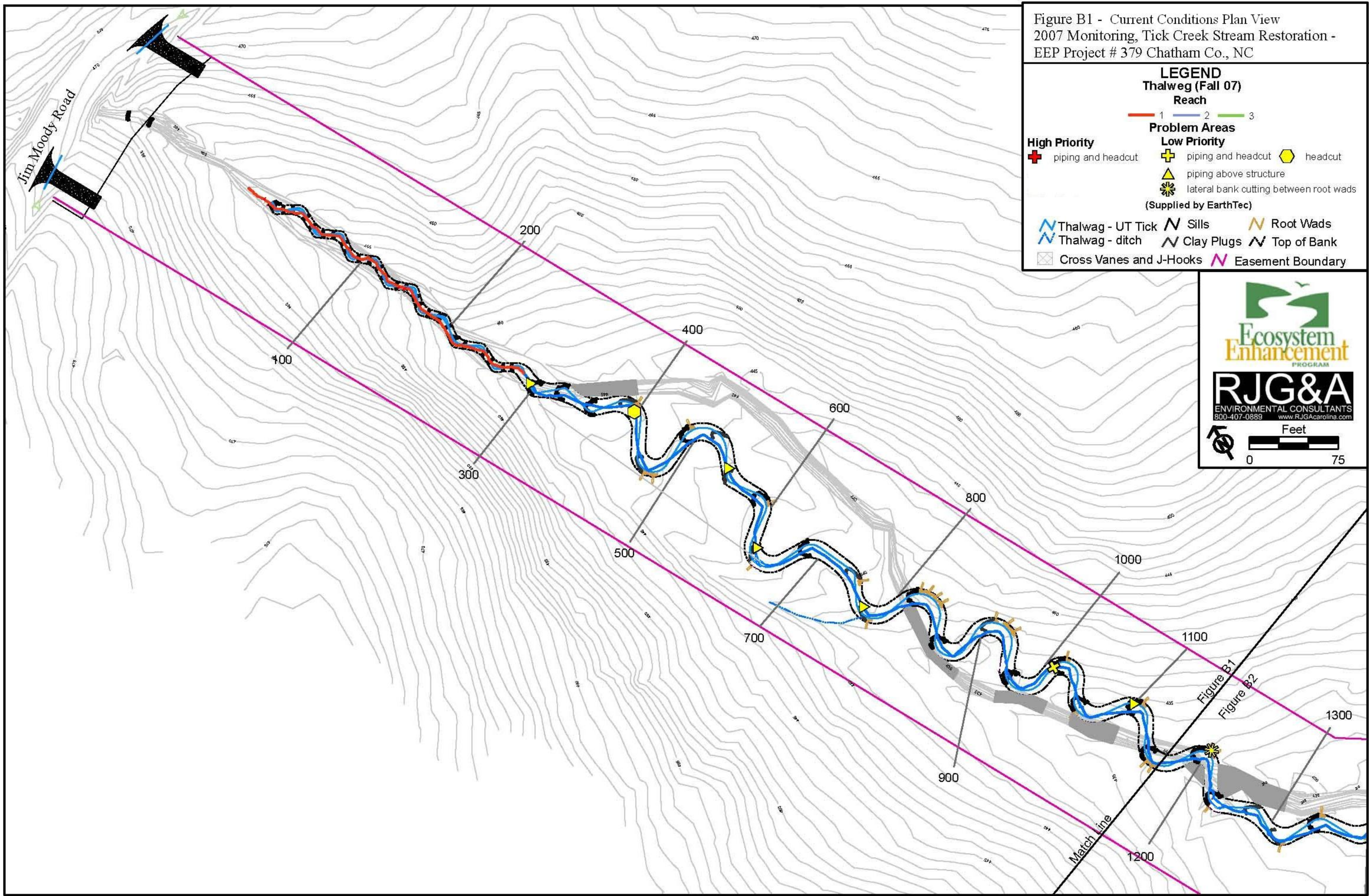
Feet
 0 75

Appendix B Geomorphologic Raw Data

- B1. Current Conditions Plan View
- B2. Stream Problem Areas Table
- B3. Representative Stream Problem Area Photos
- B4. Stream Photo-station Photos
- B5. Qualitative Visual Stability Assessment Table
- B6. Cross section Plots and Raw Data Tables
- B7. Longitudinal Plots and Raw Data Tables
- B8. Pebble Counts

Figure B1 - Current Conditions Plan View
 2007 Monitoring, Tick Creek Stream Restoration -
 EEP Project # 379 Chatham Co., NC



LEGEND
Thalweg (Fall 07)
 Reach
 1 2 3
Problem Areas
High Priority
 + piping and headcut
Low Priority
 + piping and headcut
 ▲ piping above structure
 * lateral bank cutting between root wads
 (Supplied by EarthTec)
 ~ Thalweg - UT Tick
 ~ Thalweg - ditch
 ⊠ Cross Vanes and J-Hooks
 ~ Sills
 ~ Clay Plugs
 ~ Root Wads
 ~ Top of Bank
 ~ Easement Boundary

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 Feet
 0 75

Figure B1-2. Current Conditions Plan View
 2007 Monitoring, Tick Creek Stream Restoration -
 EEP Project # 379 Chatham Co., NC

LEGEND
Thalweg (Fall 07)
 Reach
 1 — 2 — 3

Problem Areas
High Priority
 + piping and headcut
 ▲ piping above structure
 * lateral bank cutting between root wads

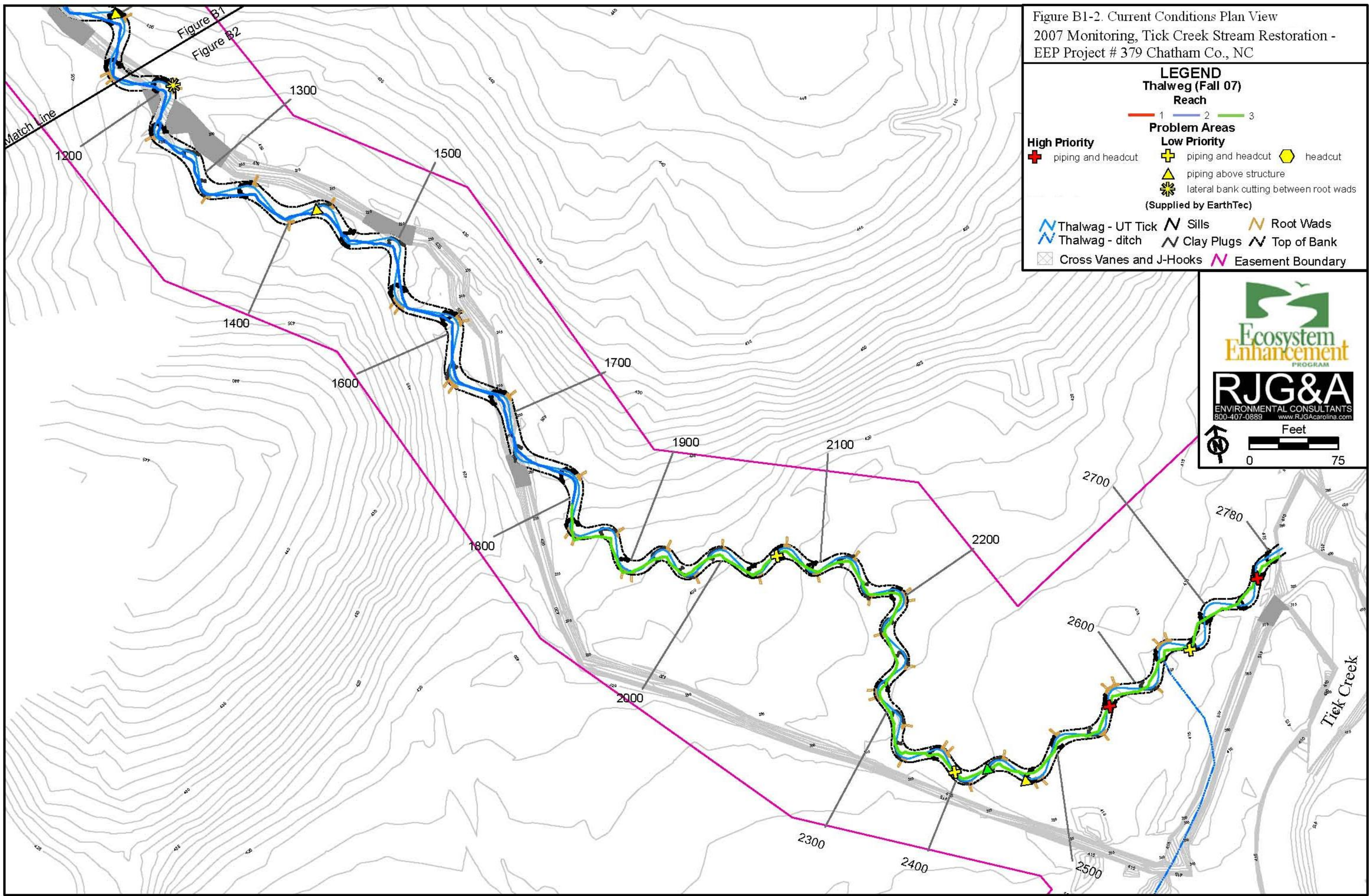
Low Priority
 + piping and headcut
 ▲ piping above structure
 * lateral bank cutting between root wads
 (Supplied by EarthTec)

Thalweg - UT Tick Sills Root Wads
 Thalweg - ditch Clay Plugs Top of Bank
 Cross Vanes and J-Hooks Easement Boundary



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Feet
 0 75



B2. Stream Problem Areas Table - Tick Creek Stream Restoration - EEP Project #379			
Feature/Issue	Station	Suspected Cause	Photo #
Reach 1			
Piping above structure	290	Insufficient coarse backfill	SP1
Reach 2			
Headcut channel	396	Insufficient coarse backfill	SP3
Piping above structure	545	Insufficient coarse backfill	SP1
Piping above structure	625	Insufficient coarse backfill	SP1
Piping above structure	760	Insufficient coarse backfill	SP1
Piping with headcut	1001	Insufficient coarse backfill	SP2
Piping above structure	1104	Insufficient coarse backfill	SP1
Lateral bankcut between rootwads	1203	Insufficient coarse backfill	SP4
Piping above structure	1418	Insufficient coarse backfill	SP1
Reach 3			
Piping with headcut	2050	Insufficient coarse backfill	SP2
Piping above structure	2373	Insufficient coarse backfill	SP1
Piping with headcut	2396	Insufficient coarse backfill	SP2
Piping above structure	2463	Insufficient coarse backfill	SP1
Piping with headcut	2568	Insufficient coarse backfill	SP2
Piping with headcut	2662	Insufficient coarse backfill	SP2
Piping with headcut	2754	Insufficient coarse backfill	SP2

Appendix B3. Representative Stream Problem Area Photographs - 2007 - Tick Creek Stream Restoration - EEP Project # 379



SP1. Piping above rock structure



SP2. Piping and headcutting

Appendix B3. Representative Stream Problem Area Photographs - 2007 - Tick Creek Stream Restoration - EEP Project # 379



SP3. Headcut in channel



SP4. Lateral bankcut in rootwad

Appendix B4. Permanent Photopoint Photographs - 2006 & 2007 - Tick Creek - EEP Project #379



PP#1 Looking Upstream (11/21/06)



PP#1 Looking Upstream (08/23/07)



PP#2 Looking Upstream (08/23/07)



PP#2 Looking Upstream (08/17/07)

Appendix B4. Permanent Photopoint Photographs - 2006 & 2007 - Tick Creek - EEP Project #379



PP#3 Looking Upstream (11/21/06)



PP#3 Looking Upstream (08/17/07)



PP#4 Looking Downstream (11/21/06)



PP#4 Looking Downstream (08/17/07)

Appendix B4. Permanent Photopoint Photographs - 2006 & 2007 - Tick Creek - EEP Project #379



PP#5 Looking Upstream (11/14/06)



PP#5 Looking Downstream (08/17/07)



PP#6 Looking Downstream (11/14/06)



PP#6 Looking Downstream (08/17/07)

Appendix B4. Permanent Photopoint Photographs - 2006 & 2007 - Tick Creek - EEP Project #379



PP#7 Looking Downstream (11/14/06)



PP#7 Looking Downstream (08/17/07)



PP#8 Looking Upstream (11/14/06)



PP#8 Looking Downstream (08/17/07)

Appendix B4. Permanent Photopoint Photographs - 2006 & 2007 - Tick Creek - EEP Project #379



PP#9 Looking Downstream (11/14/06)



PP#9 Looking Downstream (08/17/07)



PP#10 Looking Downstream (11/14/06)



PP#10 Looking Downstream (08/20/07)

Appendix B4. Permanent Photopoint Photographs - 2006 & 2007 - Tick Creek - EEP Project #379



PP#11 Looking Downstream (11/14/06)



PP#11 Looking Downstream (08/20/07)



PP#12 Looking Downstream (11/13/06)



PP#12 Looking Downstream (08/20/07)

Appendix B4. Permanent Photopoint Photographs - 2006 & 2007 - Tick Creek - EEP Project #379



PP#13 Looking Downstream (11/13/06)



PP#13 Looking Downstream (08/20/07)



PP#14 Looking Downstream (11/13/06)



PP#14 Looking Downstream (08/20/07)

Table B5. Visual Morphological Assessment Tick Creek Stream Restoration Project EEP Project #379- Reach 1

Feature Category	Metric (per As-built and reference baselines)	(# Stable) Number Performing as Intended	Total Number per As- built	Total Number/ feet in Unstable State	Percent Performing in Stable Condition	Feature Performing Mean (%)
A. Riffles	1. Present	12	12	0/0	100	100
	2. Armor stable	12	12	0/0	100	
	3. Facet grade appears stable	12	12	0/0	100	
	4. Minimal evidence of embedding/fining	12	12	0/0	100	
	5. Length appropriate	12	12	0/0	100	
B. Pools	1. Present	13	13	0/0	100	100
	2. Sufficiently deep	13	13	0/0	100	
	3. Length appropriate	13	13	0/0	100	
C. Thalweg	1. Upstream of meander bend (run/inflection) centering	6	6	0/0	100	100
	2. Downstream of meander (glide/inflection) centering	7	7	0/0	100	
D. Meanders	1. Outer bend in state of limited/controlled erosion	12	12	0/0	100	100
	2. Of those eroding, # w/concomitant point bar formation	NA	NA	NA	NA	
	3. Apparent Rc within spec	12	12	0/0	100	
	4. Sufficient floodplain access and relief	12	12	0/0	100	
E. Bed (General)	1. General channel bed aggradation areas (bar formation)	NA	NA	0/0	100	100
	2. Channel bed degradation – areas of increasing downcutting or head cutting	NA	NA	0/0	100	
F. Vanes	1. Free of back or arm scour	27	27	0/0	100	100
	2. Height appropriate	27	27	0/0	100	
	3. Angle and geometry appear appropriate	27	27	0/0	100	
	4. Free of piping or other structural failures	27	27	0/0	100	
G. Wads/Boulders	1. Free of scour	NA	0	NA	NA	NA
	2. Footing stable	NA	0	NA	NA	

Table B5. Visual Morphological Assessment Tick Creek Stream Restoration Project Project #379 - Reach 2

Feature Category	Metric (per As-built and reference baselines)	(# Stable) Number Performing as Intended	Total Number per As- built	Total Number/ feet in Unstable State	Percent Performing in Stable Condition	Feature Performing Mean (%)
A. Riffles	1. Present	39	39	0/0	100	100
	2. Armor stable	39	39	0/0	100	
	3. Facet grade appears stable	39	39	0/0	100	
	4. Minimal evidence of embedding/fining	39	39	0/0	100	
	5. Length appropriate	39	39	0/0	100	
B. Pools	1. Present	44	44	0/0	100	100
	2. Sufficiently deep	44	44	0/0	100	
	3. Length appropriate	44	44	0/0	100	
C. Thalweg	1. Upstream of meander bend (run/inflection) centering	23	31	8/50	74	82.41
	2. Downstream of meander (glide/inflection) centering	29	32	0/0	91	
D. Meanders	1. Outer bend in state of limited/controlled erosion	32	32	0/0	100	100
	2. Of those eroding, # w/concomitant point bar formation	NA	NA	0/0	NA	
	3. Apparent Rc within spec	32	32	0/0	100	
	4. Sufficient floodplain access and relief	32	32	0/0	100	
E. Bed (General)	1. General channel bed aggradation areas (bar formation)	NA	NA	NA	NA	NA
	2. Channel bed degradation – areas of increasing downcutting or head cutting	NA	NA	1/5	NA	
F. Vanes	1. Free of back or arm scour	32	32	0/0	100	95
	2. Height appropriate	32	32	0/0	100	
	3. Angle and geometry appear appropriate	32	32	0/0	100	
	4. Free of piping or other structural failures	26	32	6/25	81	
G. Wads/Boulders	1. Free of scour	34	34	0/0	100	99
	2. Footing stable	33	34	1/5	97	

Table B5. Visual Morphological Assessment Tick Creek Stream Restoration Project Project #379 - Reach 3

Feature Category	Metric (per As-built and reference baselines)	(# Stable) Number Performing as Intended	Total Number per As- built	Total Number/ feet in Unstable State	Percent Performing in Stable Condition	Feature Performing Mean (%)
A. Riffles	1. Present	31	31	0/0	100	100
	2. Armor stable	31	31	0/0	100	
	3. Facet grade appears stable	31	31	0/0	100	
	4. Minimal evidence of embedding/fining	31	31	0/0	100	
	5. Length appropriate	31	31	0/0	100	
B. Pools	1. Present	32	32	0/0	100	100
	2. Sufficiently deep	32	32	0/0	100	
	3. Length appropriate	32	32	0/0	100	
C. Thalweg	1. Upstream of meander bend (run/inflection) centering	30	30	0/0	100	100
	2. Downstream of meander (glide/inflection) centering	30	30	0/0	100	
D. Meanders	1. Outer bend in state of limited/controlled erosion	30	30	0/0	100	100
	2. Of those eroding, # w/concomitant point bar formation	NA	NA	0/0	NA	
	3. Apparent Rc within spec	30	30	0/0	100	
	4. Sufficient floodplain access and relief	30	30	0/0	100	
E. Bed (General)	1. General channel bed aggradation areas (bar formation)	NA	NA	0/0	100	NA
	2. Channel bed degradation – areas of increasing downcutting or head cutting	NA	NA	1/3	NA	
F. Vanes	1. Free of back or arm scour	29	31	0/0	94	92
	2. Height appropriate	31	31	0/0	100	
	3. Angle and geometry appear appropriate	30	31	2/8	97	
	4. Free of piping or other structural failures	24	31	8/26	77	
G. Wads/Boulders	1. Free of scour	34	34	0/0	100	100
	2. Footing stable	34	34	0/0	100	

B6. Cross Section Plots, Photos, and Raw Data Tables - Tick Creek Stream Restoration - Project #379 - Chatham County, NC

River Basin:	Cape Fear
Watershed:	Tick Creek
XS ID	XS 1-1 (riffle)
Reach:	1
Date:	8/14/2007
Field Crew:	S. Doig and L. Cole

