Camp Branch Stream Restoration

EEP Project No. 92350
2011 Final Monitoring Report: Year 5 of 5

Construction Completed: February 2007
Submission Date: March 2012

Submitted to: NCDENR-EEP
1652 Mail Service Center
Raleigh, NC 27699

Table of Contents

Appendix D – Stream Survey Data

Appendix E – Hydrologic Data

SECTION 1
EXECUTIVE SUMMARY

SECTION 1

EXECUTIVE SUMMARY

The Camp Branch Stream Restoration Project (Site) is located in Anson County, North Carolina within the Piedmont Eco-Region of the Yadkin River Basin (USGS Subbasin HUC 03040105). The Site is one of three separate Ecosystem Enhancement Program (EEP) projects located on the 200-acre Bishop Property, each confined within a North Carolina Department of Transportation owned conservation easement. The stream preservation/enhancement/restoration plan was designed by EcoScience Corporation and constructed by Vaughn Construction, Inc. Construction and planting activities were completed in February 2007. As-built surveys for the Site were performed in May 2007. The first annual monitoring activities were conducted in October 2007.

This report serves as the fifth year of the five year monitoring plan for the Site.

1.1 Goals and Objectives

Prior to restoration, the Site was predominantly utilized for row cropping and recreational activities, such as hunting and wildlife viewing. Historically, drainage features and wetland areas within the Site were dredged, straightened, and filled for conversion into agriculturally developed land. These activities are thought to have impacted stream channel stability; therefore, producing an incised, eroded stream and degraded water quality. The primary goal for the site was to improve water quality by reducing erosion through reconnection of the stream with a flood prone area, riparian buffer filtering, and reconfiguring the stream to better attenuate flow velocities. Secondary Site restoration goals included increased stream biology through enhancement activities and protection of functional areas via preservation. The goals were achieved by incorporating the following objectives:

1. Priority II stream restoration (including all attendant benefits outlined in Rosgen 1996) via excavation of approximately 1,767 linear feet (lf) of a designed E/C-type stream of the main Camp Branch channel on new location (creating 1810 lf), including adjacent floodplain excavation to achieve an entrenchment ratio characteristic of E/C-type streams.

2. Priority I stream restoration (including all attendant benefits outlined in Rosgen 1996) of approximately 403 lf and Priority II restoration of approximately 143 lf of a designed E/C-type stream of a unnamed tributary (UT) to Camp Branch, including floodplain excavation along the UT upstream of Camp Branch to achieve a stable confluence.

3. Level II stream enhancement of approximately 945 lf of Camp Branch upstream of its confluence with the UT via riparian plantings adjacent to the Camp Branch stream banks.

4. Re-establishment of the characteristic, pre-disturbance Piedmont Bottomland Forest (Schafale and Weakley 1990) community adjacent to restoration reaches using bare root seedling plantings.

The main reach of Camp Branch was restored by relocating approximately 1,767 lf of the existing channel (Restoration, Priority II), increasing total stream length to 1810 lf. Restoration of approximately 403 lf (Restoration, Priority I) and 143 lf (Restoration, Priority II) was conducted along the UT. Camp Branch (Reach 1) and its tributary (Reach 4) were designed as E/C-type streams. Bankfull benches were created along Reach 1 and 4 to re-establish floodplain connection at the existing streambed elevation. Along Reach 3, the tributary's streambed was raised to re-connect the channel with its floodplain at a higher elevation. The Site's riparian areas were planted to improve habitat and stabilize streambanks via planting bare root seedlings to recreate pre-disturbance vegetation communities within their appropriate landscape contexts. Appendix A provides more detailed project activity, history, contact information, and watershed/site background information for this project.

1.2 Vegetation Assessment

JJG conducted the 2011 (year 5 of 5) vegetation assessment and vegetation plot analysis in August 2011 per the 2006 CVS-EEP Level 2 protocol (Lee et al., 2006). The seven vegetation plots previously established in the design phase were selected randomly and represent the riparian buffer zone. Vegetation monitoring success criteria as stated in the 2007 mitigation plan requires an average number of planted stems per acre exceeding 320 stems/acre after the third year of monitoring, 288 stems/acre after the fourth year of monitoring, and 260 stems/acre after the fifth and final year of project monitoring.

