Rocky Branch Stream Restoration

Yadkin County, North Carolina

2008 Year 1 Monitoring Report
EEP Project Number: 308
USGS HUC 03040102
EcoEngineering Project Number: EEP-08020

Prepared for:

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Executive Summary/Project Abstract

The As-Built Mitigation Rocky Branch Stream Restoration report and As-Built Plan were completed in February, 2008. The project involves approximately 3,992 linear feet of stream restoration and 24.10 acres of riparian buffer.

The single largest problem observed within the stream channel was sloughing of stream banks along the lower portion of the project. Sloughed stream banks were observed in five (5) locations totaling approximately 90 feet. The condition of these stream banks appeared very similar to the condition depicted in the mitigation plan (Year-0) problem areas photos. Overall the channel morphology appeared stable and functioning as intended.

No wetlands are being monitored for mitigation credits at this project site.

Various exotic/invasive species were observed at the site. Exotic species observed at the site include Chinese privet (Ligustrum sinense), Chinese lespedeza (Lespedeza cuneata), multiflora rose (Rosa multiflora), and Japanese honeysuckle (Lonicera japonica). The extent of exotic/invasive species is depicted in the Integrated Project Problem Areas Plan View Appendix D.

One crest gage is installed at Rocky Branch Stream Restoration Site to document bankfull events. This crest gage was inspected and no evidence of a bankfull event was observed.

Current stem counts were calculated using vegetation plot monitoring data. Interim density targets (stems/acre) are 320 at year 3 and 288 at year 4. Final stem count criteria is 260 trees per acre at the end of the five (5) year monitoring. As for monitored Year 1, Rocky Branch had 11 plots encompassing 0.27 acres, containing 189 stems, which yielded a density of 700 trees per acre.

There are a few minor concerns at the site, but overall, the channel is stable and the planted vegetation is becoming established. The primary concern associated with the stream channel is sloughing stream banks. The sloughing stream banks are likely a result of constructing the stream with a low width-to-depth ratio, thus creating steep slopes along the edge of the stream. Sand lenses in the soil material could have also contributed to bank sloughing.

1.0 Project Background

1.1 Project Objectives

The goals of this stream restoration project were to:

- To improve the overall water quality and aquatic habitat in and around the stream channels by reducing sediment and waste inputs into the stream caused by bank erosion, mass-wasting, and livestock influences.
- To improve the richness and diversity of the plant species within the conservation easement.
- To facilitate on-going livestock operations through farm management improvements.
- To provide perpetual protection for the restored stream channels and associated riparian and upland buffers.

These goals will be met through the following objectives:

- By using natural channel design to restore stable dimension, pattern, and profile for the project stream reaches.
- By establishing a native plant community to match the endemic plant species at the site.
- By reducing the quantities of exotic invasive species at the site through mechanical and chemical methods.
- By decommissioning a dairy waste storage pond to eliminate future risks to the Rocky Branch channel and the watershed.
- By installing watering facilities and a shadehouse to manage livestock previously using the restoration site.
- By establishing a conservation easement and permanent fencing to provide long-term protection for the site. (Mulkey, 2008)

1.2 Project Structure, Restoration Type, and Approach

The proposed stream classification for Rocky Branch was a C4 channel. A combination of Priority 1, 2, and 4 restoration levels were implemented on the Rocky Branch channel. The restored Rocky Branch channel located within the conservation easement totaled 3,820 linear feet. Tributary 1 was relocated and shortened and Tributary 2 was converted to a pond due to landowner agreements. The restoration of Tributary 1 resulted in 172 linear feet of new E4 stream channel utilizing Priority 1 restoration. A total of 3,992 linear feet of stream channel was restored at the Rocky Branch Stream Restoration Site within the conservation easement.

A conservation easement totaling 24.10 acres was established to perpetually protect the stream restoration project. Approximately 17.6 acres of riparian and 3.9 acres of upland buffer were planted within the conservation easement to reestablish a native plant community. Additionally, cattle drinkers, wells, and shadehouse were installed as a farm

management component of the project. An inactive waste storage pond upslope of the project site was decommissioned prior to the stream restoration activities. (Mulkey, 2008)

1.3 Location and Setting

The Rocky Branch Stream Restoration Site (RBSRS) is situated in the southwest corner of Yadkin County, North Carolina. Specifically, it is located on the east side of I-77 between SR 1120 and SR 1122, approximately three miles east of Hamptonville and two miles south of the US 421/I-77 interchange. The restored reaches lie within a 24.10 acre conservation easement. Three individual landowners currently make up the land contained within this conservation easement. The acreage within the easement is divided amongst Mr. Bill Allen (13.47 acres), Mr. Joe Allen (6.99 acres), and Mrs. Texie Owens (3.64 acres).

Rocky Branch and its two unnamed tributaries are situated within the Yadkin-Pee Dee River Basin. The site is specifically within the US Geological Survey (USGS) hydrological unit code (HUC) 03040102 and the NC Division of Water Quality (NCDWQ) sub-basin 03-07-06. This sub-basin is known as the South Yadkin River Watershed and covers 907 square miles (580,480 acres). Forests and agriculture operations account for approximately 95% of the land use within the sub-basin. (Mulkey, 2008)

1.4 Project History and Background

The original Rocky Branch channel totaled 2,901 linear feet within the proposed conservation easement. The pre-existing Rocky Branch channel classified as predominantly a degraded C4 channel according to the Rosgen stream classification system (Rosgen, 1994). The two existing tributaries located within the proposed conservation easement are 873 linear feet. The original Tributary 1 classified as a C5 stream channel and Tributary 2 was not classified due to its severely degraded nature. (Mulkey, 2008) The As-Built Mitigation Rocky Branch Stream Restoration report and As-Built Plan were completed in February, 2008. The project involves approximately 3,992 linear feet of stream restoration and 24.10 acres of riparian buffer.

Exhibit Table I. Project Restoration Components
Rocky Branch Stream Restoration Site/EEP Project Number: 308

Project Segment or Reach ID	Existing Feet/Acres	Type	Approach	Footage or Acreage	Stationing	Comment
Rocky Branch	2,901	R	P1 & P2	3,614	0+00 - 39+97	
		EI	SS	206		
Tributary 1	593	R	P1	172	0+00 - 1+72	
Tributary 2	280	NA	NA	Pond	NA	NA = Not Applicable; Portion of original channel contained within proposed conservation easement
Mitigation Unit Summations						
Stream (lf)	Riparian Wetland (Ac)	Nonriparian Wetland (Ac)	Total Wetland (Ac)	Buffer (Ac)	Comment	
3,923	0	0	0	24.10		

R= Restoration EII= Enhancement II P1= Priority I P3= Priority III
EI= Enhancement S= Stabilization P2= Priority II SS=Stream Bank Stabilization

Exhibit Table II. Project Activity and Reporting History Rocky Branch Stream Restoration Site/EEP Project Number: 308		
Activity or Report	**Data Collection Complete**	**Actual Completion or Delivery**
Restoration Plan	Winter 04	Mar-05
Final Design – 90%	Summer 05	Winter 05
Construction	May-06	Sep-06
Temporary S&E mix applied to entire project area	May-06	Sep-06
Permanent seed mix applied to reach/segments 1 & 2	Sep-06	Sep-06
Containerized and B&B plantings for reach/segments 1 & 2	Fall 06	Dec-06
Mitigation Plan / As-built (Year 0 Monitoring – baseline)	Winter 07	Feb-08
Year 1 Monitoring	Sep-08	Nov-08
Year 2 Monitoring	------	------

Note: Timeframe estimated from information provided by EEP.

Exhibit Table III. Project Contacts Table Rocky Branch Stream Restoration Site/EEP Project Number: 308	
Designer Primary project design POC	Mulkey Engineers & Consultants 6750 Tryon Road, Cary, NC 27518 Wendee Smith, 919-858-1833
Construction Contractor Construction contractor POC	Fluvial Solutions, Inc. PO Box 28749, Raleigh, NC 27611-8749 Peter Jelenevsky, 919-605-6134
Planting Contractor Planting contractor POC	Carolina Silvics 908 Indian Trail Road, Edenton, NC 27932 Mary-Margaret McKinney 252-484-8491
Seeding Contractor Planting contractor POC	Contact: Fluvial Solutions, Inc. PO Box 28749, Raleigh, NC 27611-8749 Peter Jelenevsky, 919-605-6134
Seed Mix Sources	Contact: Fluvial Solutions, Inc. Peter Jelenevsky, 919-605-6134
Nursery Stock Suppliers	ArborGen 843-851-4129
Monitoring Performers	EcoEngineering - A Division of The John R. McAdams Co. 2905 Meridian Parkway, Durham, NC 27713
Stream Monitoring POC Jim Halley	919-287-4262
Vegetation Monitoring POC Jim Halley	919-287-4262
Wetland Monitoring POC NA	NA

Note: Information obtained from EEP documents and bid tabulation results. Use contacts in table for additional information or to verify data.

Exhibit Table IV. Project Background Table Rocky Branch Stream Restoration Site/EEP Project Number: 308	
Project County	Yadkin County
Drainage Area	3.1 square miles
Drainage impervious cover estimate (%)	5%
Stream Order	1
Physiographic Region	Piedmont
Ecoregion	Northern Inner Piedmont
Rosgen Classification of As-built	C4
Cowardin Classification	R3UBH
Dominant soil types	Chewacla, Cecil, Appling, and Wilkes
Reference site ID	Spencer Creek
USGS HUC for Project and Reference	Project 03040102, Reference 03040104
NCDWQ Sub-basin for Project and Reference	Project 03-07-06, Reference 03-07-09
NCDWQ classification for Project and Reference	Project WS-III, Reference WS-IV
Any portion of any project segment 303d listed?	no
Any portion of any project segment upstream of a 303d listed segment?	no
Reasons for 303d listing or stressor	no
% of project easement fenced	100%

1.5 Monitoring Plan View

See **Appendix D** for Stream Restoration Project – Year One Monitoring Plan View.

2.0 Project Condition and Monitoring Results

2.1 Vegetation Assessment

Vegetation monitoring plot stem counts and photos are located in **Appendix A**.

2.1.1 Vegetative Problem Areas

Vegetative problem areas can be grouped into two categories: bare floodplain and invasive species encroachment. Of the two categories, the invasive species encroachment category is of high concern.

One area, located at Station 1+77, was noted in the As-Built Mitigation Rocky Branch Stream Restoration report as a bare floodplain. This is an eroded area caused by a debris jam. The As-Built Mitigation Rocky Branch Stream Restoration report noted the area was naturally vegetated with sycamore (*Plantanus occidentalis*) seedlings. At the time of the field investigations for the First Year Monitoring, exposed soil persists at the bare floodplain area;

however, vegetation is thriving. It appears the vegetation is filling in the bare floodplain area at an adequate rate. Over time, it is likely that areas of exposed soil will diminish.

There are areas in which invasive populations have encroached into Rocky Branch Stream Restoration Site. Patches of Chinese privet (*Ligustrum sinense*), Chinese lespedeza (*Lespedeza cuneata*), multiflora rose (*Rosa multiflora*), and Japanese honeysuckle (*Lonicera japonica*) were noted.

2.1.2 Vegetative Problem Area Plan View

All vegetative problem areas discussed above are shown on Stream Restoration Project – Year One Monitoring Plan View located in **Appendix D**.

2.2 Stream Assessment

2.2.1 Procedural Items

2.2.1.1 Morphometric Criteria

Dimension and profile were sampled per the 2003 Stream Mitigation Guidelines (USACE, 2003) as follows:

2.2.1.1.1 Dimension

See **Appendix B** for cross-section information.

2.2.1.1.2 Profile

See **Appendix B** for cross-section information.

2.2.1.2 Hydrologic Criteria

One crest gage is installed at Rocky Branch Stream Restoration Site to document bankfull events. This crest gage was inspected and no evidence of a bankfull event was observed.

Exhibit Table V. Verification of Bankfull Events
Rocky Branch Stream Restoration Site/EEP Project Number: 308

Date of Data Collection	Date of Occurrence	Method	Photo # (if available)
September 24, 2008	No occurrence	Observation	Not Available

2.2.1.2 Bank Stability Assessments

This is the first year of monitoring; and therefore, BEHI and NBS assessments were not performed. As required by EEP, BEHI and NBS assessments will be performed during the year five monitoring period.

2.2.2 Problem Areas Plan View

See **Appendix D** for Stream Restoration Project – Year One Monitoring Plan View.

2.2.3 Problem Areas Summary

See Exhibit Table B.1 in **Appendix B** for the Stream Problem Areas table.

2.2.4 Stream Problem Area Photographs

See representative stream problem area photographs located in **Appendix B**.

2.2.5 Fixed Station Photos

Stream Photo Station photographs are located in **Appendix B**.

2.2.6 Stability Assessment

The following is the Categorical Stream Feature Visual Stability Assessment Table (Exhibit Table VII).

Exhibit Table VIIa. Categorical Stream Feature Visual Stability Assessment
Rocky Branch Stream Restoration Site/EEP Project Number: 308
Rocky Branch: 3,751 Linear Feet

Feature	Initial	MY-01	MY-02	MY-03	MY-04	MY-05
A. Riffles		96%				
B. Pools		93%				
C. Thalweg		94%				
D. Meanders		100%				
E. Bed General		100%				
F. Bank Condition		98%				
G. Vanes/J-Hooks etc.		100%				
H. Wads and Boulders		100%				

Exhibit Table VIIb. Categorical Stream Feature Visual Stability Assessment
Rocky Branch Stream Restoration Site/EEP Project Number: 308
Tributary 1: 172 Linear Feet

Feature	Initial	MY-01	MY-02	MY-03	MY-04	MY-05
A. Riffles		100%				
B. Pools		NA				
C. Thalweg		100%				
D. Meanders		100%				
E. Bed General		100%				
F. Bank Condition		100%				
G. Vanes/J-Hooks etc.		100%				
H. Wads and Boulders		NA				

2.2.7 Quantitative Measures Summary

The following are the Baseline Morphology and Hydraulic Summary (Exhibit Table VIII) and Morphology and Hydraulic Monitoring Summary (Exhibit Table IX) tables.

Exhibit Table VIII(a). Baseline Morphology and Hydraulic Summary
Rocky Branch Stream Restoration Site/EEP Project Number: 308
Rocky Branch: 3,751 Linear Feet

Parameter	USGS Gage Data			Regional Curve Interval			Pre-Existing Condition			Project Reference Stream			Design			As-built		
Dimension	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med
BF Width (ft)						19.3	19.0	25.5	21.6	13.2	13.5	13.3			23.0	17.8	39.2	21.6
Floodprone Width (ft)							29	78	54	169	169	169	60	>120		100	100	100
BF Cross Sectional Area (ft2)						46.2	27.5	44.4	35.3	19.4	23.0	21.5	30.0	35.0	32.5	23.2	29.5	24.6
BF Mean Depth (ft)						2.2	1.4	2.1	1.4	1.5	1.7	1.6	1.3	1.5	1.4	0.6	1.4	1.3
BF Max Depth							1.7	2.9	1.8	2.0	2.7	2.4	1.8	2.0	1.9	2.1	2.7	2.3
Width/Depth Ratio							11	18	13	8	9	8	15	18	16	>12	>12	>12
Entrenchment Ratio							1.5	3.0	2.3	12.7	12.7	12.7	2.6	>5.2		>2.2	>2.2	>2.2
Bank Height Ratio							1.5	1.9	1.7	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Wetted Perimeter (ft)																18.8	39.8	22.6
Hydraulic radius (ft)																0.6	1.3	1.2
Pattern																		
Channel Beltwidth (ft)							43	43	43	13	54	27	47	96	72	53	80	61
Radius of Curvature (ft)							27	27	27	12	20	16	40	64	52	47	50	48
Meander Wavelength (ft)							146	146	146	64	97	75	96	200	148	123	171	145
Meander Width ratio							5.7	7.7	6.7	0.9	4.1	2.0	2.1	4.2	3.1	5.3	7.5	6.3
Profile																		
Riffle length (ft)													15	55	25	17	51	38
Riffle slope (ft/ft)							0.010	0.010	0.010	0.012	0.027	0.021	0.011	0.033	0.022	0.009	0.027	0.017
Pool length (ft)							39	39	39	15	24	20	28	39	35	35	35	35
Pool spacing (ft)							298	298	298	70	70	70	115	161	138	138	138	138
Channel Substrate																		
d50 (mm)									11			20			11			6
d84 (mm)									87			50			87			27
Additional Reach Parameters																		
Valley Length (ft)									2522						2522			2522
Channel Length (ft)									3800						3800			3802
Sinuosity									1.5			1.4			1.5			1.5
Water Surface Slope (ft/ft)													0.007	0.011	0.008			
BF slope (ft/ft)																		
Rosgen Classification							E4	C4	B1/4C			E4-C4			C4			C4
*Habitat Index																		
*Macrobenthos																		

*Inclusion will be project specific and determined by As-built monitoring plan/success criteria

Exhibit Table VIII(b). Baseline Morphology and Hydraulic Summary
Rocky Branch Stream Restoration Site/EEP Project Number: 308
Tributary: 172 Linear Feet

Parameter	USGS Gage Data			Regional Curve Interval			Pre-Existing Condition			Project Reference Stream			Design			As-built		
Dimension	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med
BF Width (ft)						19.3	19.0	25.5	21.6	13.2	13.5	13.3			23.0			38.5
Floodprone Width (ft)							29	78	54	169	169	169	60	>120				100
BF Cross Sectional Area (ft2)						46.2	27.5	44.4	35.3	19.4	23.0	21.5	30.0	35.0	32.5			20.0
BF Mean Depth (ft)						2.2	1.4	2.1	1.4	1.5	1.7	1.6	1.3	1.5	1.4			0.5
BF Max Depth							1.7	2.9	1.8	2.0	2.7	2.4	1.8	2.0	1.9			2.0
Width/Depth Ratio							10.5	18.3	13.2	8.0	8.8	8.3	15.1	17.7	16.4			>12
Entrenchment Ratio							1.5	3.0	2.3	12.7	12.7	12.7	2.6	>5.2				>2.2
Bank Height Ratio							1.5	1.9	1.7	1.0	1.0	1.0	1.0	1.0	1.0			1.0
Wetted Perimeter (ft)																		39.3
Hydraulic radius (ft)																		0.5
Pattern																		
Channel Beltwidth (ft)							43	43	43	13	54	27	47	96	72	53	80	61
Radius of Curvature (ft)							27	27	27	12	20	16	40	64	52	47	50	48
Meander Wavelength (ft)							146	146	146	64	97	75	96	200	148	123	171	145
Meander Width ratio							5.7	7.7	6.7	0.9	4.1	2.0	2.1	4.2	3.1	5.3	7.5	6.3
Profile																		
Riffle length (ft)																13	20	20
Riffle slope (ft/ft)							0.010	0.010	0.010	0.012	0.027	0.021	0.011	0.033	0.022	0.028	0.046	0.037
Pool length (ft)							39	39	39	15	24	20	28	39	35	14	19	17
Pool spacing (ft)							298	298	298	70	70	70	115	161	138	21	36	29
Channel Substrate																		
d50 (mm)									11			20			11			
d84 (mm)									87			50			87			
Additional Reach Parameters																		
Valley Length (ft)									150						150			150
Channel Length (ft)									160						160			172
Sinuosity									1.1			1.4			1.1			1.1
Water Surface Slope (ft/ft)															0.008			
BF slope (ft/ft)																		
Rosgen Classification							E4	C4	B1/4C			E4-C4			C4			C4
*Habitat Index																		
*Macrobenthos																		

*Inclusion will be project specific and determined by As-built monitoring plan/success criteria

Exhibit Table IX(a). Morphology and Hydraulic Monitoring Summary
Rocky Branch Stream Restoration Site/EEP Project Number: 308
Rocky Branch: 3,751 Linear Feet

Parameter	Cross Section 1 Pool						Cross Section 2 Riffle						Cross Section 3 Pool						Cross Section 4 Riffle					
Dimension	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+
BF Width (ft)	24.0						23.2						21.3						25.8					
Floodprone Width (ft)	100						100						100						100					
BF Cross Sectional Area (ft2)	47.7						23.4						52.6						43.7					
BF Mean Depth (ft)	2.0						1.0						2.5						1.7					
BF Max Depth (ft)	3.9						2.2						3.7						3.2					
Width/Depth Ratio	>12						>12						8.6						>12					
Entrenchment Ratio	>2.2						>2.2						>2.2						>2.2					
Bank Height Ratio	1.0						1.0						1.0						1.0					
Wetted Perimeter (ft)	26.8						23.8						23.9						26.8					
Hydraulic radius (ft)	1.8						1.0						2.2						1.6					
Substrate																								
d50 (mm)	NA						9						NA						11					
d84 (mm)	NA						90						NA						56					

Parameter	Cross Section 5 Pool						Cross Section 6 Pool						Cross Section 7 Riffle					
Dimension	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+
BF Width (ft)	28.1						26.5						28.4					
Floodprone Width (ft)	100						100						100					
BF Cross Sectional Area (ft2)	59.3						95.4						37.6					
BF Mean Depth (ft)	2.1						3.6						1.3					
BF Max Depth (ft)	4.5						6.5						3.2					
Width/Depth Ratio	>12						7.4						>12					
Entrenchment Ratio	>2.2						>2.2						>2.2					
Bank Height Ratio	1.0						1.0						1.0					
Wetted Perimeter (ft)	30.5						31.6						29.5					
Hydraulic radius (ft)	1.9						3.0						1.3					
Substrate																		
d50 (mm)	NA						NA						0.5					
d84 (mm)	NA						NA						1					

Parameter	MY-01 (2008)			MY-02 (2009)			MY-03 (2010)			MY-04 (2011)			MY-05 (2012)			MY+ (2013)		
Pattern	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med
Channel Beltwidth (ft)	20	88	78															
Radius of Curvature (ft)	22	58	34															
Meander Wavelength (ft)	106	207	157															
Meander Width ratio	1.2	3.7	3.3															
Profile																		
Riffle length (ft)	1	42	19															
Riffle slope (ft/ft)	0.001	0.044	0.013															
Pool length (ft)	9	117	37															
Pool spacing (ft)	50	216	105															
Additional Reach Parameters																		
Valley Length (ft)	2522																	
Channel Length (ft)	3094																	
Sinuosity	1.2																	
Water Surface Slope (ft/ft)	0.007																	
BF slope (ft/ft)	0.004																	
Rosgen Classification	C4																	
Habitat Index*																		
Macrobenthos*																		

Exhibit Table IX(b). Morphology and Hydraulic Monitoring Summary
Rocky Branch Stream Restoration Site/EEP Project Number: 308
Tributary 1: 172 Linear Feet

Parameter	Cross Section 8 Riffle					
Dimension	MY1	MY2	MY3	MY4	MY5	MY+
BF Width (ft)	25.8					
Floodprone Width (ft)	100					
BF Cross Sectional Area (ft2)	20.8					
BF Mean Depth (ft)	0.8					
BF Max Depth (ft)	2.1					
Width/Depth Ratio	>12					
Entrenchment Ratio	>2.2					
Bank Height Ratio	1.0					
Wetted Perimeter (ft)	26.4					
Hydraulic radius (ft)	0.8					
Substrate						
d50 (mm)	0.2					
d84 (mm)	45					

Parameter	MY-01 (2008)			MY-02 (2009)			MY-03 (2010)			MY-04 (2011)			MY-05 (2012)			MY+ (2013)		
Pattern*	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med
Channel Beltwidth (ft)																		
Radius of Curvature (ft)																		
Meander Wavelength (ft)																		
Meander Width ratio																		
Profile*																		
Riffle length (ft)																		
Riffle slope (ft/ft)																		
Pool length (ft)																		
Pool spacing (ft)																		
Additional Reach Parameters*																		
Valley Length (ft)																		
Channel Length (ft)																		
Sinuosity																		
Water Surface Slope (ft/ft)																		
BF slope (ft/ft)																		
Rosgen Classification																		
Habitat Index*																		
Macrobenthos*																		

*Only 1 cross-section was measured along the tributary and the tributary was not included in the longitudinal profile; therefore, no pattern or profile data can be computed.

2.3 Wetland Assessment

2.3.1 Problem Areas Plan View

The Rocky Branch Stream Restoration Site does not have wetland areas; therefore, a wetland assessment was not performed.

2.3.2 Wetland Criteria Attainment

The Rocky Branch Stream Restoration Site does not have wetland areas; therefore, a wetland assessment was not performed.

3.0 Methodology Section

All monitoring methodologies follow the most current templates and guidelines provided by EEP (EEP, 2006). Photographs were taken at high resolution using an Olympus FE-115 5.0 megapixel digital camera. GPS location information was collected using a Trimble Geo XT handheld mapping grade GPS unit. Stream and vegetation problem areas were noted in the field on As-Built Plan Sheets.