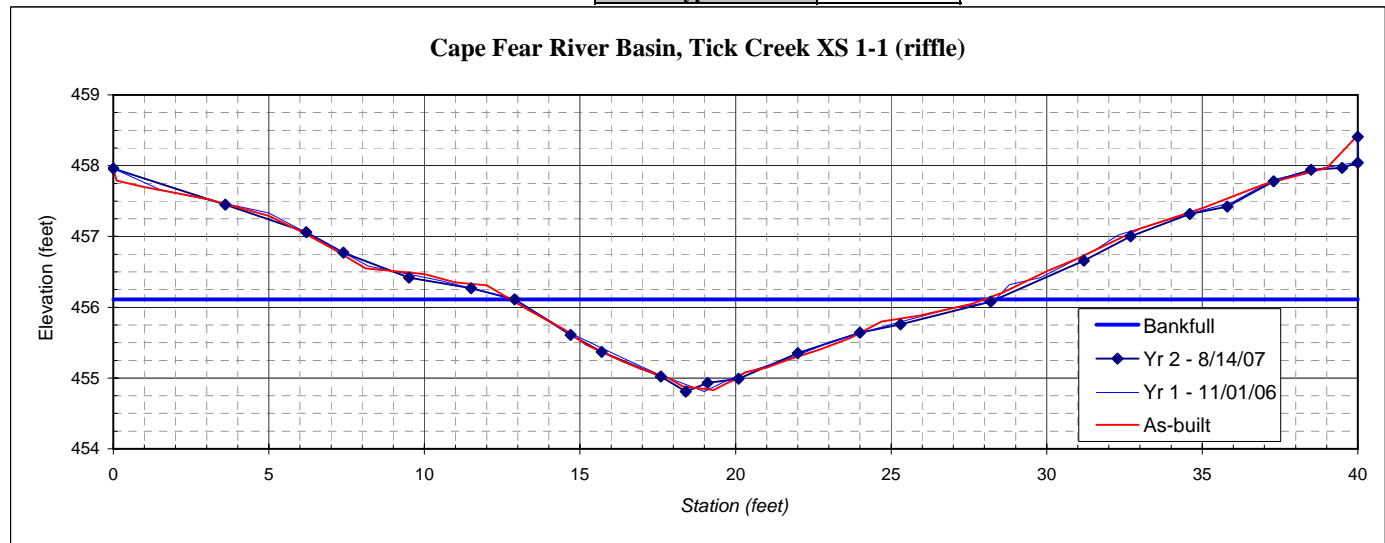
Station	Rod Ht.	Elevation
0	5.39	457.96
3.6	5.9	457.45
6.2	6.29	457.06
7.4	6.58	456.77
9.5	6.93	456.42
11.5	7.08	456.27
12.9	7.24	456.11
14.7	7.74	455.61
15.7	7.98	455.37
17.6	8.33	455.02
18.4	8.54	454.81
19.1	8.42	454.93
20.1	8.36	454.99
22	8	455.35
24	7.71	455.64
25.3	7.59	455.76
28.2	7.27	456.08
31.2	6.69	456.66
32.7	6.35	457
34.6	6.03	457.32
35.8	5.93	457.42
37.3	5.57	457.78
38.5	5.41	457.94
39.5	5.38	457.97
40	5.31	458.04
40	4.94	458.41

SUMMARY DATA	
Floodprone Elevation (ft)	457.41
Bankfull Elevation (ft)	456.11
Floodprone Width (ft)	42.00
Bankfull Width (ft)	15.46
Entrenchment Ratio	2.72
Mean Depth (ft)	0.64
Maximum Depth (ft)	1.30
Width/Depth Ratio	24.16
Bankfull Area (sq ft)	9.88
Wetted Perimeter (ft)	15.70
Hydraulic Radius (ft)	0.63



View of cross-section 1-1 looking upstream

Stream Type:	B6a
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B6. Cross Section Plots, Photos, and Raw Data Tables - Tick Creek Stream Restoration - Project #379 - Chatham County, NC

River Basin:	Cape Fear
Watershed:	Tick Creek
XS ID	XS 1-2 (pool)
Reach:	1
Date:	8/14/2007
Field Crew:	S. Doig and L. Cole

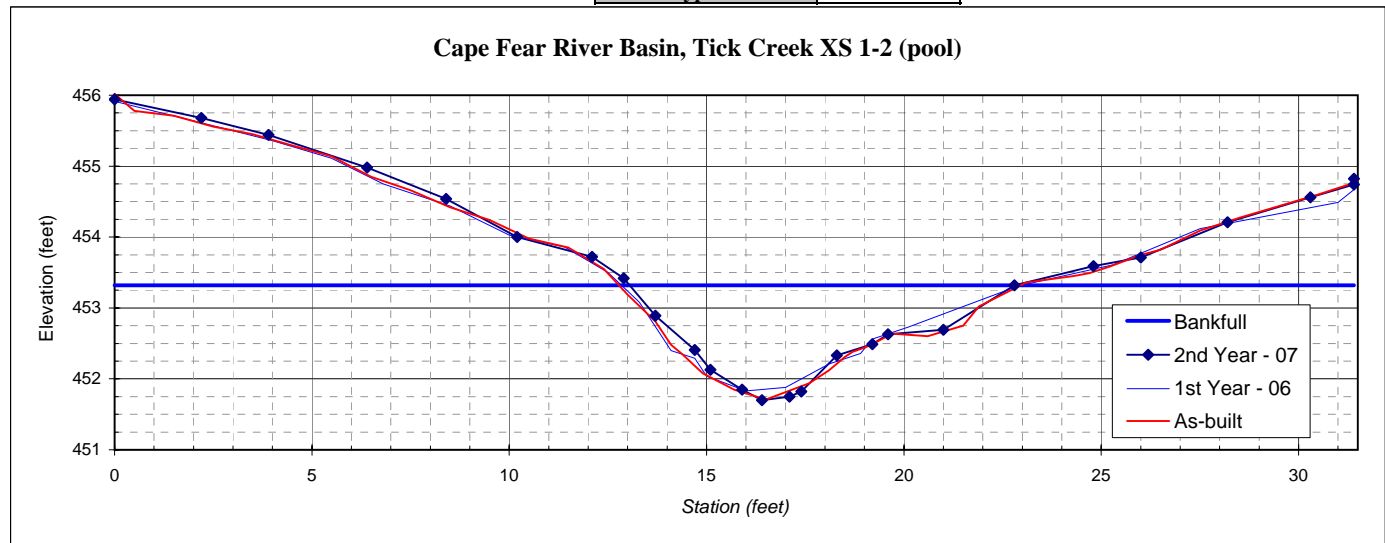
Station	Rod Ht.	Elevation
0	7.37	456.02
0	7.45	455.94
2.2	7.71	455.68
3.9	7.95	455.44
6.4	8.41	454.98
8.4	8.85	454.54
10.2	9.39	454
12.1	9.67	453.72
12.9	9.97	453.42
13.7	10.5	452.89
14.7	10.98	452.41
15.1	11.26	452.13
15.9	11.54	451.85
16.4	11.69	451.7
17.1	11.64	451.75
17.4	11.57	451.82
18.3	11.06	452.33
19.2	10.9	452.49
19.6	10.76	452.63
21	10.7	452.69
22.8	10.07	453.32
24.8	9.8	453.59
26	9.68	453.71
28.2	9.18	454.21
30.3	8.83	454.56
31.4	8.65	454.74
31.4	8.57	454.82

SUMMARY DATA	
Floodprone Elevation (ft)	454.94
Bankfull Elevation (ft)	453.32
Floodprone Width (ft)	44.00
Bankfull Width (ft)	9.75
Entrenchment Ratio	4.51
Mean Depth (ft)	0.86
Maximum Depth (ft)	1.62
Width/Depth Ratio	11.35
Bankfull Area (sq ft)	8.38
Wetted Perimeter (ft)	10.44
Hydraulic Radius (ft)	0.76



View of cross-section 1-2 looking upstream

Stream Type:	B
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B6. Cross Section Plots, Photos, and Raw Data Tables - Tick Creek Stream Restoration - Project #379 - Chatham County, NC

River Basin:	Cape Fear
Watershed:	Tick Creek
XS ID	XS 1-3 (riffle)
Reach:	1
Date:	8/14/2007
Field Crew:	S. Doig and L. Cole

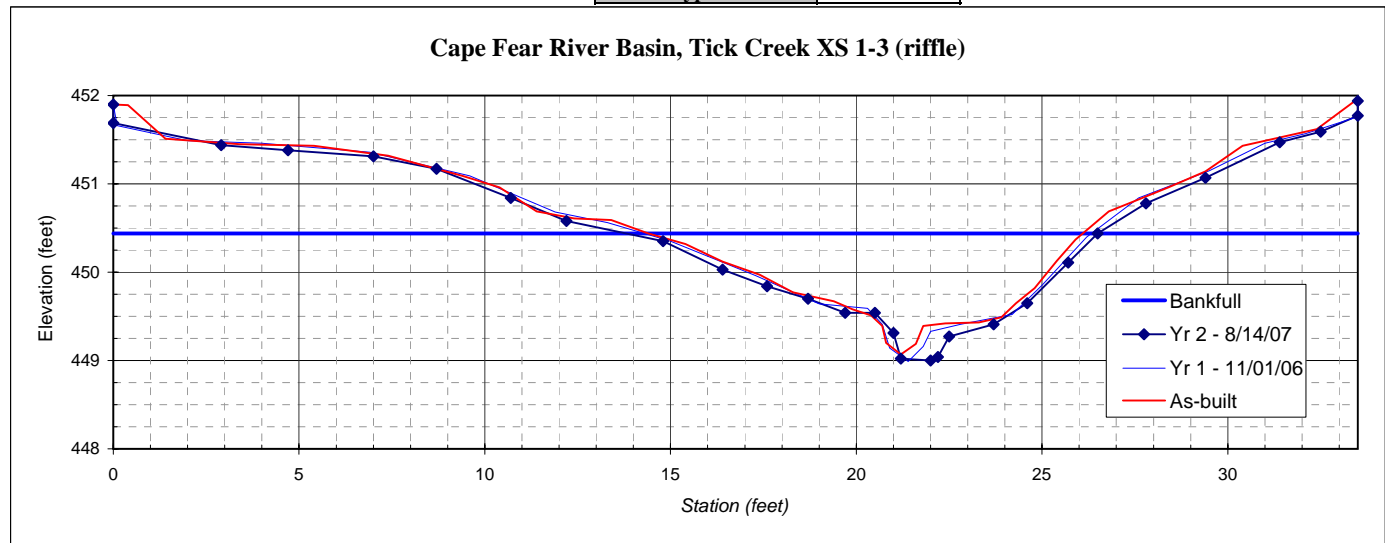
Station	Rod Ht.	Elevation
0	5.73	451.90
0	5.94	451.69
2.9	6.19	451.44
4.7	6.25	451.38
7	6.32	451.31
8.7	6.46	451.17
10.7	6.79	450.84
12.2	7.05	450.58
14.8	7.28	450.35
16.4	7.6	450.03
17.6	7.79	449.84
18.7	7.93	449.70
19.7	8.09	449.54
20.5	8.09	449.54
21	8.32	449.31
21.2	8.61	449.02
22	8.63	449.00
22.2	8.59	449.04
22.5	8.36	449.27
23.7	8.22	449.41
24.6	7.98	449.65
25.7	7.52	450.11
26.5	7.19	450.44
27.8	6.85	450.78
29.4	6.56	451.07
31.4	6.16	451.47
32.5	6.04	451.59
33.5	5.86	451.77
33.5	5.69	451.94

SUMMARY DATA	
Floodprone Elevation (ft)	451.88
Bankfull Elevation (ft)	450.44
Floodprone Width (ft)	56.00
Bankfull Width (ft)	12.72
Entrenchment Ratio	4.40
Mean Depth (ft)	0.69
Maximum Depth (ft)	1.44
Width/Depth Ratio	18.40
Bankfull Area (sq ft)	8.79
Wetted Perimeter (ft)	13.27
Hydraulic Radius (ft)	0.66



View of cross-section 1-3 looking upstream

Stream Type:	C5b
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B6. Cross Section Plots, Photos, and Raw Data Tables - Tick Creek Stream Restoration - Project #379 - Chatham County, NC

River Basin:	Cape Fear
Watershed:	Tick Creek
XS ID:	XS 2-1 (pool)
Reach:	2
Date:	8/14/2007
Field Crew:	S. Doig and L. Cole

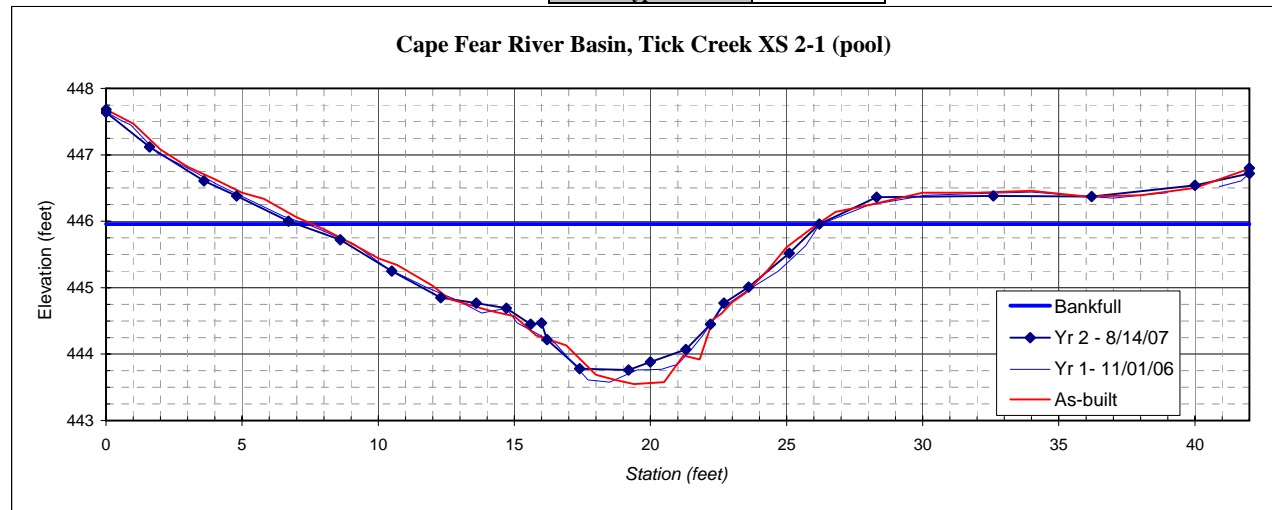
Station	Rod Ht.	Elevation
0	3.69	447.68
0	3.73	447.64
1.6	4.25	447.12
3.6	4.76	446.61
4.8	4.99	446.38
6.7	5.37	446
8.6	5.65	445.72
10.5	6.12	445.25
12.3	6.52	444.85
13.6	6.6	444.77
14.7	6.68	444.69
15.6	6.92	444.45
16	6.9	444.47
16.2	7.15	444.22
17.4	7.59	443.78
19.2	7.61	443.76
20	7.49	443.88
21.3	7.3	444.07
22.2	6.92	444.45
22.7	6.6	444.77
23.6	6.36	445.01
25.1	5.85	445.52
26.2	5.41	445.96
28.3	5.01	446.36
32.6	4.99	446.38
36.2	5	446.37
40	4.83	446.54
42	4.65	446.72
42	4.57	446.8

SUMMARY DATA	
Floodprone Elevation (ft)	448.16
Bankfull Elevation (ft)	445.96
Floodprone Width (ft)	105.00
Bankfull Width (ft)	19.23
Entrenchment Ratio	5.46
Mean Depth (ft)	1.19
Maximum Depth (ft)	2.20
Width/Depth Ratio	16.22
Bankfull Area (sq ft)	22.80
Wetted Perimeter (ft)	19.98
Hydraulic Radius (ft)	1.14



View of cross-section 2-1 looking downstream

Stream Type: C5b



B6. Cross Section Plots, Photos, and Raw Data Tables - Tick Creek Stream Restoration - Project #379 - Chatham County, NC

River Basin:	Cape Fear
Watershed:	Tick Creek
XS ID	XS 2-2 (riffle)
Reach:	2
Date:	8/14/2007
Field Crew:	S. Doig and L. Cole

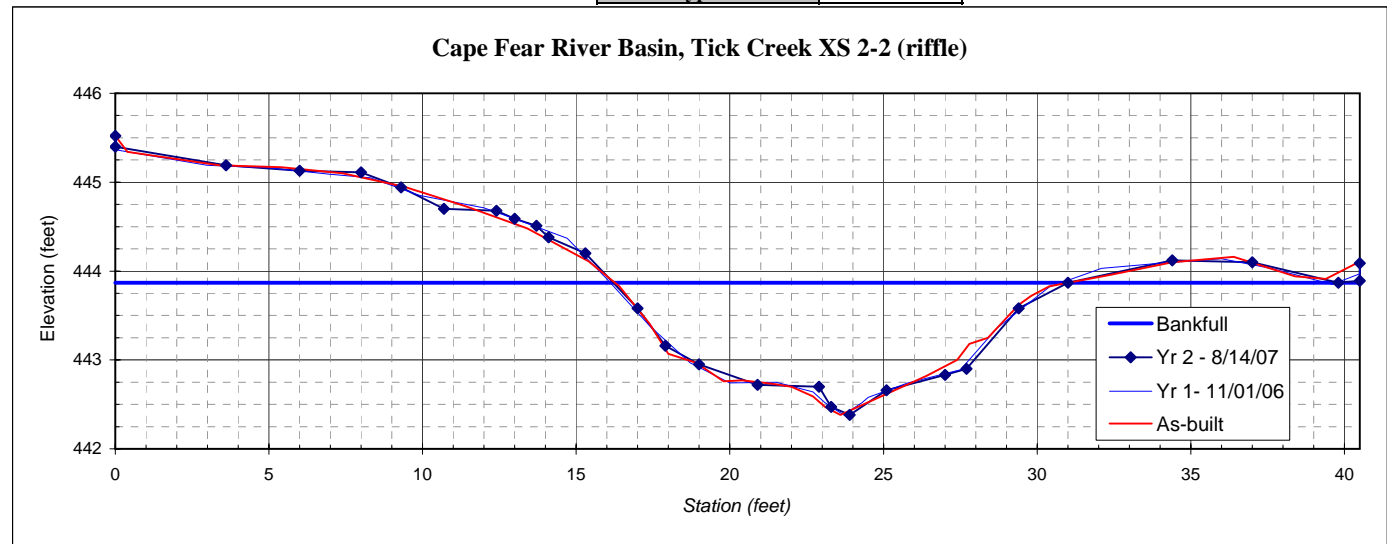
Station	Rod Ht.	Elevation
0	5.85	445.52
0	5.97	445.4
3.6	6.18	445.19
6	6.24	445.13
8	6.26	445.11
9.3	6.43	444.94
10.7	6.67	444.7
12.4	6.69	444.68
13	6.78	444.59
13.7	6.86	444.51
14.1	6.99	444.38
15.3	7.17	444.2
17	7.79	443.58
17.9	8.21	443.16
19	8.42	442.95
20.9	8.65	442.72
22.9	8.67	442.7
23.3	8.9	442.47
23.9	8.99	442.38
25.1	8.71	442.66
27	8.54	442.83
27.7	8.47	442.9
29.4	7.79	443.58
31	7.5	443.87
34.4	7.25	444.12
37	7.27	444.1
39.8	7.5	443.87
40.5	7.48	443.89
40.5	7.28	444.09

SUMMARY DATA	
Floodprone Elevation (ft)	445.36
Bankfull Elevation (ft)	443.87
Floodprone Width (ft)	210.00
Bankfull Width (ft)	14.80
Entrenchment Ratio	14.19
Mean Depth (ft)	0.87
Maximum Depth (ft)	1.49
Width/Depth Ratio	16.98
Bankfull Area (sq ft)	12.89
Wetted Perimeter (ft)	15.24
Hydraulic Radius (ft)	0.85



View of cross-section 2-2 looking downstream

Stream Type:	C5b
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B6. Cross Section Plots, Photos, and Raw Data Tables - Tick Creek Stream Restoration - Project #379 - Chatham County, NC

River Basin:	Cape Fear
Watershed:	Tick Creek
XS ID	XS 2-3 (pool)
Reach:	2
Date:	8/15/2007
Field Crew:	J. O'Neal and L. Cole

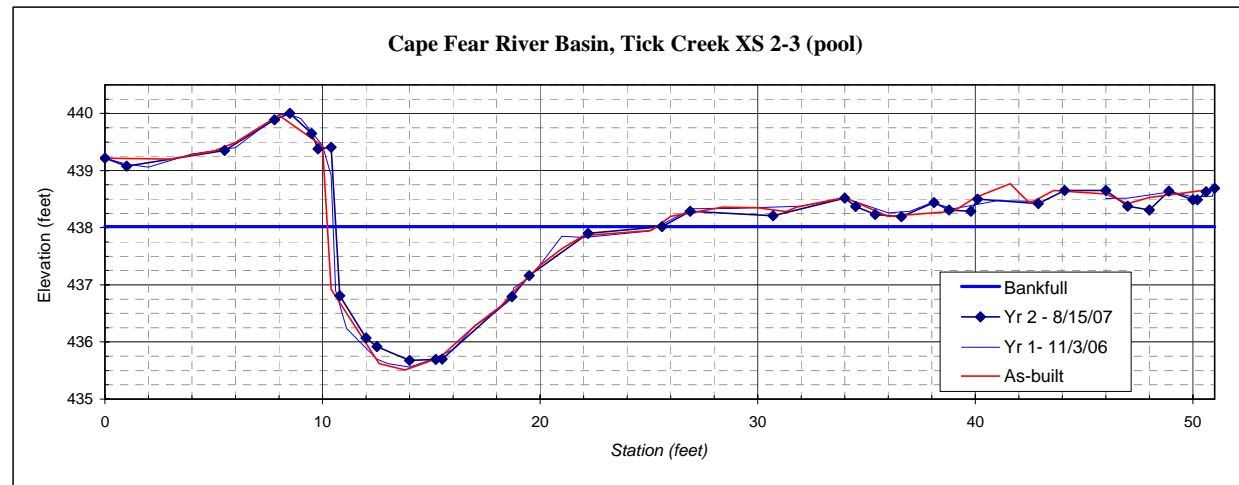


View of cross-section 2-3 looking upstream.