The 2011 vegetation monitoring results indicate that the Site is meeting vegetative success criteria. Average site density is approximately 742 planted stems per acre with an average of 25 live planted stems per plot. A review of the total stem count, including natural recruits, indicated an increase in the average site density when compared to the 2010 monitoring data. Average site density was approximately 2,065 stems per acre with an average of 42 total stems per plot. The number of native woody species per plot ranged from two (2) to twelve (12) with an average of eight (8) woody species per plot, indicating desirable species diversity.

Individually, all plots met the success criteria excluding Plot 1 (162 stems/acre). Plot 1 is located along the enhancement reach, within an existing hardwood forest riparian area. Limited survivability of planted species within Plot 1 is likely due to shading and competition from adjacent mature trees. Site-wide, the vigor of the live planted stems appears to have been affected by wildlife activity and drought conditions over the

previous monitoring years. Planted stems exhibiting poor growth in previous years have continued to improve in vigor, with the exception of those in Plot 1 as discussed above.

In conclusion, the vegetation throughout the stream and riparian restoration project meets the success requirements. Although some loss of vegetation has occurred, the overall growth of the riparian buffer is meeting the survivability requirements. Please refer to Appendix C for more information regarding 2011 vegetation assessment data.

1.3 Stream Assessment

Results from the 2011 stream monitoring effort indicate that Camp Branch and its tributary are maintaining vertical and lateral stability with minimal bank erosion. Although some areas are illustrating minor erosion, visual assessments along the channel indicated that there are no major advancements toward instability within the reach. Please refer to Appendix D for more information regarding 2011 stream survey data.

Two crest gauges are located on the Camp Branch Site. One is located on the main channel upstream of cross-section 1 and the second is located on the UT upstream of cross-section 5. At least one bankfull event occurred within the 2011 monitoring year, which was verified through field indicators such as wrack lines and other visual observations.

Main Channel

Overall, the main channel is maintaining both lateral and vertical stability. The average bankfull width (21.2 ft) and average cross-sectional area (32.0 ft^2) of the surveyed cross-sections are consistent with proposed design ranges. Variation between individual cross sections is minimal, signifying consistent stability throughout site maturity. The thalweg profile appears to be stable, and is characterized by well-defined riffle and pool features. The average water surface slope and the average bankfull slope were very similar for the surveyed reach, 0.0038 ft/ft and 0.0034 ft/ft, respectively. Although parameters such as riffle length, pool length, and pool-to-pool spacing have fluctuated throughout the monitoring period, they remain relatively consistent and indicate the streambed is not significantly aggrading or degrading.

Substrate assessment indicates the streambed is transforming to a finer bed material. However, erosive conditions at the site are localized and not significant enough to suggest stream-wide aggradation or siltation. Similarly, except for localized low-growth areas, riparian zones are vegetating as expected and providing adequate soil stabilization and protection. The drastic shift in substrate size compared to stable channel morphology indicates a discrepancy in substrate analysis data. This discrepancy may be due to latent sediment from a recent rain event, recent watershed inputs, and/or variation in substrate sampling technique and methodology.

Tributary

Based on current monitoring data and the visual inspection, the channel's dimension appears to be functioning properly and maintaining stability. No erosional failure was observed along this reach. The average bankfull width (6.6 ft) of the surveyed cross-sections is similar to the proposed design width of 6.4 ft. Compared to previous data, the thalweg profile appears to have shifted from well-defined riffle and pool features to a near continuous run with unconsolidated fine soil material. There are few areas of diverse stream bed variation. The channel is stable and the immediate riparian zone is well established and appears to be offering adequate stabilization. Therefore, it seems that the up gradient watershed is contributing a sediment load that is being captured within the stream and causing reduced bed variability. Erosional ruts were evident along the dirt/gravel road that crosses the tributary, which are likely contributing to the sediment load. Additionally, the large area of agricultural activity up gradient is also likely contributing silt to the channel. The average water surface slope and the average bankfull slope were very similar for the surveyed reach, 0.0102 ft/ft and 0.0092 ft/ft, respectively.