The methods used to generate the data in this report are standard fluvial geomorphology techniques as described in *Applied River Morphology* (Rosgen, 1996) and related publications from US Forest Service and the interagency Stream Mitigation Guidelines (USACE, 2003).

Vegetation monitoring methods followed the 2007, Version 4.1 CVS-EEP Protocol for Recording Vegetation (Lee et. al., 2007). Vegetation plot photographs were collected for each vegetation plot. Vegetation monitoring plots were re-marked in the field by replacing all old flagging with new orange flagging. Monitoring taxonomy follows *Flora of the Carolinas, Virginia, Georgia, and Surrounding Areas* (Weakley 2007). Stem height was measured with a folding one-meter rule. Diameter at breast height and decimeter height were measured with calipers.

References:

Ecosystem Enhancement Program (EEP), 2006. Monitoring Report Guidelines.

Lee, Michael T., R. K. Peet, S. D. Roberts, and T. R. Wentworth. 2007. CVS-EEP Protocol for Recording Vegetation, Version 4.1 (http://cvs.bio.unc.edu/methods.htm)

Mulkey Engineer and Consultants, 2008. As-Built Mitigation Plan Rocky Branch Stream Mitigation Report. Submitted to NCDENR-EEP, February 2008.

Rosgen, D.L. 1996. Applied Morphology. Wildland Hydrology, Pagosa Springs, CO.

US Army Corps of Engineers (USACE), 2003. April 2003 Stream Mitigation Guidelines.

US Army Corps of Engineers (USACE), 2005. Information Regarding Stream Restoration In The Outer Coastal Plain of North Carolina. US Army Corps of Engineers, Wilmington District, Regulatory Division and North Carolina Department of Environment and Natural Resources, Division of Water Quality, December 1, 2005.

Weakley, A. S., 2008. Flora of the Carolinas, Virginia, Georgia, northern Florida, and surrounding areas. University of North Carolina Herbarium (NCU), North Carolina Botanical Garden, University of North Carolina at Chapel Hill, working Draft as of April 7, 2008.

APPENDIX A

Table 1. Vegetation Metadata	
Rocky Branch Stream Restoration Site/EEP Project ID: 308	
Report Prepared By	George Buchholz
Date Prepared	10/10/2008 13:15
database name	EcoEngineering-2008-B.mdb
database location	X:\Projects\EEP\EEP-08020 (Rocky Branch)\Storm
computer name	BUCHHOLZ

DESCRIPTION OF WORKSHEETS IN THIS DOCUMENT----------	
Metadata	Description of database file, the report worksheets, and a summary of project(s) and project data.
Proj, planted	Each project is listed with its PLANTED stems per acre, for each year. This excludes live stakes.
Proj, total stems	Each project is listed with its TOTAL stems per acre, for each year. This includes live stakes, all planted stems, and all natural/volunteer stems.
Plots	List of plots surveyed with location and summary data (live stems, dead stems, missing, etc.).
Vigor	Frequency distribution of vigor classes for stems for all plots.
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.
Planted Stems by Plot and Spp	A matrix of the count of PLANTED living stems of each species for each plot; dead and missing stems are excluded.
PROJECT SUMMARY----------	
Project Code	70715101
project Name	Rocky Branch
Description	Rocky Branch Stream Restoration Project
River Basin	Yadkin-Pee Dee
length(ft)	3,992
stream-to-edge width (ft)	24
area (sq m)	0.04 sq mile (24.10 acres)
Required Plots (calculated)	11
Sampled Plots	11

Table 2. Vegetation Vigor by Species Rocky Branch Stream Restoration Site/EEP Project ID: 308								
	Species	**4**	**3**	**2**	**1**	**0**	**Missing**	**Unknown**
	Acer spicatum		2					
	Alnus serrulata		2	3				
	Betula nigra		6	2				
	Cephalanthus occidentalis		16	9				
	Cornus amomum		6					
	Fraxinus pennsylvanica		40	6	1			
	Itea virginica		3					
	Quercus nigra		8	1				
	Quercus phellos		15	3				
	Salix nigra		20					
	Sambucus canadensis		1	1	1			
	Liriodendron tulipifera		2	1				
	Platanus occidentalis		26	10	1			
	Prunus virginiana		1	2				
TOT:	**14**		**148**	**38**	**3**			

Table 3. Vegetation Damage by Species
Rocky Branch Stream Restoration Site/EEP Project ID: 308

	Species	All Damage Categories	(no damage)	Deer	Diseased	Human Trampled	Insects	Vine Strangulation	(other damage)
	Acer spicatum	2	2						
	Alnus serrulata	5	2			1	1		1
	Betula nigra	8	6	1			1		
	Cephalanthus occidentalis	25	16	1		1	2	2	3
	Cornus amomum	6	6						
	Fraxinus pennsylvanica	47	40		2	1	3	1	
	Itea virginica	3	3						
	Liriodendron tulipifera	3	2					1	
	Platanus occidentalis	37	26		1	1	9		
	Prunus virginiana	3	1				2		
	Quercus nigra	9	8	1					
	Quercus phellos	18	15	2			1		
	Salix nigra	20	20						
	Sambucus canadensis	3	1					1	1
TOT:	**14**	**189**	**148**	**5**	**3**	**4**	**19**	**5**	**5**

Table 4. Vegetation Damage by Plot
Rocky Branch Stream Restoration Site/EEP Project ID: 308

	plot	All Damage Categories	(no damage)	Deer	Diseased	Human Trampled	Insects	Vine Strangulation	(other damage)
	070715101-01-VP10-year:2008	29	28	1					
	070715101-01-VP11-year:2008	18	15			1	1		1
	070715101-01-VP1-year:2008	27	24				3		
	070715101-01-VP2-year:2008	10	8	1			1		
	070715101-01-VP3-year:2008	15	10			2	3		
	070715101-01-VP4-year:2008	13	8				4		1
	070715101-01-VP5-year:2008	11	8			1	1		1
	070715101-01-VP6-year:2008	12	11	1					
	070715101-01-VP7-year:2008	19	13	1			1	3	1
	070715101-01-VP8-year:2008	20	11		1		5	2	1
	070715101-01-VP9-year:2008	15	12	1	2				
TOT:	**11**	**189**	**148**	**5**	**3**	**4**	**19**	**5**	**5**

Table 5. Stem Count by Plot
Rocky Branch Stream Restoration Site/EEP Project ID: 308

	Species	Total Planted Stems	# plots	avg# stems	plot 070715101-01-VP10-year:2008	plot 070715101-01-VP11-year:2008	plot 070715101-01-VP1-year:2008	plot 070715101-01-VP2-year:2008	plot 070715101-01-VP3-year:2008	plot 070715101-01-VP4-year:2008	plot 070715101-01-VP5-year:2008	plot 070715101-01-VP6-year:2008	plot 070715101-01-VP7-year:2008	plot 070715101-01-VP8-year:2008	plot 070715101-01-VP9-year:2008
	Acer spicatum	2	1	2									2		
	Alnus serrulata	5	3	1.67		2								2	1
	Betula nigra	8	4	2	4							1	2		1
	Cephalanthus occidentalis	25	5	5		9					4	6	2	4	
	Cornus amomum	6	1	6	6										
	Fraxinus pennsylvanica	47	10	4.7	3	1		5	3	5	5	4	6	5	10
	Itea virginica	3	2	1.5			2	1							
	Liriodendron tulipifera	3	3	1			1							1	1
	Platanus occidentalis	37	7	5.29	2	2	11	1	11	2				8	
	Prunus virginiana	3	2	1.5			1			2					
	Quercus nigra	9	5	1.8		1	5	1	1				1		
	Quercus phellos	18	7	2.57	1	3		2		3	2		5		2
	Salix nigra	20	2	10	13		7								
	Sambucus canadensis	3	3	1						1		1	1		
TOT:	**14**	**189**	**14**		**29**	**18**	**27**	**10**	**15**	**13**	**11**	**12**	**19**	**20**	**15**

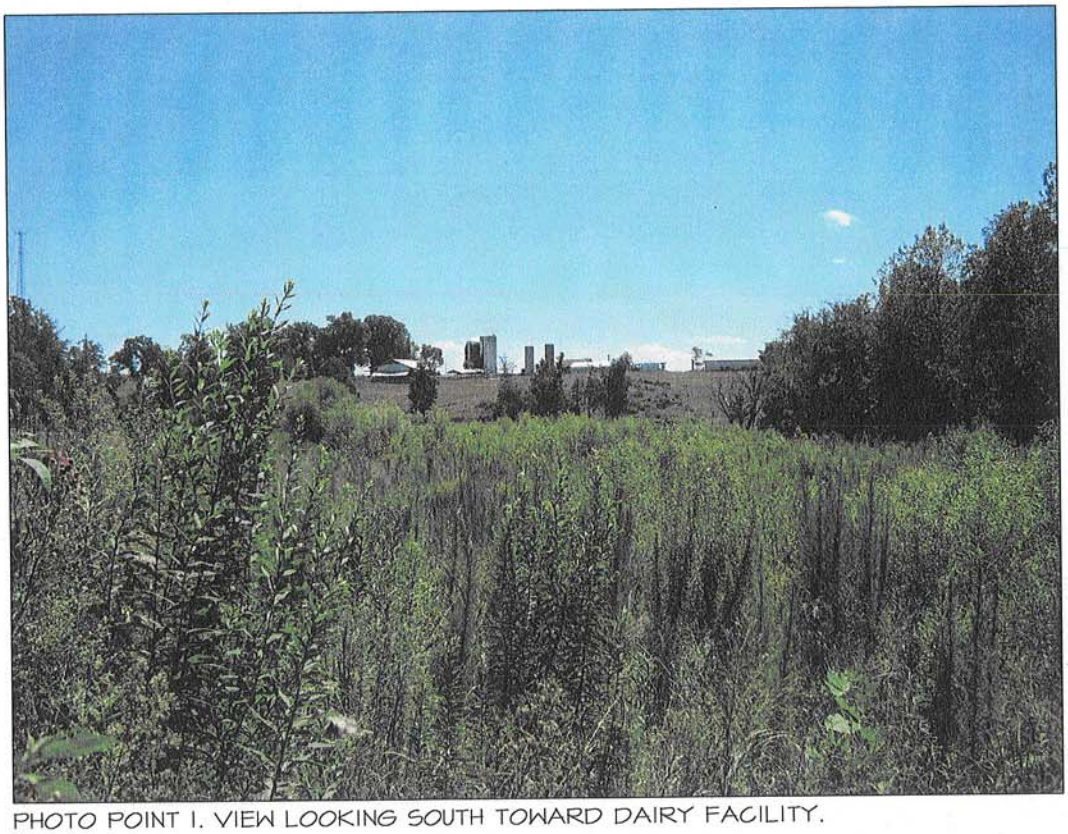

PHOTO POINT 1. VIEW LOOKING SOUTH TOWARD DAIRY FACILITY.

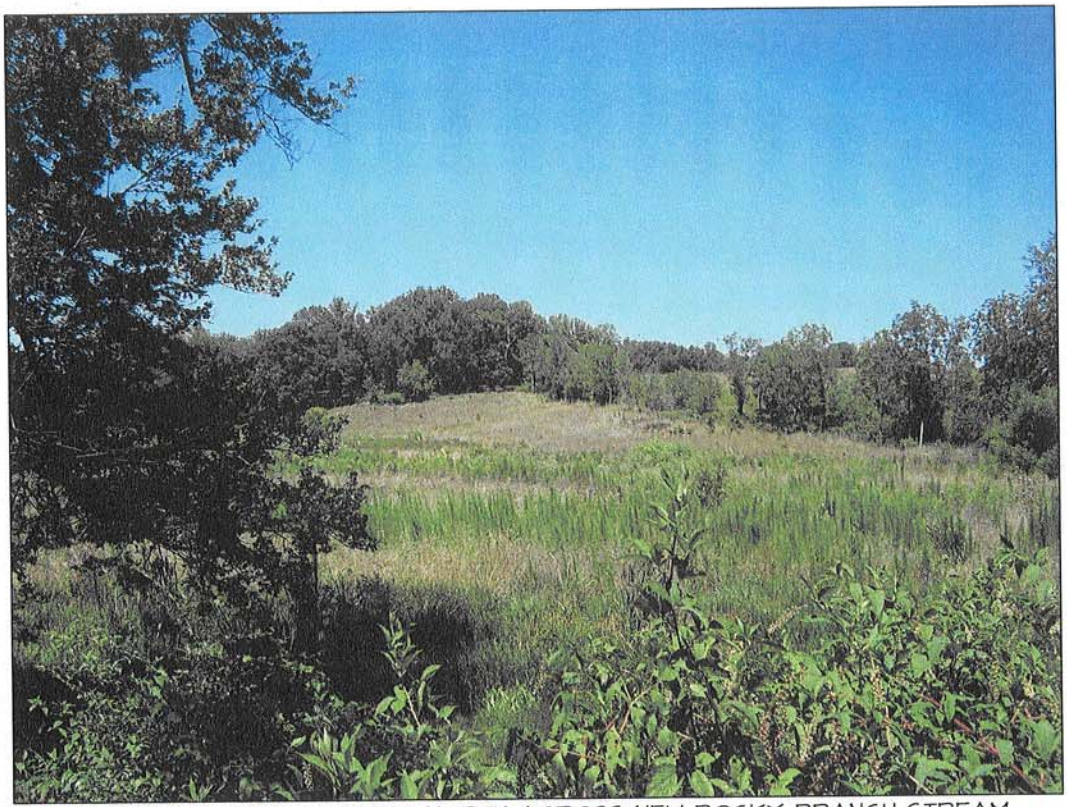

PHOTO POINT 2. VIEW LOOKING NORTH ACROSS NEW ROCKY BRANCH STREAM CHANNEL.

PROJECT NO.	EEP-08020
FILENAME:	EEP08020-EX1
SCALE:	NTS
DATE:	08-20-08

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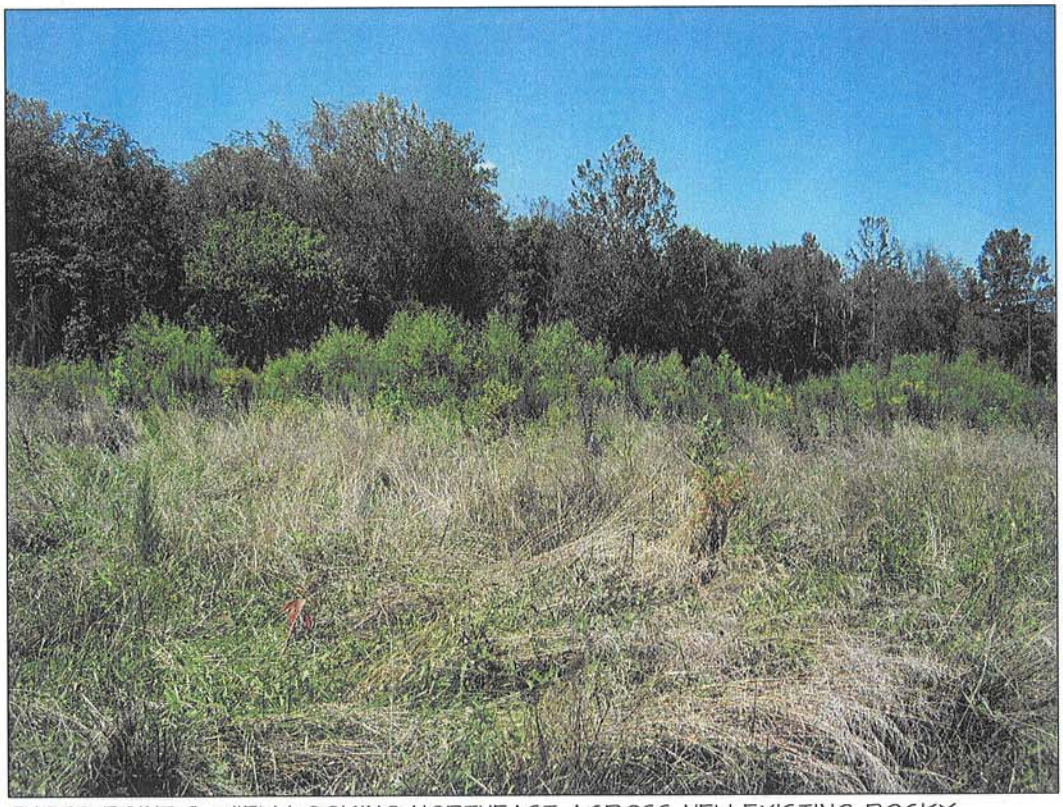

PHOTO POINT 2. VIEW LOOKING NORTHEAST ACROSS NEW EXISTING ROCKY BRANCH STREAM CHANNEL.

PHOTO POINT 3. VIEW LOOKING WEST TOWARD THE I-77 ROADWAY CORRIDOR.

PROJECT NO.	EEP-08020
FILENAME:	EEP08020-EX1
SCALE:	NTS
DATE:	08-20-08

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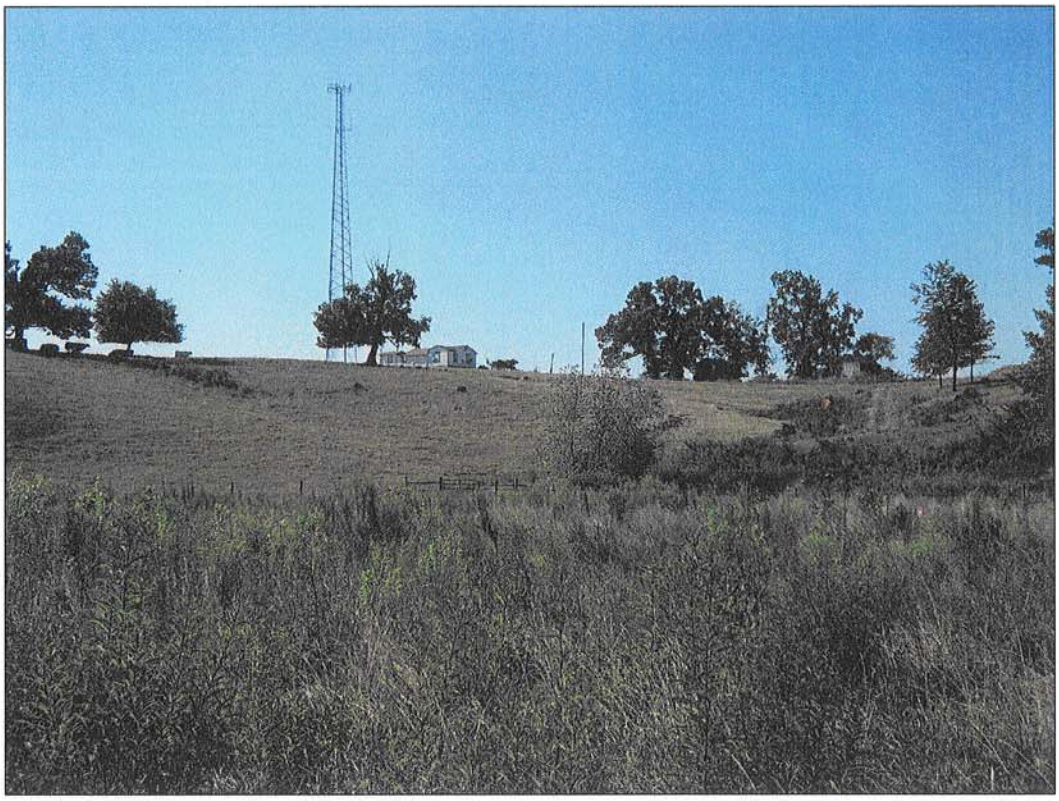

PHOTO POINT 3. VIEW LOOKING SOUTH TOWARD HOMES LOCATED ALONG SR 1120.

PHOTO POINT 3. VIEW LOOKING EAST TOWARD WOODED AREA.

PROJECT NO.	EEP-08020
FILENAME:	EEP08020-EX1
SCALE:	NTS
DATE:	08-20-08

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PHOTO POINT 4. VIEW LOOKING WEST THROUGH WOODED SECTION.

PHOTO POINT 4. VIEW LOOKING SOUTH TOWARD SR 1120.

PROJECT NO.	EEP-08020
FILENAME:	EEP08020-EX1
SCALE:	NTS
DATE:	08-20-08

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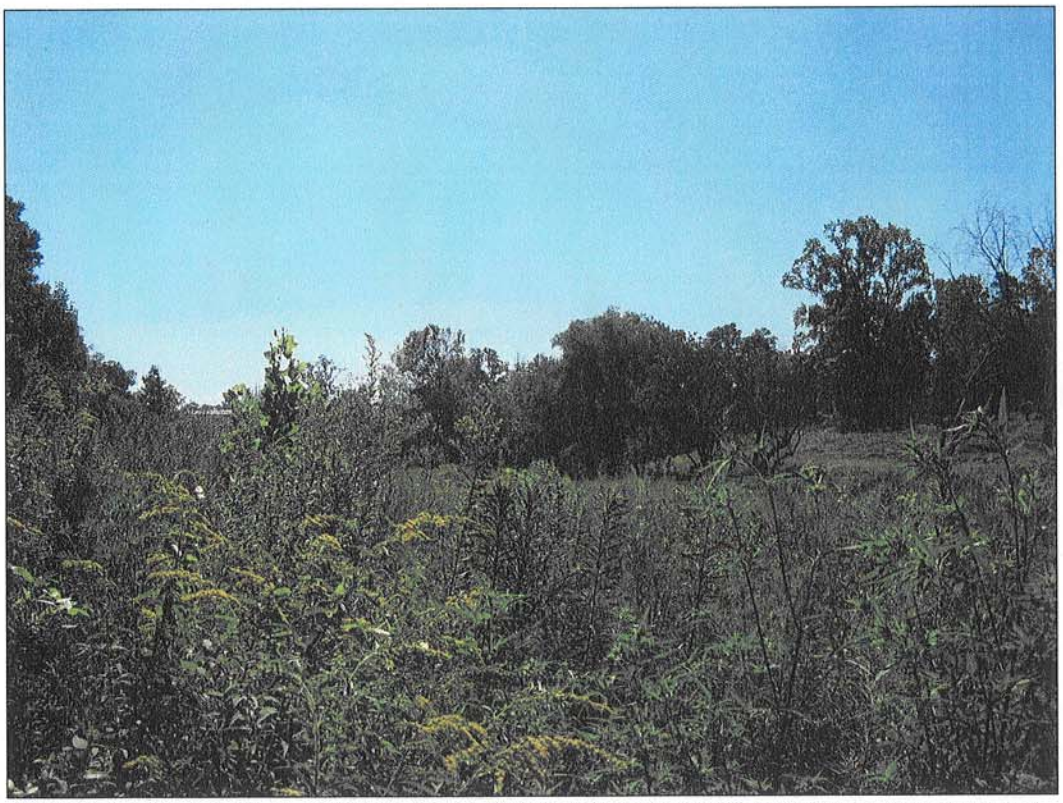

PHOTO POINT 4. VIEW LOOKING EAST TOWARD NEWLY CONSTRUCTED TRIBUTARY 1 AND MAIN CHANNEL.

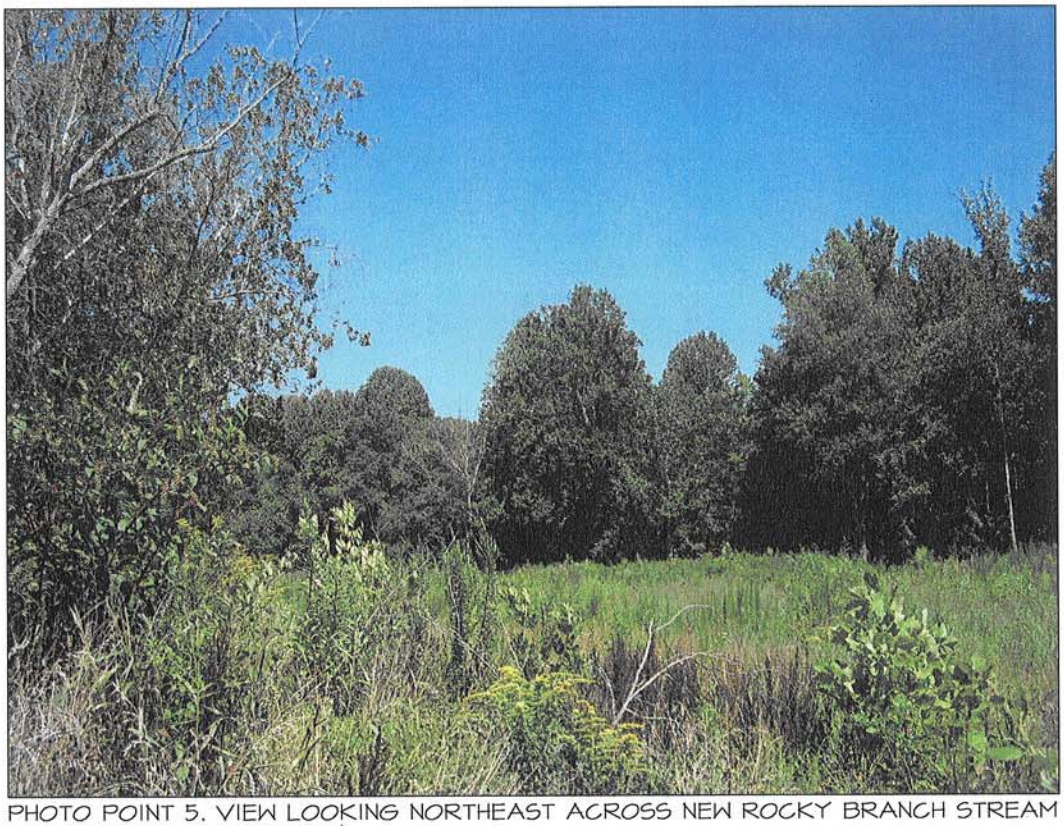

PHOTO POINT 5. VIEW LOOKING NORTHEAST ACROSS NEW ROCKY BRANCH STREAM CHANNEL.