Station	Rod Ht.	Elevation
0	4.46	439.22
1	4.6	439.08
5.5	4.33	439.35
7.8	3.79	439.89
8.5	3.68	440
9.5	4.03	439.65
9.8	4.3	439.38
10.4	4.27	439.41
10.8	6.87	436.81
12	7.61	436.07
12.5	7.76	435.92
14	8	435.68
15.2	7.985	435.695
15.5	7.98	435.7
18.7	6.89	436.79
19.5	6.52	437.16
22.2	5.78	437.9
25.6	5.66	438.02
26.9	5.39	438.29
30.7	5.47	438.21
34	5.16	438.52
34.5	5.31	438.37
35.4	5.45	438.23
36.6	5.49	438.19
38.1	5.24	438.44
38.8	5.37	438.31
39.8	5.39	438.29
40.1	5.18	438.5
42.9	5.26	438.42
44.1	5.03	438.65
46	5.03	438.65
47	5.3	438.38
48	5.37	438.31
48.9	5.04	438.64
50	5.19	438.49
50.2	5.19	438.49
50.6	5.05	438.63
51	4.99	438.69

SUMMARY DATA	
Floodprone Elevation (ft)	440.36
Bankfull Elevation (ft)	438.02
Floodprone Width (ft)	125.00
Bankfull Width (ft)	14.99
Entrenchment Ratio	8.34
Mean Depth (ft)	1.19
Maximum Depth (ft)	2.34
Width/Depth Ratio	12.55
Bankfull Area (sq ft)	17.89
Wetted Perimeter (ft)	16.64
Hydraulic Radius (ft)	1.08

Stream Type:	C5b
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B6. Cross Section Plots, Photos, and Raw Data Tables - Tick Creek Stream Restoration - Project #379 - Chatham County, NC

River Basin:	Cape Fear
Watershed:	Tick Creek
XS ID	XS 2-4 (riffle)
Reach:	2
Date:	8/15/2007
Field Crew:	J. O'Neal and L. Cole

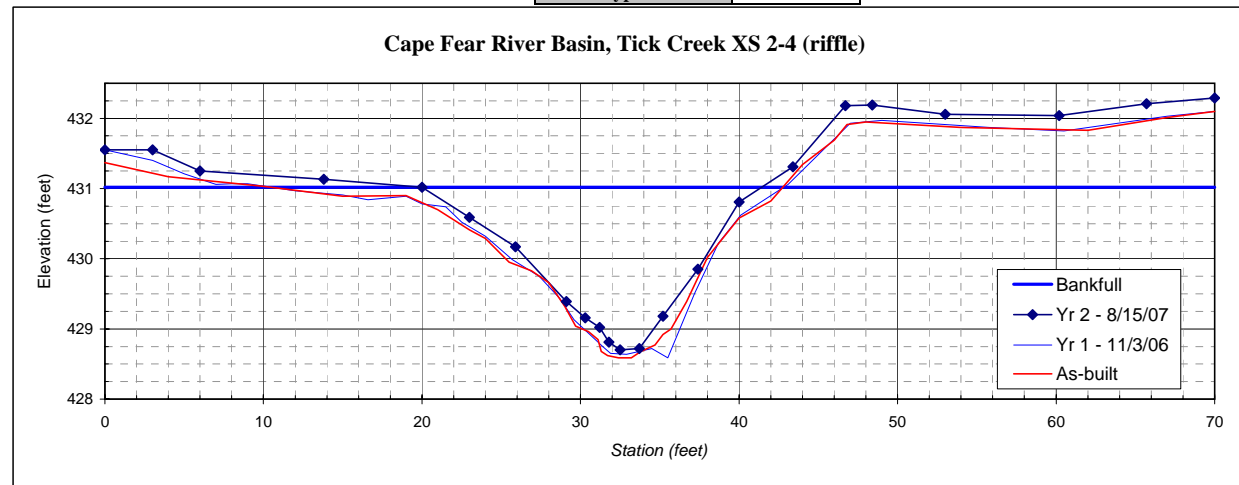
Station	Rod Ht.	Elevation
0	5.52	431.55
3	5.52	431.55
6	5.82	431.25
13.8	5.94	431.13
20	6.05	431.02
23	6.48	430.59
25.9	6.9	430.17
29.1	7.68	429.39
30.3	7.91	429.16
31.2	8.05	429.02
31.8	8.26	428.81
32.5	8.37	428.7
33.7	8.35	428.72
35.2	7.89	429.18
37.4	7.22	429.85
40	6.26	430.81
43.4	5.76	431.31
46.7	4.89	432.18
48.4	4.88	432.19
53	5.01	432.06
60.2	5.03	432.04
65.7	4.86	432.21
70	4.78	432.29

SUMMARY DATA	
Floodprone Elevation (ft)	433.34
Bankfull Elevation (ft)	431.02
Floodprone Width (ft)	120.00
Bankfull Width (ft)	21.43
Entrenchment Ratio	5.60
Mean Depth (ft)	1.13
Maximum Depth (ft)	2.32
Width/Depth Ratio	18.91
Bankfull Area (sq ft)	24.28
Wetted Perimeter (ft)	22.02
Hydraulic Radius (ft)	1.10



View of cross-section 2-4 looking upstream

Stream Type: C5b



B6. Cross Section Plots, Photos, and Raw Data Tables - Tick Creek Stream Restoration - Project #379 - Chatham County, NC

River Basin:	Cape Fear
Watershed:	Tick Creek
XS ID	XS 2-5 (riffle)
Reach:	2
Date:	8/20/2007
Field Crew:	S. Doig and J. Tisdale

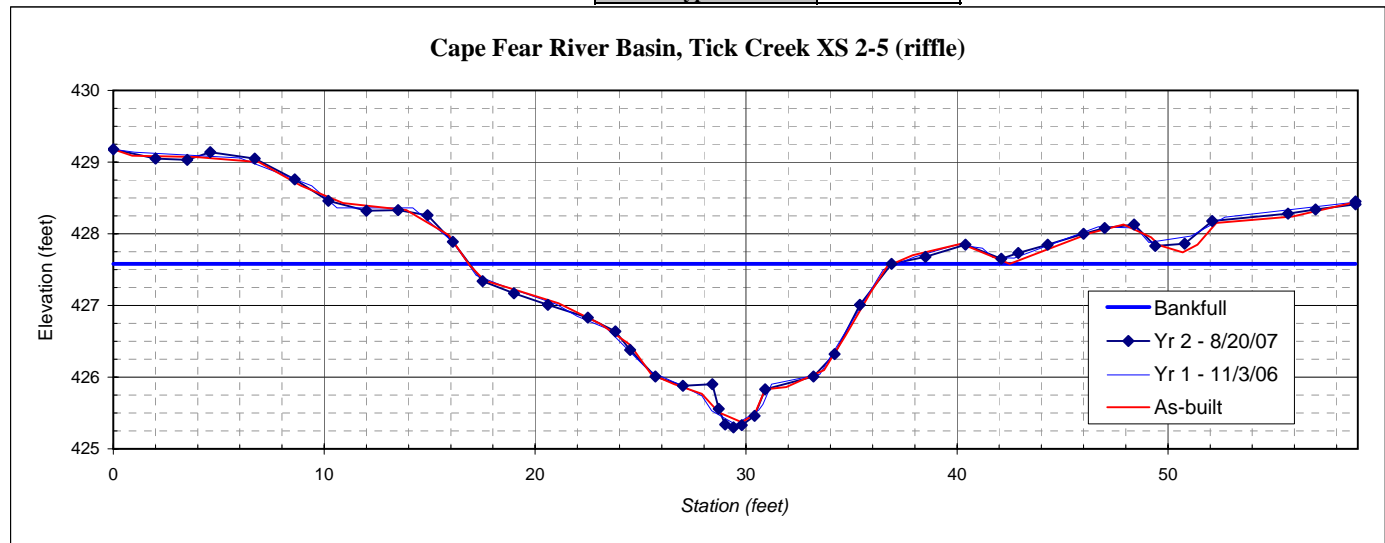
Station	Rod Ht.	Elevation
0	3.48	429.18
2	3.61	429.05
3.5	3.63	429.03
4.6	3.52	429.14
6.7	3.61	429.05
8.6	3.9	428.76
10.2	4.2	428.46
12	4.34	428.32
13.5	4.33	428.33
14.9	4.4	428.26
16.1	4.77	427.89
17.5	5.32	427.34
19	5.49	427.17
20.6	5.65	427.01
22.5	5.83	426.83
23.8	6.02	426.64
24.5	6.28	426.38
25.7	6.65	426.01
27	6.78	425.88
28.4	6.76	425.90
28.7	7.1	425.56
29	7.32	425.34
29.4	7.36	425.30
29.8	7.33	425.33
30.4	7.2	425.46
30.9	6.83	425.83
33.2	6.65	426.01
34.2	6.34	426.32
35.4	5.65	427.01
36.9	5.08	427.58
38.5	4.98	427.68
40.4	4.81	427.85
42.1	5.01	427.65
42.9	4.93	427.73
44.3	4.81	427.85
46	4.66	428.00

SUMMARY DATA	
Floodprone Elevation (ft)	429.86
Bankfull Elevation (ft)	427.58
Floodprone Width (ft)	90.00
Bankfull Width (ft)	20.01
Entrenchment Ratio	4.50
Mean Depth (ft)	1.13
Maximum Depth (ft)	2.28
Width/Depth Ratio	17.69
Bankfull Area (sq ft)	22.64
Wetted Perimeter (ft)	20.91
Hydraulic Radius (ft)	1.08



View of cross-section 2-5 looking upstream

Stream Type: C5b



B6. Cross Section Plots, Photos, and Raw Data Tables - Tick Creek Stream Restoration - Project #379 - Chatham County, NC

River Basin:	Cape Fear
Watershed:	Tick Creek
XS ID	XS 2-6 (riffle)
Reach:	2
Date:	8/20/2007
Field Crew:	S. Doig and J. Tisdale

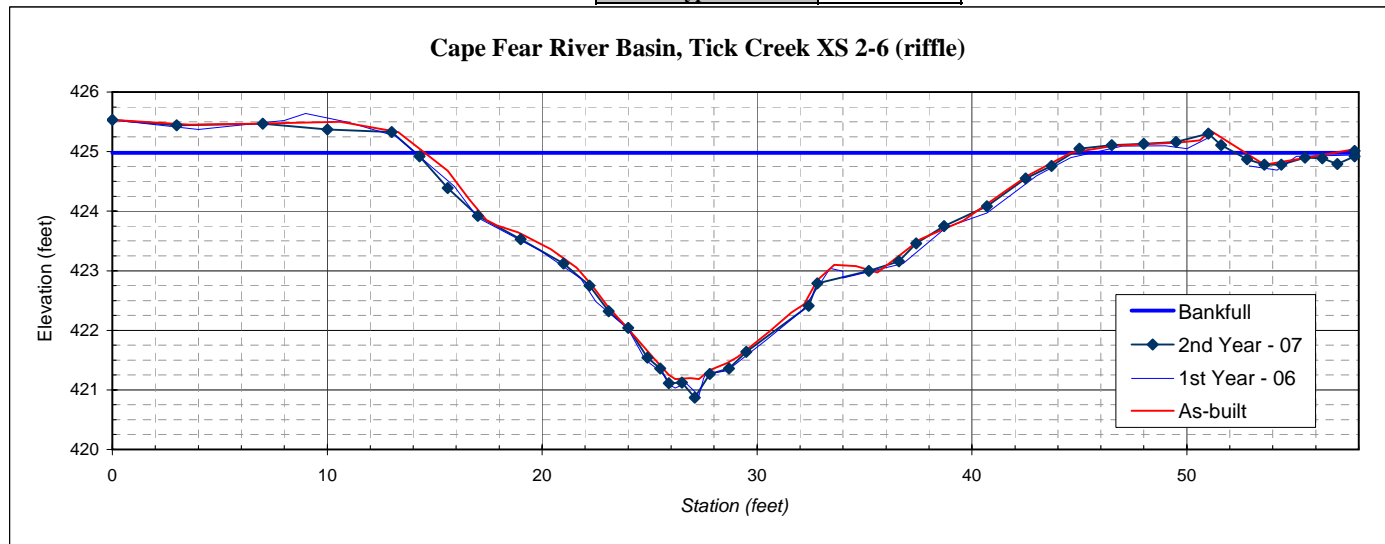
Station	Rod Ht.	Elevation
0	3.96	425.53
3	4.05	425.44
7	4.02	425.47
10	4.12	425.37
13	4.16	425.33
14.3	4.57	424.92
15.6	5.1	424.39
17	5.57	423.92
19	5.96	423.53
21	6.37	423.12
22.2	6.74	422.75
23.1	7.17	422.32
24	7.45	422.04
24.9	7.95	421.54
25.5	8.13	421.36
25.9	8.38	421.11
26.5	8.37	421.12
27.1	8.62	420.87
27.8	8.22	421.27
28.7	8.13	421.36
29.5	7.85	421.64
32.4	7.08	422.41
32.8	6.7	422.79
35.2	6.49	423
36.6	6.33	423.16
37.4	6.03	423.46
38.7	5.74	423.75
40.7	5.41	424.08
42.5	4.94	424.55
43.7	4.73	424.76
45	4.44	425.05
46.5	4.38	425.11
48	4.36	425.13
49.5	4.33	425.16
51	4.19	425.3
51.6	4.38	425.11

SUMMARY DATA	
Floodprone Elevation (ft)	429.33
Bankfull Elevation (ft)	425.05
Floodprone Width (ft)	63.00
Bankfull Width (ft)	37.01
Entrenchment Ratio	1.70
Mean Depth (ft)	1.68
Maximum Depth (ft)	4.18
Width/Depth Ratio	22.09
Bankfull Area (sq ft)	62.02
Wetted Perimeter (ft)	38.60
Hydraulic Radius (ft)	1.61



View of cross-section 2-6 looking downstream

Stream Type:	B6
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B6. Cross Section Plots, Photos, and Raw Data Tables - Tick Creek Stream Restoration - Project #379 - Chatham County, NC

River Basin:	Cape Fear
Watershed:	Tick Creek
XS ID	XS 3-1(rifle)
Reach:	3
Date:	8/20/2007
Field Crew:	S. Doig and J. Tisdale

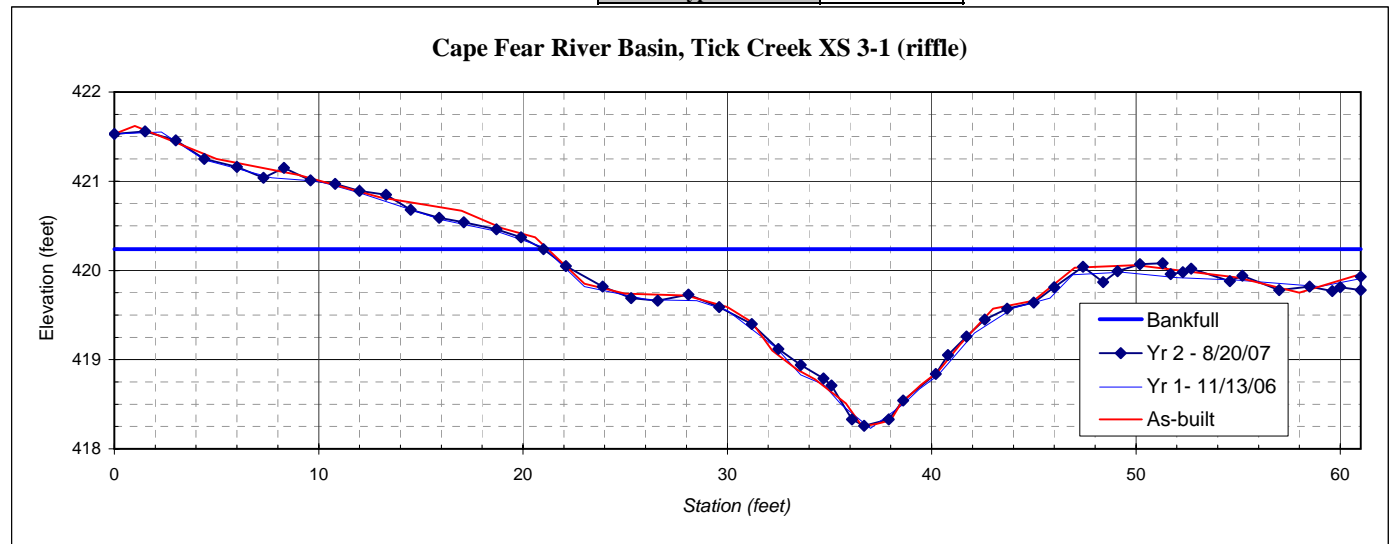


View of cross-section 3-1 looking downstream

Station	Rod Ht.	Elevation
0	3.42	421.53
1.5	3.39	421.56
3	3.49	421.46
4.4	3.7	421.25
6	3.79	421.16
7.3	3.91	421.04
8.3	3.8	421.15
9.6	3.94	421.01
10.8	3.98	420.97
12	4.06	420.89
13.3	4.1	420.85
14.5	4.27	420.68
15.9	4.36	420.59
17.1	4.41	420.54
18.7	4.49	420.46
19.9	4.58	420.37
21	4.71	420.24
22.1	4.9	420.05
23.9	5.13	419.82
25.3	5.26	419.69
26.6	5.29	419.66
28.1	5.22	419.73
29.6	5.36	419.59
31.2	5.55	419.4
32.5	5.83	419.12
33.6	6.01	418.94
34.7	6.16	418.79
35.1	6.24	418.71
36.1	6.62	418.33
36.7	6.69	418.26
37.9	6.62	418.33
38.6	6.41	418.54
40.2	6.11	418.84
40.8	5.9	419.05
41.7	5.69	419.26
42.6	5.5	419.45

SUMMARY DATA	
Floodprone Elevation (ft)	422.22
Bankfull Elevation (ft)	420.24
Floodprone Width (ft)	265.00
Bankfull Width (ft)	40.00
Entrenchment Ratio	6.63
Mean Depth (ft)	0.71
Maximum Depth (ft)	1.98
Width/Depth Ratio	56.68
Bankfull Area (sq ft)	28.23
Wetted Perimeter (ft)	40.90
Hydraulic Radius (ft)	0.69

Stream Type:	B6
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B6. Cross Section Plots, Photos, and Raw Data Tables - Tick Creek Stream Restoration - Project #379 - Chatham County, NC

River Basin:	Cape Fear
Watershed:	Tick Creek
XS ID	XS 3-2(pool)
Reach:	3
Date:	8/20/2007
Field Crew:	S. Doig and J. Tisdale