Pebble counts within the tributary indicate a trend toward finer sediment composition compared to previous monitoring years. This decrease in bedform distribution diversity may indicate contributing watershed sediment input issues.

Two crest gauges are located on the Site. One is located on the main channel upstream of cross-section 1 and the second is located on the UT upstream of cross-section 5. At least one bankfull event occurred within the 2011 monitoring year, which was verified through field indicators such as wrack lines, sediment deposition, and other visual observations.

1.5 Annual Monitoring Summary

In summary, the portions of the Site that have been surveyed to date have met the stream and vegetation mitigation goals for monitoring year five. The pattern, profile, and dimension of the restored main Camp Branch channel appear to be maintaining vertical and lateral stability with minimal bank erosion. The profile of the UT has experienced a relatively significant change from MY3 as indicated in the MY4 report and this MY5 report. The UT appears to be experiencing increased sediment load from the contributing watershed. The 2011 vegetation plot monitoring results indicate that the planted and naturally recruited vegetation is doing well at the site, aside from some canopy tree shading within Plot 1. The minor vegetation problems noted in previous reports due to herbivory from deer and drought appear to be improving.

As in previous years, a few problem areas were observed, such as moderate bank erosion, moderate to poor streambank cover, patches of in-stream vegetation, and aggradation. These areas of stream instability do not appear to have advanced from the previous monitoring years and in many cases have healed naturally. Heavy sediment deposition is occurring on the downstream end of the main channel where the

restoration reach converges with the preservation reach, but is not causing stream instability at this time.

The background information provided in this report is referenced from the mitigation plan and previous monitoring reports prepared by EcoScience (2007). Summary information/data related to the occurrence of items such as beaver or encroachment and statistics related to performance of various project and monitoring elements can be found in the tables and figures in the report appendices. Narrative background and supporting information formerly found in these reports can be found in the mitigation and restoration plan documents available on EEP's website. All raw data supporting the tables and figures in the appendices is available from EEP upon request.

SECTION 2
METHODOLOGY

SECTION 2
METHODOLOGY

2.1 Methodology

Methods employed for the Camp Branch Stream Restoration Project were a combination of those established by standard regulatory guidance and procedures documents as well as previous monitoring reports completed by EcoScience. Geomorphic and stream assessments were performed following guidelines outlined in the *Stream Channel Reference Sites: An Illustrated Guide to Field Techniques* (Harrelson et al., 1994) and in the *Stream Restoration a Natural Channel Design Handbook* (Doll et al, 2003). Vegetation assessments were performed following the Carolina Vegetation Survey-NCEEP Level 2 Protocol (Lee et al., 2006). JJG used the *Flora of the Carolinas, Virginia, Georgia, and surrounding areas* by Alan S. Weakley as the taxonomic standard for vegetation nomenclature for this report.

SECTION 3
REFERENCES

SECTION 3
REFERENCES

Doll, B.A., Grabow, G.L., Hall, K.A., Halley, J., Harman, W.A., Jennings, G.D., and Wise, D.E., 2003. Stream Restoration A Natural Channel Design Handbook.

EcoScience Corporation. 2007. Bishop Site Stream and Wetland Restoration 2007 Annual Monitoring Report (Year 1). Raleigh, NC.

Harrelson, Cheryl C; Rawlins, C.L.; Potyondy, John P. 1994. *Stream Channel Reference Sites: An Illustrated Guide to Field Technique.* Gen. Tech. Rep. RM-245. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station. 61 p.