PROJECT NO.	EEP-08020
FILENAME:	EEP08020-EX1
SCALE:	NTS
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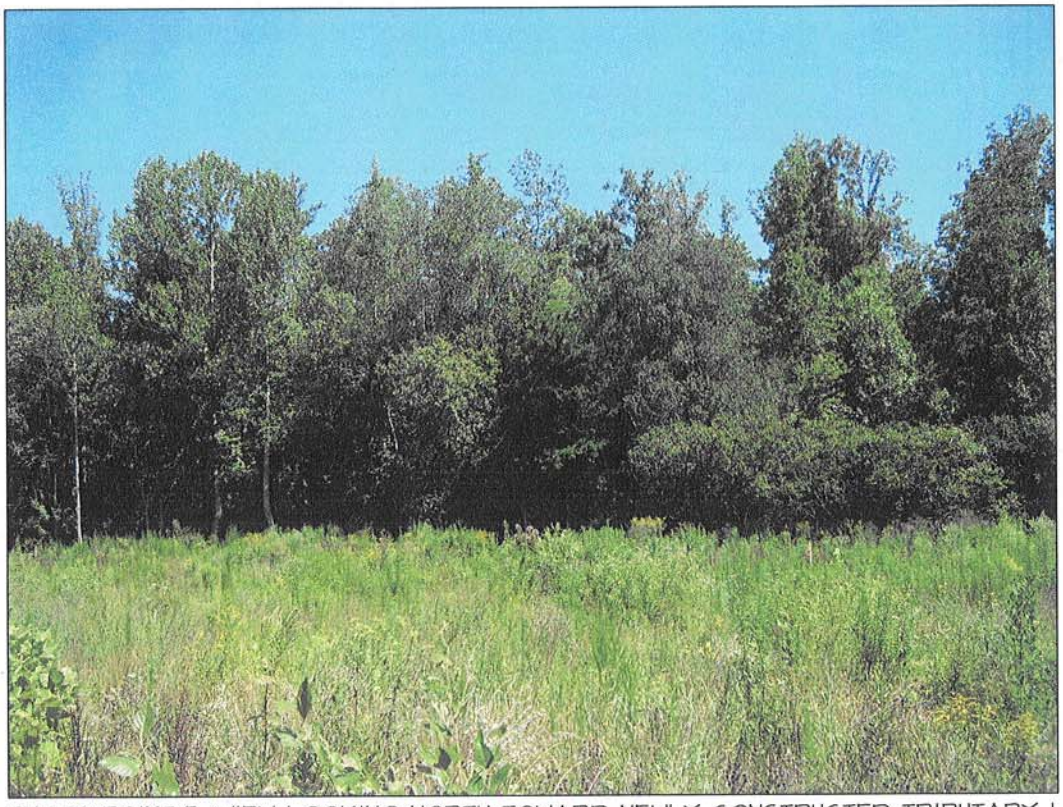

PHOTO POINT 5. VIEW LOOKING NORTH TOWARD NEWLY CONSTRUCTED TRIBUTARY 1.

PHOTO POINT 5. VIEW LOOKING NORTHEAST TOWARD NEW POND.

PROJECT NO.	EEP-08020
FILENAME:	EEP08020-EX1
SCALE:	NTS
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PHOTO POINT 6. VIEW LOOKING WEST TOWARD SR 1120.

PHOTO POINT 6. VIEW LOOKING SOUTH TOWARD SR 1120 AND JOE ALLEN RESIDENCE.

PROJECT NO.	EEP-08020
FILENAME:	EEP08020-EX1
SCALE:	NTS
DATE:	08-20-08

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PHOTO POINT 6. VIEW LOOKING EAST TOWARD NEW POND.

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E:	EEP08020-EX1
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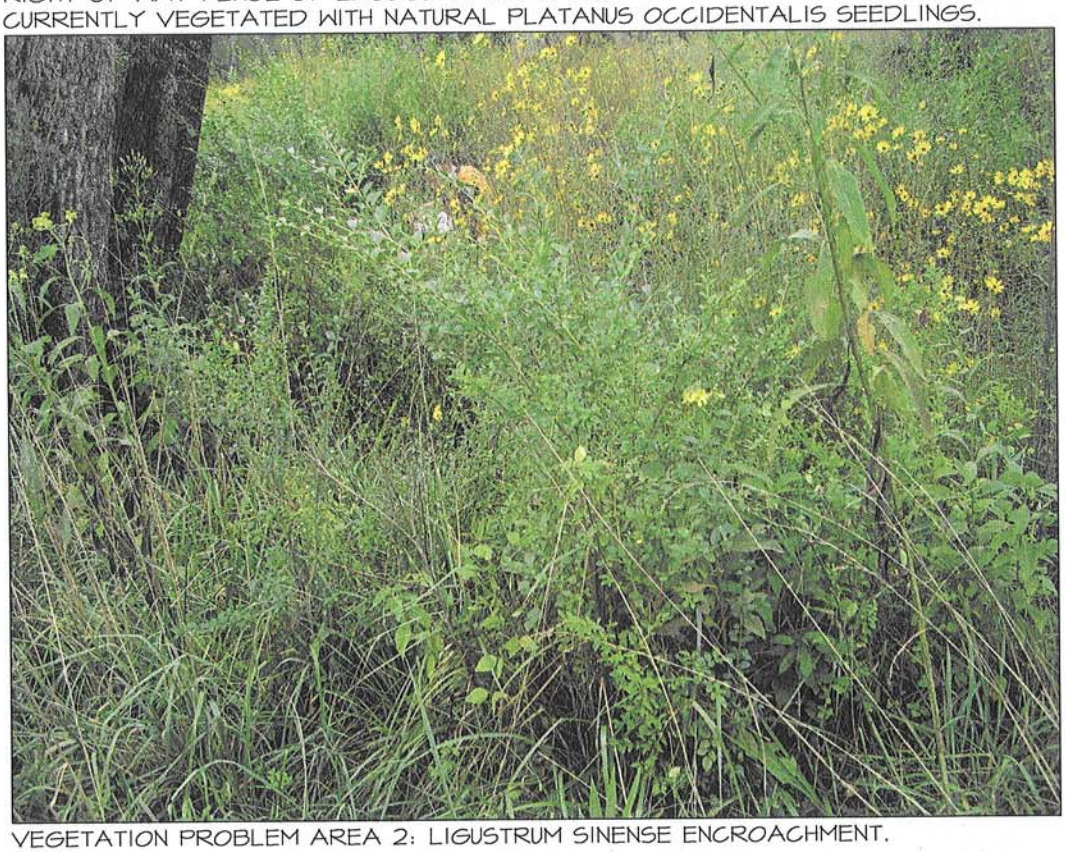
VEGETATION PROBLEM AREA 1: ROCKY BRANCH (STATION 1+77) VIEW NEAR I-77 RIGHT-OF-WAY FENCE OF ERODED AREA CAUSED BY A DEBRIS JAM. AREA IS CURRENTLY VEGETATED WITH NATURAL PLATANUS OCCIDENTALIS SEEDLINGS.



VEGETATION PROBLEM AREA 2: LIGUSTRUM SINENSE ENCROACHMENT.

PROJECT NO.	EEP-08020
FILENAME:	EEP08020-EX1
SCALE:	NTS
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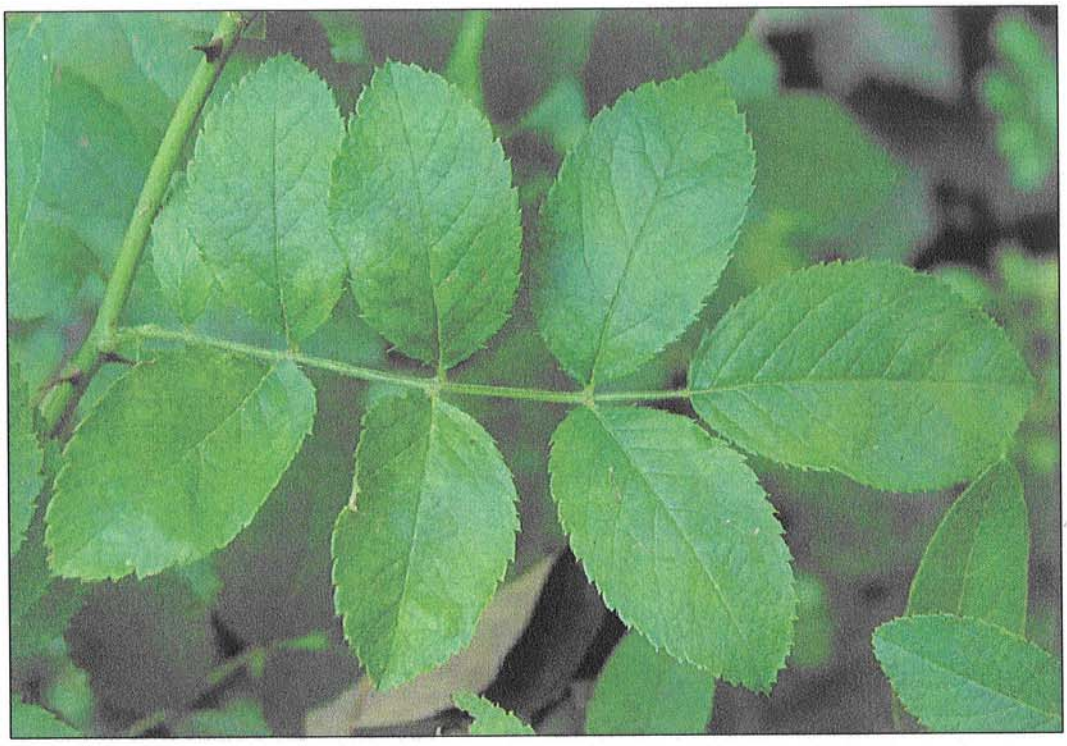
VEGETATION PROBLEM AREA 3: LESPEDEZA CUNEATA ENCROACHMENT.



VEGETATION PROBLEM AREA 4: ROSA MULTIFLORA ENCROACHMENT.

PROJECT NO.	EEP-08020
FILENAME:	EEP08020-EX1
SCALE:	NTS
DATE:	08-20-08

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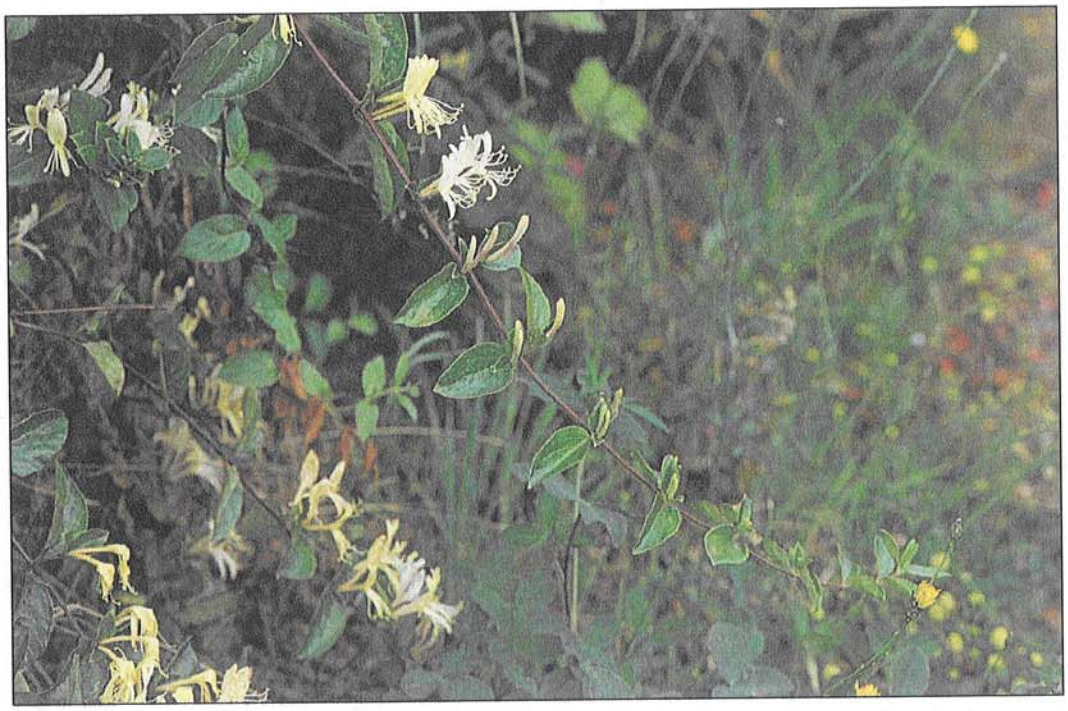

VEGETATION PROBLEM AREA 5: LONICERA JAPONICA ENCROACHMENT.

PROJECT NO.	EEP-08020
FILENAME:	EEP08020-EX1
SCALE:	NTS
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VEGETATION PLOT 1 - STREAMBANKS (5m X 20m). VIEW FROM SOUTHEAST PLOT CORNER.

VEGETATION PLOT 2 - RIPARIAN BUFFER (10m x 10m). VIEW FROM SOUTHEAST PLOT CORNER.

PROJECT NO.	EEP-08020
FILENAME:	EEP08020-EX1
SCALE:	NTS
DATE:	08-20-08

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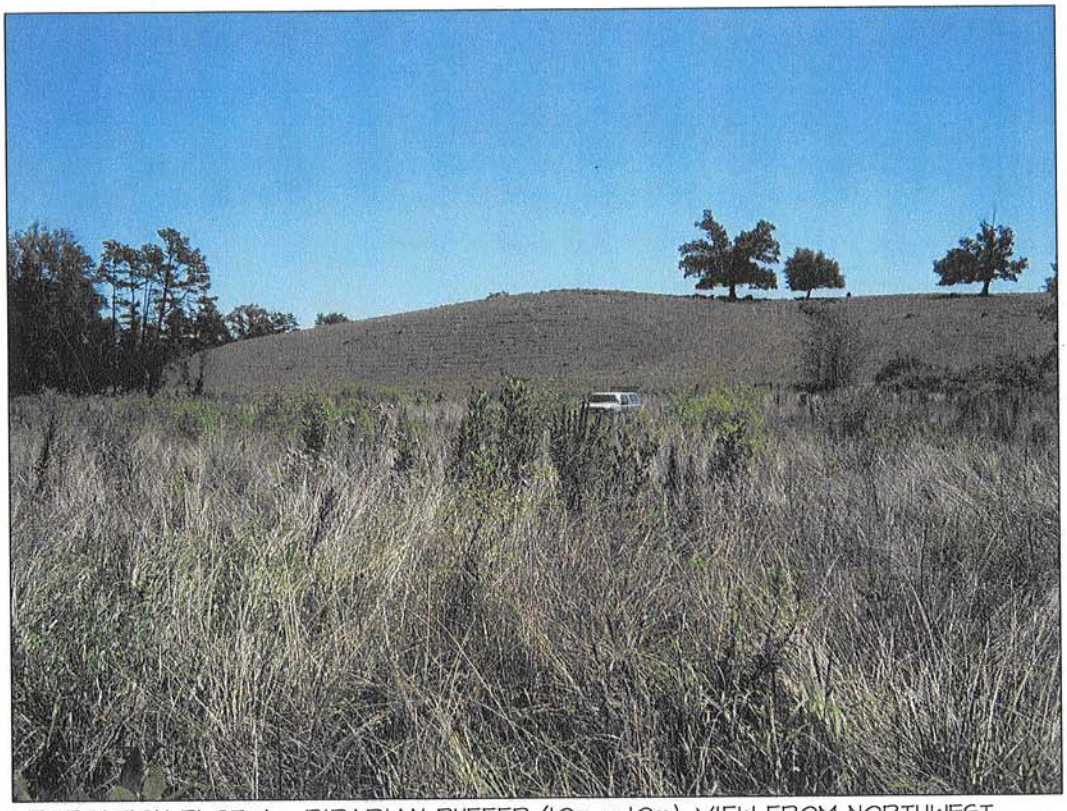
VEGETATION PLOT 3 - RIPARIAN BUFFER (10m x 10m). VIEW FROM NORTHWEST PLOT CORNER.



VEGETATION PLOT 4 - RIPARIAN BUFFER (10m x 10m). VIEW FROM NORTHWEST PLOT CORNER.

PROJECT NO.	EEP-08020
FILENAME:	EEP08020-EX1
SCALE:	NTS
DATE:	08-20-08

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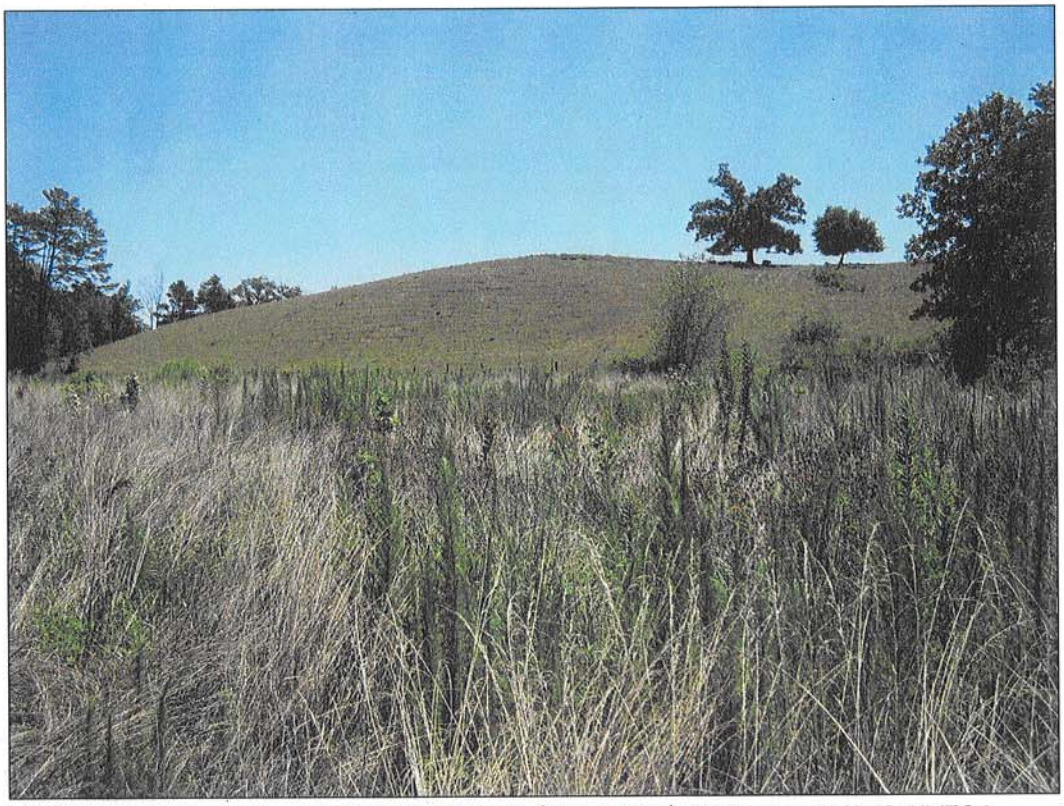

VEGETATION PLOT 5 - RIPARIAN BUFFER (10m x 10m). VIEW FROM NORTHWEST CORNER.

VEGETATION PLOT 6 - RIPARIAN BUFFER (10m x 10m). VIEW FROM NORTHWEST PLOT CORNER.

PROJECT NO.	EEP-08020
FILENAME:	EEP08020-EX1
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VEGETATION PLOT 7 - RIPARIAN BUFFER (10m x 10m). VIEW FROM NORTHWEST CORNER.

VEGETATION PLOT 8 - RIPARIAN BUFFER (10m x 10m). VIEW FROM NORTHWEST PLOT CORNER.

PROJECT NO.	EEP-08020
FILENAME:	EEP08020-EX1
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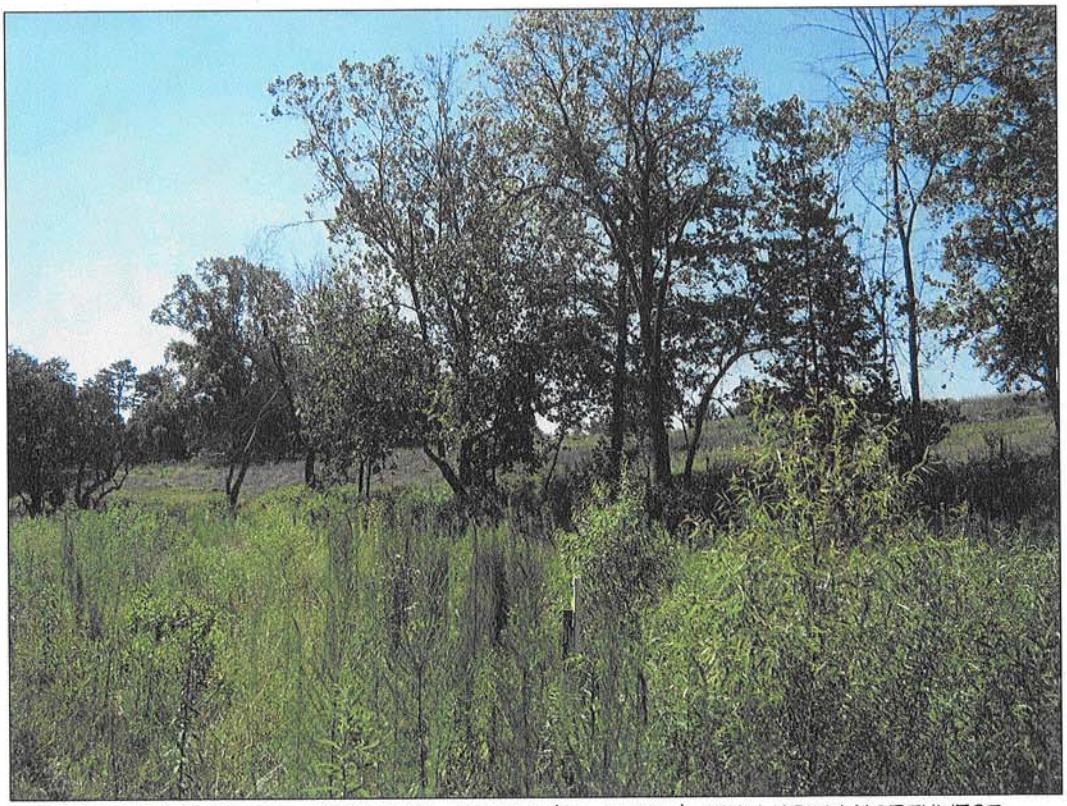
VEGETATION PLOT 9 - RIPARIAN BUFFER (10m x 10m). VIEW FROM NORTHWEST CORNER.



VEGETATION PLOT 10 - RIPARIAN BUFFER (5m x 20m). VIEW FROM NORTHWEST PLOT CORNER.