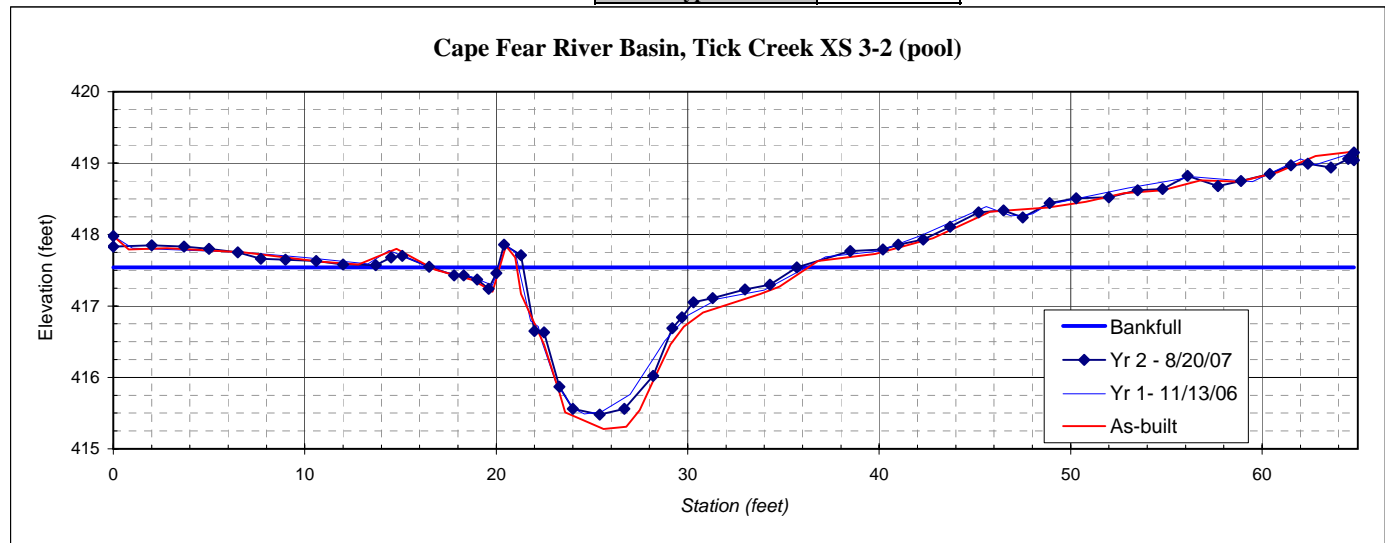
Station	Rod Ht.	Elevation
0	5.8	417.98
0	5.95	417.83
2	5.93	417.85
3.7	5.95	417.83
5	5.98	417.8
6.5	6.03	417.75
7.7	6.12	417.66
9	6.13	417.65
10.6	6.15	417.63
12	6.2	417.58
13.7	6.21	417.57
14.5	6.1	417.68
15.1	6.08	417.7
16.5	6.23	417.55
17.8	6.35	417.43
18.3	6.35	417.43
19	6.41	417.37
19.6	6.54	417.24
20	6.32	417.46
20.4	5.92	417.86
21.3	6.07	417.71
22	7.13	416.65
22.5	7.15	416.63
23.3	7.91	415.87
24	8.22	415.56
25.4	8.3	415.48
26.7	8.22	415.56
28.2	7.76	416.02
29.2	7.09	416.69
29.7	6.94	416.84
30.3	6.73	417.05
31.3	6.67	417.11
33	6.55	417.23
34.3	6.48	417.3
35.7	6.24	417.54
38.5	6.01	417.77

SUMMARY DATA	
Floodprone Elevation (ft)	419.60
Bankfull Elevation (ft)	417.54
Floodprone Width (ft)	270.00
Bankfull Width (ft)	17.76
Entrenchment Ratio	15.20
Mean Depth (ft)	0.85
Maximum Depth (ft)	2.06
Width/Depth Ratio	20.91
Bankfull Area (sq ft)	15.08
Wetted Perimeter (ft)	19.08
Hydraulic Radius (ft)	0.79



View of cross-section 3-2 looking upstream

Stream Type: C6b



B6. Cross Section Plots, Photos, and Raw Data Tables - Tick Creek Stream Restoration - Project #379 - Chatham County, NC

River Basin:	Cape Fear
Watershed:	Tick Creek
XS ID	XS 3-3 (pool)
Reach:	3
Date:	8/20/2007
Field Crew:	S. Doig and J. Tisdale

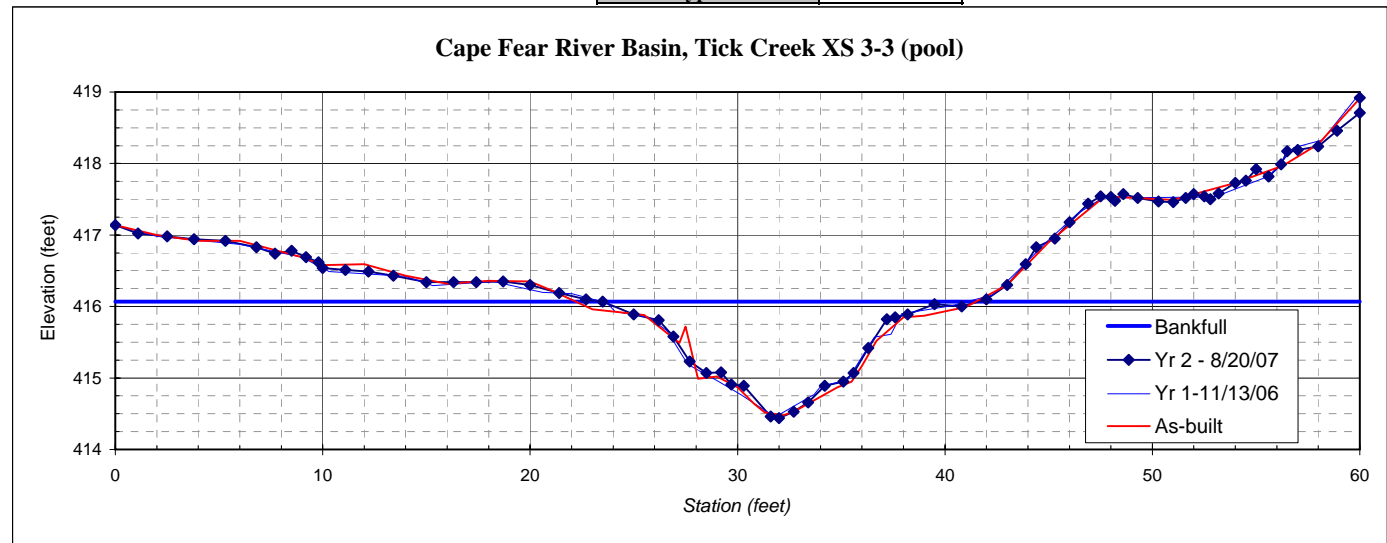
Station	Rod Ht.	Elevation
0	4.7	417.14
1.1	4.82	417.02
2.5	4.86	416.98
3.8	4.9	416.94
5.3	4.92	416.92
6.8	5.01	416.83
7.7	5.1	416.74
8.5	5.06	416.78
9.2	5.15	416.69
9.8	5.22	416.62
10	5.3	416.54
11.1	5.33	416.51
12.2	5.35	416.49
13.4	5.41	416.43
15	5.5	416.34
16.3	5.5	416.34
17.4	5.5	416.34
18.7	5.49	416.35
20	5.54	416.3
21.4	5.65	416.19
22.7	5.74	416.1
23.5	5.77	416.07
25	5.95	415.89
26.2	6.03	415.81
26.9	6.26	415.58
27.7	6.61	415.23
28.5	6.77	415.07
29.2	6.76	415.08
29.7	6.93	414.91
30.3	6.95	414.89
31.6	7.38	414.46
32	7.4	414.44
32.7	7.31	414.53
33.4	7.18	414.66
34.2	6.95	414.89
35.1	6.89	414.95

SUMMARY DATA	
Floodprone Elevation (ft)	417.70
Bankfull Elevation (ft)	416.07
Floodprone Width (ft)	250.00
Bankfull Width (ft)	18.14
Entrenchment Ratio	13.78
Mean Depth (ft)	0.69
Maximum Depth (ft)	1.63
Width/Depth Ratio	26.30
Bankfull Area (sq ft)	12.51
Wetted Perimeter (ft)	18.62
Hydraulic Radius (ft)	0.67



View of cross-section 3-3 looking upstream

Stream Type: C6b



B6. Cross Section Plots, Photos, and Raw Data Tables - Tick Creek Stream Restoration - Project #379 - Chatham County, NC

River Basin:	Cape Fear
Watershed:	Tick Creek
XS ID	XS 3-4 (pool)
Reach:	3
Date:	8/21/2007
Field Crew:	J. O'Neal and J. Tisdale

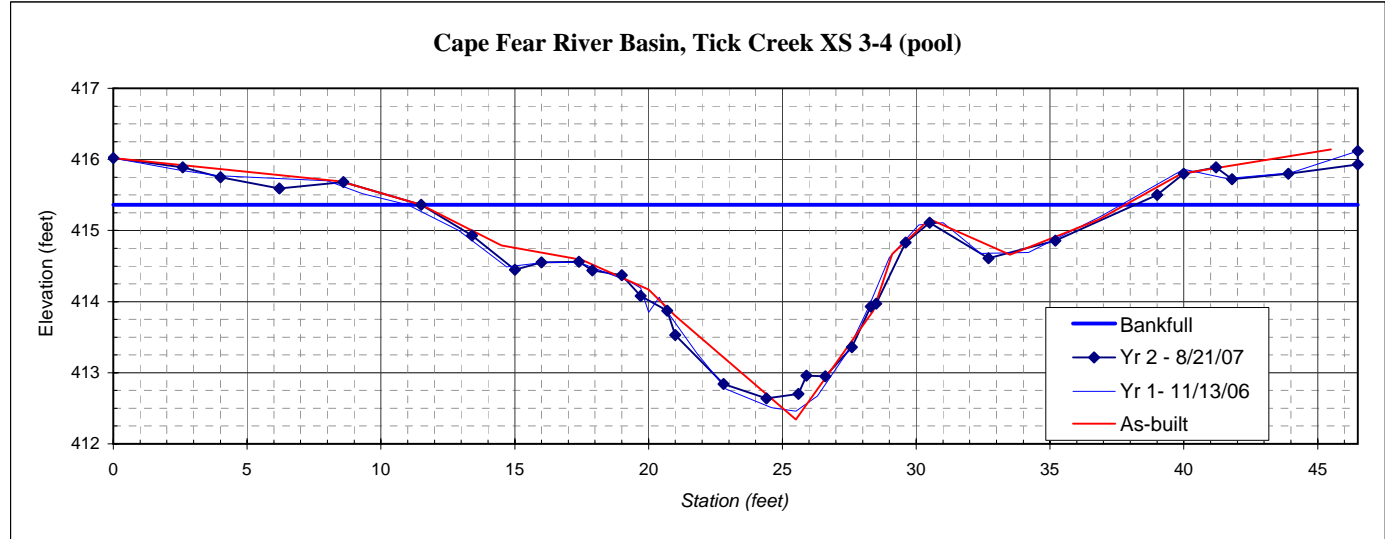


View of cross-section 3-4 looking downstream

Station	Rod Ht.	Elevation
0	4.75	416.02
2.6	4.88	415.89
4	5.02	415.75
6.2	5.18	415.59
8.6	5.09	415.68
11.5	5.41	415.36
13.4	5.84	414.93
15	6.32	414.45
16	6.22	414.55
17.4	6.21	414.56
17.9	6.33	414.44
19	6.4	414.37
19.7	6.69	414.08
20.7	6.9	413.87
21	7.24	413.53
22.8	7.93	412.84
24.4	8.13	412.64
25.6	8.07	412.7
25.9	7.81	412.96
26.6	7.82	412.95
27.6	7.41	413.36
28.3	6.84	413.93
28.5	6.8	413.97
29.6	5.94	414.83
30.5	5.66	415.11
32.7	6.16	414.61
35.2	5.91	414.86
39	5.27	415.5
40	4.97	415.8
41.2	4.88	415.89
41.8	5.05	415.72
43.9	4.97	415.8
46.5	4.84	415.93
46.5	4.65	416.12

SUMMARY DATA	
Floodprone Elevation (ft)	418.08
Bankfull Elevation (ft)	415.36
Floodprone Width (ft)	300.00
Bankfull Width (ft)	26.67
Entrenchment Ratio	11.25
Mean Depth (ft)	1.12
Maximum Depth (ft)	2.72
Width/Depth Ratio	23.78
Bankfull Area (sq ft)	29.90
Wetted Perimeter (ft)	28.02
Hydraulic Radius (ft)	1.07

Stream Type:	C6
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B6. Cross Section Plots, Photos, and Raw Data Tables - Tick Creek Stream Restoration - Project #379 - Chatham County, NC

River Basin:	Cape Fear
Watershed:	Tick Creek
XS ID	XS 3-5 (pool)
Reach:	3
Date:	8/21/2007
Field Crew:	J. O'Neal and J. Tisdale

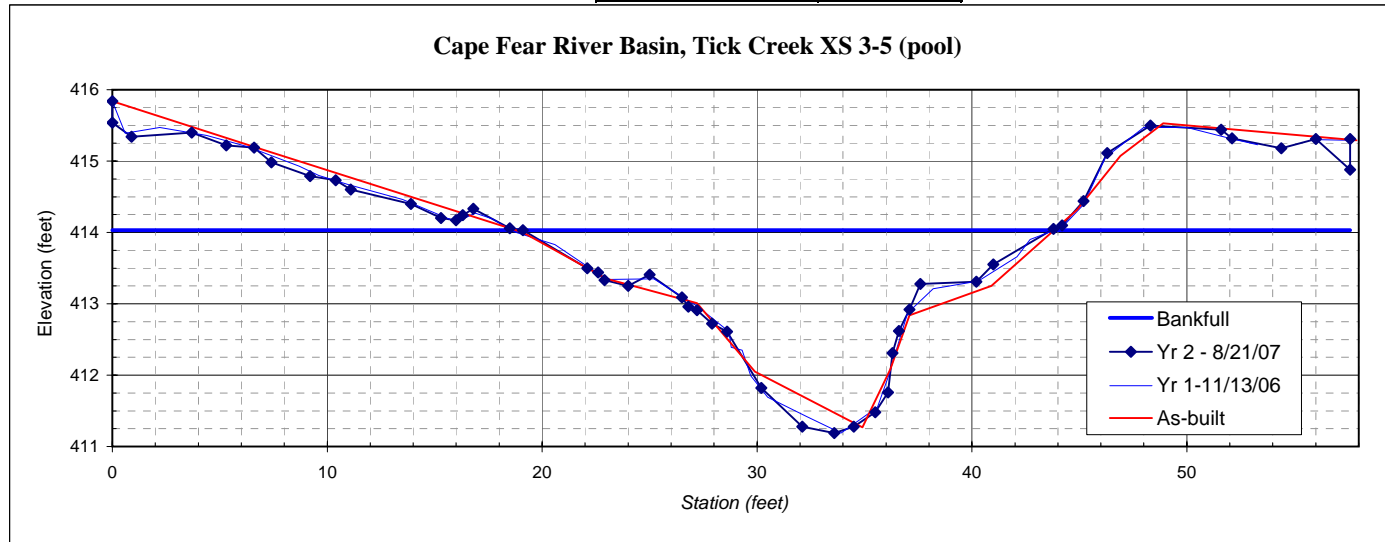
Station	Rod Ht.	Elevation
0	2.44	415.84
0	2.74	415.54
0.9	2.94	415.34
3.7	2.88	415.4
5.3	3.06	415.22
6.6	3.09	415.19
7.4	3.3	414.98
9.2	3.49	414.79
10.4	3.55	414.73
11.1	3.68	414.6
13.9	3.88	414.4
15.3	4.08	414.2
16	4.11	414.17
16.3	4.04	414.24
16.8	3.95	414.33
18.5	4.22	414.06
19.1	4.25	414.03
22.1	4.78	413.5
22.6	4.84	413.44
22.9	4.95	413.33
24	5.03	413.25
25	4.87	413.41
26.5	5.19	413.09
26.8	5.32	412.96
27.2	5.37	412.91
27.9	5.56	412.72
28.6	5.67	412.61
30.2	6.46	411.82
32.1	7	411.28
33.6	7.09	411.19
34.5	7	411.28
35.5	6.8	411.48
36.1	6.52	411.76
36.3	5.97	412.31
36.6	5.66	412.62
37.1	5.36	412.92

SUMMARY DATA	
Floodprone Elevation (ft)	416.87
Bankfull Elevation (ft)	414.03
Floodprone Width (ft)	220.00
Bankfull Width (ft)	24.59
Entrenchment Ratio	8.95
Mean Depth (ft)	1.22
Maximum Depth (ft)	2.84
Width/Depth Ratio	20.21
Bankfull Area (sq ft)	29.92
Wetted Perimeter (ft)	25.91
Hydraulic Radius (ft)	1.15



View of cross-section 3-5 looking downstream

Stream Type: C6



B6. Cross Section Plots, Photos, and Raw Data Tables - Tick Creek Stream Restoration - Project #379 - Chatham County, NC

River Basin:	Cape Fear
Watershed:	Tick Creek
XS ID	XS 3-6 (riffle)
Reach:	3
Date:	8/20/2007
Field Crew:	S. Doig and J. Tisdale

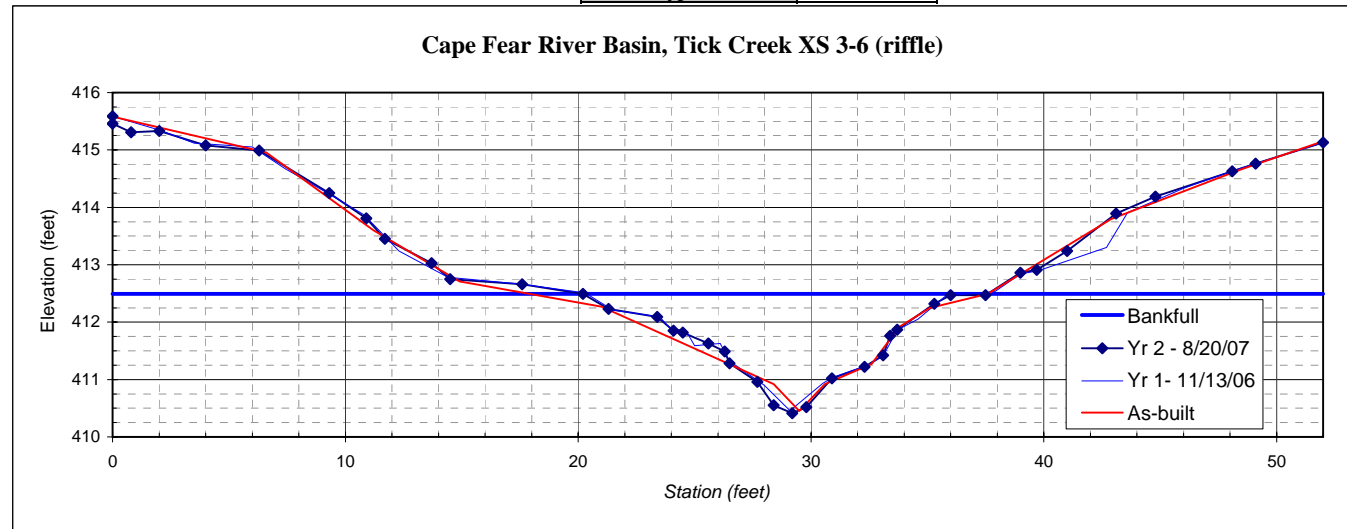
Station	Rod Ht.	Elevation
0	2.67	415.59
0	2.8	415.46
0.8	2.95	415.31
2	2.93	415.33
4	3.18	415.08
6.3	3.27	414.99
9.3	4.01	414.25
10.9	4.45	413.81
11.7	4.81	413.45
13.7	5.23	413.03
14.5	5.51	412.75
17.6	5.6	412.66
20.2	5.77	412.49
21.3	6.03	412.23
23.4	6.17	412.09
24.1	6.41	411.85
24.5	6.44	411.82
25.6	6.63	411.63
26.3	6.77	411.49
26.5	6.98	411.28
27.7	7.3	410.96
28.4	7.71	410.55
29.2	7.85	410.41
29.8	7.74	410.52
30.9	7.24	411.02
32.3	7.04	411.22
33.1	6.84	411.42
33.4	6.5	411.76
33.7	6.39	411.87
35.3	5.94	412.32
36	5.79	412.47
37.5	5.79	412.47
39	5.4	412.86
39.7	5.35	412.91
41	5.02	413.24
43.1	4.37	413.89
44.8	4.07	414.19
48.1	3.63	414.63
49.1	3.5	414.76
52	3.13	415.13

SUMMARY DATA	
Floodprone Elevation (ft)	414.57
Bankfull Elevation (ft)	412.49
Floodprone Width (ft)	62.00
Bankfull Width (ft)	17.38
Entrenchment Ratio	3.57
Mean Depth (ft)	0.85
Maximum Depth (ft)	2.08
Width/Depth Ratio	20.40
Bankfull Area (sq ft)	14.80
Wetted Perimeter (ft)	18.15
Hydraulic Radius (ft)	0.82