Lee, Michael T., R. K. Peet, S. D. Roberts, and T. R. Wentworth. 2006. CVS-EEP Protocol for Recording Vegetation, Version 4.0 (http://cvs.bio.unc.edu/methods.htm).

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

Weakley, A.S. 2008. *Flora of the Carolinas, Virginia, Georgia, Northern Florida, and Surrounding Areas* (Draft April 2008). University of North Carolina at Chapel Hill: Chapel Hill, NC.

SECTION 4
APPENDICES

Appendix A – Project Vicinity Map and Background Tables

Appendix B – Visual Assessment Data

Appendix C – Vegetation Plot Data

Appendix D – Stream Survey Data

Appendix E – Hydrologic Data

APPENDIX A
PROJECT VICINITY MAP AND BACKGROUND TABLES

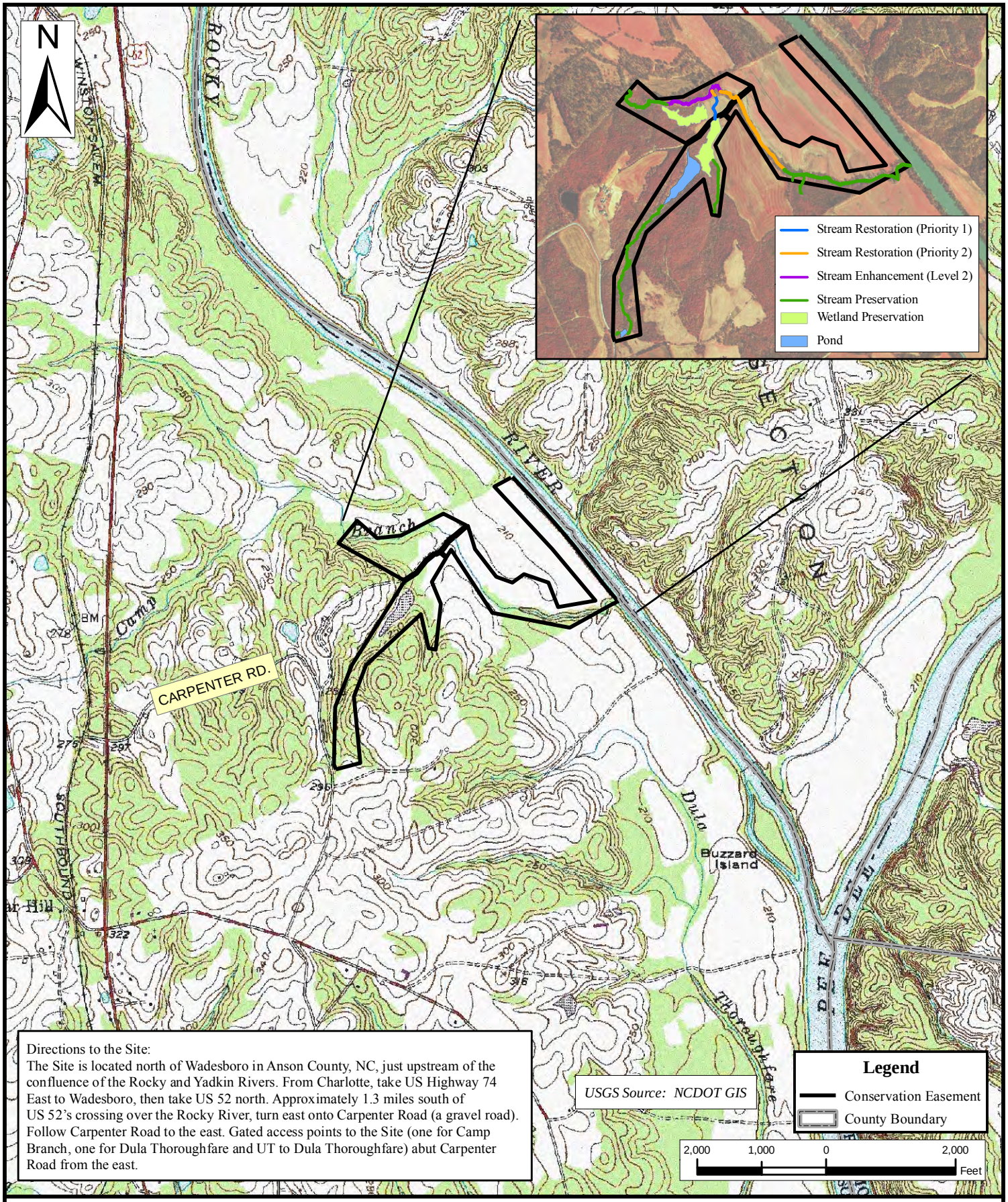


Figure 1. Project Vicinity Map
Camp Branch Stream Restoration/EEP Project No. 92350
Anson County, NC
Monitoring Year 5 of 5
Submittal Date: March 2012

Appendix A. Project Vicinity Map and Background Tables
Table 1: Project Components and Mitigation Credits
Camp Branch Stream Restoration/EEP Project 92350
Monitoring Year 5 of 5

Mitigation Credits						
	Stream	**Riparian Wetland**	**Non-riparian Wetland**	**Buffer**	**Nitrogen Nutrient Offset**	**Phosphorous Nutrient Offset**
Type	R, EII, P	P	N/A	N/A	N/A	N/A
Totals	9,794 SMU	5.2 WMU	N/A	N/A	N/A	N/A

Project Components						
Project Component/Reach ID	**Stationing (ft)**	**Existing Footage/ Acreage**	**Approach**	**Restoration or Restoration Equivalent**	**Restoration Footage or Acres**	**Mitigation Ratio**