PROJECT NO.	EEP-08020
FILENAME:	EEP08020-EX1
SCALE:	NTS
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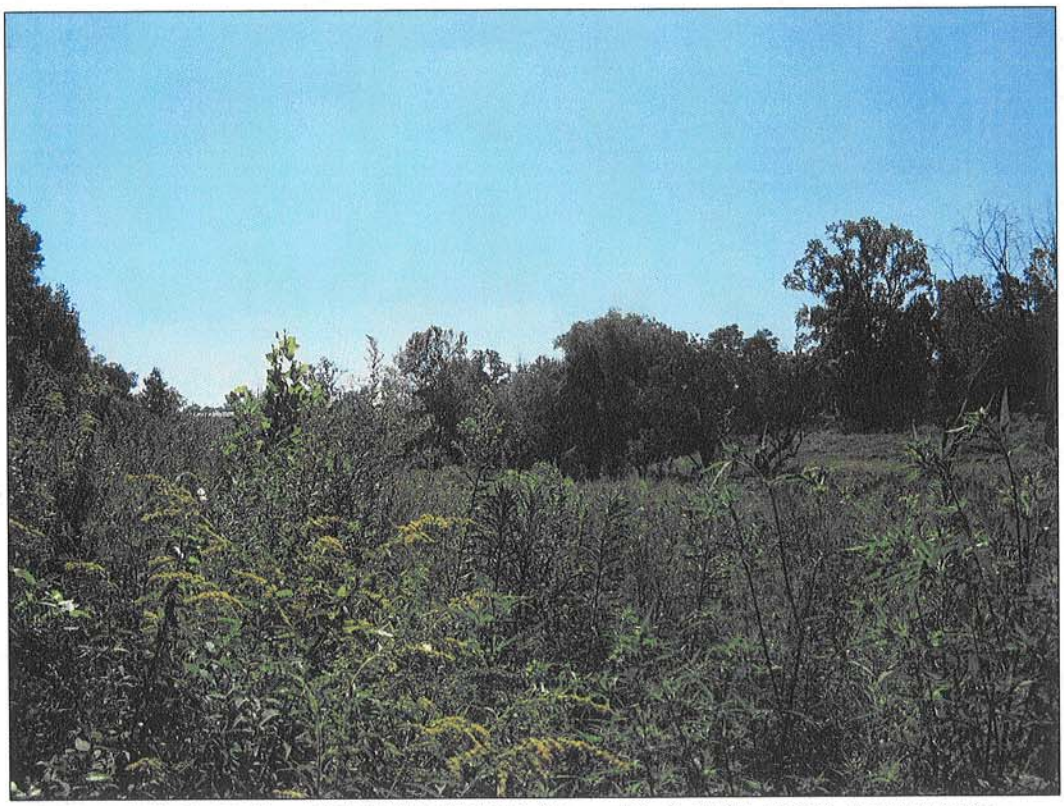

VEGETATION PLOT 11 - RIPARIAN BUFFER (10m x 10m). VIEW FROM NORTHWEST CORNER.

PROJECT NO.	EEP-08020
FILENAME:	EEP08020-EX1
SCALE:	NTS
DATE:	08-20-08

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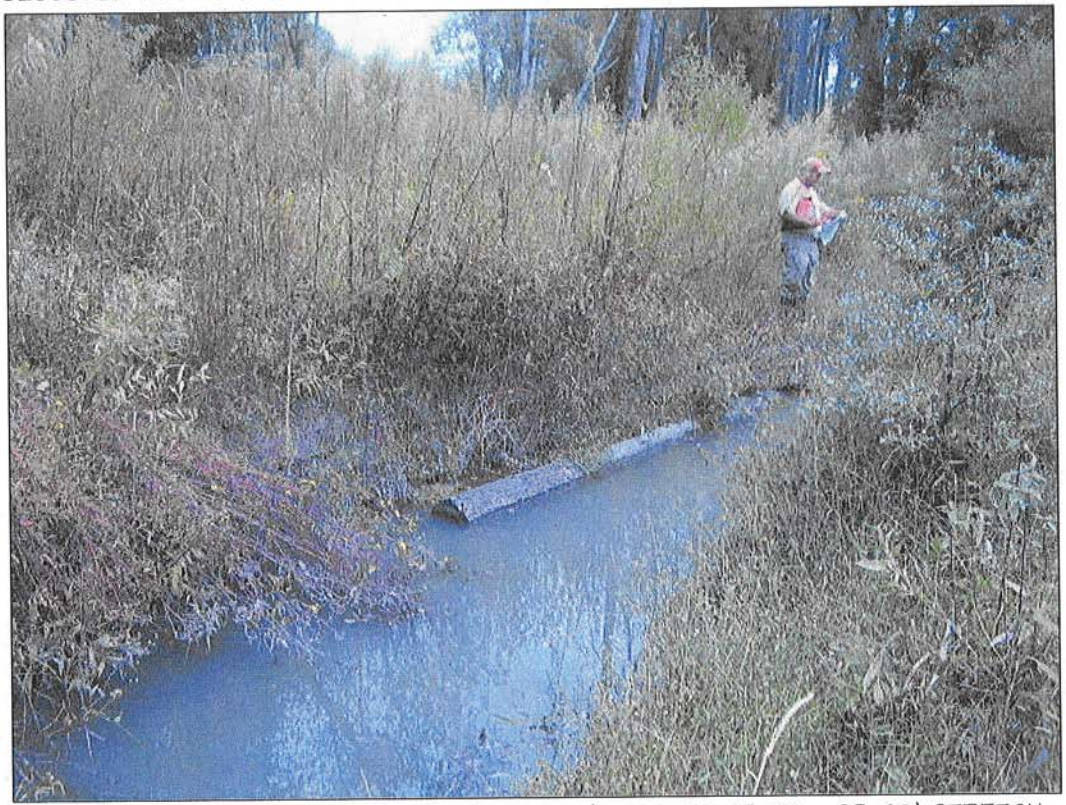
Table 6. Vegetative Problem Areas			
Rocky Branch Stream Restoration Site/EEP Project Number: 308			
Feature/Issue	**Station # / Range**	**Probable Cause**	**Photo #**
Bare Floodplain	1+77	Eroded area caused by debris jam. Vegetation is thriving	VPA1
Invasive/Exotic Populations	See Plan View	Ligustrum sinense encroachment	VPA2
	See Plan View	Lespedeza cuneata encroachment	VPA3
	See Plan View	Rosa multiflora encroachment	VPA4
	See Plan View	Lonicera japonica encroachment	VPA5

APPENDIX B

Exhibit Table B.1. Stream Problem Areas			
Rocky Branch Stream Restoration Site/EEP Project Number: 308			
Feature Issue	**Station numbers**	**Suspected Cause**	**Photo number**
Bank Scour	4+10 - 4+20	Sloughed Banks	SP1
	23+70 - 23+90	Sloughed Banks	SP2
	26+10 - 26+30	Sloughed Banks	SP3
	32+80 - 33+00	Sloughed Banks	SP4
	34+00 - 34+30	Sloughed Banks	SP5

STREAM PROBLEM AREA 1: ROCKY BRANCH (STATIONS 4+10 - 4+20) POOL WITH SLOUGHED BANKS UPSTREAM OF CROSS SECTION 4. VIEW LOOKING DOWNSTREAM.



STREAM PROBLEM AREA 2: ROCKY BRANCH (STATIONS 23+70 - 23+90) STRETCH OF CHANNEL WITH SLOUGHED BANKS. VIEW LOOKING ACROSS CHANNEL FROM RIGHT TO LEFT.

PROJECT NO.	EEP-08020
FILENAME:	EEP08020-EX1
SCALE:	NTS
DATE:	08-20-08

McADAMS

Ecosystem Enhancement Program

ROCKY BRANCH

MONITORING PHOTOS

YADKIN COUNTY, NORTH CAROLINA

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(919) 361-5000

STREAM PROBLEM AREA 3: ROCKY BRANCH (STATIONS 25+70 - 25+80) STRETCH OF CHANNEL WITH SLOUGHED BANKS. VIEW LOOKING ACROSS CHANNEL FROM RIGHT TO LEFT.

STREAM PROBLEM AREA 4: ROCKY BRANCH (STATIONS 32+80 - 33+00) AREA OF SLOUGHING BANKS. VIEW LOOKING ACROSS CHANNEL FROM LEFT TO RIGHT.

PROJECT NO.	EEP-08020
FILENAME:	EEP08020-EX1
SCALE:	NTS
DATE:	08-20-08

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ROCKY BRANCH

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STREAM PROBLEM AREA 5: ROCKY BRANCH (STATIONS 34+00 - 34+30) AREA OF SLOUGHING BANKS. VIEW LOOKING ACROSS CHANNEL FROM LEFT TO RIGHT.

PROJECT NO.	EEP-08020
FILENAME:	EEP08020-EX1
SCALE:	NTS
DATE:	08-20-08

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ROCKY BRANCH

MONITORING PHOTOS

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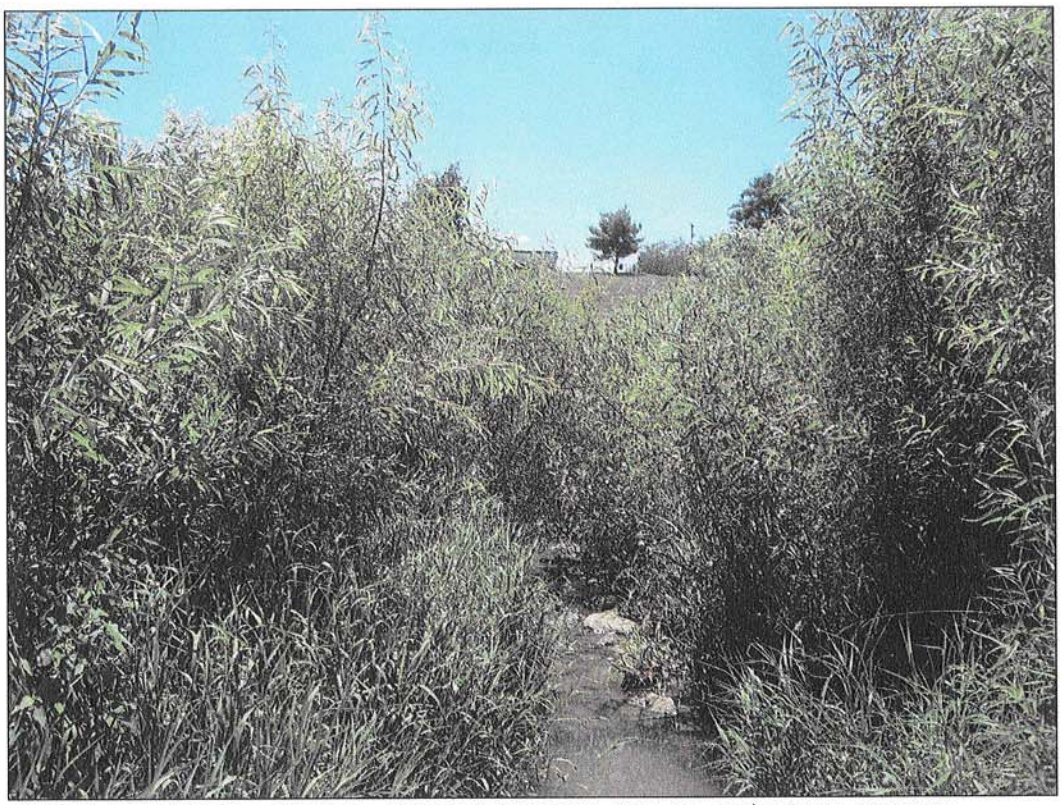
CROSS SECTION 1 - POOL. (ROCKY BRANCH, STA 4 + 25) VIEW LOOKING DOWNSTREAM.



CROSS SECTION 2 - RIFFLE. (ROCKY BRANCH, STA 9 + 22) VIEW LOOKING DOWNSTREAM.

PROJECT NO.	EEP-08020
FILENAME:	EEP08020-EX1
SCALE:	NTS
DATE:	08-20-08

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CROSS SECTION 3 - POOL. (ROCKY BRANCH, STA 13 + 25) VIEW LOOKING DOWNSTREAM.

CROSS SECTION 4 - RIFFLE. (ROCKY BRANCH, STA 17 + 49) VIEW LOOKING DOWNSTREAM.

PROJECT NO.	EEP-08020
FILENAME:	EEP08020-EX1
SCALE:	NTS
DATE:	08-20-08

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ROCKY BRANCH

MONITORING PHOTOS

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CROSS SECTION 5 - POOL. (ROCKY BRANCH, STA 22 + 32) VIEW LOOKING DOWNSTREAM.

CROSS SECTION 6 - RIFFLE. (ROCKY BRANCH, STA 26 + 22) VIEW LOOKING DOWNSTREAM.

PROJECT NO.	EEP-08020
FILENAME:	EEP08020-EX1
SCALE:	NTS
DATE:	08-20-08

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ROCKY BRANCH

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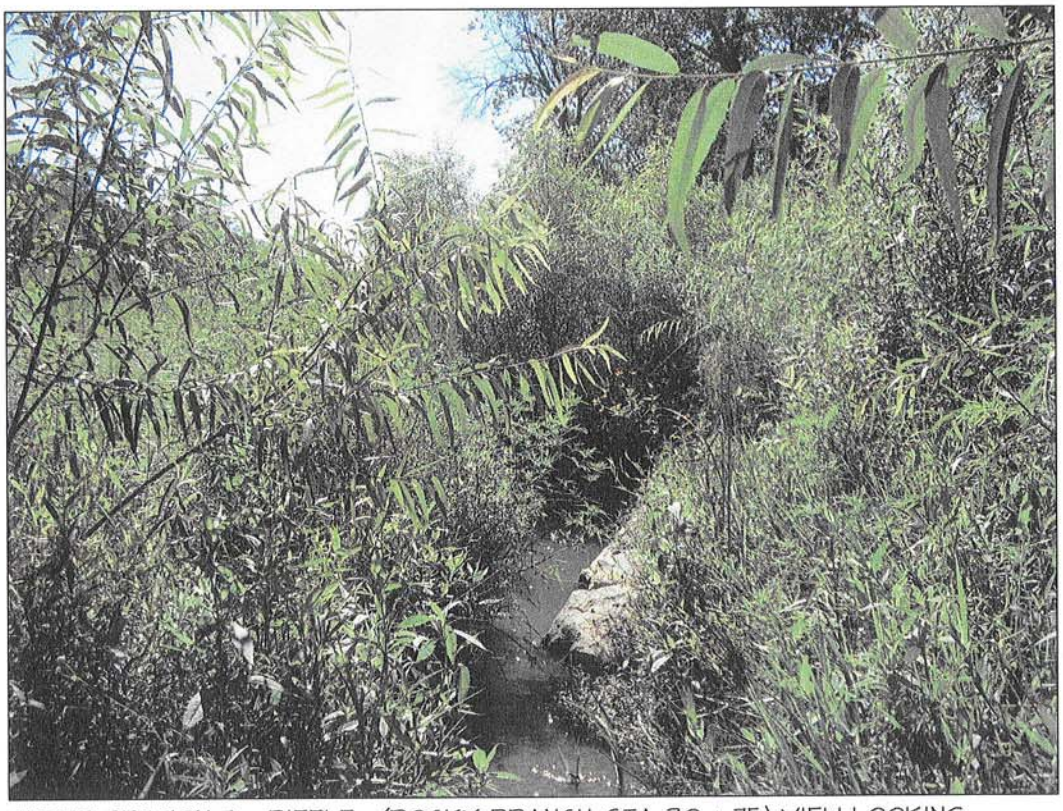

CROSS SECTION 7 - RIFFLE. (ROCKY BRANCH, STA 30 + 75) VIEW LOOKING DOWNSTREAM.

CROSS SECTION 8 - RIFFLE. (TRIBUTARY 1, STA 0 + 75) VIEW LOOKING DOWNSTREAM.

McADAMS

PROJECT NO.	EEP-08020
FILENAME:	EEP08020-EX1
SCALE:	NTS
DATE:	08-20-08

Ecosystem Enhancement Program

ROCKY BRANCH

MONITORING PHOTOS

YADKIN COUNTY, NORTH CAROLINA

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Table B2a. Visual Morphological Stability Assessment Rocky Branch Stream Restoration Site/EEP Project Number: 308 Rocky Branch: 3,751 Linear Feet						
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[1]	% Perform in Stable Condition[2]	Feature Perform. Mean or Total[3]
A. Riffles	1. Present ?[4]	28	28	NA	100	
	2. Armor stable (e.g. n o displacement)?	28	28	NA	100	
	3. Facet grade appears stable?	23	28	NA	82	
	4. Minimal evidence of embedding/fining?	28	28	NA	100	
	5. Length appropriate?	NA	NA	NA	NA	**96**
B. Pools	1. Present? (e.g. not subject to severe aggrad. or migrat.?)	27	27	NA	100	
	2. Sufficiently deep (Max Pool D:Mean Bkf>1.6?)	3.5 / 1.5 = 2.3 27	Max Pool / 1.5 > 1.6, 24 of 27	NA	89	
	3. Length appropriate?	24	27	NA	89	**93**
C. Thalweg	1. Upstream of meander bend (run/inflection) centering?[5]	37 on Main, 4 on Tributary	39 on Main Plus 4 on Tributary	NA	95	
	2. Downstream of meander (glide/inflection) centering?[5]	37 on Main, 3 on Tributary	39 on Main Plus 4 on Tributary	NA	93	**94**
D. Meander	1. Outer bend in state of limited/controlled erosion?	43	43	NA	100	
	2. Of those eroding, # w/concomitant point bar formation	43	43	NA	100	
	3. Apparent Rc within spec?	42	43	NA	98	
	4. Sufficient floodplain access and relief?	43	43	NA	100	**100**
E. Bed General	1. General channel bed aggradation areas (bar formation)	NA	NA	NA	100	
	2. Channel bed degradation – areas of increasing down-cutting or head cutting?	NA	NA	NA	100	**100**

F. Bank[6]	1. Actively eroding, wasting, or slumping bank	NA	NA	5/90	98	**98**
G. Vanes	1. Free of bank or arm scour?	36	36	NA	100	
	2. Height appropriate?	36	36	NA	100	
	3. Angle and geometry appear appropriate?	36	36	NA	100	
	4. Free of piping or other structural failures?	36	36	NA	100	**100**
H. Wads/ Boulders	1. Free of scour?	40	40	NA	100	
	2. Footing stable?	40	40	NA	100	**100**

Table B2b. Visual Morphological Stability Assessment
Rocky Branch Stream Restoration Site/EEP Project Number: 308
Rocky Branch Tributary 1: 172 Linear Feet

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[1]	% Perform in Stable Condition[2]	Feature Perform. Mean or Total[3]
A. Riffles	1. Present ?[4]	3	3	NA	100	
	2. Armor stable (e.g. n o displacement)?	3	3	NA	100	
	3. Facet grade appears stable?	3	3	NA	100	
	4. Minimal evidence of embedding/fining?	3	3	NA	100	
	5. Length appropriate?	NA	NA	NA	NA	**100**
B. Pools	1. Present? (e.g. not subject to severe aggrad. or migrat.?)	NA	NA	NA	NA	
	2. Sufficiently deep (Max Pool D:Mean Bkf>1.6?)	NA	NA	NA	NA	
	3. Length appropriate?	NA	NA	NA	NA	**NA**
C. Thalweg	1. Upstream of meander bend (run/inflection) centering?[5]	4 on Tributary	4 on Tributary	NA	100	
	2. Downstream of meander (glide/inflection) centering?[5]	3 on Tributary	4 on Tributary	NA	100	**100**

	1. Outer bend in state of limited/controlled erosion?	5	5	NA	100	
	2. Of those eroding, # w/concomitant point bar formation	0	0	NA	100	
	3. Apparent Rc within spec?	5	5	NA	100	
D. Meander	4. Sufficient floodplain access and relief?	5	5	NA	100	**100**
	1. General channel bed aggradation areas (bar formation)	NA	NA	NA	100	
E. Bed General	2. Channel bed degradation – areas of increasing down-cutting or head cutting?	NA	NA	NA	100	**100**
F. Bank[6]	1. Actively eroding, wasting, or slumping bank	NA	NA	0/172	100	**100**
	1. Free of bank or arm scour?	3	3	NA	100	
	2. Height appropriate?	3	3	NA	100	
	3. Angle and geometry appear appropriate?	3	3	NA	100	
G. Vanes	4. Free of piping or other structural failures?	3	3	NA	100	**100**
	1. Free of scour?	NA	NA	NA	NA	
H. Wads/ Boulders	2. Footing stable?	NA	NA	NA	NA	**NA**

Footnotes:

The above should be completed using the visual assessment data form for each project reach/segement. It is recognized that the various metrics within a feature category may not have equal influence on the overall stability of that feature and that this does not incorporate weighting or scoring; however, at this time, EEP requires documentation of the relevant observations for these feature categories.

Metrics that are spatial estimates are the number of locales over the reach for which the failing condition is observed/followed by the total
1 linear distance (feet) or area for which the failing or unstable condition is observed.
2 In the case of categorical metrics for which a feature count is involved, this is simply calculated as the number of functional features that are
3 The mean of the metrics for a given feature category.
4 Was the feature actually present as compared to the As-built or has the feature been completely obscured (aggraded) or removed (degraded).
5 Is the Thalweg centering up on the channel in between meander bends?

1-YEAR, 2008 SURVEY DATA

PROJECT NAME ROCKY BRANCH

TASK LONGITUDINAL PROFILE

FEATURE/FACET SLOPE LENGTH, AND SPACING AND LONGITUDINAL PROFILE DATA

REACH ROCKY BRANCH

DATE 9/23/2008 to 9/25/2008

CREW ALTIZER/BUCHHOLZ/HALLEY/FURRY

Overall water surface slope =	0.6%		
WS sta. start =	53.01 ft		
WS sta. end =	3019.91 ft		
ELEV. Start =	929.28 ft msl		
ELEV. End =	912.48 ft msl	Results	

	DESIGN	MIN.	MAX.
Riffle	1.1%	3.3%	
Run	---	---	
p-p spacing	115	161	

	n =	MIN.	MEDIAN.	AVG.	MAX.
Riffle slopes measured =	28	0.1%	1.3%	1.6%	4.4%
Run slopes measured =	23	0.3%	2.9%	4.0%	21.3%
Pools measured =	27	50	105	111	216

All data reported in units of **feet** unless otherwise specified. Elevation data is presented in feet mean sea level.