View of cross-section 3-6 looking downstream

Stream Type: C6

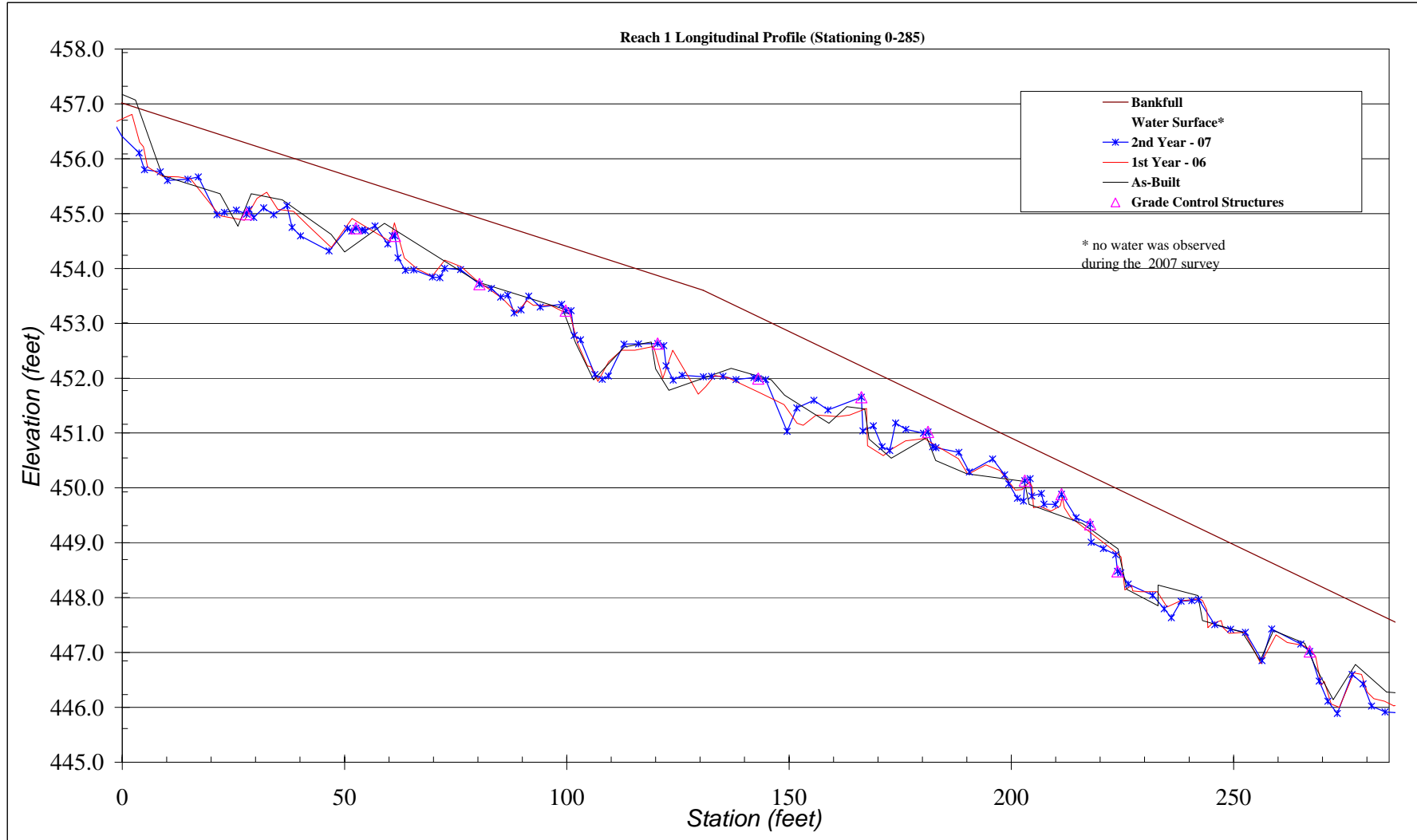


B7. Longitudinal Plots and Raw Data Tables - Tick Creek Stream Restoration - EEP Project #379

River Basin:	Cape Fear
Watershed:	Tick Creek
Reach:	Upstream
Profile ID:	Profile 1
Date:	16-Jul-07
Field Crew:	S. Doig and L. Cole

Pattern	min	max	average	Profile	min	max	average
Channel Beltwidth (ft)	4.37	9.38	6.84	Riffle length (ft)	3.16	18.75	9.43
Radius of Curvature (ft)	3.58	15.04	7.36	Riffle slope (ft/ft)	0.001	0.055	0.027
Meander Wavelength	31.40	44.68	38.08	Pool length (ft)	4.67	12.42	8.09
Meander Width ratio	0.34	0.61	0.52	Pool spacing (ft)	8.56	36.11	19.88

Additional Reach Parameters	
Valley Length (ft)	255
Channel Length (ft)	286
Sinuosity	1.12
Water Surface Slope (ft/ft)	NA*
BF slope (ft/ft)	0.0039
Rosgen Classification	B6



B7. Longitudinal Plots and Raw Data Tables - Tick Creek Stream Restoration - EEP Project #379

River Basin:	Cape Fear
Watershed:	Tick Creek
Reach:	Middle
Profile ID:	Profile 2
Date:	17-Jul-07
Field Crew:	S. Doig and L. Cole

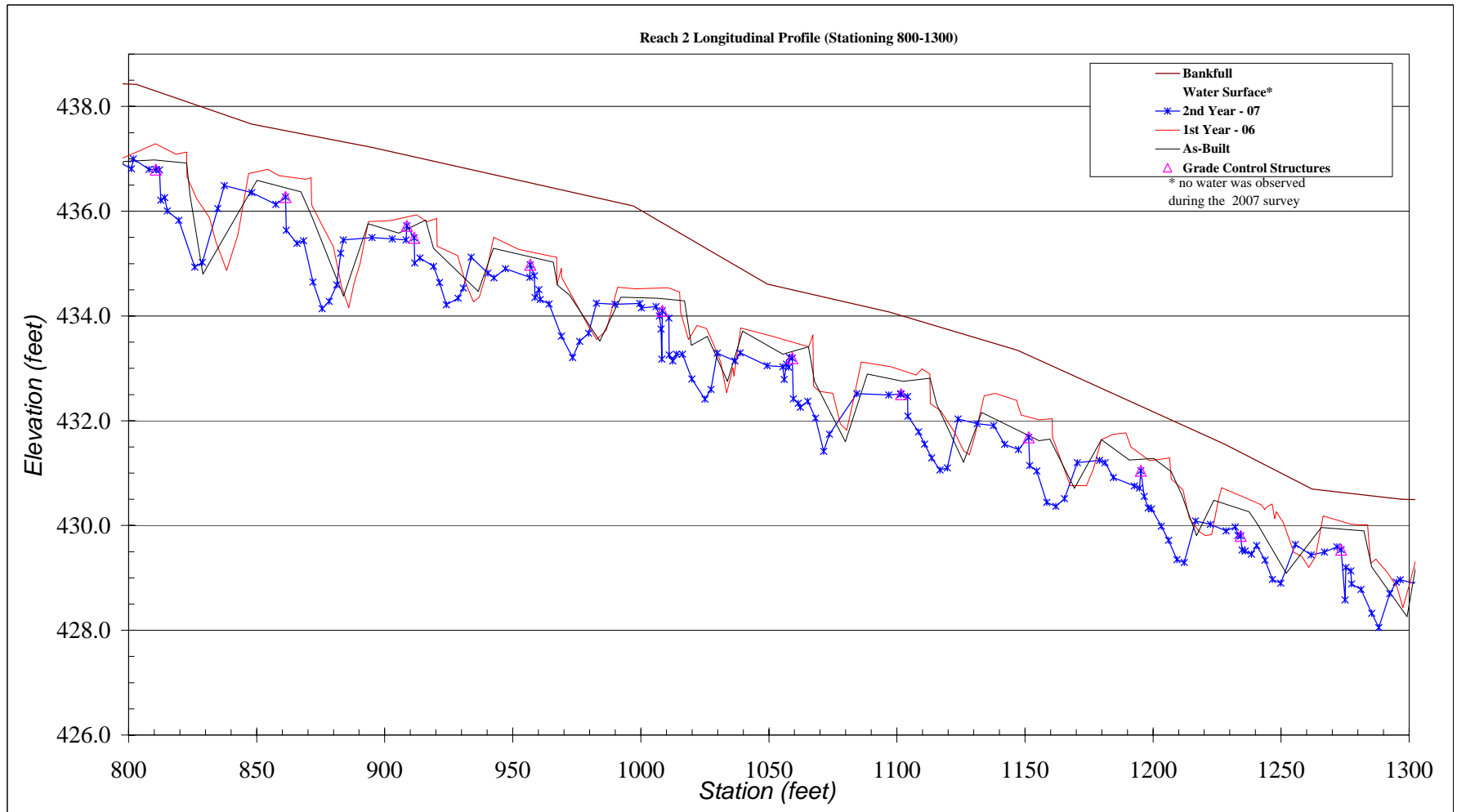
Pattern	min	max	average	Profile	min	max	average	Additional Reach Parameters	
Channel Beltwidth (ft)	8.89	53.48	26.01	Riffle length (ft)	4.90	31.09	15.45	Valley Length (ft)	1,150
Radius of Curvature (ft)	7.58	21.68	15.95	Riffle slope (ft/ft)	0.001	0.037	0.015	Channel Length (ft)	1,506
Meander Wavelength	57.62	132.45	78.43	Pool length (ft)	5.1871	42.937	19.45942	Simuosity	1.31
Meander Width ratio	0.450	1.445	1.059	Pool spacing (ft)	2.521	37.776	22.857405	Water Surface Slope (ft/ft)	NA*
								BF slope (ft/ft)	0.016
								Rosgen Classification	C5b



B7. Longitudinal Plots and Raw Data Tables - Tick Creek Stream Restoration - EEP Project #379

River Basin:	Cape Fear
Watershed:	Tick Creek
Reach:	Middle
Profile ID:	Profile 2
Date:	17-Jul-07
Field Crew:	S. Doig and L. Cole

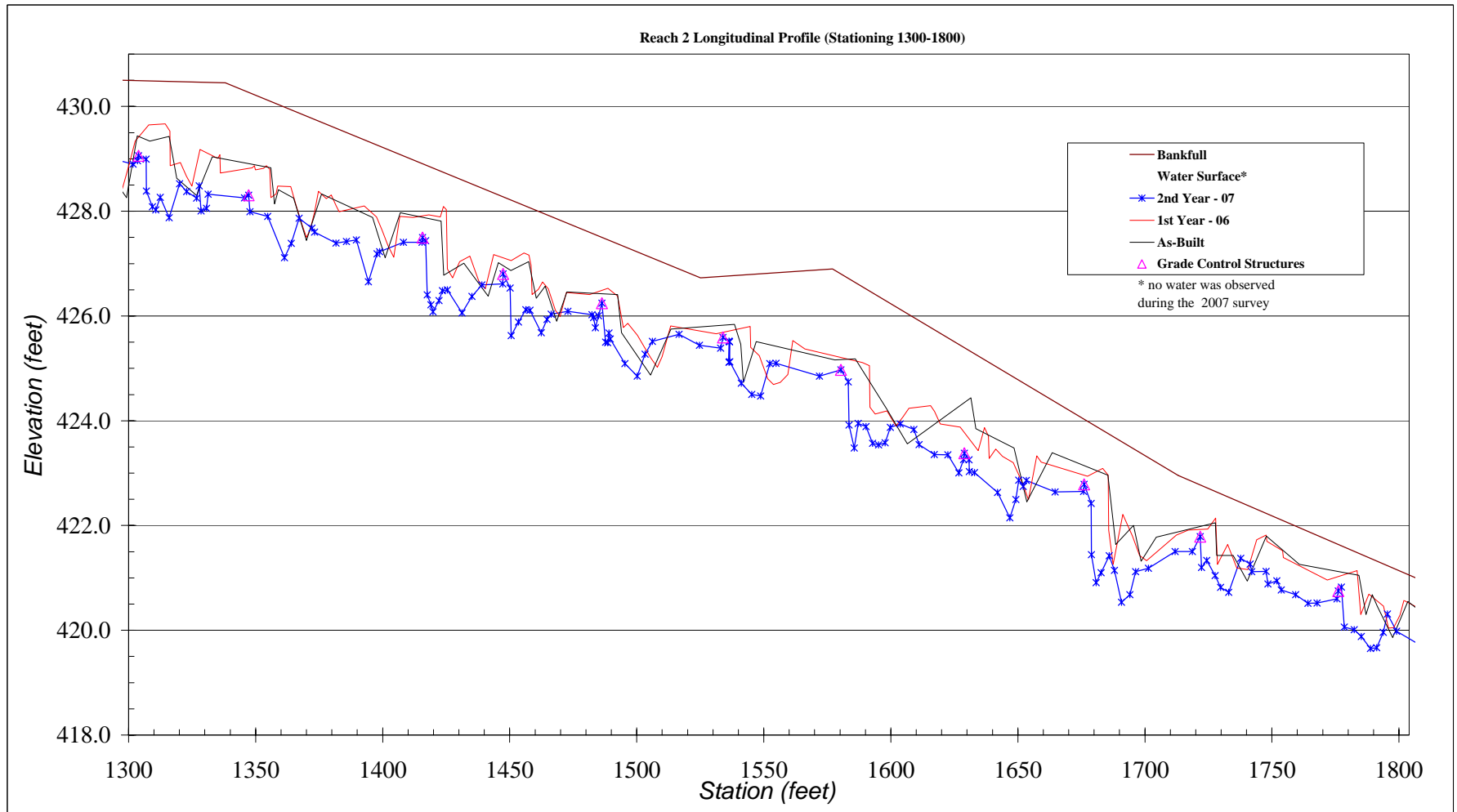
Pattern	min	max	average	Profile	min	max	average	Additional Reach Parameters	
Channel Beltwidth (ft)	8.89	53.48	26.01	Riffle length (ft)	4.90	31.09	15.45	Valley Length (ft)	1,150
Radius of Curvature (ft)	7.58	21.68	15.95	Riffle slope (ft/ft)	0.001	0.037	0.015	Channel Length (ft)	1,506
Meander Wavelength	57.62	132.45	78.43	Pool length (ft)	5.1871	42.937	19.45942	Simosity	1.31
Meander Width ratio	0.450	1.445	1.059	Pool spacing (ft)	2.521	37.776	22.857405	Water Surface Slope (ft/ft)	NA*
								BF slope (ft/ft)	0.016
								Rosgen Classification	C5b



B7. Longitudinal Plots and Raw Data Tables - Tick Creek Stream Restoration - EEP Project #379

River Basin:	Cape Fear
Watershed:	Tick Creek
Reach:	Middle
Profile ID:	Profile 2
Date:	17-Jul-07
Field Crew:	S. Doig and L. Cole

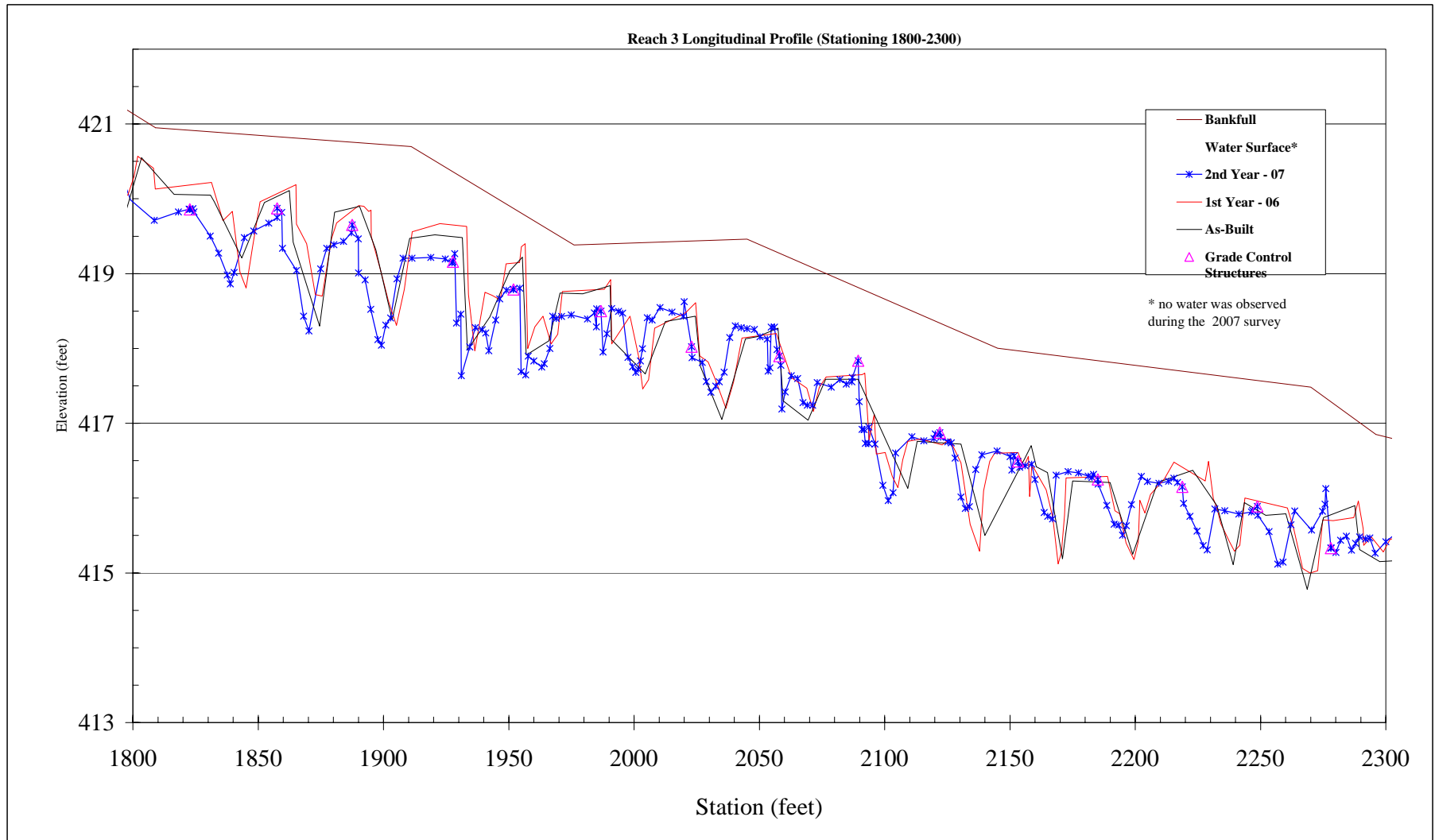
Pattern	min	max	average	Profile	min	max	average	Additional Reach Parameters	
Channel Beltwidth (ft)	8.89	53.48	26.01	Rifle length (ft)	4.90	31.09	15.45	Valley Length (ft)	1,150
Radius of Curvature (ft)	7.58	21.68	15.95	Rifle slope (ft/ft)	0.001	0.037	0.015	Channel Length (ft)	1,506
Meander Wavelength	57.62	132.45	78.43	Pool length (ft)	5.1871	42.937	19.45942	Simuosity	1.31
Meander Width ratio	0.450	1.445	1.059	Pool spacing (ft)	2.521	37.776	22.857405	Water Surface Slope (ft/ft)	NA*
								BF slope (ft/ft)	0.016
								Rosgen Classification	C5b



B7. Longitudinal Plots and Raw Data Tables - Tick Creek Stream Restoration - EEP Project #379

River Basin:	Cape Fear
Watershed:	Tick Creek
Reach:	Downstream
Profile ID:	Profile 3
Date:	18-Jul-07
Field Crew:	J. O'Neal and J. Tisdale