Reach 1-Camp Branch	0+00 – 17+94	1,500 lf	P2	Restoration	1,767 lf	1:1
Reach 2-Camp Branch	N/A*	945 lf	N/A	Enhancement Level 2	945 lf	2.5:1
Reach 3-UT Camp Branch	0+00 – 4+33	220 lf (total)	P1	Restoration	403 lf	1:1
Reach 4-UT Camp Branch	4+33 – 5+76	Included in Reach 3 total	P2	Restoration	143 lf	1:1
Stream Preservation**	N/A*	6,563 lf	N/A	Preservation	6,563 lf	5:1
Wetland Preservation	N/A	5.2 ac	N/A	Preservation	5.2 ac	5:1

Component Summations						
Restoration Level	**Stream (linear feet)**	**Riparian Wetland (acres)**		**Non-riparian Wetland (acres)**	**Buffer (square feet)**	**Upland (acres)**
		Riverine	**Non-Riverine**			
Restoration (R)	2,313	N/A	N/A	N/A	N/A	N/A
Enhancement (E)	N/A	N/A	N/A	N/A	N/A	N/A
Enahncement I (E)	N/A	N/A	N/A	N/A	N/A	N/A
Enhancement II (E)	945	N/A	N/A	N/A	N/A	N/A
Creation (C)	N/A	N/A	N/A	N/A	N/A	N/A
Preservation (P)	6,563	5.2	N/A	N/A	N/A	N/A
HQ Preservation (P)	N/A	N/A	N/A	N/A	N/A	N/A
Totals	**9,821**	**5.2**	**N/A**	**N/A**	**N/A**	**N/A**

BMP Elements			
Element	**Location**	**Purpose/Function**	**Notes**
N/A	N/A	N/A	N/A

BMP Elements
BR = Bioretention Cell; SF = Sand Filter; SW = Stormwater Wetland; WDP = Wet Detention Pond; DDP - Dry Detention Pond; FS = Filter Strip; S = Grassed Swale; LS = Level Spreader; NI = Natural Infiltration Area; FB = Forested Buffer
SMU = Stream Mitigation Unit; WMU = Wetland Mitigation Unit
*Enhancement and Preservation reaches were not stationed.