Feature	Start sta.	End sta.	Length	WS El. Start	WS El. End	Change	Slope
Riffle	53	66	13	929.28	928.74	0.54	4.2%
Riffle	129	136	7	928.31	928.04	0.27	4.0%
Riffle	260	261	1	926.82	926.77	0.05	3.4%
Riffle	380	413	34	925.89	925.31	0.58	1.7%
Riffle	511	525	14	925.05	924.50	0.55	3.8%
Riffle	636	643	7	923.85	923.75	0.11	1.5%
Riffle	723	745	22	923.58	923.50	0.08	0.4%
Riffle	791	799	8	922.86	922.74	0.12	1.5%
Riffle	966	975	9	922.27	921.87	0.40	4.4%
Riffle	1083	1092	9	921.25	920.97	0.28	3.0%
Riffle	1146	1187	41	920.45	919.62	0.84	2.0%
Riffle	1245	1265	21	919.32	919.25	0.07	0.3%
Riffle	1334	1353	19	919.25	918.75	0.50	2.6%
Riffle	1465	1487	22	918.74	918.29	0.45	2.1%
Riffle	1537	1574	37	918.27	918.24	0.03	0.1%
Riffle	1633	1639	6	918.13	918.11	0.02	0.3%
Riffle	1721	1732	11	917.85	917.76	0.10	0.8%
Riffle	1805	1824	19	917.18	917.07	0.11	0.6%
Riffle	1900	1936	36	916.95	916.83	0.12	0.3%
Riffle	2016	2058	42	916.72	916.54	0.18	0.4%
Riffle	2254	2275	21	915.79	915.58	0.21	1.0%
Riffle	2346	2365	19	915.39	914.84	0.55	2.9%
Riffle	2465	2478	13	914.79	914.74	0.05	0.4%

Riffle	2551	2574	23	914.69	914.57	0.12	0.5%
Riffle	2638	2670	32	914.47	913.95	0.52	1.6%
Riffle	2721	2730	9	913.43	913.35	0.08	0.9%
Riffle	2824	2843	19	913.35	913.32	0.03	0.2%
Riffle	2987	3013	27	912.79	912.48	0.31	1.2%

n =	28
MIN =	0.1%
MEDIAN =	1.3%
AVG. =	1.6%
MAX =	4.4%

Feature	Start sta.	End sta.	Length	WS El. Start	WS El. End	Change	Slope
Run	66	69	3	928.74	928.42	0.32	9.9%
Run	136	146	11	928.04	927.77	0.27	2.6%
Run	261	265	3	926.77	926.12	0.65	21.3%
Run	413	441	28	925.31	925.07	0.24	0.8%
Run	525	540	15	924.50	924.26	0.25	1.6%
Run	643	648	5	923.75	923.64	0.11	2.1%
Run	745	765	19	923.50	922.86	0.64	3.3%
Run	799	805	6	922.74	922.62	0.12	1.9%
Run	975	989	14	921.87	921.47	0.40	2.9%
Run	1092	1107	15	920.97	920.45	0.52	3.5%
Run	1187	1191	4	919.62	919.32	0.29	8.0%
Run	1574	1592	18	918.24	918.13	0.11	0.6%
Run	1639	1672	33	918.11	917.85	0.26	0.8%
Run	1732	1750	18	917.76	917.18	0.58	3.2%
Run	1824	1835	12	917.07	916.95	0.12	1.0%
Run	1936	1948	11	916.83	916.71	0.12	1.1%
Run	2058	2074	16	916.54	915.90	0.64	4.0%
Run	2275	2289	14	915.58	915.39	0.19	1.3%
Run	2478	2493	15	914.74	914.69	0.05	0.3%
Run	2574	2576	2	914.57	914.47	0.10	4.9%
Run	2670	2679	9	913.95	913.45	0.50	5.5%
Run	2843	2853	9	913.32	912.79	0.53	5.6%
Run	3013	3020	7	912.48	912.12	0.36	5.3%

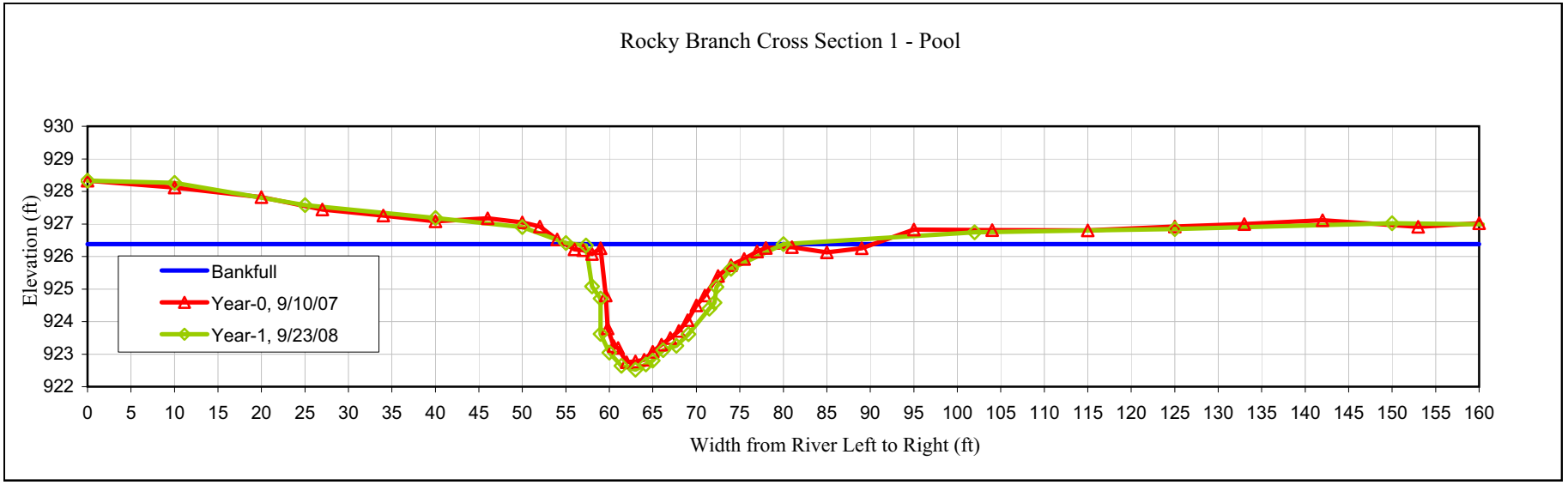
n =	23
MIN =	0.3%
MEDIAN =	2.9%
AVG. =	4.0%
MAX =	21.3%

Feature	Start sta.	End sta.	Length	p-p spacing
Pool	69	112	42	
Pool	146	182	35	77
Pool	298	361	62	152
Pool	441	482	41	143
Pool	540	568	28	99
Pool	648	687	40	107
Pool	765	788	23	117
Pool	814	831	16	50
Pool	989	1038	49	175
Pool	1107	1128	21	118
Pool	1191	1223	32	84
Pool	1265	1306	41	75
Pool	1353	1393	40	88
Pool	1487	1530	43	134
Pool	1592	1631	38	105
Pool	1672	1702	30	79
Pool	1750	1794	44	78
Pool	1835	1882	47	85
Pool	1948	2008	61	113
Pool	2074	2191	117	126
Pool	2289	2318	28	216
Pool	2371	2408	37	82
Pool	2493	2530	37	122
Pool	2576	2610	34	83
Pool	2679	2708	29	103
Pool	2853	2862	9	174
Pool	2957	2979	21	105

n =	27	
MIN =	50	(p-p spacing)
MEDIAN =	105	
AVG. =	111	
MAX =	216	

ROCKY BRANCH **EEP PROJECT # 308** CROSS-SECTION: 1

Year-0		Year-1		Year-2		Year-3		Year-4		Year-5		Year-6	
Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)
0.00	928.33	0.00	928.33										
10.00	928.12	10.00	928.26										
20.00	927.82	25.00	927.58										
27.00	927.44	40.00	927.18										
34.00	927.26	50.00	926.90										
40.00	927.08	55.00	926.41										
46.00	927.17	57.30	926.34										
50.00	927.05	58.00	925.08										
52.00	926.92	59.00	924.71										
54.00	926.52	59.00	923.62										
56.00	926.22	60.00	923.05										
57.00	926.19	61.40	922.64										
58.00	926.08	63.00	922.52										
59.00	926.25	64.20	922.68										
59.60	924.80	65.00	922.80										
59.80	923.79	66.20	923.12										
60.50	923.25	67.70	923.26										
61.00	923.19	69.10	923.61										
62.00	922.75	71.50	924.40										
63.00	922.78	72.10	924.58										
64.00	922.83	72.30	925.06										
65.00	923.07	74.00	925.62										
66.00	923.29	80.00	926.38										
67.00	923.49	102.00	926.74										
68.00	923.71	125.00	926.84										
69.00	924.04	150.00	927.02										
70.00	924.50	160.40	926.99										
71.00	924.80												
72.50	925.40												
74.00	925.73												
75.50	925.92												
77.00	926.15												
78.00	926.26												
81.00	926.29												
85.00	926.13												
89.00	926.25												
95.00	926.83												
104.00	926.81												
115.00	926.80												
125.00	926.92												
133.00	927.00												
142.00	927.11												
153.00	926.91												
160.00	927.02												



CROSS SECTION PLOT - LOOKING DOWNSTREAM

YEAR-1, 2008 SURVEY DATA **CROSS-SECTION:** 1

PROJECT ROCKY BRANCH **FEATURE:** Pool

TASK CROSS SECTION

REACH ROCKY BRANCH

DATE 9/23/2008 to 9/25/2008

CREW ALTIZER/BUCHHOLZ/HALLEY/FURRY

Summary Data
All dimensions in feet.

Bankfull X-sec area	47.7	sq. ft.
Bankfull Width	24.0	ft.
Bankfull Mean Depth	2.0	ft.
Bankfull Max Depth	3.9	ft.
Width/Depth Ratio	12.4	
Entrenchment Ratio	>2.2	
Classification	n/a	
Bank Height Ratio	1.0	
Bankfull Elevation:	926.38	ft.

CROSS SECTION PHOTO - LOOKING DOWNSTREAM

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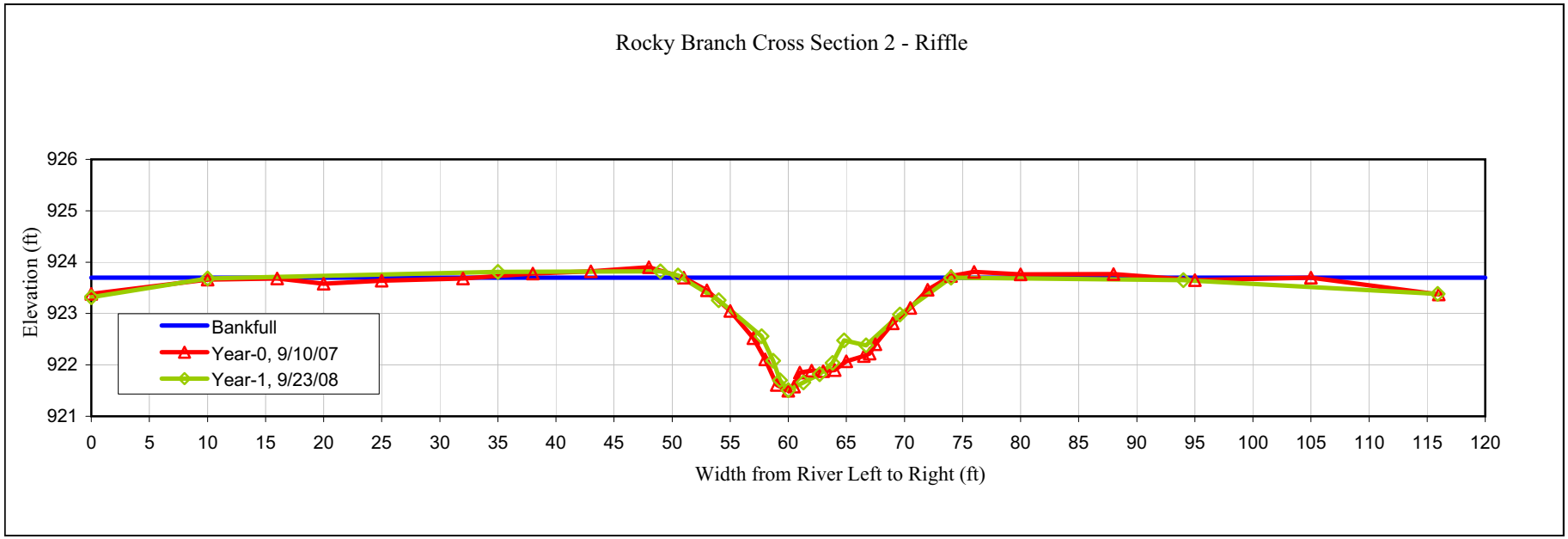
ROCKY BRANCH **EEP PROJECT # 308** CROSS-SECTION: 2

Year-0		Year-1		Year-2		Year-3		Year-4		Year-5		Year-6	
Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)
0.00	923.38	0.00	923.32										
10.00	923.66	10.00	923.68										
16.00	923.68	35.00	923.81										
20.00	923.58	49.00	923.82										
25.00	923.64	50.50	923.74										
32.00	923.68	54.00	923.26										
38.00	923.78	57.70	922.56										
43.00	923.82	58.70	922.08										
48.00	923.90	59.30	921.70										
51.00	923.70	60.00	921.51										
53.00	923.45	61.30	921.66										
55.00	923.05	62.70	921.82										
57.00	922.52	63.80	922.04										
58.00	922.11	64.80	922.48										
59.00	921.61	66.70	922.38										
60.00	921.50	69.60	922.98										
60.50	921.58	74.00	923.70										
61.00	921.85	94.00	923.65										
62.00	921.89	115.90	923.38										
63.00	921.88												
64.00	921.90												
65.00	922.07												
66.50	922.17												
67.00	922.22												
67.50	922.40												
69.00	922.81												
70.50	923.11												
72.00	923.46												
74.00	923.73												
76.00	923.81												
80.00	923.76												
88.00	923.77												
95.00	923.65												
105.00	923.70												
116.00	923.37												



CROSS SECTION PLOT - LOOKING DOWNSTREAM

YEAR-1, 2008 SURVEY DATA **CROSS-SECTION:** 2
PROJECT ROCKY BRANCH **FEATURE:** Riffle
TASK CROSS SECTION
REACH ROCKY BRANCH
DATE 9/23/2008 to 9/25/2008
CREW ALTIZER/BUCHHOLZ/HALLEY/FURRY

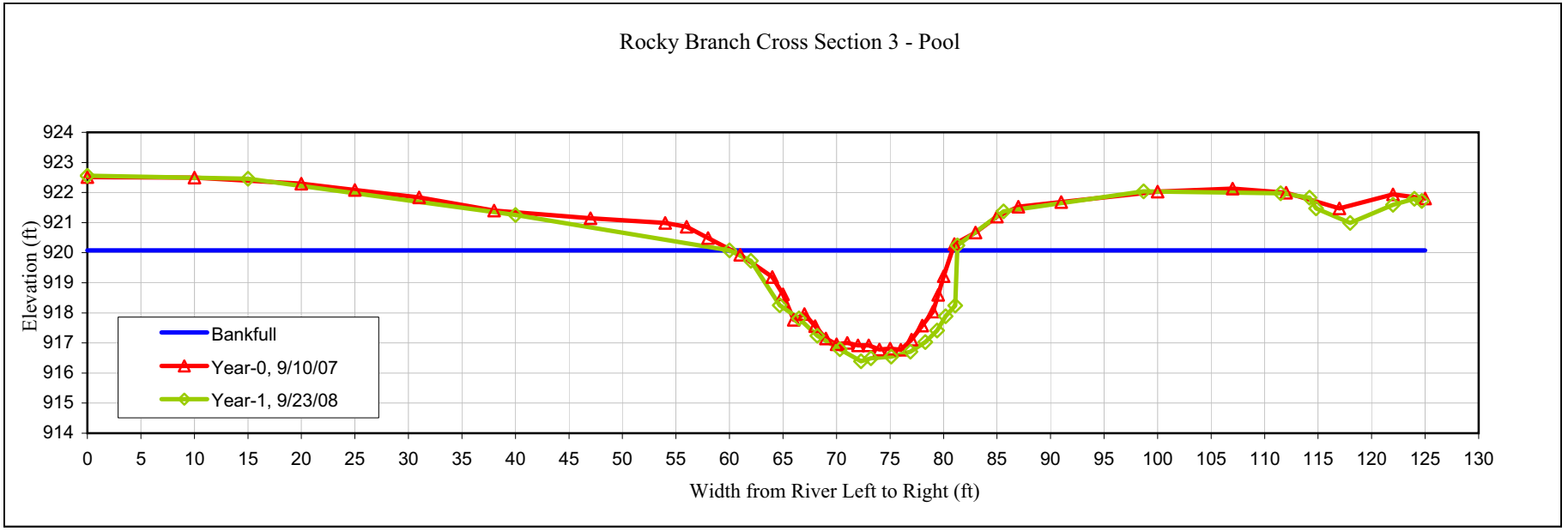
Summary Data
All dimensions in feet.

Bankfull X-sec area	23.4	sq. ft.
Bankfull Width	23.2	ft.
Bankfull Mean Depth	1.0	ft.
Bankfull Max Depth	2.2	ft.
Width/Depth Ratio	>12	
Entrenchment Ratio	>2.2	
Classification	C	
Bank Height Ratio	1.0	
Bankfull Elevation:	923.70	ft.

>2.2

CROSS SECTION PHOTO - LOOKING DOWNSTREAM

ROCKY BRANCH		EEP PROJECT # 308		CROSS-SECTION: 3											
Year-0		Year-1		Year-2		Year-3		Year-4		Year-5		Year-6	
Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)
0.00	922.51	0.00	922.56										
10.00	922.49	15.00	922.46										
20.00	922.29	40.00	921.25										
25.00	922.08	60.00	920.08										
31.00	921.84	62.00	919.73										
38.00	921.40	64.70	918.25										
47.00	921.14	66.50	917.81										
54.00	920.99	68.20	917.24										
56.00	920.86	70.30	916.79										
58.00	920.49	72.30	916.39										
61.00	919.93	73.20	916.49										
64.00	919.19	75.10	916.55										
65.00	918.62	76.90	916.71										
66.00	917.77	78.30	917.03										
67.00	917.96	79.40	917.41										
68.00	917.56	80.20	917.89										
69.00	917.15	81.10	918.24										
70.00	916.96	81.30	920.24										
71.00	917.00	85.60	921.37										
72.00	916.92	98.70	922.04										
73.00	916.92	111.50	921.97										
74.00	916.78	114.20	921.83										
75.00	916.81	114.80	921.47										
76.00	916.77	118.00	920.99										
77.00	917.11	122.00	921.59										
78.00	917.58	124.00	921.79										
79.00	918.04	124.70	921.72										
79.50	918.60												
80.00	919.22												
81.00	920.29												
83.00	920.67												
85.00	921.20												
87.00	921.53												
91.00	921.68												
100.00	922.03												
107.00	922.13												
112.00	921.99												
117.00	921.47												
122.00	921.94												
125.00	921.80												



CROSS SECTION PLOT - LOOKING DOWNSTREAM

YEAR-1, 2008 SURVEY DATA **CROSS-SECTION:** 3
PROJECT ROCKY BRANCH **FEATURE:** Pool
TASK CROSS SECTION
REACH ROCKY BRANCH
DATE 9/23/2008 to 9/25/2008
CREW ALTIZER/BUCHHOLZ/HALLEY/FURRY

Summary Data
All dimensions in feet.

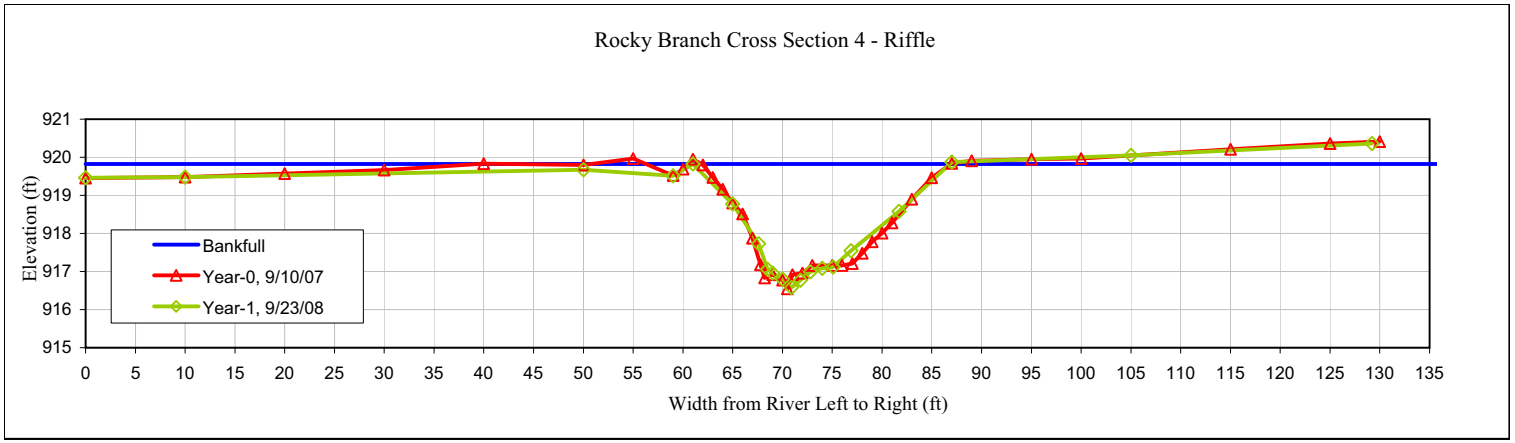
Bankfull X-sec area	52.6	sq. ft.
Bankfull Width	21.3	ft.
Bankfull Mean Depth	2.5	ft.
Bankfull Max Depth	3.7	ft.
Width/Depth Ratio	8.6	
Entrenchment Ratio	>2.2	
Classification	n/a	
Bank Height Ratio	1.0	
Bankfull Elevation:	920.08	ft.

>2.2

CROSS SECTION PHOTO - LOOKING DOWNSTREAM

ROCKY BRANCH **EEP PROJECT # 308** CROSS-SECTION: 4

Year-0		Year-1		Year-2		Year-3		Year-4		Year-5		Year-6	
Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)
0.00	919.45	0.00	919.46										
10.00	919.48	10.00	919.48										
20.00	919.57	50.00	919.67										
30.00	919.66	59.00	919.51										
40.00	919.83	61.00	919.82										
50.00	919.80	65.00	918.77										
55.00	919.97	67.60	917.73										
59.00	919.52	68.50	917.06										
60.00	919.69	69.00	916.96										
61.00	919.95	70.00	916.80										
62.00	919.80	70.90	916.58										
63.00	919.47	71.80	916.77										
64.00	919.16	72.80	916.99										
65.00	918.80	74.00	917.08										
66.00	918.51	75.10	917.12										
67.00	917.87	76.90	917.55										
67.80	917.18	81.70	918.58										
68.20	916.83	87.00	919.87										
69.00	916.92	105.00	920.05										
70.00	916.77	129.20	920.36										
70.50	916.55												
71.00	916.92												
72.00	916.96												
73.00	917.16												
75.00	917.16												
76.00	917.16												
77.00	917.21												
78.00	917.48												
79.00	917.78												
80.00	918.01												
81.00	918.28												
83.00	918.90												
85.00	919.46												
87.00	919.84												
89.00	919.91												
95.00	919.95												
100.00	919.97												
115.00	920.21												
125.00	920.36												
130.00	920.41												



CROSS SECTION PLOT - LOOKING DOWNSTREAM

YEAR-1, 2008 SURVEY DATA **CROSS-SECTION:** 4

PROJECT ROCKY BRANCH **FEATURE:** Riffle

TASK CROSS SECTION

REACH ROCKY BRANCH

DATE 9/23/2008 to 9/25/2008

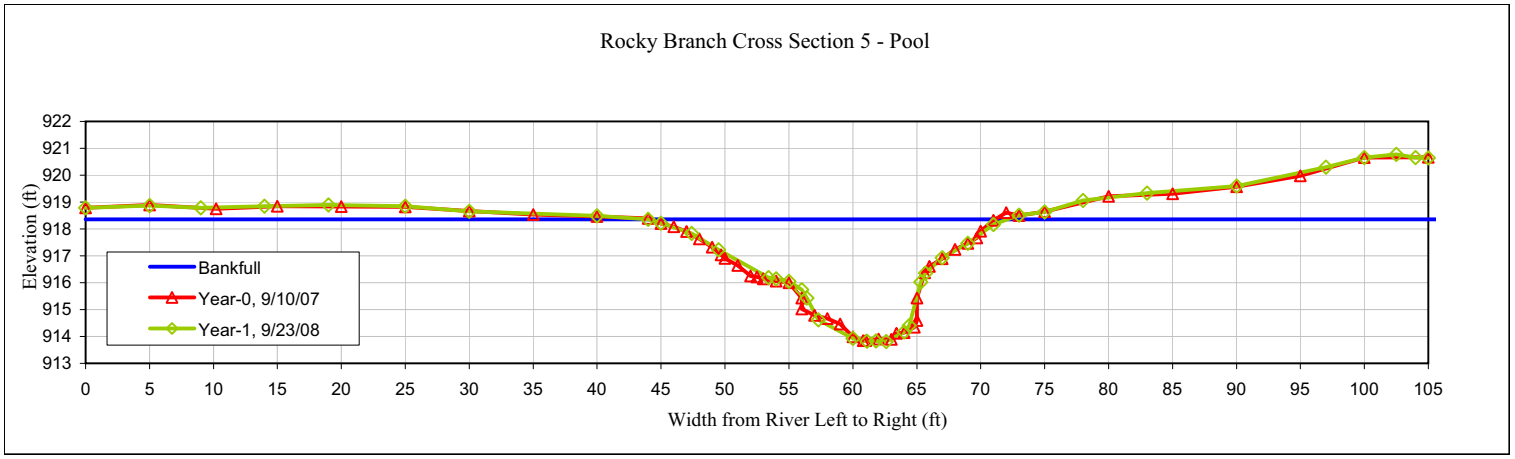
CREW ALTIZER/BUCHHOLZ/HALLEY/FURRY

Summary Data
All dimensions in feet.

Bankfull X-sec area	43.7	sq. ft.
Bankfull Width	25.8	ft.
Bankfull Mean Depth	1.7	ft.
Bankfull Max Depth	3.2	ft.
Width/Depth Ratio	15.2	
Entrenchment Ratio	>2.2	
Classification	C	
Bank Height Ratio	1.0	
Bankfull Elevation:	919.82	ft.