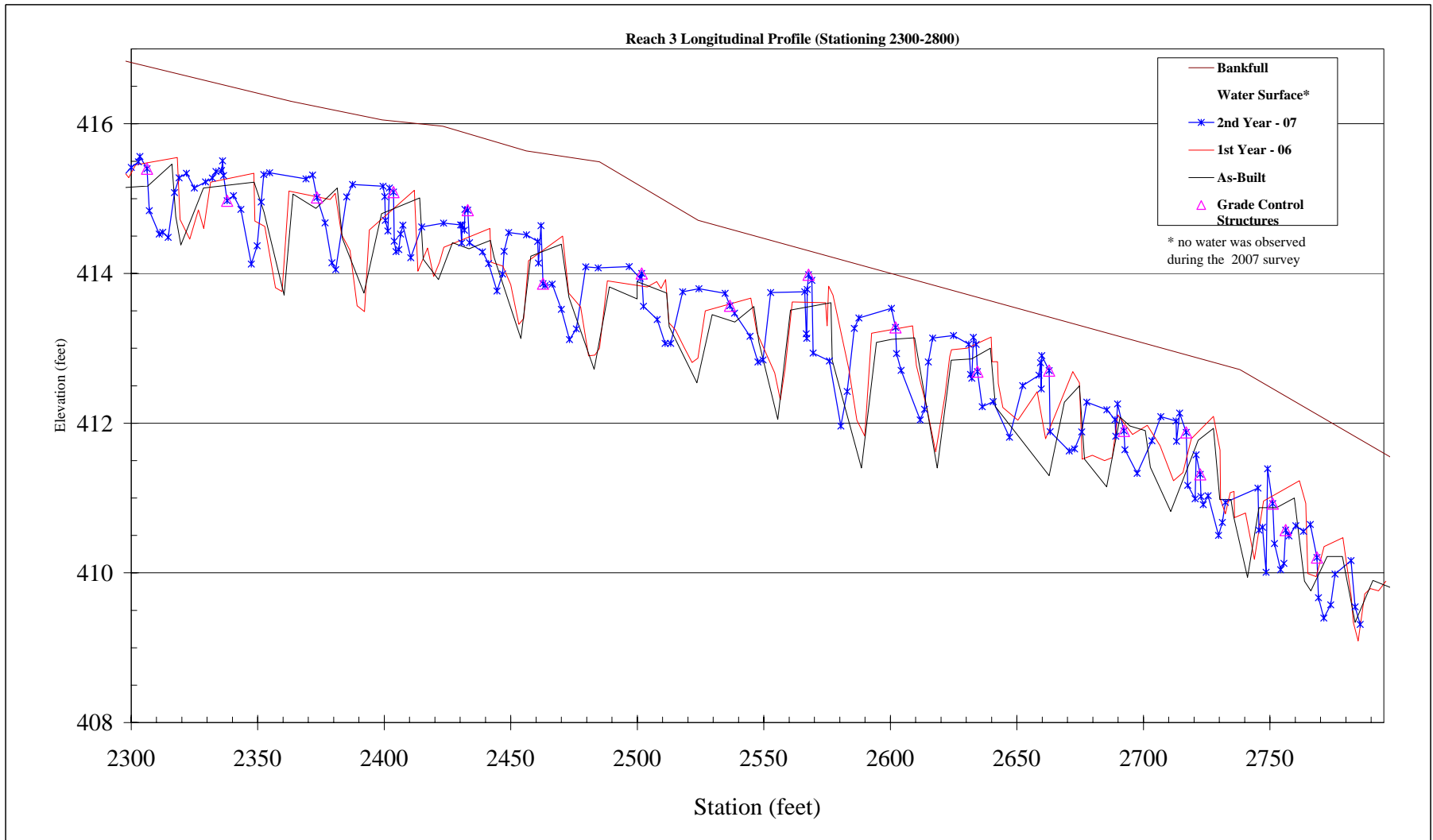
Pattern	min	max	average	Profile	min	max	average	Additional Reach Parameters	
Channel Beltwidth (ft)	8.74	26.93	15.31	Riffle length (ft)	5.33	22.16	13.27	Valley Length (ft)	635
Radius of Curvature (ft)	8.27	23.08	13.88	Riffle slope (ft/ft)	0.002	0.013	0.007	Channel Length (ft)	975
Meander Wavelength	34.43	84.77	53.96	Pool length (ft)	7.02	35.04	22.45	Sinuosity	1.53
Meander Width ratio	0.503	0.673	0.530	Pool spacing (ft)	1.81	48.74	16.68	Water Surface Slope (ft/ft)	NA
								BF slope (ft/ft)	0.010
								Rosgen Classification	E6



B7. Longitudinal Plots and Raw Data Tables - Tick Creek Stream Restoration - EEP Project #379

River Basin:	Cape Fear
Watershed:	Tick Creek
Reach:	Downstream
Profile ID:	Profile 3
Date:	18-Jul-07
Field Crew:	J. O'Neal and J. Tisdale

Pattern	min	max	average	Profile	min	max	average	Additional Reach Parameters	
Channel Beltwidth (ft)	8.74	26.93	15.31	Riffle length (ft)	5.33	22.16	13.27	Valley Length (ft)	635
Radius of Curvature (ft)	8.27	23.08	13.88	Riffle slope (ft/ft)	0.002	0.013	0.007	Channel Length (ft)	975
Meander Wavelength	34.43	84.77	53.96	Pool length (ft)	7.02	35.04	22.45	Sinuosity	1.53
Meander Width ratio	0.503	0.673	0.530	Pool spacing (ft)	1.81	48.74	16.68	Water Surface Slope (ft/ft)	NA
								BF slope (ft/ft)	0.010
								Rosgen Classification	E6

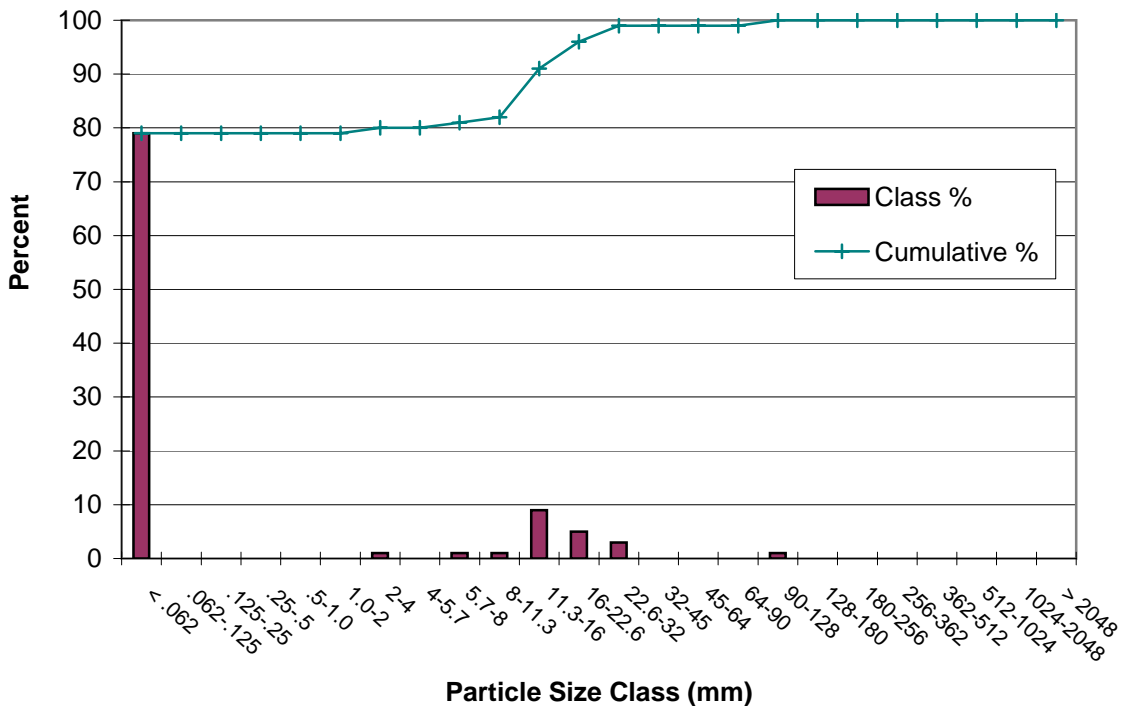


B8. Pebble Count - Tick Creek Stream Restoration - Second Year Monitoring 8/22/2007

Cross Section 1-1

	Particle	Size Range (mm)	Total #	Class %	Cumulative %
S/C	Silt/Clay	< .062	79	79	79
Sand	Very Fine Sand	.062-.125		0	79
	Fine Sand	.125-.25		0	79
	Medium Sand	.25-.5		0	79
	Coarse Sand	.5-1.0		0	79
	Very Course Sand	1.0-2		0	79
Gravel	Very Fine Gravel	2-4	1	1	80
	Fine Gravel	4-5.7		0	80
	Fine Gravel	5.7-8	1	1	81
	Medium Gravel	8-11.3	1	1	82
	Medium Gravel	11.3-16	9	9	91
	Coarse Gravel	16-22.6	5	5	96
	Coarse Gravel	22.6-32	3	3	99
	Very Course Gravel	32-45		0	99
	Very Course Gravel	45-64		0	99
Cobble	Small Cobble	64-90		0	99
	Small Cobble	90-128	1	1	100
	Medium Cobble	128-180		0	100
	Large Cobble	180-256		0	100
Boulder	Small Boulders	256-362		0	100
	Small Boulders	362-512		0	100
	Medium Boulders	512-1024		0	100
	Large Boulders	1024-2048		0	100
	Bedrock	> 2048		0	100
Total			100		

d₅₀ = 0.04
d₈₄ = 12.34

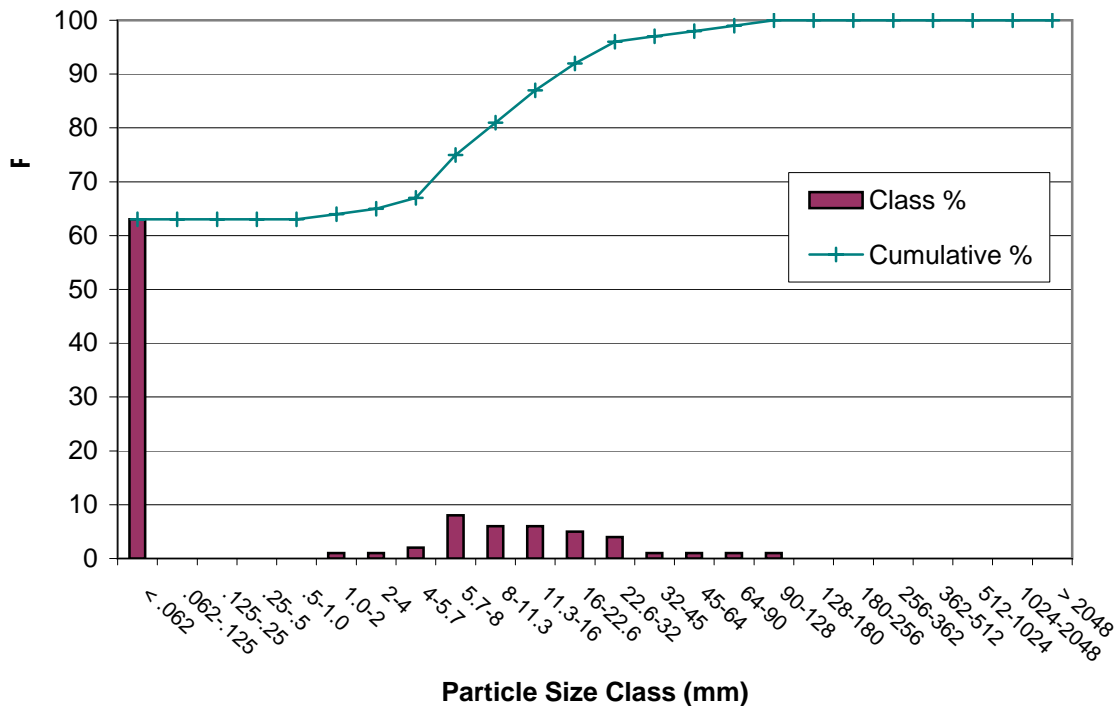


B8. Pebble Count - Tick Creek Stream Restoration - Second Year Monitoring 8/22/2007

Cross Section 1-2

	Particle	Size Range (mm)	Total #	Class %	Cumulative %
S/C	Silt/Clay	< .062	63	63	63
Sand	Very Fine Sand	.062-.125		0	63
	Fine Sand	.125-.25		0	63
	Medium Sand	.25-.5		0	63
	Coarse Sand	.5-1.0		0	63
	Very Coarse Sand	1.0-2	1	1	64
Gravel	Very Fine Gravel	2-4	1	1	65
	Fine Gravel	4-5.7	2	2	67
	Fine Gravel	5.7-8	8	8	75
	Medium Gravel	8-11.3	6	6	81
	Medium Gravel	11.3-16	6	6	87
	Coarse Gravel	16-22.6	5	5	92
	Coarse Gravel	22.6-32	4	4	96
	Very Coarse Gravel	32-45	1	1	97
	Very Coarse Gravel	45-64	1	1	98
Cobble	Small Cobble	64-90	1	1	99
	Small Cobble	90-128	1	1	100
	Medium Cobble	128-180		0	100
	Large Cobble	180-256		0	100
Boulder	Small Boulders	256-362		0	100
	Small Boulders	362-512		0	100
	Medium Boulders	512-1024		0	100
	Large Boulders	1024-2048		0	100
	Bedrock	> 2048		0	100
Total			100		

d₅₀ = 0.05
d₈₄ = 13.65

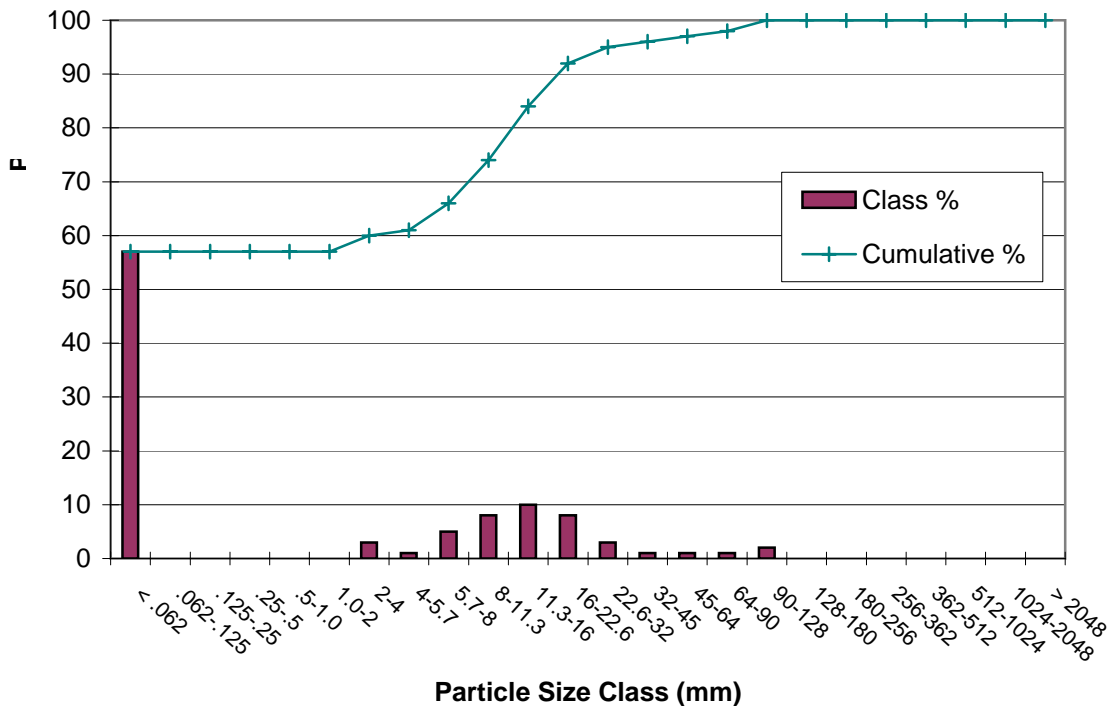


B8. Pebble Count - Tick Creek Stream Restoration - Second Year Monitoring 8/22/2007

Cross Section 1-3

	Particle	Size Range (mm)	Total #	Class %	Cumulative %
S/C	Silt/Clay	< .062	57	57	57
Sand	Very Fine Sand	.062-.125		0	57
	Fine Sand	.125-.25		0	57
	Medium Sand	.25-.5		0	57
	Coarse Sand	.5-1.0		0	57
	Very Coarse Sand	1.0-2		0	57
Gravel	Very Fine Gravel	2-4	3	3	60
	Fine Gravel	4-5.7	1	1	61
	Fine Gravel	5.7-8	5	5	66
	Medium Gravel	8-11.3	8	8	74
	Medium Gravel	11.3-16	10	10	84
	Coarse Gravel	16-22.6	8	8	92
	Coarse Gravel	22.6-32	3	3	95
	Very Coarse Gravel	32-45	1	1	96
	Very Coarse Gravel	45-64	1	1	97
Cobble	Small Cobble	64-90	1	1	98
	Small Cobble	90-128	2	2	100
	Medium Cobble	128-180		0	100
	Large Cobble	180-256		0	100
Boulder	Small Boulders	256-362		0	100
	Small Boulders	362-512		0	100
	Medium Boulders	512-1024		0	100
	Large Boulders	1024-2048		0	100
	Bedrock	> 2048		0	100
Total			100		

d₅₀ = 0.05
d₈₄ = 16.00

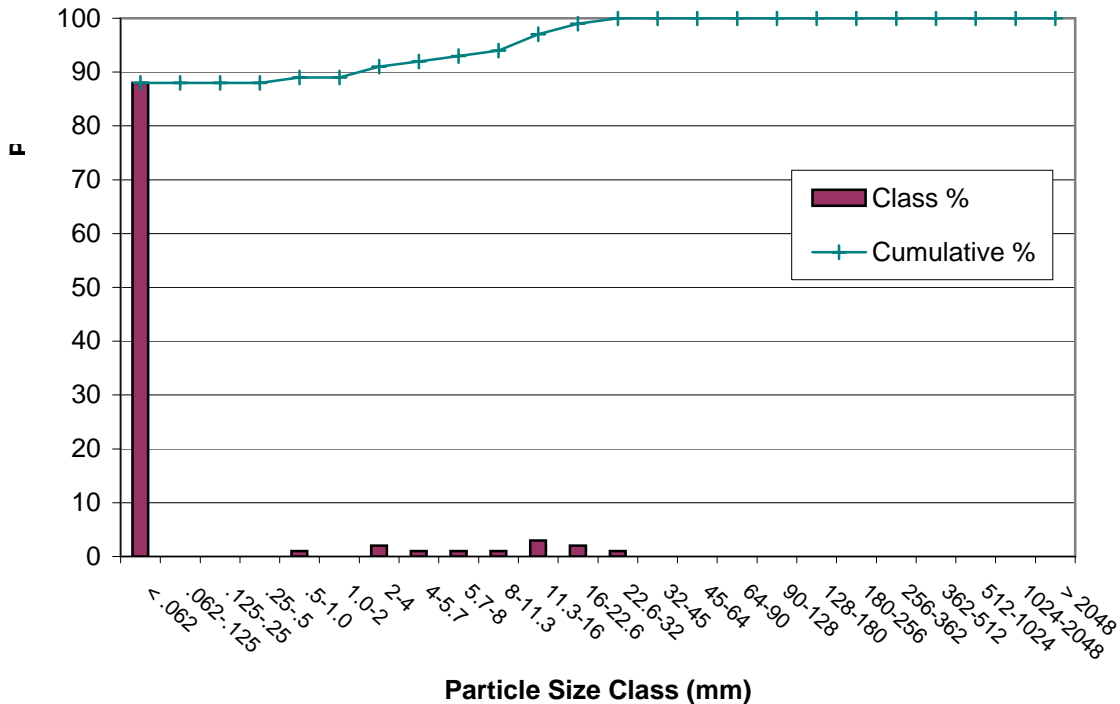


B8. Pebble Count - Tick Creek Stream Restoration - Second Year Monitoring 8/22/2007