Appendix A. Project Vicinity Map and Background Tables
Table 2: Project Activity and Reporting History
Camp Branch Stream Restoration/EEP Project 92350
Monitoring Year 5 of 5

Elapsed Time Since Grading Complete	**5 yrs 2 months**
Elapsed Time Since Planting Complete	**5 yrs 2 months**
Number of Reporting Years	**5**

Activity or Report	Data Collection Completed	Actual Completion or Delivery
Restoration Plan	Aug-04	Sep-04
Final Design (90%)	Mar-05	Jun-05
Construction	N/A	Feb-07
Temporary S&E mix applied to entire project area *	N/A	Throughout construction
Permanent seed mix applied to reach/segments	N/A	Oct-06
Bare Root Seedling Installation	N/A	Feb-07
Mitigation Plan	Jun-07	Oct-07
Final Report	Jun-07	Oct-07
Year 1 Monitoring	Oct-07 /Dec-07	Oct-07 /Dec-08
Year 2 Monitoring	May-08/Sept-08	Nov-08
Year 3 Monitoring	Jul-09/Jan-10	Jan-10
Year 4 Monitoring	Jun-10/Jan-11	Feb-11
Year 5 Monitoring **	July-11/March-12	Mar-12

*Seed and mulch is added as each section of construction is completed.

** Morphological surveying not yet complete along UT to Camp Branch

Table 3: Project Contacts Table
Camp Branch Stream Restoration/EEP Project 92350
Monitoring Year 5 of 5

Designer	EcoScience Corporation 1101 Haynes Street, Suite 101 Raleigh, NC 27604 919- 828-3433
Construction	Vaughn Contruction, Inc. Tommy Vaughn and Spencer Walker (Foremen) P.O. Box 796 Wadesboro, NC 28170 704- 694-6450
Planting Contractor	Kiker Forestry and Realty P.O. Box 933 Wadesboro, NC 28170 704- 694-6436
Seeding Contractor	N/A
Monitoring Performers	
Year 1	EcoScience Corporation 1101 Haynes Street, Suite 101 Raleigh, NC 27604 919- 828-3433
Year 2-present	Jordan, Jones & Goulding Inc. 6801 Governor's Lake Pkwy Norcross, GA 30071
Stream Monitoring, POC	Alison Nichols, 770-455-8555
Vegetation Monitoring, POC	

Appendix A. Project Vicinity Map and Background Tables
Table 4 Project Attribute Table
Camp Branch Stream Restoration/EEP Project 92350
Monitoring Year 5 of 5

Project Information				
Project Name	Camp Branch Stream Restoration			
Project County	Anson County, North Carolina			
Project Area (acres)	94.9 acres			
Project Coordinates	35º 9' 37.38" N 80º 5' 46.94." W			
Project Watershed Summary Information				
Physiographic Region	Piedmont			
River Basin	Yadkin			
USGS HUC for Project (8 digit)	03040105			
USGS HUC for Project (14 digit)	03040105081060			
DWQ Sub-basin	03-07-14			
Project Drainage Area (acres)	1,856			
Project Drainage Area Percentage of Impervious Area*	< 1%			
CGIA Land Use Classification	2.01			
Reach Summary Information				
Parameters	**Reach 1**	**Reach 2**	**Reach 3**	**Reach 4**
Length of reach (linear feet)	1,767	945	403	143
Valley classification	U	U	U	U
Drainage area (acres)	U	U	U	U
NCDWQ stream identification score	U	U	U	U
NCDWQ Water Quality Classification	C	C	C	C
Morphological Description (stream type)	Perennial	Perennial	Perennial	Perennial
Evolutionaly trend	G4 to C4	G4 to C4	G to C4/5	G to C4/5
Underlying mapped soils	Badin Channery Silt Loam (BaB, BaC) Badin-Goldston Complex (BgD) McQueen (MrB) Shellbluff (ShA) Tetotum (ToA) Chewacla (ChA)			
Drainage Class	U	U	U	U
Soil Hydric status	N/A	N/A	N/A	N/A
Slope	0.0041	0.0041	N/A	N/A
FEMA classification	100 year floodplain	100 year floodplain	100 year floodplain	100 year floodplain
Native vegetation community	Mesic mixed pine/hardwood forest, upland slope forest, bottomland hardwood forest			
Percent composition of exotic invasive vegetation	U	U	U	U
Wetland Summary Information**				
Parameters	**Wetland 1**	**Wetland 2**	**Wetland 3**	
Size of Wetland (acres)	5.2			
Wetland Type (non-riparian, riparian riverine or riparian non-riverine)	Riparian Riverine			
Mapped Soil Series	BgD, MrB, ToA			
Drainage class	WD,WD, MWD			
Soil Hydric Status	N/A, N/A, Hydric			
Source of Hydrology	Slope & Overbank			
Hydrologic impairment	N/A			
Native vegetation community	bottomland hardwood			
Percent composition of exotic invasive vegetation	U			
Regulatory Considerations				
Regulation	**Applicable?**	**Resolved?**	**Supporting Documentation**	
Waters of the United States - Section 404	No	N/A	N/A	
Waters of the United States - Section 401	No	N/A	N/A	
Endangered Species Act	No	N/A	N/A	
Historic Preservation Act	No	N/A	N/A	
Costal Zone Managemetn Act (CZMA)/Costal Area	No	N/A	N/A	
FEMA Floodplain Compliance	Yes	U	N/A	
Essential Fisheries Habitat	No	N/A	N/A	