CROSS SECTION PHOTO - LOOKING DOWNSTREAM

ROCKY BRANCH		EEP PROJECT # 308		CROSS-SECTION: 5									
Year-0		Year-1		Year-2		Year-3		Year-4		Year-5		Year-6	
Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)
0.00	918.78	0.00	918.78										
5.00	918.89	5.00	918.87										
10.20	918.75	9.00	918.79										
15.00	918.84	14.00	918.84										
20.00	918.83	19.00	918.89										
25.00	918.82	25.00	918.85										
30.00	918.67	30.00	918.66										
35.00	918.54	40.00	918.49										
40.00	918.47	44.00	918.36										
44.00	918.39	45.00	918.21										
45.00	918.20	47.40	917.83										
46.00	918.08	49.50	917.23										
47.00	917.91	53.40	916.19										
48.00	917.63	54.00	916.14										
49.00	917.32	55.00	916.05										
49.70	917.03	56.00	915.74										
50.00	916.91	56.40	915.43										
51.00	916.64	57.30	914.62										
52.00	916.25	60.00	913.93										
52.50	916.21	61.10	913.82										
53.00	916.14	61.80	913.83										
54.00	916.06	62.60	913.81										
55.00	916.00	64.00	914.17										
56.00	915.43	64.40	914.41										
56.00	915.02	65.30	916.02										
57.00	914.78	65.70	916.36										
58.00	914.67	67.00	916.93										
59.00	914.47	69.00	917.47										
60.00	913.99	71.00	918.17										
60.80	913.85	73.00	918.51										
61.00	913.85	75.00	918.63										
62.00	913.90	78.00	919.06										
63.00	913.89	83.00	919.33										
63.40	914.12	90.00	919.60										
64.00	914.14	97.00	920.30										
64.80	914.35	100.00	920.65										
65.00	914.59	102.50	920.77										
65.00	915.43	104.00	920.65										
65.60	916.37	105.00	920.64										
66.00	916.61												
67.00	916.89												
68.00	917.24												
69.00	917.47												
69.70	917.67												
70.00	917.92												
71.00	918.32												
72.00	918.61												
73.00	918.50												
75.00	918.64												
80.00	919.21												
85.00	919.31												
90.00	919.57												
95.00	919.98												
100.00	920.66												
105.00	920.67												



CROSS SECTION PLOT - LOOKING DOWNSTREAM

YEAR-1, 2008 SURVEY DATA **CROSS-SECTION:** 5

PROJECT ROCKY BRANCH **FEATURE:**

TASK CROSS SECTION

REACH ROCKY BRANCH

DATE 9/23/2008 to 9/25/2008

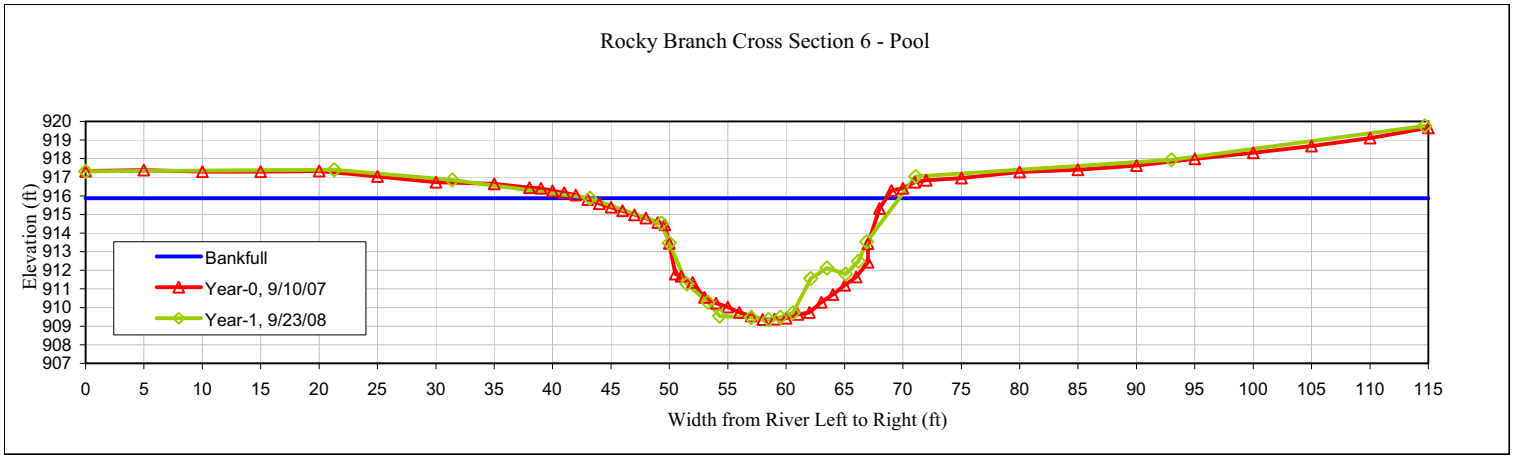
CREW ALTIZER/BUCHHOLZ/HALLEY/FURRY

Summary Data
All dimensions in feet.

Bankfull X-sec area	59.3	sq. ft.
Bankfull Width	28.1	ft.
Bankfull Mean Depth	2.1	ft.
Bankfull Max Depth	4.5	ft.
Width/Depth Ratio	13.3	
Entrenchment Ratio	>2.2	
Classification	n/a	
Bank Height Ratio	1.0	
Bankfull Elevation:	918.36	ft.

CROSS SECTION PHOTO - LOOKING DOWNSTREAM

ROCKY BRANCH		EEP PROJECT # 308		CROSS-SECTION: 6									
Year-0		Year-1		Year-2		Year-3		Year-4		Year-5		Year-6	
Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)
0.00	917.33	0.00	917.32										
5.00	917.39	21.30	917.41										
10.00	917.30	31.40	916.85										
15.00	917.30	43.20	915.88										
20.00	917.34	49.30	914.54										
25.00	917.05	50.00	913.46										
30.00	916.73	51.50	911.26										
35.00	916.65	53.30	910.28										
38.00	916.44	54.30	909.55										
39.00	916.41	57.00	909.46										
40.00	916.27	58.50	909.36										
41.00	916.16	59.50	909.47										
42.00	916.04	60.60	909.72										
43.00	915.80	62.10	911.56										
44.00	915.58	63.50	912.12										
45.00	915.40	65.10	911.80										
46.00	915.21	66.20	912.49										
47.00	914.98	66.90	913.53										
48.00	914.80	71.10	917.04										
49.00	914.57	93.00	917.93										
49.60	914.45	114.70	919.76										
50.00	913.45												
50.50	911.79												
51.00	911.68												
52.00	911.35												
53.00	910.55												
54.00	910.23												
55.00	910.03												
56.00	909.73												
57.00	909.55												
58.00	909.35												
59.00	909.38												
60.00	909.43												
61.00	909.63												
62.00	909.73												
63.00	910.28												
64.00	910.69												
65.00	911.20												
66.00	911.64												
67.00	912.44												
67.00	913.43												
68.00	915.32												
69.00	916.28												
70.00	916.41												
71.00	916.74												
72.00	916.84												
75.00	916.96												
80.00	917.28												
85.00	917.4												
90.00	917.63												
95.00	917.98												
100.00	918.32												
105.00	918.68												
110.00	919.11												
115.00	919.66												



CROSS SECTION PLOT - LOOKING DOWNSTREAM

YEAR-1, 2008 SURVEY DATA **CROSS-SECTION:** 6

PROJECT ROCKY BRANCH **FEATURE:** Pool

TASK CROSS SECTION

REACH ROCKY BRANCH

DATE 9/23/2008 to 9/25/2008

CREW ALTIZER/BUCHHOLZ/HALLEY/FURRY

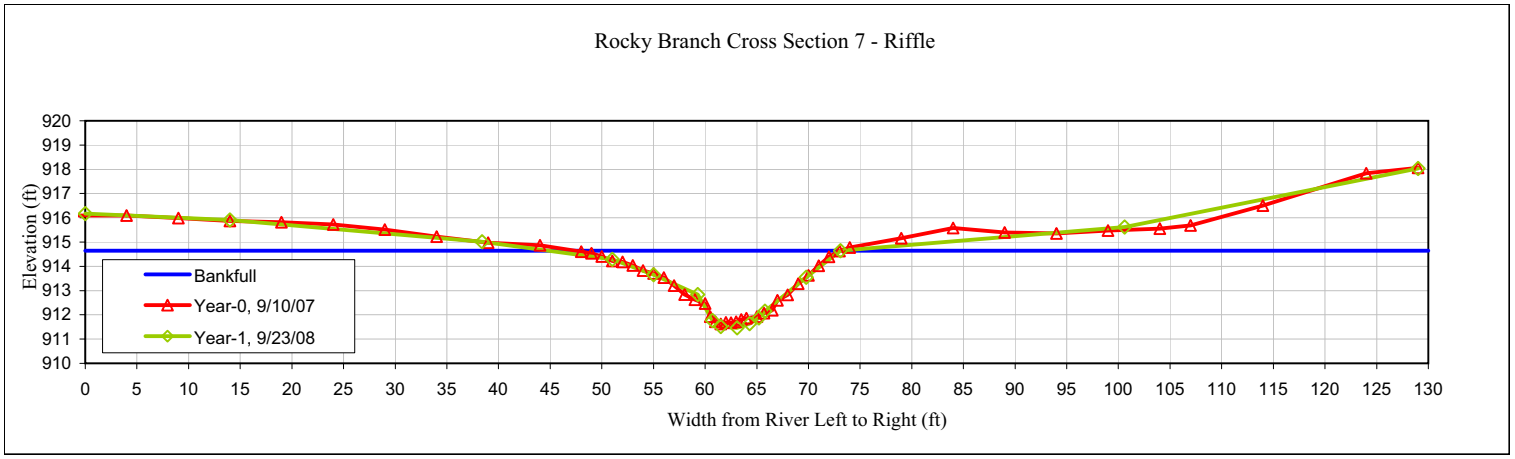
Summary Data
All dimensions in feet.

Bankfull X-sec area	95.4	sq. ft.
Bankfull Width	26.5	ft.
Bankfull Mean Depth	3.6	ft.
Bankfull Max Depth	6.5	ft.
Width/Depth Ratio	7.4	
Entrenchment Ratio	>2.2	
Classification	n/a	
Bank Height Ratio	1.0	
Bankfull Elevation:	915.88	ft.

CROSS SECTION PHOTO - LOOKING DOWNSTREAM

ROCKY BRANCH **EEP PROJECT # 308** CROSS-SECTION: 7

Year-0		Year-1		Year-2		Year-3		Year-4		Year-5		Year-6	
Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)
-1.00	916.10	0.00	916.17										
4.00	916.10	14.00	915.91										
9.00	915.99	38.40	915.01										
14.00	915.87	51.00	914.29										
19.00	915.82	55.00	913.65										
24.00	915.73	59.30	912.83										
29.00	915.52	60.70	911.77										
34.00	915.23	61.50	911.52										
39.00	914.97	63.10	911.47										
44.00	914.87	64.30	911.64										
48.00	914.61	65.20	911.87										
49.00	914.54	65.80	912.15										
50.00	914.40	69.80	913.55										
51.00	914.22	73.10	914.65										
52.00	914.18	100.60	915.62										
53.00	914.04	129.00	918.03										
54.00	913.83												
55.00	913.71												
56.00	913.54												
57.00	913.20												
58.00	912.84												
59.00	912.63												
60.00	912.47												
60.50	911.93												
61.00	911.72												
61.50	911.62												
62.00	911.69												
62.50	911.67												
63.00	911.71												
63.50	911.81												
64.00	911.86												
65.00	911.93												
65.70	912.07												
66.50	912.19												
67.00	912.60												
68.00	912.82												
69.00	913.29												
70.00	913.63												
71.00	914.03												
72.00	914.39												
73.00	914.63												
74.00	914.77												
79.00	915.16												
84.00	915.58												
89.00	915.39												
94.00	915.36												
99.00	915.48												
104.00	915.56												
107.00	915.68												
114.00	916.5												
124.00	917.84												
129.00	918.06												



CROSS SECTION PLOT - LOOKING DOWNSTREAM

YEAR-1, 2008 SURVEY DATA **CROSS-SECTION:** 7

PROJECT ROCKY BRANCH **FEATURE:** Riffle

TASK CROSS SECTION

REACH ROCKY BRANCH

DATE 9/23/2008 to 9/25/2008

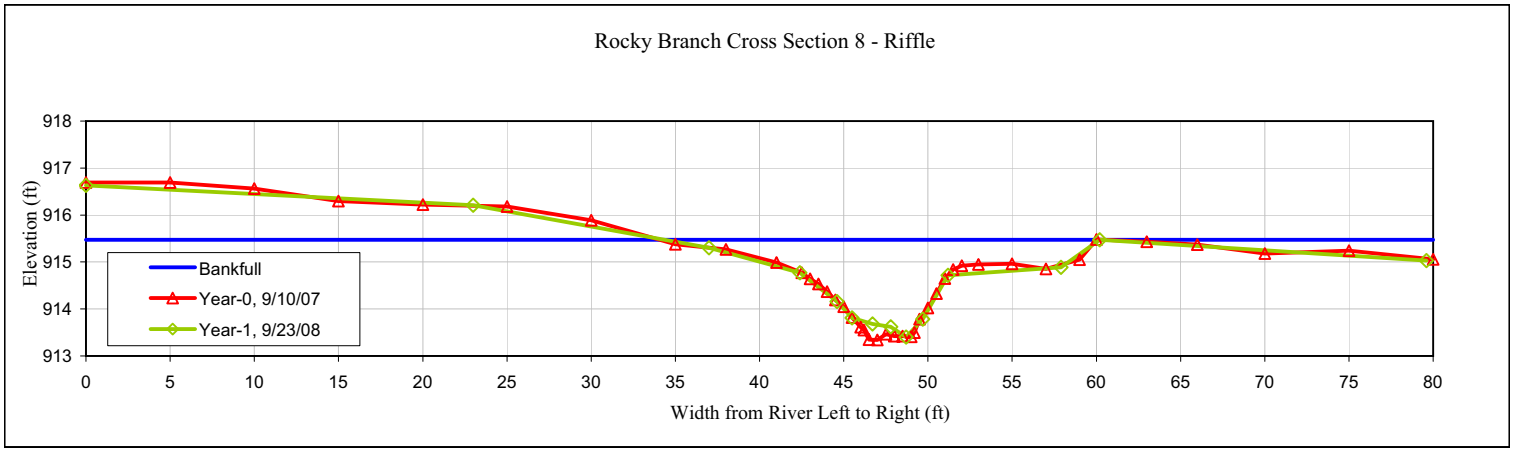
CREW ALTIZER/BUCHHOLZ/HALLEY/FURRY

Summary Data
All dimensions in feet.

Bankfull X-sec area	37.6	sq. ft.
Bankfull Width	28.4	ft.
Bankfull Mean Depth	1.3	ft.
Bankfull Max Depth	3.2	ft.
Width/Depth Ratio	21.5	
Entrenchment Ratio	>2.2	
Classification	C	
Bank Height Ratio	1.0	
Bankfull Elevation:	914.65	ft.

CROSS SECTION PHOTO - LOOKING DOWNSTREAM

ROCKY BRANCH		EEP PROJECT # 308		CROSS-SECTION: 8											
Year-0		Year-1		Year-2		Year-3		Year-4		Year-5		Year-6			
Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)	Station (ft)	Elev. (ft)		
0.00	916.69	0.00	916.63												
5.00	916.69	23.00	916.21												
10.00	916.56	37.00	915.30												
15.00	916.30	42.40	914.77												
20.00	916.22	44.60	914.16												
25.00	916.18	45.50	913.81												
30.00	915.89	46.70	913.68												
35.00	915.38	47.80	913.62												
38.00	915.27	48.70	913.40												
41.00	914.99	49.70	913.78												
42.50	914.77	51.20	914.72												
43.00	914.64	57.90	914.89												
43.50	914.53	60.20	915.47												
44.00	914.37	79.60	915.03												
44.50	914.19														
45.00	914.05														
45.50	913.82														
46.00	913.61														
46.20	913.55														
46.50	913.35														
47.00	913.34														
47.50	913.46														
48.00	913.42														
48.50	913.42														
49.00	913.41														
49.20	913.50														
49.50	913.78														
50.00	914.02														
50.50	914.33														
51.00	914.65														
51.50	914.84														
52.00	914.92														
53.00	914.95														
55.00	914.96														
57.00	914.85														
59.00	915.05														
60.00	915.48														
63.00	915.43														
66.00	915.37														
70.00	915.18														
75.00	915.24														
80.00	915.06														



CROSS SECTION PLOT - LOOKING DOWNSTREAM

YEAR-1, 2008 SURVEY DATA **CROSS-SECTION:** 8

PROJECT ROCKY BRANCH **FEATURE:** Riffle

TASK CROSS SECTION

REACH ROCKY BRANCH

DATE 9/23/2008 to 9/25/2008

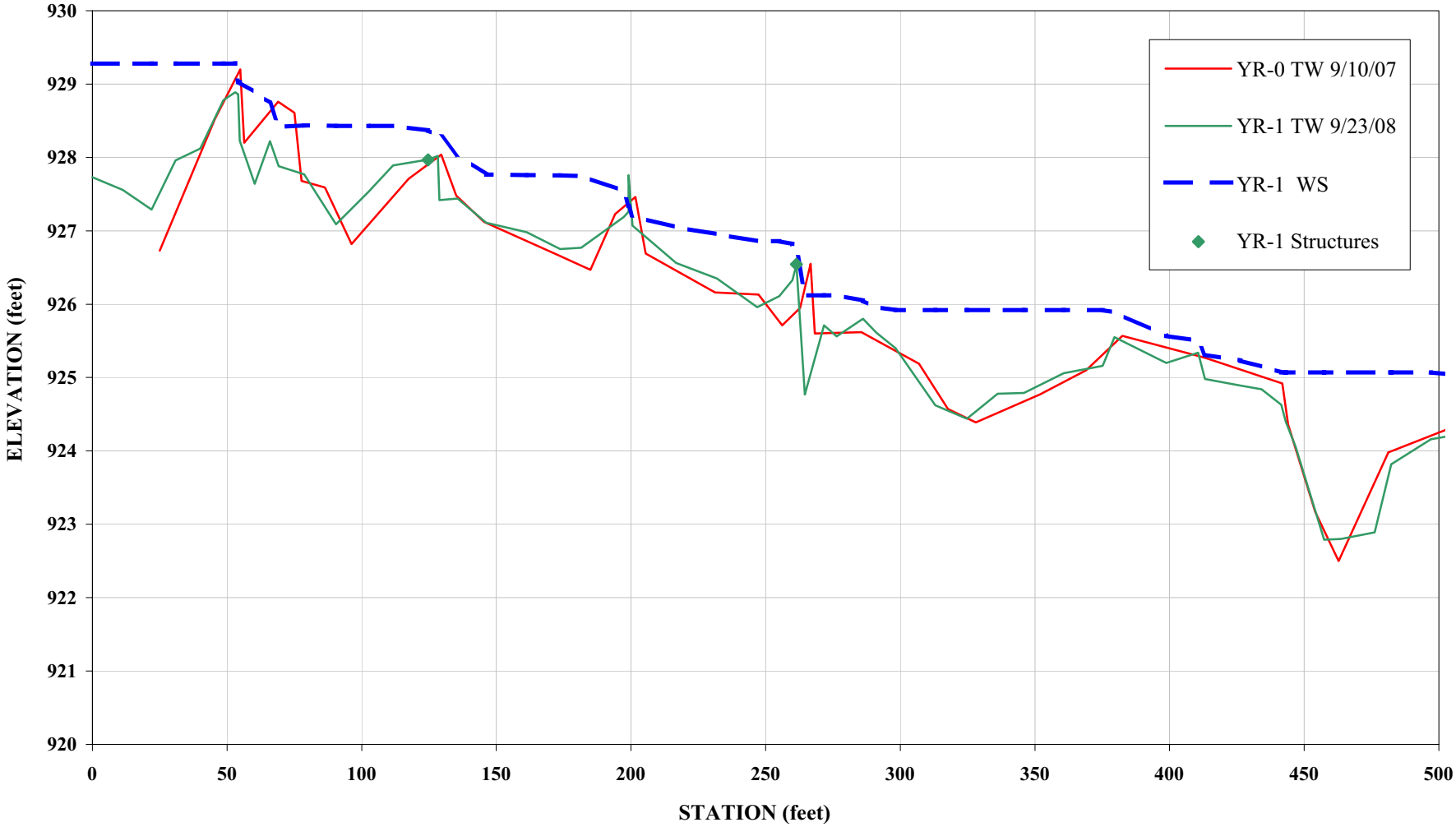
CREW ALTIZER/BUCHHOLZ/HALLEY/FURRY

Summary Data
All dimensions in feet.

Bankfull X-sec area	25.1	sq. ft.
Bankfull Width	45.2	ft.
Bankfull Mean Depth	0.6	ft.
Bankfull Max Depth	2.1	ft.
Width/Depth Ratio	>12	
Entrenchment Ratio	>2.2	
Classification	C	
Bank Height Ratio	1.0	
Bankfull Elevation:	915.47	ft.

CROSS SECTION PHOTO - LOOKING DOWNSTREAM

Rocky Branch
Longitudinal Profile
2008 (Year-1) Monitoring



Note: Due to slight differences in thalweg length, longitudinal profile was adjusted horizontally. Structures were used as a guide.

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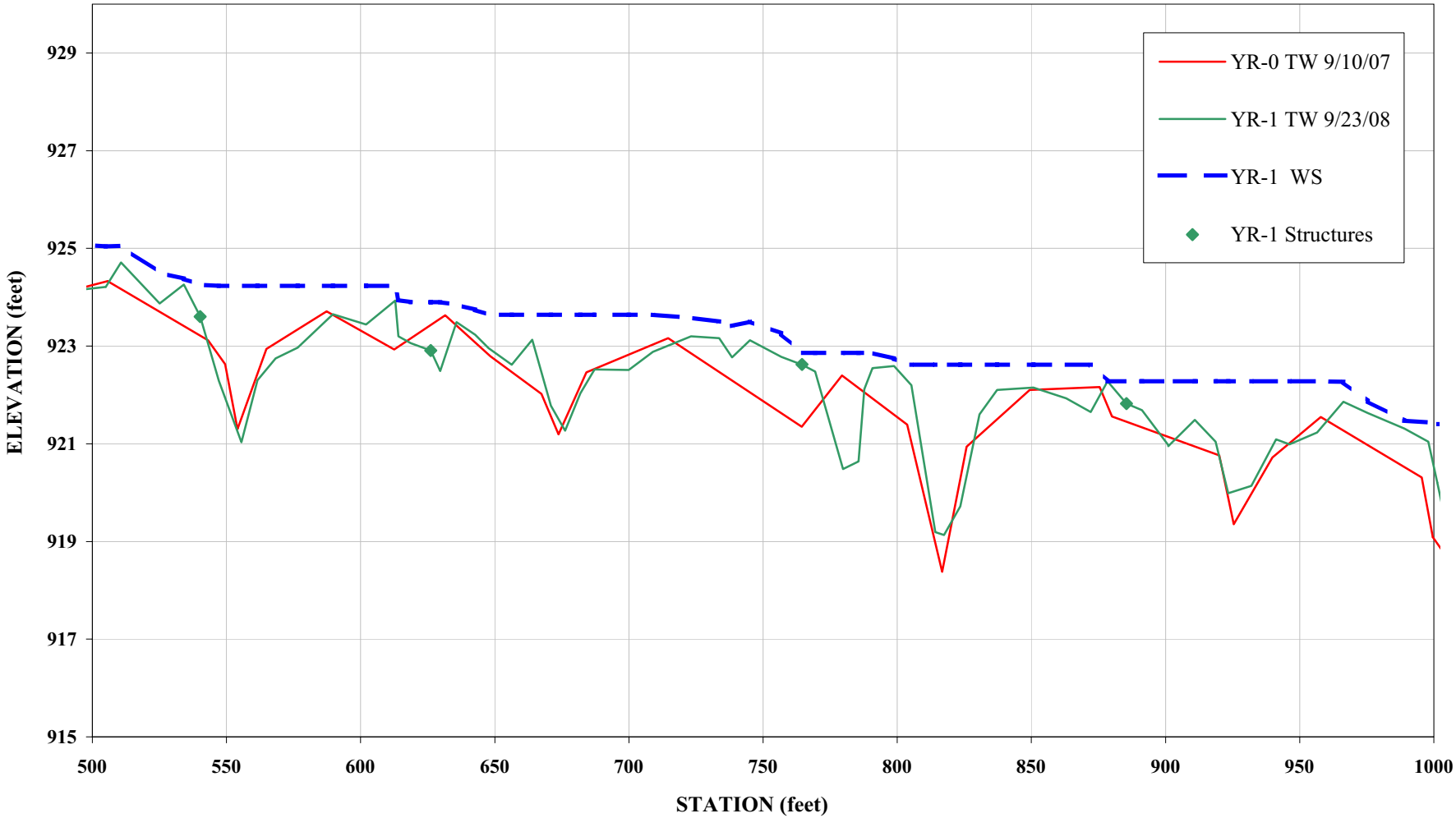
Rocky Branch
Longitudinal Profile
2008 (Year-1) Monitoring



Note: Due to slight differences in thalweg length, longitudinal profile was adjusted horizontally. Structures were used as a guide.

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Rocky Branch
Longitudinal Profile
2008 (Year-1) Monitoring

Note: Due to slight differences in thalweg length, longitudinal profile was adjusted horizontally. Structures were used as a guide.