Cross Section 2-1

	Particle	Size Range (mm)	Total #	Class %	Cumulative %
S/C	Silt/Clay	< .062	88	88	88
Sand	Very Fine Sand	.062-.125		0	88
	Fine Sand	.125-.25		0	88
	Medium Sand	.25-.5		0	88
	Coarse Sand	.5-1.0	1	1	89
	Very Coarse Sand	1.0-2		0	89
Gravel	Very Fine Gravel	2-4	2	2	91
	Fine Gravel	4-5.7	1	1	92
	Fine Gravel	5.7-8	1	1	93
	Medium Gravel	8-11.3	1	1	94
	Medium Gravel	11.3-16	3	3	97
	Coarse Gravel	16-22.6	2	2	99
	Coarse Gravel	22.6-32	1	1	100
	Very Coarse Gravel	32-45		0	100
	Very Coarse Gravel	45-64		0	100
Cobble	Small Cobble	64-90		0	100
	Small Cobble	90-128		0	100
	Medium Cobble	128-180		0	100
	Large Cobble	180-256		0	100
Boulder	Small Boulders	256-362		0	100
	Small Boulders	362-512		0	100
	Medium Boulders	512-1024		0	100
	Large Boulders	1024-2048		0	100
	Bedrock	> 2048		0	100
Total			100		

d₅₀ = 0.04
d₈₄ = 0.06

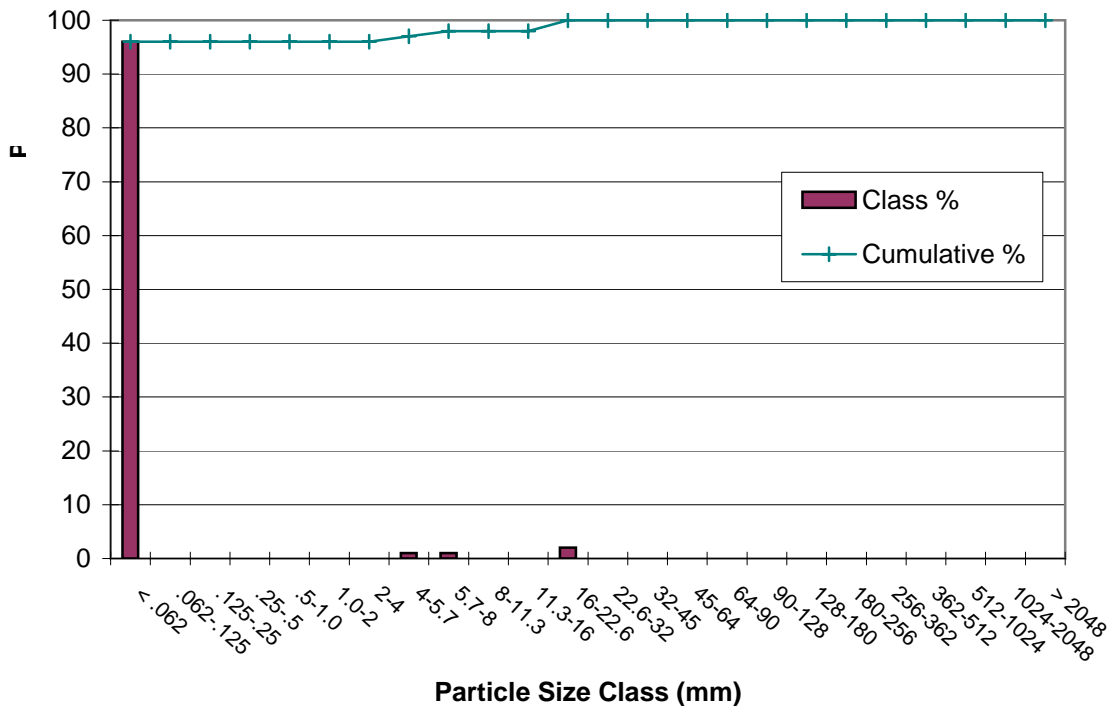


B8. Pebble Count - Tick Creek Stream Restoration - Second Year Monitoring 8/22/2007

Cross Section 2-2

	Particle	Size Range (mm)	Total #	Class %	Cumulative %
S/C	Silt/Clay	< .062	96	96	96
Sand	Very Fine Sand	.062-.125		0	96
	Fine Sand	.125-.25		0	96
	Medium Sand	.25-.5		0	96
	Coarse Sand	.5-1.0		0	96
	Very Course Sand	1.0-2		0	96
Gravel	Very Fine Gravel	2-4		0	96
	Fine Gravel	4-5.7	1	1	97
	Fine Gravel	5.7-8	1	1	98
	Medium Gravel	8-11.3		0	98
	Medium Gravel	11.3-16		0	98
	Coarse Gravel	16-22.6	2	2	100
	Coarse Gravel	22.6-32		0	100
	Very Course Gravel	32-45		0	100
	Very Course Gravel	45-64		0	100
Cobble	Small Cobble	64-90		0	100
	Small Cobble	90-128		0	100
	Medium Cobble	128-180		0	100
	Large Cobble	180-256		0	100
Boulder	Small Boulders	256-362		0	100
	Small Boulders	362-512		0	100
	Medium Boulders	512-1024		0	100
	Large Boulders	1024-2048		0	100
	Bedrock	> 2048		0	100
Total			100		

d₅₀ = 0.03
d₈₄ = 0.05

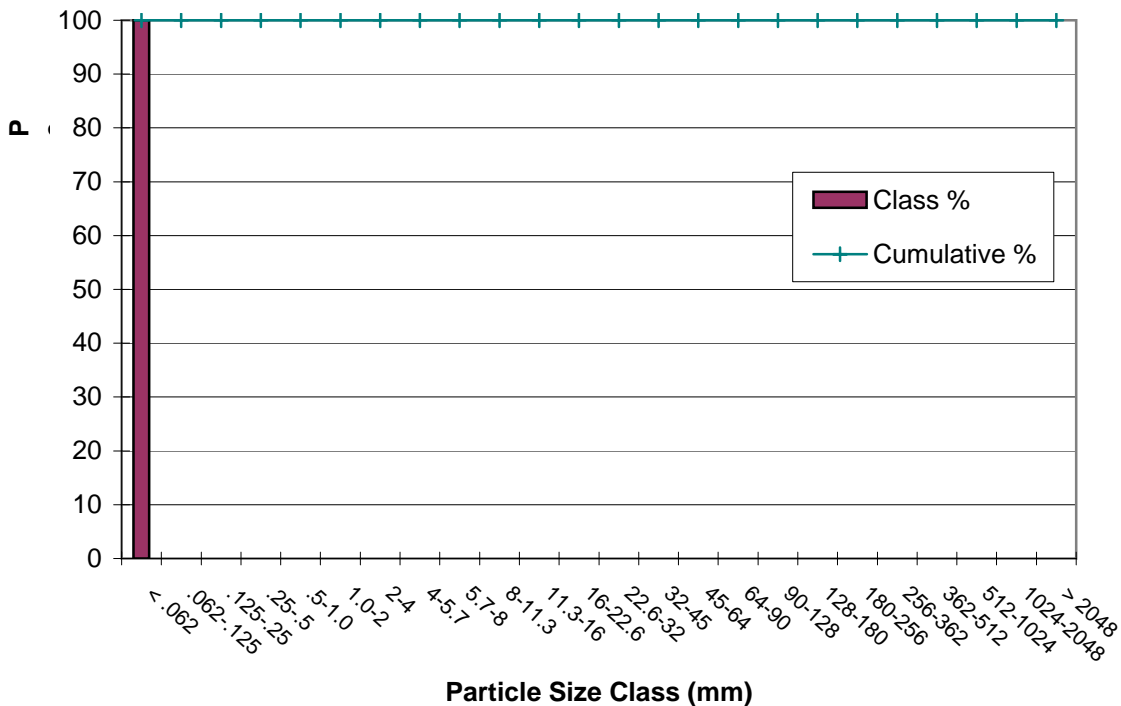


B8. Pebble Count - Tick Creek Stream Restoration - Second Year Monitoring 8/22/2007

Cross Section 2-3

S/C	Particle	Size Range (mm)	Total #	Class %	Cumulative %
	Silt/Clay	< .062	100	100	100
Sand	Very Fine Sand	.062-.125		0	100
	Fine Sand	.125-.25		0	100
	Medium Sand	.25-.5		0	100
	Coarse Sand	.5-1.0		0	100
	Very Course Sand	1.0-2		0	100
Gravel	Very Fine Gravel	2-4		0	100
	Fine Gravel	4-5.7		0	100
	Fine Gravel	5.7-8		0	100
	Medium Gravel	8-11.3		0	100
	Medium Gravel	11.3-16		0	100
	Coarse Gravel	16-22.6		0	100
	Coarse Gravel	22.6-32		0	100
	Very Course Gravel	32-45		0	100
	Very Course Gravel	45-64		0	100
Cobble	Small Cobble	64-90		0	100
	Small Cobble	90-128		0	100
	Medium Cobble	128-180		0	100
	Large Cobble	180-256		0	100
Boulder	Small Boulders	256-362		0	100
	Small Boulders	362-512		0	100
	Medium Boulders	512-1024		0	100
	Large Boulders	1024-2048		0	100
	Bedrock	> 2048		0	100
Total			100		

d₅₀ = 0.03
d₈₄ = 0.05

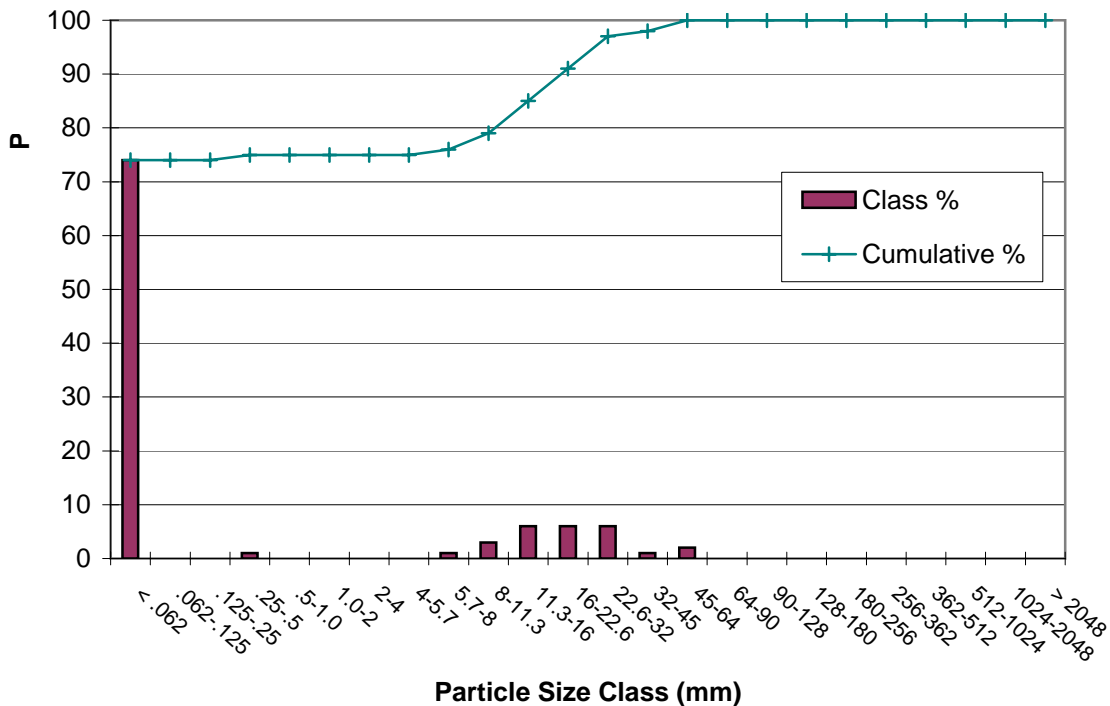


B8. Pebble Count - Tick Creek Stream Restoration - Second Year Monitoring 8/22/2007

Cross Section 2-4

	Particle	Size Range (mm)	Total #	Class %	Cumulative %
S/C	Silt/Clay	< .062	74	74	74
Sand	Very Fine Sand	.062-.125		0	74
	Fine Sand	.125-.25		0	74
	Medium Sand	.25-.5	1	1	75
	Coarse Sand	.5-1.0		0	75
	Very Coarse Sand	1.0-2		0	75
Gravel	Very Fine Gravel	2-4		0	75
	Fine Gravel	4-5.7		0	75
	Fine Gravel	5.7-8	1	1	76
	Medium Gravel	8-11.3	3	3	79
	Medium Gravel	11.3-16	6	6	85
	Coarse Gravel	16-22.6	6	6	91
	Coarse Gravel	22.6-32	6	6	97
	Very Coarse Gravel	32-45	1	1	98
	Very Coarse Gravel	45-64	2	2	100
Cobble	Small Cobble	64-90		0	100
	Small Cobble	90-128		0	100
	Medium Cobble	128-180		0	100
	Large Cobble	180-256		0	100
Boulder	Small Boulders	256-362		0	100
	Small Boulders	362-512		0	100
	Medium Boulders	512-1024		0	100
	Large Boulders	1024-2048		0	100
	Bedrock	> 2048		0	100
Total			100		

d₅₀ = 0.04
d₈₄ = 15.22

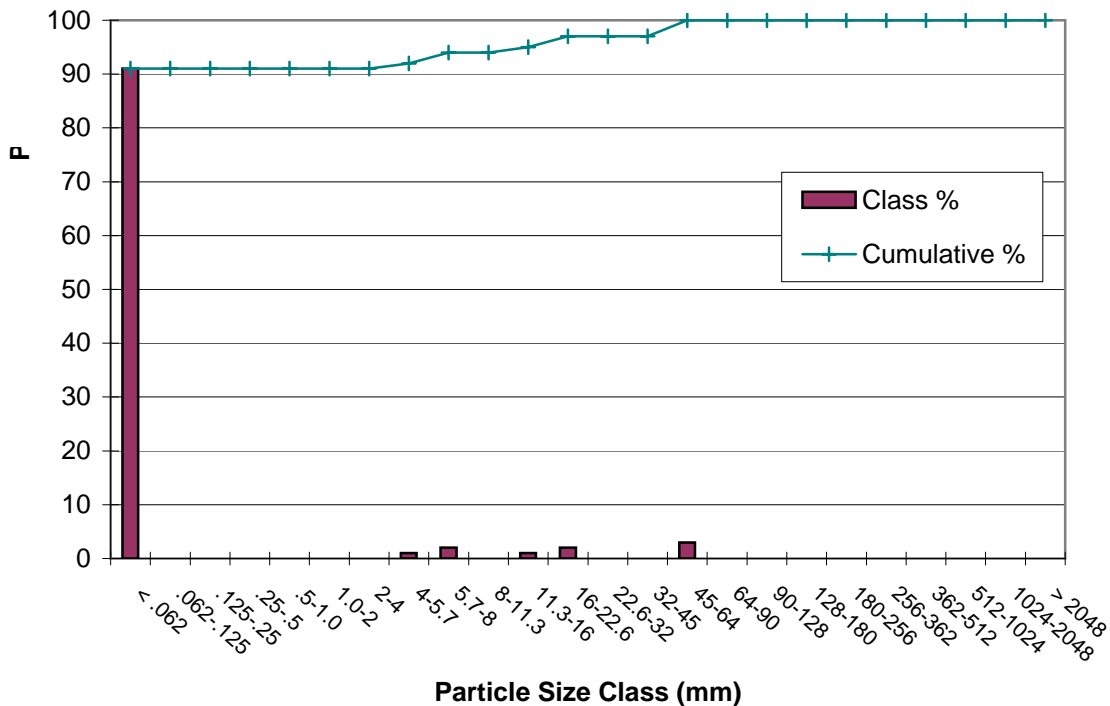


B8. Pebble Count - Tick Creek Stream Restoration - Second Year Monitoring 8/22/2007

Cross Section 2-5

	Particle	Size Range (mm)	Total #	Class %	Cumulative %
S/C	Silt/Clay	< .062	91	91	91
Sand	Very Fine Sand	.062-.125		0	91
	Fine Sand	.125-.25		0	91
	Medium Sand	.25-.5		0	91
	Coarse Sand	.5-1.0		0	91
	Very Course Sand	1.0-2		0	91
Gravel	Very Fine Gravel	2-4		0	91
	Fine Gravel	4-5.7	1	1	92
	Fine Gravel	5.7-8	2	2	94
	Medium Gravel	8-11.3		0	94
	Medium Gravel	11.3-16	1	1	95
	Coarse Gravel	16-22.6	2	2	97
	Coarse Gravel	22.6-32		0	97
	Very Course Gravel	32-45		0	97
	Very Course Gravel	45-64	3	3	100
Cobble	Small Cobble	64-90		0	100
	Small Cobble	90-128		0	100
	Medium Cobble	128-180		0	100
	Large Cobble	180-256		0	100
Boulder	Small Boulders	256-362		0	100
	Small Boulders	362-512		0	100
	Medium Boulders	512-1024		0	100
	Large Boulders	1024-2048		0	100
	Bedrock	> 2048		0	100
Total			100		

d₅₀ = 0.03
d₈₄ = 0.06

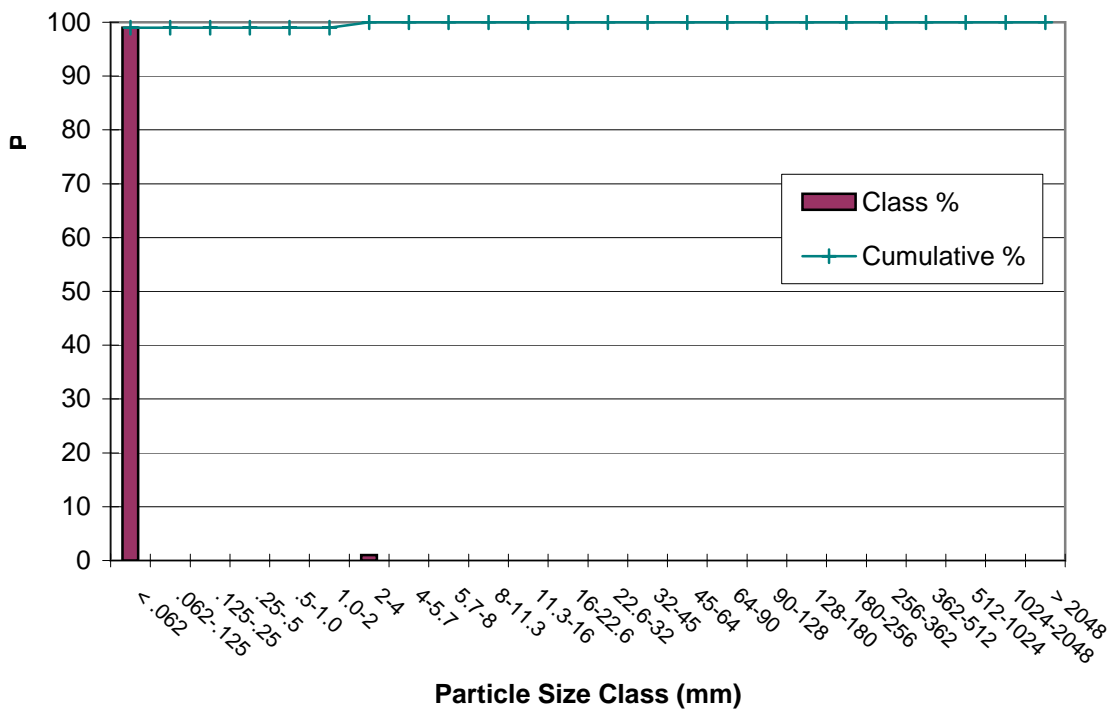


B8. Pebble Count - Tick Creek Stream Restoration - Second Year Monitoring 8/22/2007