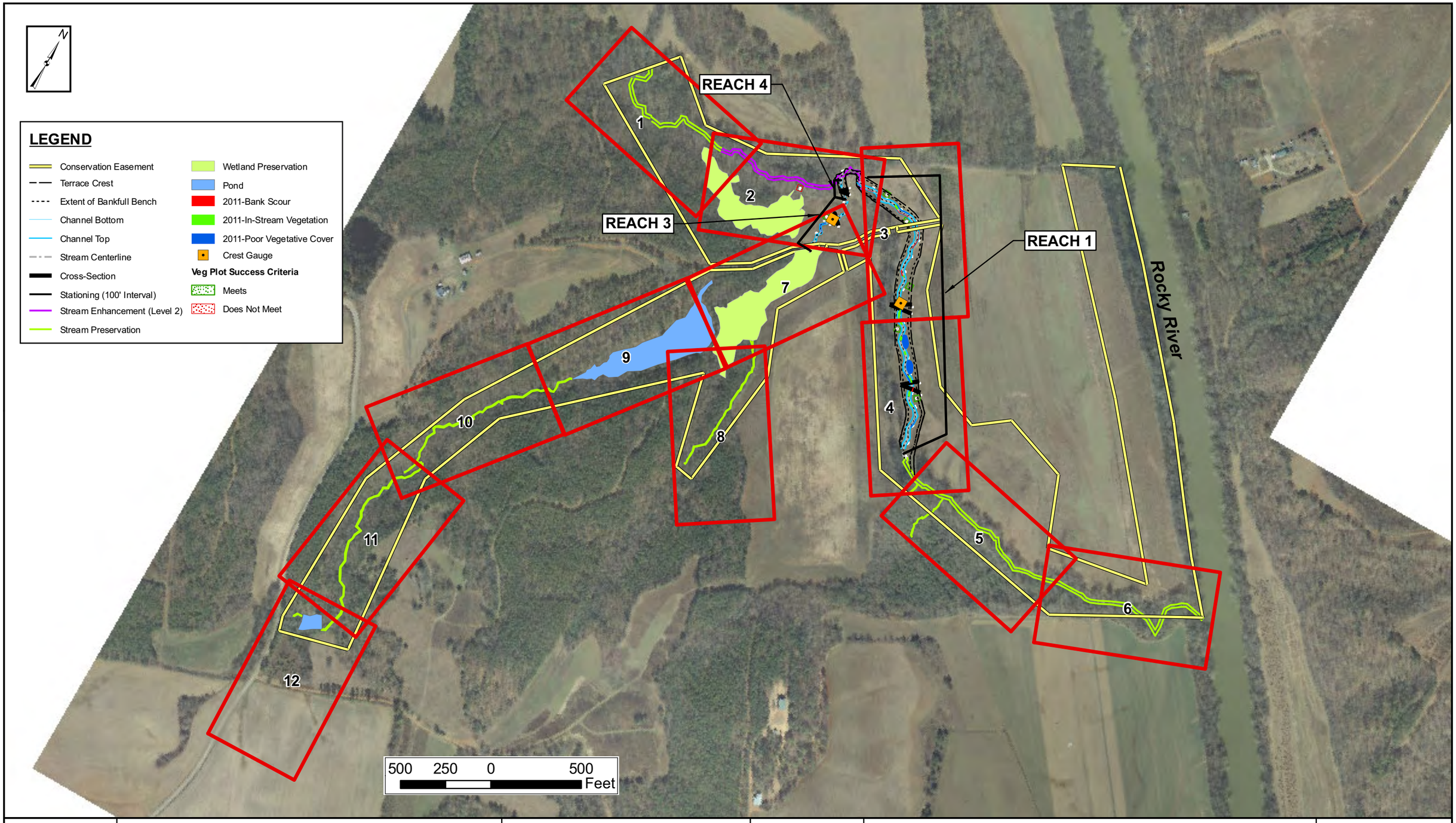
*****At the time of project completion.