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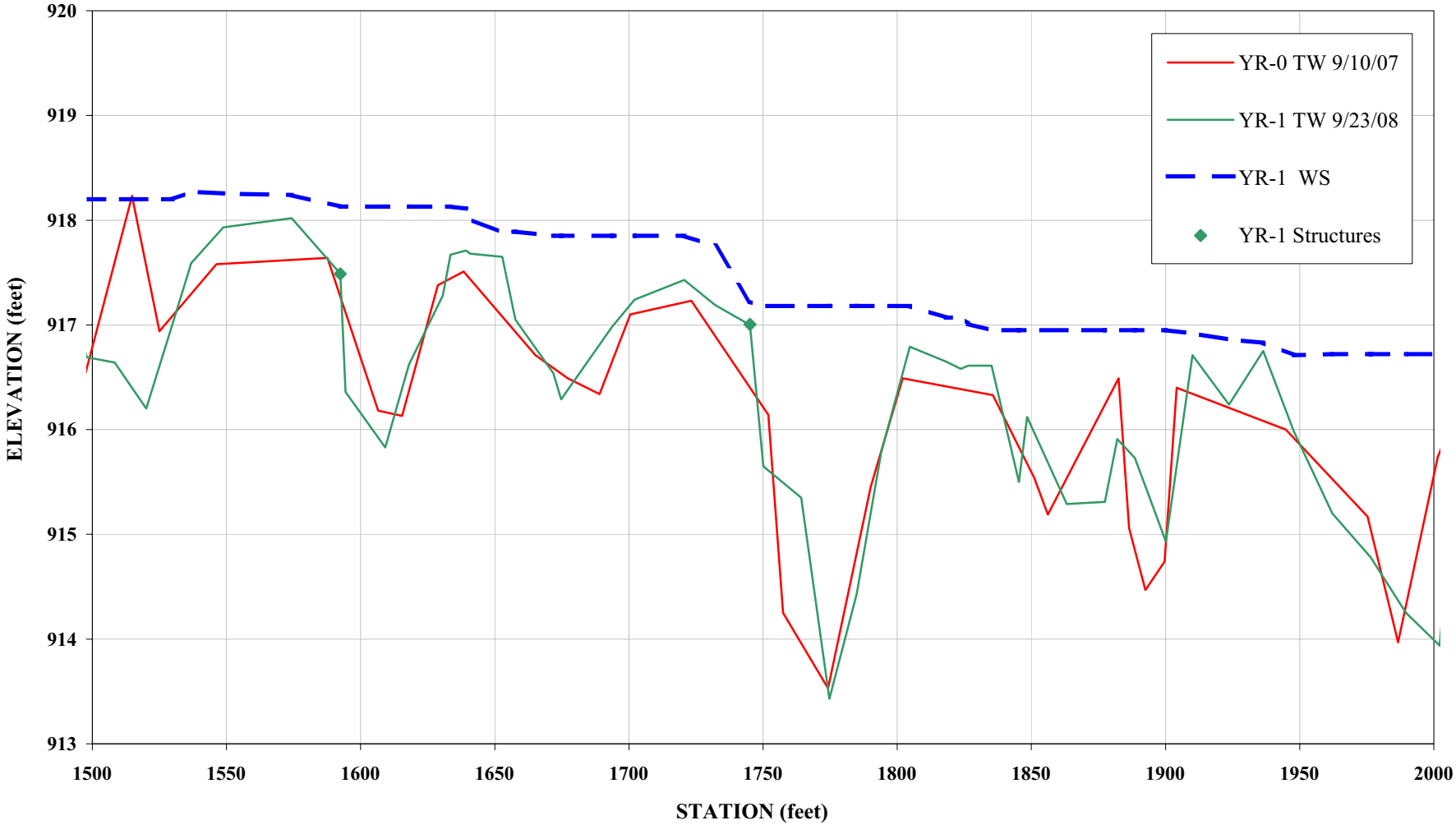
Rocky Branch
Longitudinal Profile
2008 (Year-1) Monitoring



Note: Due to slight differences in thalweg length, longitudinal profile was adjusted horizontally. Structures were used as a guide.

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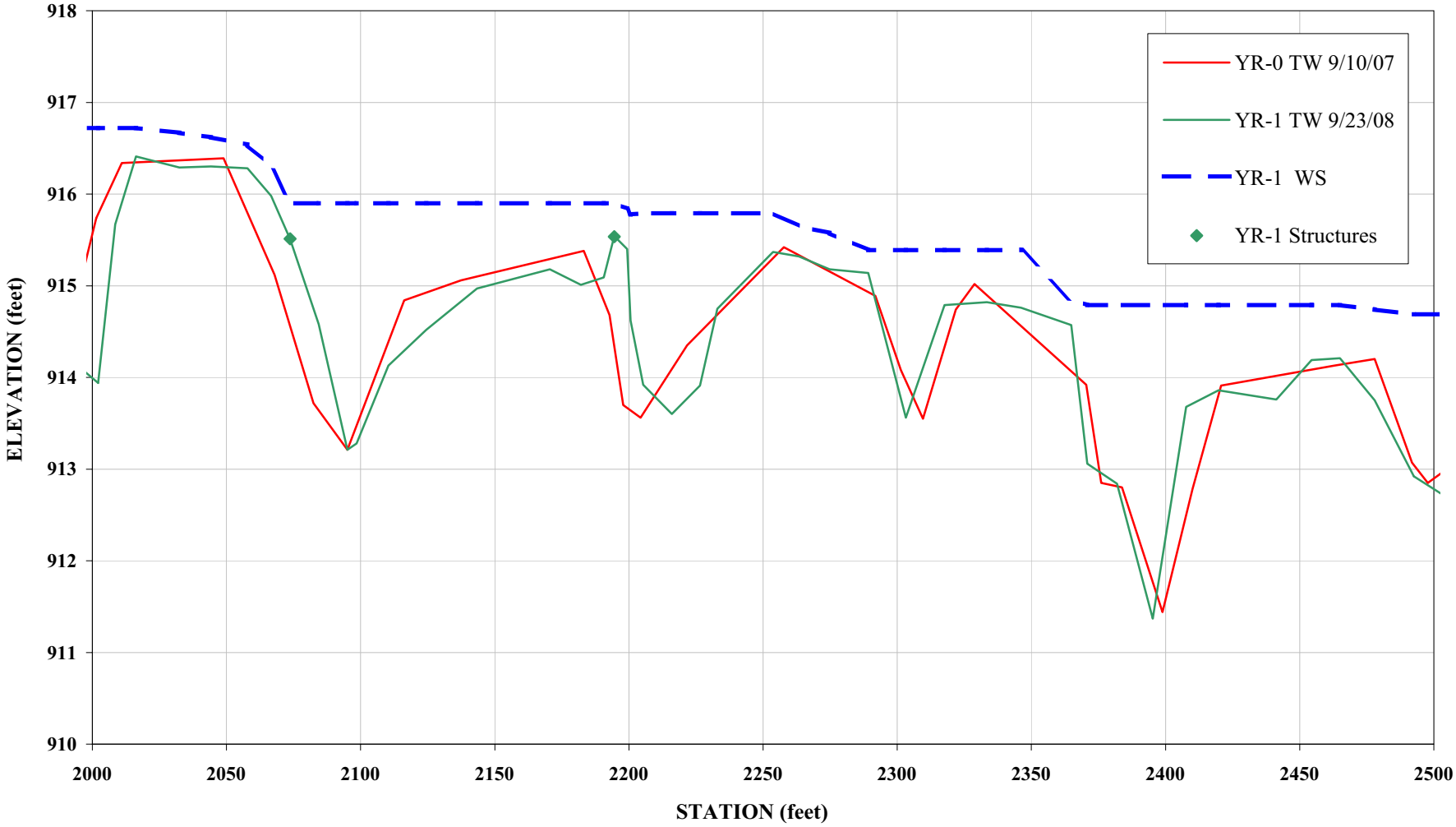
Rocky Branch
Longitudinal Profile
2008 (Year-1) Monitoring



Note: Due to slight differences in thalweg length, longitudinal profile was adjusted horizontally. Structures were used as a guide.

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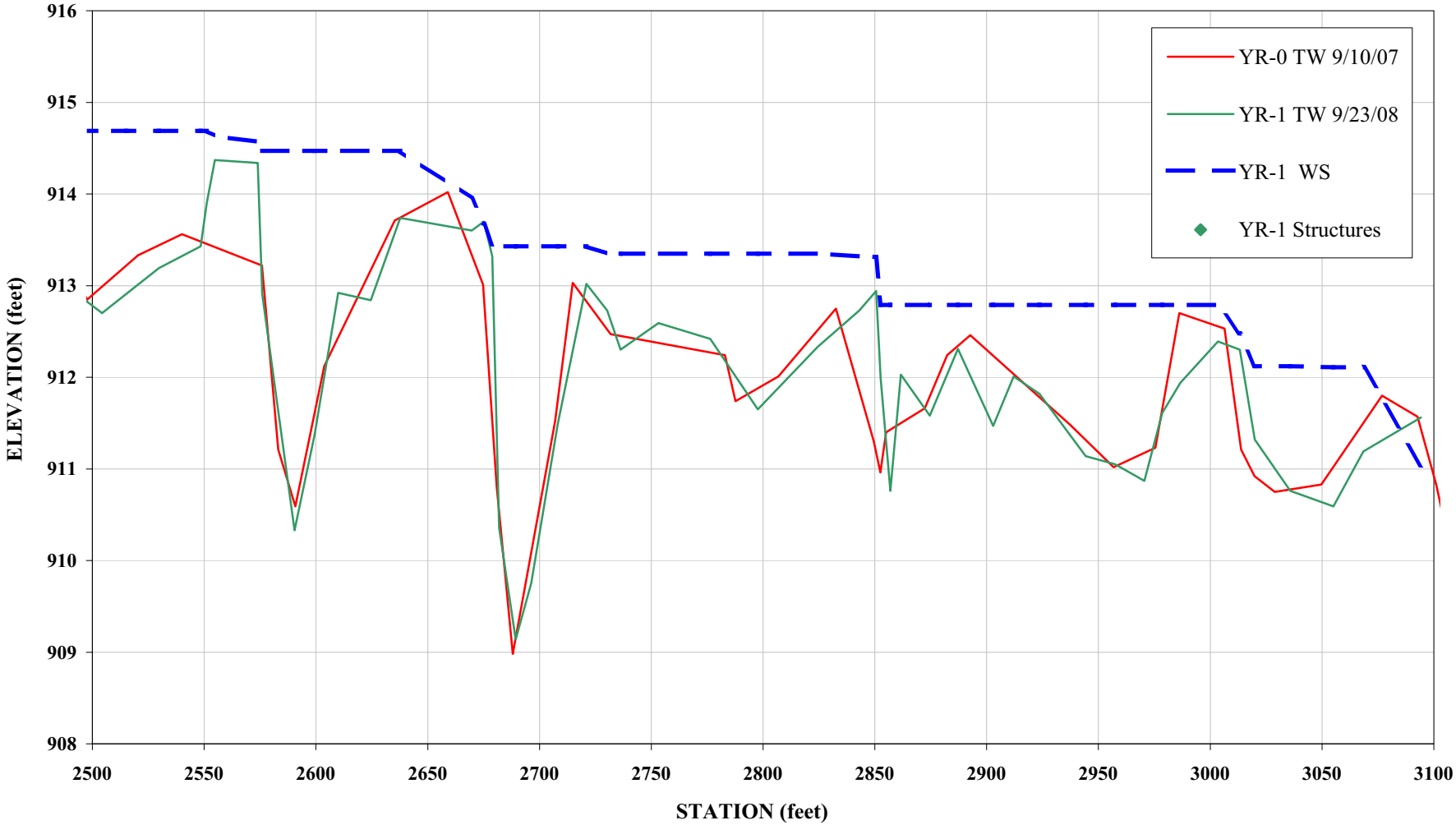
Rocky Branch
Longitudinal Profile
2008 (Year-1) Monitoring



Note: Due to slight differences in thalweg length, longitudinal profile was adjusted horizontally. Structures were used as a guide.

EcoEngineering
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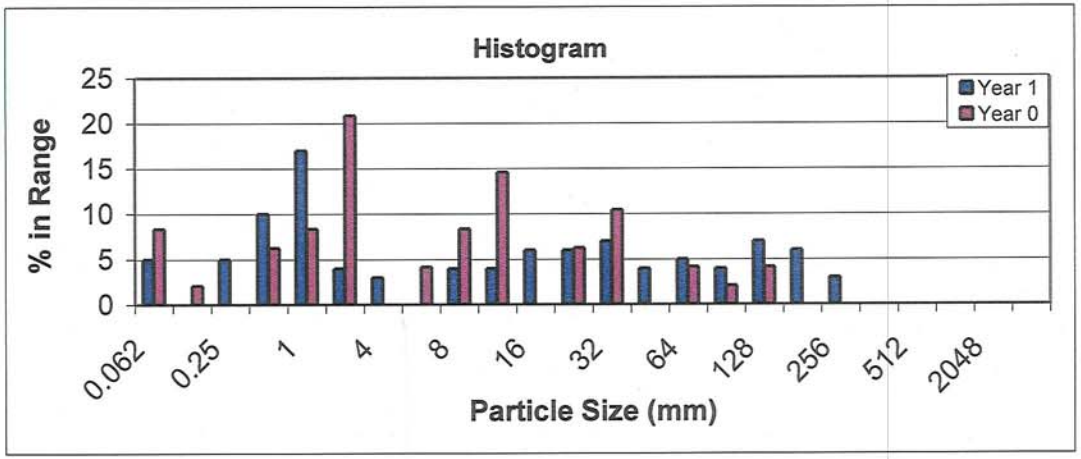


EEP PROJECT ID: 308
CROSS-SECTION: 2 **FEATURE: RIFFLE**

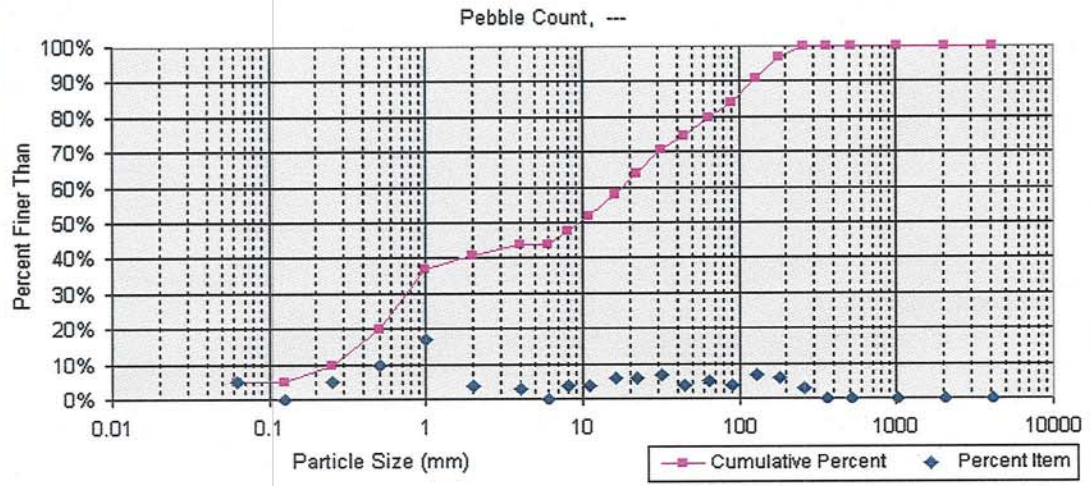
Ecosystem Enhancement PROGRAM

PROJECT ROCKY BRANCH
TASK PEBBLE COUNT
REACH ROCKY BRANCH
DATE 9/23/2008 to 9/25/2008
CREW ALTIZER/BUCHHOLZ/HALLEY/FURRY

Pebble Count

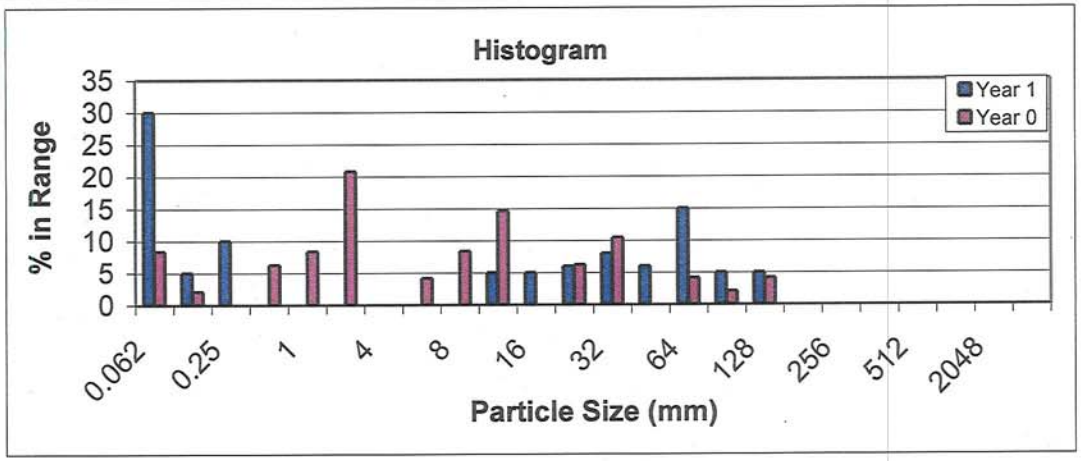
Material	Size Range (mm)		Count
silt/clay	0	0.062	5
very fine sand	0.062	0.13	0
fine sand	0.13	0.25	5
medium sand	0.25	0.5	10
coarse sand	0.5	1	17
very coarse sand	1	2	4
very fine gravel	2	4	3
fine gravel	4	6	
fine gravel	6	8	4
medium gravel	8	11	4
medium gravel	11	16	6
coarse gravel	16	22	6
coarse gravel	22	32	7
very coarse gravel	32	45	4
very coarse gravel	45	64	5
small cobble	64	90	4
medium cobble	90	128	7
large cobble	128	180	6
very large cobble	180	256	3
small boulder	256	362	
small boulder	362	512	
medium boulder	512	1024	
large boulder	1024	2048	
very large boulder	2048	4096	
bedrock			
Total Particle Count:			100

Note: ---



Size percent less than (mm)				
D16	D35	D50	D84	D95
0.379	0.92	9.4	90	161

Percent by substrate type					
silt/clay	sand	gravel	cobble	boulder	bedrock
5%	36%	39%	20%	0%	0%



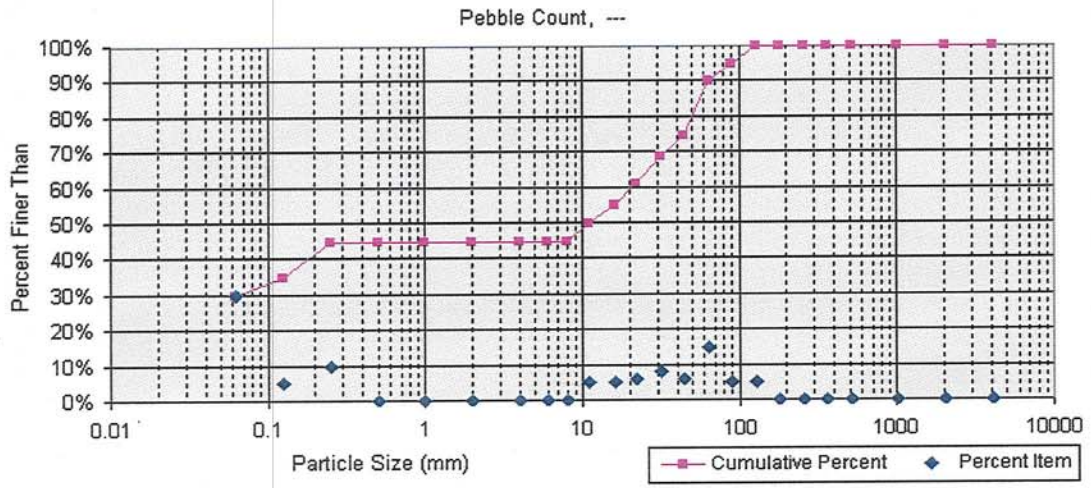
EEP PROJECT ID: 308
CROSS-SECTION: 4 **FEATURE:** RIFFLE

PROJECT ROCKY BRANCH
TASK PEBBLE COUNT
REACH ROCKY BRANCH
DATE 9/23/2008 to 9/25/2008
CREW ALTIZER/BUCHHOLZ/HALLEY/FURRY

Pebble Count

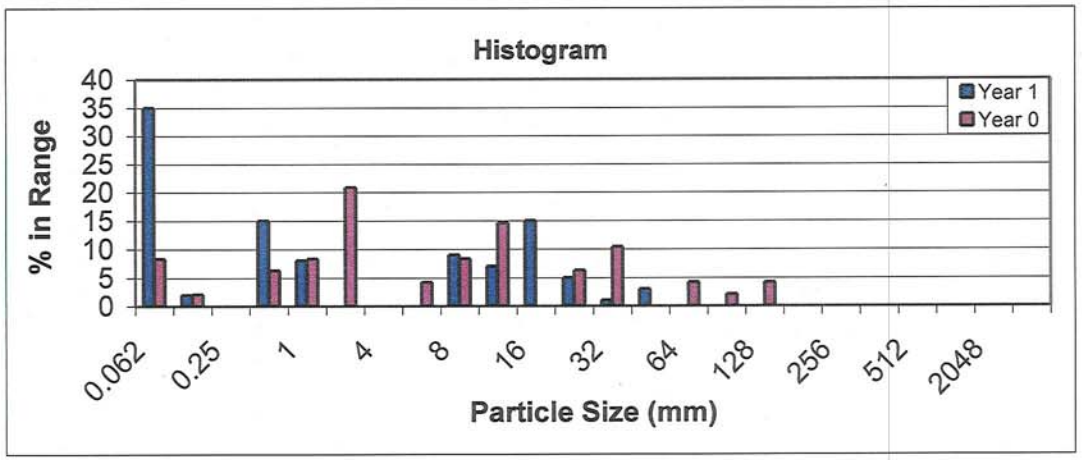
Material	Size Range (mm)		Count
silt/clay	0	0.062	30
very fine sand	0.062	0.13	5
fine sand	0.13	0.25	10
medium sand	0.25	0.5	0
coarse sand	0.5	1	
very coarse sand	1	2	
very fine gravel	2	4	
fine gravel	4	6	
fine gravel	6	8	
medium gravel	8	11	5
medium gravel	11	16	5
coarse gravel	16	22	6
coarse gravel	22	32	8
very coarse gravel	32	45	6
very coarse gravel	45	64	15
small cobble	64	90	5
medium cobble	90	128	5
large cobble	128	180	
very large cobble	180	256	
small boulder	256	362	
small boulder	362	512	
medium boulder	512	1024	
large boulder	1024	2048	
very large boulder	2048	4096	
bedrock			
Total Particle Count:			100

Note: ---



Size percent less than (mm)				
D16	D35	D50	D84	D95
#N/A	0.13	11.0	56	90

Percent by substrate type					
silt/clay	sand	gravel	cobble	boulder	bedrock
30%	15%	45%	10%	0%	0%