Cross Section 2-6

	Particle	Size Range (mm)	Total #	Class %	Cumulative %
S/C	Silt/Clay	< .062	99	99	99
Sand	Very Fine Sand	.062-.125		0	99
	Fine Sand	.125-.25		0	99
	Medium Sand	.25-.5		0	99
	Coarse Sand	.5-1.0		0	99
	Very Course Sand	1.0-2		0	99
Gravel	Very Fine Gravel	2-4	1	1	100
	Fine Gravel	4-5.7		0	100
	Fine Gravel	5.7-8		0	100
	Medium Gravel	8-11.3		0	100
	Medium Gravel	11.3-16		0	100
	Coarse Gravel	16-22.6		0	100
	Coarse Gravel	22.6-32		0	100
	Very Course Gravel	32-45		0	100
	Very Course Gravel	45-64		0	100
Cobble	Small Cobble	64-90		0	100
	Small Cobble	90-128		0	100
	Medium Cobble	128-180		0	100
	Large Cobble	180-256		0	100
Boulder	Small Boulders	256-362		0	100
	Small Boulders	362-512		0	100
	Medium Boulders	512-1024		0	100
	Large Boulders	1024-2048		0	100
	Bedrock	> 2048		0	100
Total			100		

d₅₀ = 0.03
d₈₄ = 0.05

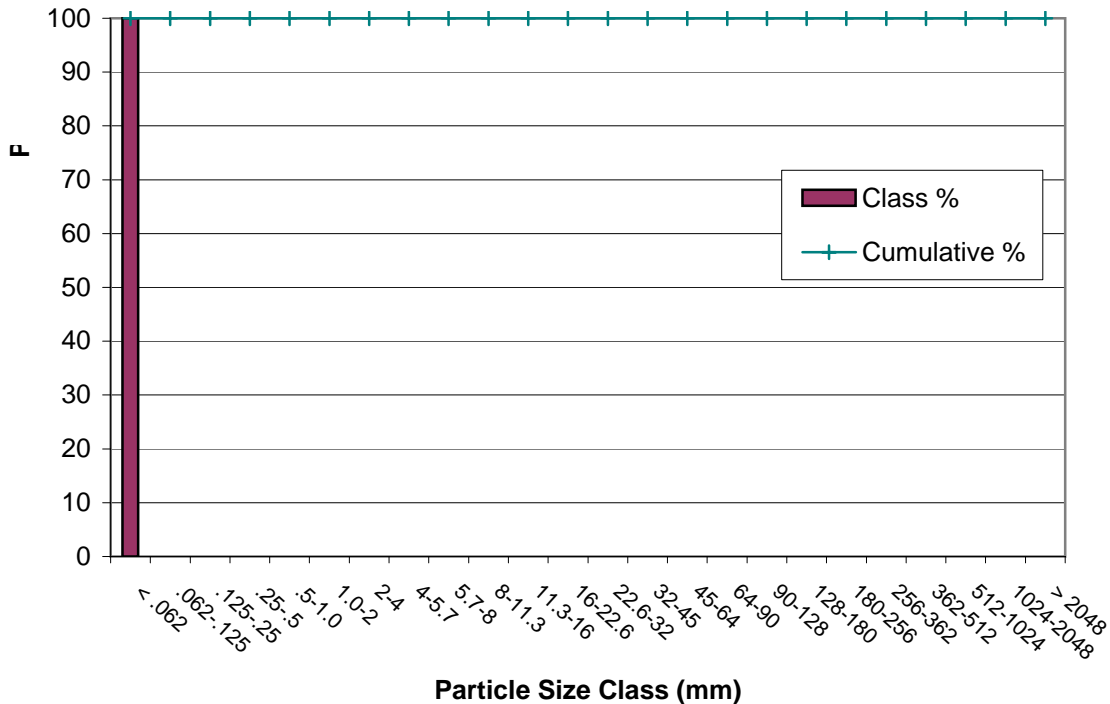


B8. Pebble Count - Tick Creek Stream Restoration - Second Year Monitoring 8/22/2007

Cross Section 3-1

S/C	Particle	Size Range (mm)	Total #	Class %	Cumulative %
	Silt/Clay	< .062	100	100	100
Sand	Very Fine Sand	.062-.125		0	100
	Fine Sand	.125-.25		0	100
	Medium Sand	.25-.5		0	100
	Coarse Sand	.5-1.0		0	100
	Very Course Sand	1.0-2		0	100
Gravel	Very Fine Gravel	2-4		0	100
	Fine Gravel	4-5.7		0	100
	Fine Gravel	5.7-8		0	100
	Medium Gravel	8-11.3		0	100
	Medium Gravel	11.3-16		0	100
	Coarse Gravel	16-22.6		0	100
	Coarse Gravel	22.6-32		0	100
	Very Course Gravel	32-45		0	100
	Very Course Gravel	45-64		0	100
Cobble	Small Cobble	64-90		0	100
	Small Cobble	90-128		0	100
	Medium Cobble	128-180		0	100
	Large Cobble	180-256		0	100
Boulder	Small Boulders	256-362		0	100
	Small Boulders	362-512		0	100
	Medium Boulders	512-1024		0	100
	Large Boulders	1024-2048		0	100
	Bedrock	> 2048		0	100
Total			100		

d₅₀ = 0.03
d₈₄ = 0.05

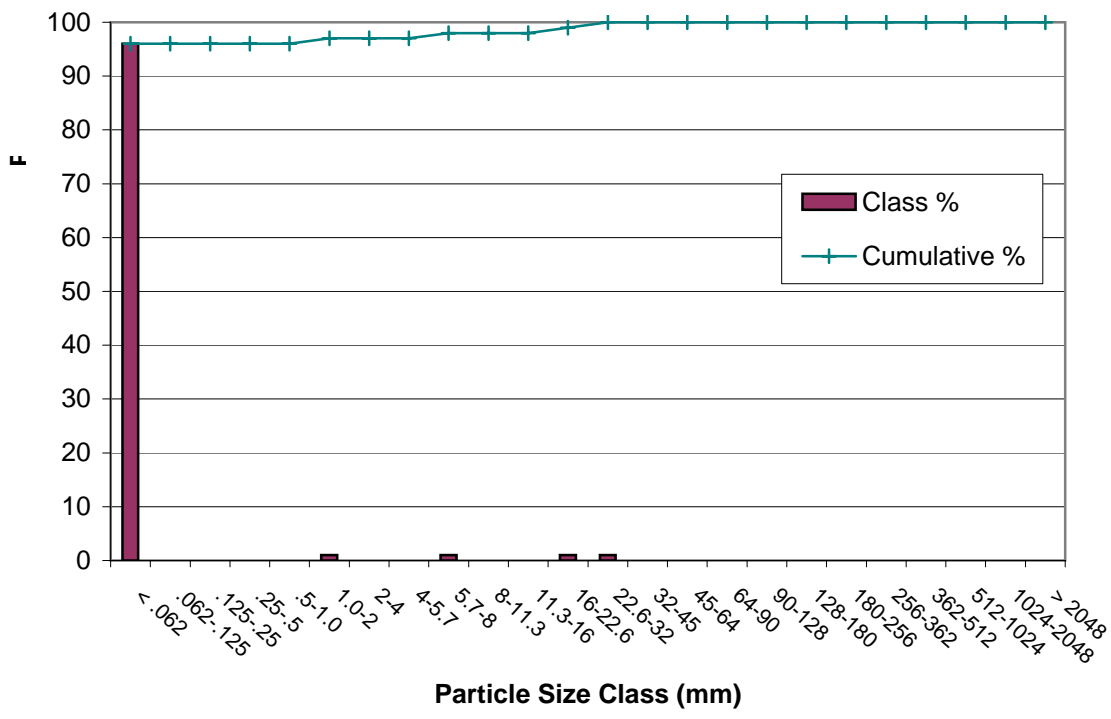


B8. Pebble Count - Tick Creek Stream Restoration - Second Year Monitoring 8/22/2007

Cross Section 3-2

	Particle	Size Range (mm)	Total #	Class %	Cumulative %
S/C	Silt/Clay	< .062	96	96	96
Sand	Very Fine Sand	.062-.125		0	96
	Fine Sand	.125-.25		0	96
	Medium Sand	.25-.5		0	96
	Coarse Sand	.5-1.0		0	96
	Very Coarse Sand	1.0-2	1	1	97
Gravel	Very Fine Gravel	2-4		0	97
	Fine Gravel	4-5.7		0	97
	Fine Gravel	5.7-8	1	1	98
	Medium Gravel	8-11.3		0	98
	Medium Gravel	11.3-16		0	98
	Coarse Gravel	16-22.6	1	1	99
	Coarse Gravel	22.6-32	1	1	100
	Very Coarse Gravel	32-45		0	100
	Very Coarse Gravel	45-64		0	100
Cobble	Small Cobble	64-90		0	100
	Small Cobble	90-128		0	100
	Medium Cobble	128-180		0	100
	Large Cobble	180-256		0	100
Boulder	Small Boulders	256-362		0	100
	Small Boulders	362-512		0	100
	Medium Boulders	512-1024		0	100
	Large Boulders	1024-2048		0	100
	Bedrock	> 2048		0	100
Total			100		

d₅₀ = 0.03
d₈₄ = 0.05

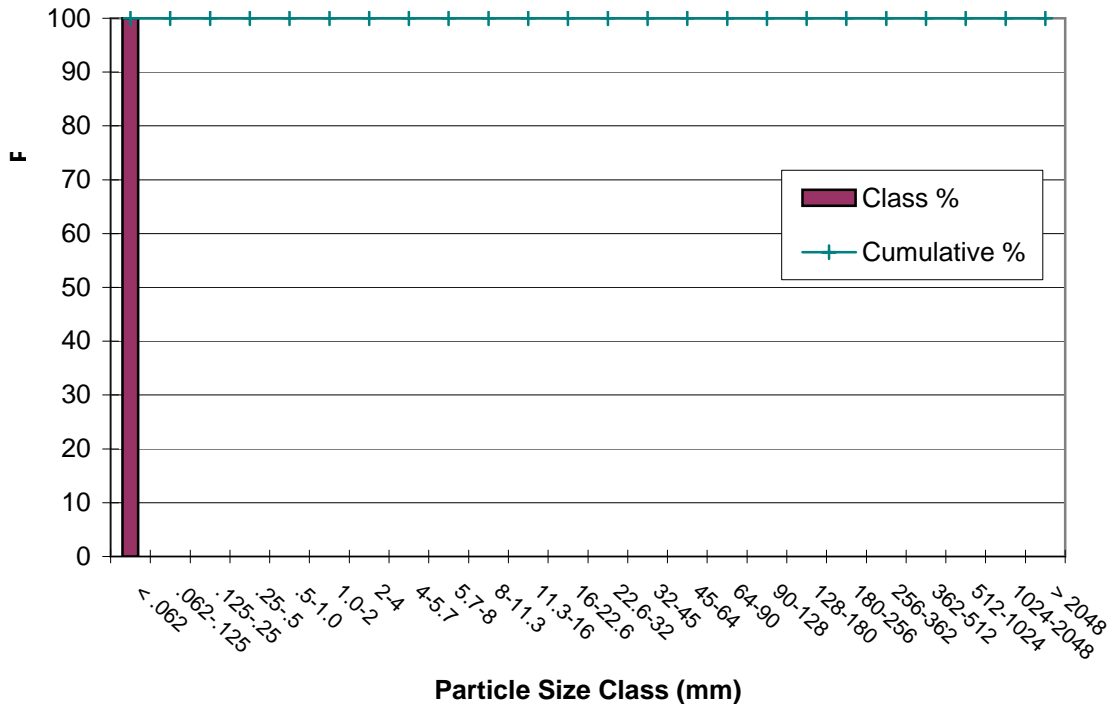


B8. Pebble Count - Tick Creek Stream Restoration - Second Year Monitoring 8/22/2007

Cross Section

S/C	Particle	Size Range (mm)	Total #	Class %	Cumulative %
	Silt/Clay	< .062	100	100	100
Sand	Very Fine Sand	.062-.125		0	100
	Fine Sand	.125-.25		0	100
	Medium Sand	.25-.5		0	100
	Coarse Sand	.5-1.0		0	100
	Very Course Sand	1.0-2		0	100
Gravel	Very Fine Gravel	2-4		0	100
	Fine Gravel	4-5.7		0	100
	Fine Gravel	5.7-8		0	100
	Medium Gravel	8-11.3		0	100
	Medium Gravel	11.3-16		0	100
	Coarse Gravel	16-22.6		0	100
	Coarse Gravel	22.6-32		0	100
	Very Course Gravel	32-45		0	100
	Very Course Gravel	45-64		0	100
Cobble	Small Cobble	64-90		0	100
	Small Cobble	90-128		0	100
	Medium Cobble	128-180		0	100
	Large Cobble	180-256		0	100
Boulder	Small Boulders	256-362		0	100
	Small Boulders	362-512		0	100
	Medium Boulders	512-1024		0	100
	Large Boulders	1024-2048		0	100
	Bedrock	> 2048		0	100
Total			100		

d₅₀ = 0.03
d₈₄ = 0.05

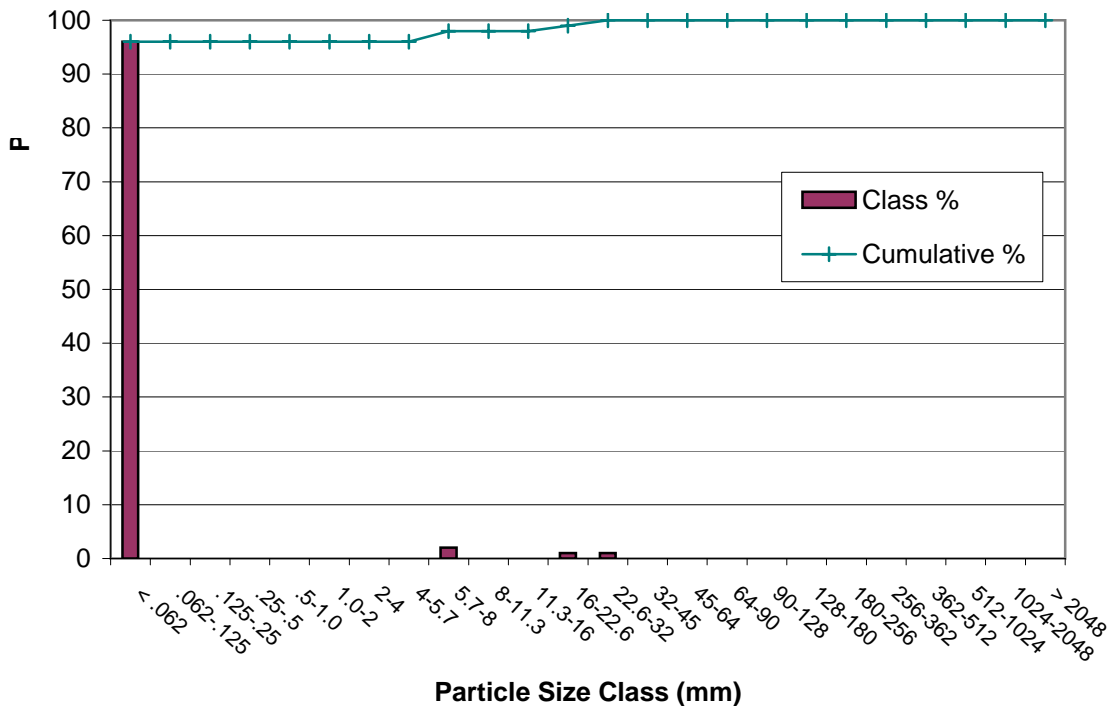


B8. Pebble Count - Tick Creek Stream Restoration - Second Year Monitoring 8/22/2007

Cross Section 3-4

	Particle	Size Range (mm)	Total #	Class %	Cumulative %
S/C	Silt/Clay	< .062	96	96	96
Sand	Very Fine Sand	.062-.125		0	96
	Fine Sand	.125-.25		0	96
	Medium Sand	.25-.5		0	96
	Coarse Sand	.5-1.0		0	96
	Very Course Sand	1.0-2		0	96
Gravel	Very Fine Gravel	2-4		0	96
	Fine Gravel	4-5.7		0	96
	Fine Gravel	5.7-8	2	2	98
	Medium Gravel	8-11.3		0	98
	Medium Gravel	11.3-16		0	98
	Coarse Gravel	16-22.6	1	1	99
	Coarse Gravel	22.6-32	1	1	100
	Very Course Gravel	32-45		0	100
	Very Course Gravel	45-64		0	100
Cobble	Small Cobble	64-90		0	100
	Small Cobble	90-128		0	100
	Medium Cobble	128-180		0	100
	Large Cobble	180-256		0	100
Boulder	Small Boulders	256-362		0	100
	Small Boulders	362-512		0	100
	Medium Boulders	512-1024		0	100
	Large Boulders	1024-2048		0	100
	Bedrock	> 2048		0	100
Total			100		

d₅₀ = 0.03
d₈₄ = 0.05

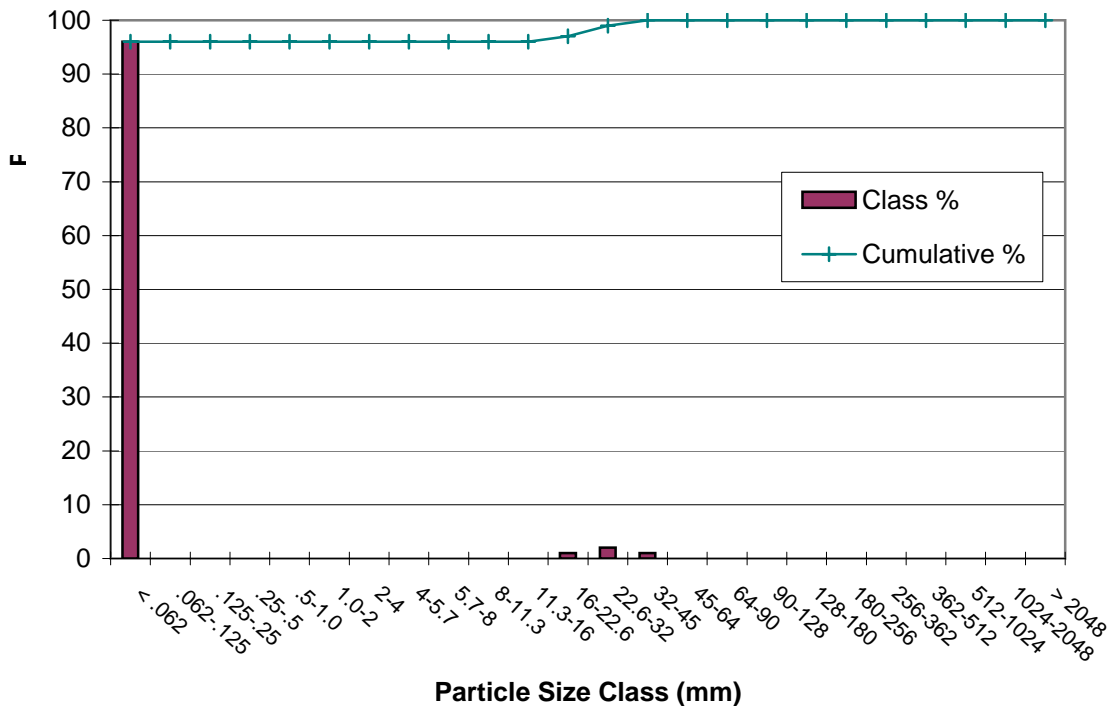


B8. Pebble Count - Tick Creek Stream Restoration - Second Year Monitoring 8/22/2007

Cross Section 3-5

	Particle	Size Range (mm)	Total #	Class %	Cumulative %
S/C	Silt/Clay	< .062	96	96	96
Sand	Very Fine Sand	.062-.125		0	96
	Fine Sand	.125-.25		0	96
	Medium Sand	.25-.5		0	96
	Coarse Sand	.5-1.0		0	96
	Very Course Sand	1.0-2		0	96
Gravel	Very Fine Gravel	2-4		0	96
	Fine Gravel	4-5.7		0	96
	Fine Gravel	5.7-8		0	96
	Medium Gravel	8-11.3		0	96
	Medium Gravel	11.3-16		0	96
	Coarse Gravel	16-22.6	1	1	97
	Coarse Gravel	22.6-32	2	2	99
	Very Course Gravel	32-45	1	1	100
	Very Course Gravel	45-64		0	100
Cobble	Small Cobble	64-90		0	100
	Small Cobble	90-128		0	100
	Medium Cobble	128-180		0	100
	Large Cobble	180-256		0	100
Boulder	Small Boulders	256-362		0	100
	Small Boulders	362-512		0	100
	Medium Boulders	512-1024		0	100
	Large Boulders	1024-2048		0	100
	Bedrock	> 2048		0	100
Total			100		

d₅₀ = 0.03
d₈₄ = 0.05



B8. Pebble Count - Tick Creek Stream Restoration - Second Year Monitoring 8/22/2007

Cross Section 3-6

S/C	Particle	Size Range (mm)	Total #	Class %	Cumulative %
	Silt/Clay	< .062	95	95	95
Sand	Very Fine Sand	.062-.125		0	95
	Fine Sand	.125-.25		0	95
	Medium Sand	.25-.5		0	95
	Coarse Sand	.5-1.0		0	95
	Very Course Sand	1.0-2		0	95
Gravel	Very Fine Gravel	2-4	2	2	97
	Fine Gravel	4-5.7		0	97
	Fine Gravel	5.7-8	1	1	98
	Medium Gravel	8-11.3		0	98
	Medium Gravel	11.3-16	1	1	99
	Coarse Gravel	16-22.6	1	1	100
	Coarse Gravel	22.6-32		0	100
	Very Course Gravel	32-45		0	100
	Very Course Gravel	45-64		0	100
Cobble	Small Cobble	64-90		0	100
	Small Cobble	90-128		0	100
	Medium Cobble	128-180		0	100
	Large Cobble	180-256		0	100
Boulder	Small Boulders	256-362		0	100
	Small Boulders	362-512		0	100
	Medium Boulders	512-1024		0	100
	Large Boulders	1024-2048		0	100
	Bedrock	> 2048		0	100
Total			100		

d₅₀ = 0.03
d₈₄ = 0.05