EEP PROJECT ID: 308
CROSS-SECTION: 7 **FEATURE: RIFFLE**

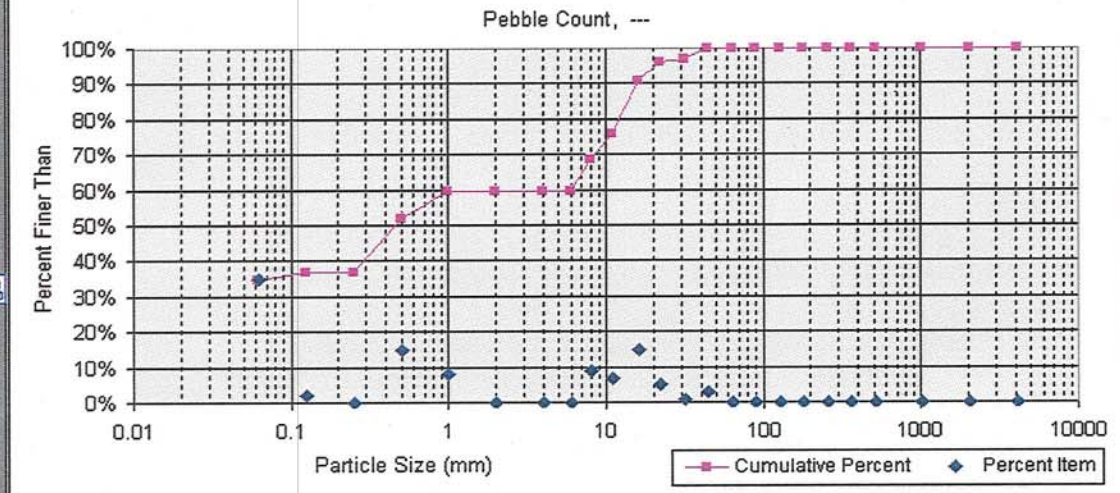
Ecosystem Enhancement PROGRAM

PROJECT ROCKY BRANCH
TASK PEBBLE COUNT
REACH ROCKY BRANCH
DATE 9/23/2008 to 9/25/2008
CREW ALTIZER/BUCHHOLZ/HALLEY/FURRY

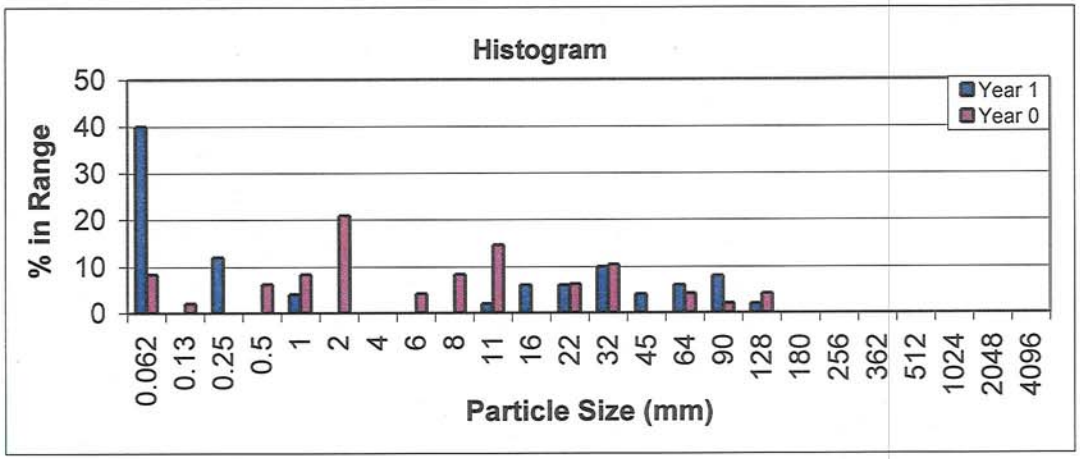
Pebble Count

Material	Size Range (mm)		Count
silt/clay	0	0.062	35
very fine sand	0.062	0.13	2
fine sand	0.13	0.25	0
medium sand	0.25	0.5	15
coarse sand	0.5	1	8
very coarse sand	1	2	
very fine gravel	2	4	
fine gravel	4	6	
fine gravel	6	8	9
medium gravel	8	11	7
medium gravel	11	16	15
coarse gravel	16	22	5
coarse gravel	22	32	1
very coarse gravel	32	45	3
very coarse gravel	45	64	
small cobble	64	90	
medium cobble	90	128	
large cobble	128	180	
very large cobble	180	256	
small boulder	256	362	
small boulder	362	512	
medium boulder	512	1024	
large boulder	1024	2048	
very large boulder	2048	4096	
bedrock			
Total Particle Count:			100

Note: ---



Size percent less than (mm)					Percent by substrate type					
D16	D35	D50	D84	D95	silt/clay	sand	gravel	cobble	boulder	bedrock
#N/A	0.06	0.5	13	21	35%	25%	40%	0%	0%	0%



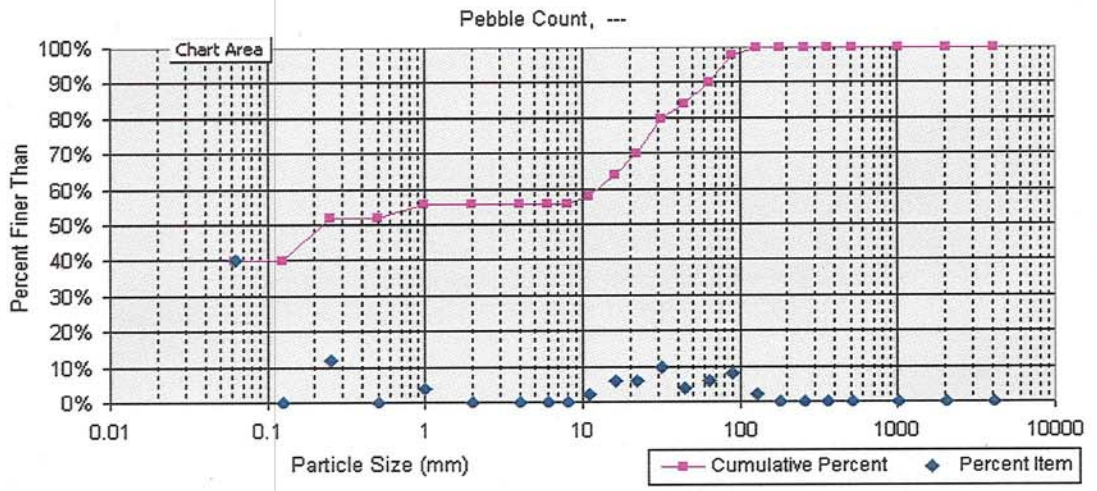
EEP PROJECT ID: 308
CROSS-SECTION: 8 **FEATURE: RIFFLE**

PROJECT ROCKY BRANCH
TASK PEBBLE COUNT
REACH ROCKY BRANCH
DATE 9/23/2008 to 9/25/2008
CREW ALTIZER/BUCHHOLZ/HALLEY/FURRY

Pebble Count

Material	Size Range (mm)		Count
silt/clay	0	0.062	40
very fine sand	0.062	0.13	0
fine sand	0.13	0.25	12
medium sand	0.25	0.5	
coarse sand	0.5	1	4
very coarse sand	1	2	
very fine gravel	2	4	
fine gravel	4	6	
fine gravel	6	8	
medium gravel	8	11	2
medium gravel	11	16	6
coarse gravel	16	22	6
coarse gravel	22	32	10
very coarse gravel	32	45	4
very coarse gravel	45	64	6
small cobble	64	90	8
medium cobble	90	128	2
large cobble	128	180	
very large cobble	180	256	
small boulder	256	362	
small boulder	362	512	
medium boulder	512	1024	
large boulder	1024	2048	
very large boulder	2048	4096	
bedrock			
Total Particle Count:			100

Note: ---



Size percent less than (mm)					Percent by substrate type					
D16	D35	D50	D84	D95	silt/clay	sand	gravel	cobble	boulder	bedrock
#N/A	#N/A	0.2	45	79	40%	16%	34%	10%	0%	0%

ROCKY BRANCH

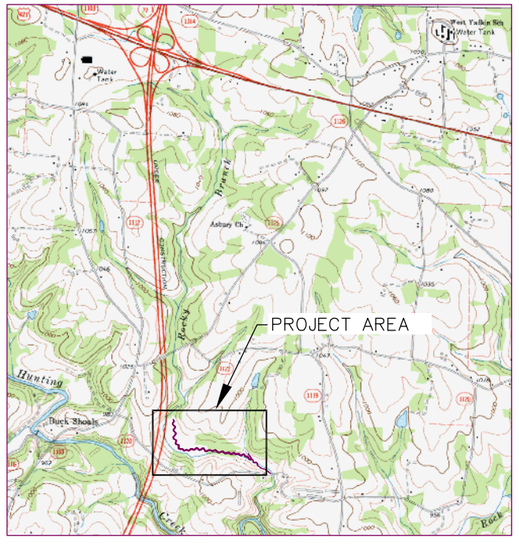
INTEGRATED CURRENT CONDITIONS PLAN VIEW - YEAR ONE MONITORING

YADKIN COUNTY, NORTH CAROLINA
EEP PROJECT NUMBER: 308
DATE: NOVEMBER 5, 2008

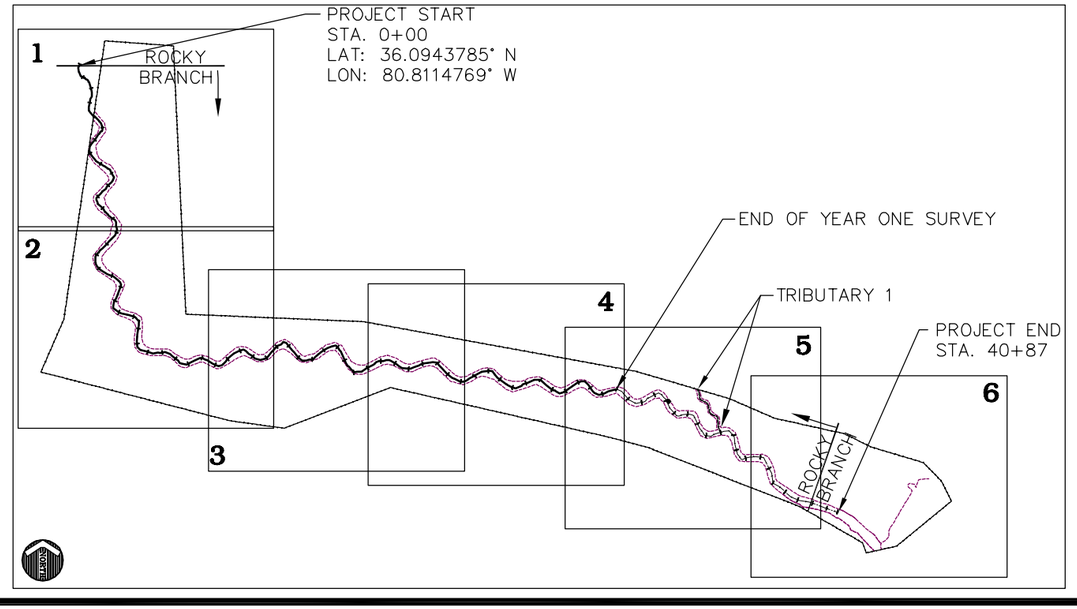
POINT TABLE				
POINT NUMBER	NORTHING	EASTING	ELEVATION	DESCRIPTION
1	858613.93	1464824.91	928.25	CONTROL
2	857706.98	1464784.29	923.60	CONTROL
3	857497.74	1465232.84	921.75	CONTROL
4	857374.24	1465869.69	943.35	CONTROL
5	857383.41	1466105.73	924.76	CONTROL
6	857286.17	1466325.15	945.11	CONTROL
7	857204.24	1466508.09	947.75	CONTROL
8	857188.08	1466694.46	939.14	CONTROL
9	856985.38	1467244.76	928.06	CONTROL
10	856996.29	1466467.36	970.98	CONTROL
11	856897.33	1467392.45	917.61	CONTROL
100	857064.87	1467441.85	917.74	CONTROL
101	858419.60	1464837.57	930.60	CONTROL
102	858025.29	1465002.38	927.84	CONTROL
103	858597.92	1464848.09	933.32	CONTROL
104	858530.69	1465077.59	969.73	CONTROL
105	857360.69	1465445.98	923.35	CONTROL
106	858309.21	1464950.27	949.60	NL SET
107	858049.05	1465099.55	941.04	NL SET
108	857672.99	1465257.40	923.10	NL SET
109	857351.66	1465705.60	933.45	NL SET
110	857528.08	1466070.12	918.28	NL SET
111	857483.76	1466334.47	916.79	NL SET
9001	858530.66	1465077.56	969.66	TTPT104
9002	858583.24	1465085.65	964.54	EIP-IN-30MAPLE
9003	858597.24	1464859.07	934.86	R/W MON
9004	858162.53	1464795.63	928.21	BENCHMARK 1
9005	858025.27	1465002.36	927.84	TTPT102
9006	857685.27	1465116.57	924.65	BENCHMARK 3
9007	857560.18	1465779.26	921.38	BENCHMARK 4?
9008	857360.66	1465446.04	923.31	TTPT105
9009	857508.68	1466220.77	919.02	BENCHMARK 5
9010	857439.76	1466843.27	918.41	BENCHMARK 8
9011	857317.78	1466690.43	919.68	BENCHMARK 7

NOTE: SURVEY DATES OF THALWEG AND TOP-OF-BANK - 9/23/08 TO 9/25/08.

NORTH CAROLINA
ECOSYSTEM ENHANCEMENT PROGRAM
NC-EEP CONTACT: MELONIE ALLEN (919) 715-1973



VICINITY MAP
NTS



SHEET INDEX
1-6 INTEGRATED PLAN VIEW

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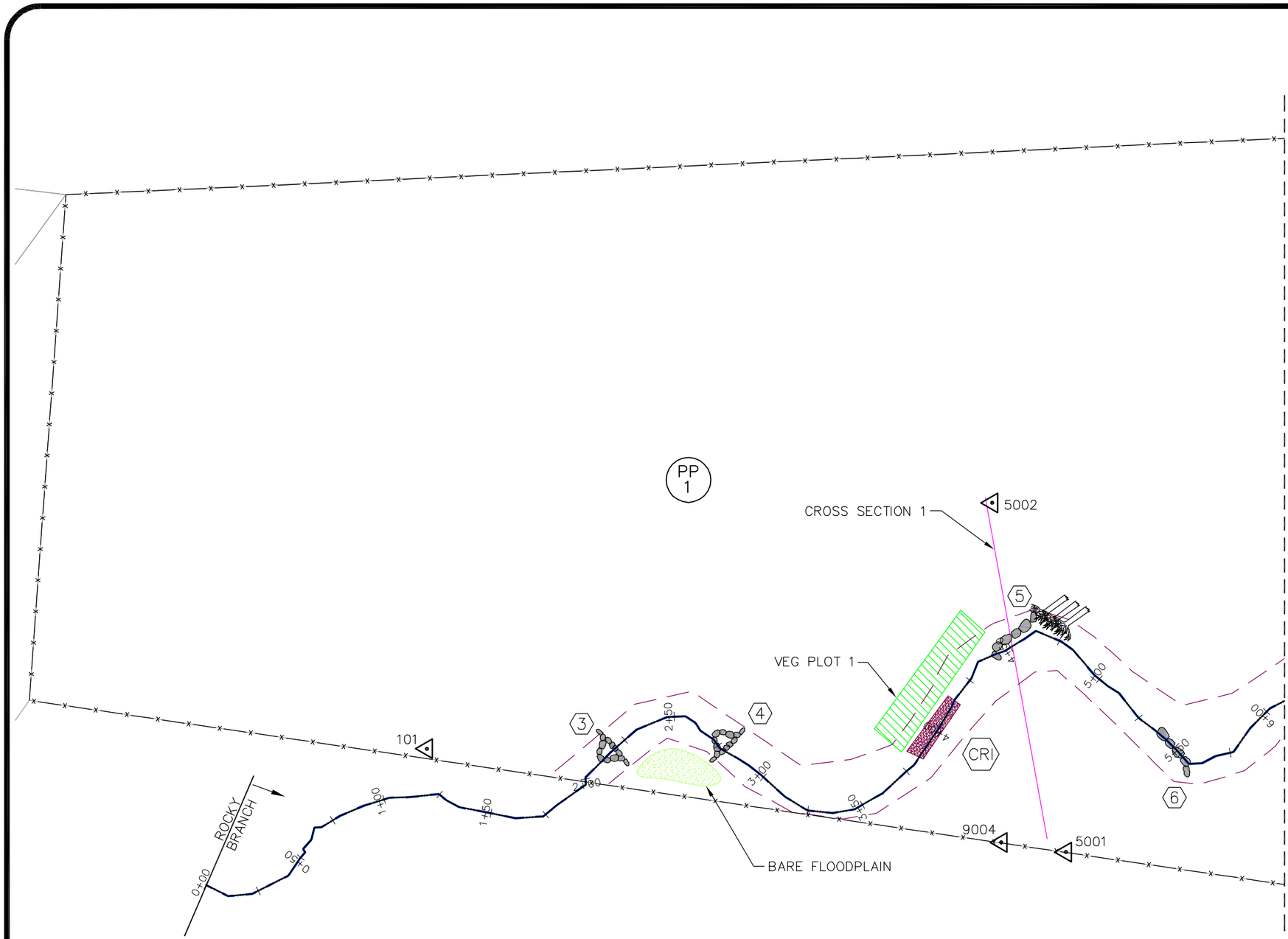

MATCH LINE - SEE SHEET 2

LEGEND

- EXISTING FENCE LINE
- THALWEG OF CREEK
- ROCK CROSS VANE
- ROCK A-VANE
- LOG VANE
- ROOT WAD
- ROCK VANE
- STRUCTURE NUMBER
- BARE FLOODPLAIN
- INVASIVE / EXOTIC POPULATION
- PHOTO POINT
- CREST GAGE
- RIFFLE
- SLOUGHED BANKS

NOTE: SURVEY DATES OF THALWEG AND TOP-OF-BANK - 9/23/08 TO 9/25/08.

NORTH

GRAPHIC SCALE

50 0 25 50 100

1 inch = 50 ft.

SHEET 1 OF 6

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Ecosystem Enhancement Program

ROCKY BRANCH

INTEGRATED CURRENT CONDITIONS PLAN VIEW - YEAR ONE MONITORING
YADKIN COUNTY, NORTH CAROLINA

PROJECT NO.	FILENAME:	SCALE:	DATE:
EEP-08020	EEP-08020X	1" = 50'	11-11-08

McADAMS

MATCH LINE - SEE SHEET 3

MATCH LINE - SEE SHEET 1

LESPEDEZA CUNEATA ENCROACHMENT

LESPEDEZA CUNEATA ENCROACHMENT

LIGUSTRUM SINENSE ENCROACHMENT

VEG PLOT 4

VEG PLOT 5

VEG PLOT 2

VEG PLOT 3

CROSS SECTION 3

CROSS SECTION 2

9006

5006

5005

5004

5003

CR1

CR3

CR4

PP 2

7

8

9

10

11

12

13

14

15

16

NORTH

GRAPHIC SCALE

60 0 30 60 120

1 inch = 60 ft.

SHEET 2 OF 6

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Ecosystem Enhancement Program

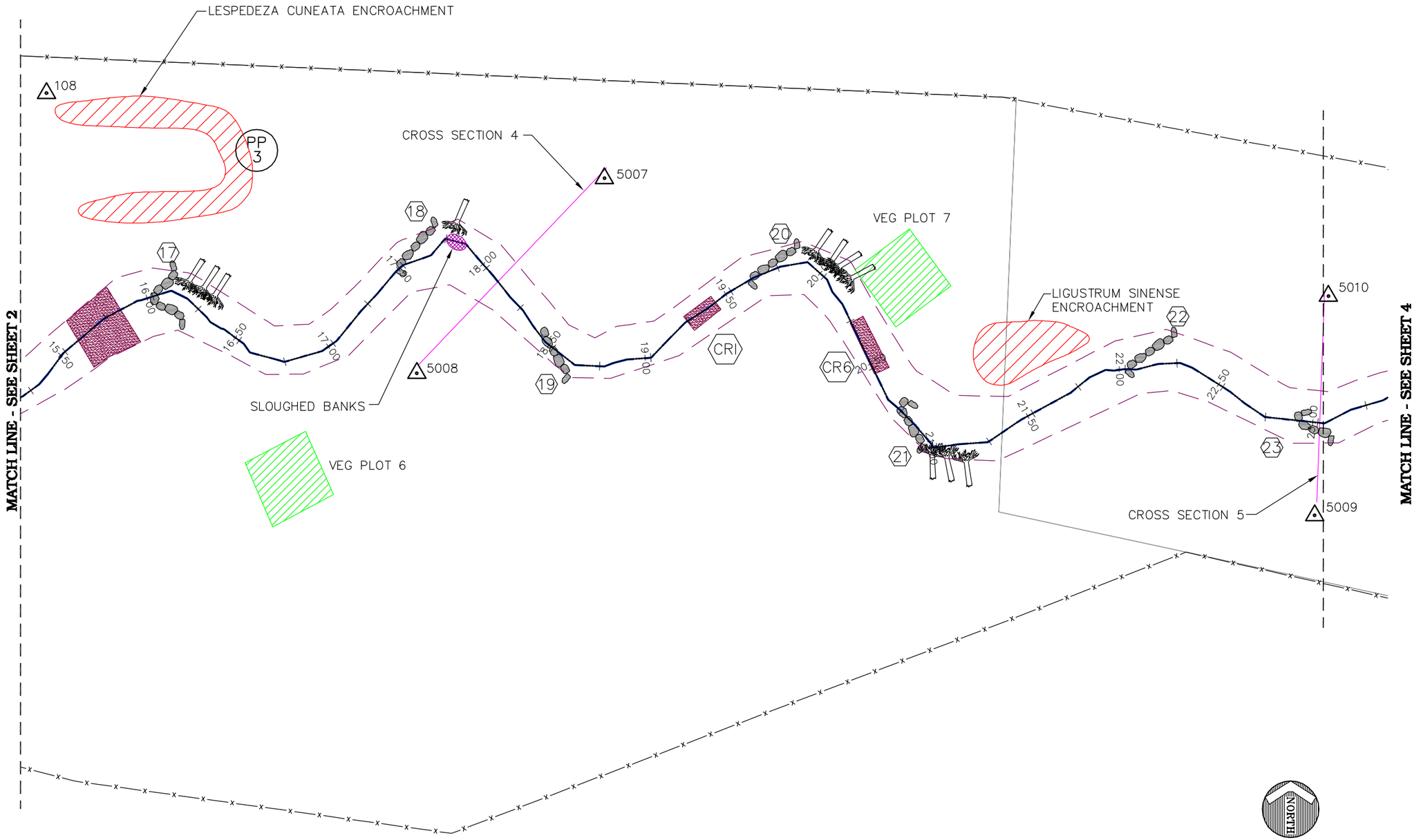
ROCKY BRANCH

INTEGRATED CURRENT CONDITIONS PLAN VIEW - YEAR ONE MONITORING

YADKIN COUNTY, NORTH CAROLINA

PROJECT NO.	EEP-08020
FILENAME:	EEP-08020X
SCALE:	1" = 60'
DATE:	11-11-08

McADAMS



SHEET 3 OF 6

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ROCKY BRANCH

INTEGRATED CURRENT CONDITIONS PLAN VIEW - YEAR ONE MONITORING
YADKIN COUNTY, NORTH CAROLINA

PROJECT NO.	EEP-08020
FILENAME:	EEP-08020X
SCALE:	1" = 50'
DATE:	11-11-08

McADAMS

MATCH LINE - SEE SHEET 3

5010

LIGUSTRUM SINENSE ENCROACHMENT

24

23+50

24+00

SLOUGHED BANKS

LESPEDEZA CUREATA AND ROSA MULTIFLORA ENCROACHMENT

5009

CROSS SECTION 5

25

24+50

25+00

110

CR7

26

25+50

26+00

SLOUGHED BANKS

ROSA MULTIFLORA ENCROACHMENT

VEG PLOT 8

CR8

27

26+50

27+00

5011

27+50

28+00

111

LONICERA JAPONICA ENCROACHMENT

28

28+50

29+00

29+50

CR9

30+00

MATCH LINE - SEE SHEET 5

5012

CROSS SECTION 6

LONICERA JAPONICA ENCROACHMENT

NORTH

GRAPHIC SCALE

50 0 25 50 100

1 inch = 50 ft.

SHEET 4 OF 6

ROCKY BRANCH

INTEGRATED CURRENT CONDITIONS PLAN VIEW - YEAR ONE MONITORING

YADKIN COUNTY, NORTH CAROLINA

PROJECT NO.	EEP-08020
FILENAME:	EEP-08020X
SCALE:	1" = 50'
DATE:	11-11-08

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McADAMS

MATCH LINE - SEE SHEET 4

LIGUSTRUM SINENSE ENCROACHMENT

END OF YEAR ONE MONITORING THALWAG SURVEY

5013

5014

CROSS SECTION 7

VEG PLOT 9

29

30

SLOUGHED BANKS

CR10

PP 4

CREST GAGE

VEG PLOT 10

TRIBUTARY 1

CROSS SECTION 8

5015

5016

SLOUGHED BANKS

LESPEDEZA CUNEATA ENCROACHMENT

31

32

VEG PLOT 11

33

CR11

34

PP 5

MATCH LINE - SEE SHEET 6

GRAPHIC SCALE

50 0 25 50 100

1 inch = 50 ft.

SHEET 5 OF 6

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Ecosystem Enhancement Program

ROCKY BRANCH

INTEGRATED CURRENT CONDITIONS PLAN VIEW - YEAR ONE MONITORING
YADKIN COUNTY, NORTH CAROLINA

PROJECT NO:	EEP-08020
FILENAME:	EEP-08020X
SCALE:	1" = 50'
DATE:	11-11-08

McADAMS

SHEET 6 OF 6

PROJECT NO.	EEP–08020
FILENAME:	EEP–08020X
SCALE:	1" = 50'
DATE:	11–11–08

ROCKY BRANCH

INTEGRATED CURRENT CONDITIONS PLAN VIEW - YEAR ONE MONITORING
YADKIN COUNTY, NORTH CAROLINA

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