******Wetland mitigation was not included for this restoration project.

"N/A": items do not apply / "-": items are unavailable / "U": items are unknown

APPENDIX B
VISUAL ASSESSMENT DATA

Figure 2	**Current Condition Plan View (CPV)**
Table 6a-d	**Visual Stream Morphology Stability Assessment Table**
Table 7	**Vegetation Condition Assessment Table**
Photos	**Stream Station Photos**
Photos	**Vegetation Plot Photos**



NOTES:
1. GENERAL SITE DATA ARE PROVIDED BY NCEEP.
2. ALL LOCATIONS ARE APPROXIMATE

PROJECT NO. 92350
ANSON COUNTY
NORTH CAROLINA
MONITORING YEAR 5 OF 5

NC ECOSYSTEM ENHANCEMENT PROGRAM
CAMP BRANCH STREAM RESTORATION

CURRENT CONDITION PLAN VIEW

DATE: JANUARY 2012
SCALE: 1" = 60'
JOB NO.: JJX31100

FIGURE INDEX

NOTES:
1. GENERAL SITE DATA ARE PROVIDED BY NCEEP.
2. ALL LOCATIONS ARE APPROXIMATE

PROJECT NO. 92350
ANSON COUNTY
NORTH CAROLINA
MONITORING YEAR 5 OF 5

NC ECOSYSTEM ENHANCEMENT PROGRAM
CAMP BRANCH STREAM RESTORATION

CURRENT CONDITION PLAN VIEW

DATE: JANUARY 2012
SCALE: 1" = 60'
JOB NO.: JJX31100

FIGURE 1 OF 12

LEGEND

- Conservation Easement
- Terrace Crest
- Extent of Bankfull Bench
- Channel Bottom
- Channel Top
- Stream Centerline
- Cross-Section
- Stationing (100' Interval)
- Stream Enhancement (Level 2)
- Stream Preservation
- Wetland Preservation
- Pond
- 2011-Bank Scour
- 2011-In-Stream Vegetation
- 2011-Poor Vegetative Cover
- Crest Gauge

Veg Plot Success Criteria

- Meets
- Does Not Meet

MATCH SHEET 1

REACH 4

REACH 3

MATCH SHEET 7

MATCH SHEET 3

5+37.43

0+00

1+00

XS-4

0+50

XS-3

4+00

3+00

2

2+00

XS-1

XS-2

1+00

1

60 30 0 60 Feet

NOTES:
1. GENERAL SITE DATA ARE PROVIDED BY NCEEP.
2. ALL LOCATIONS ARE APPROXIMATE

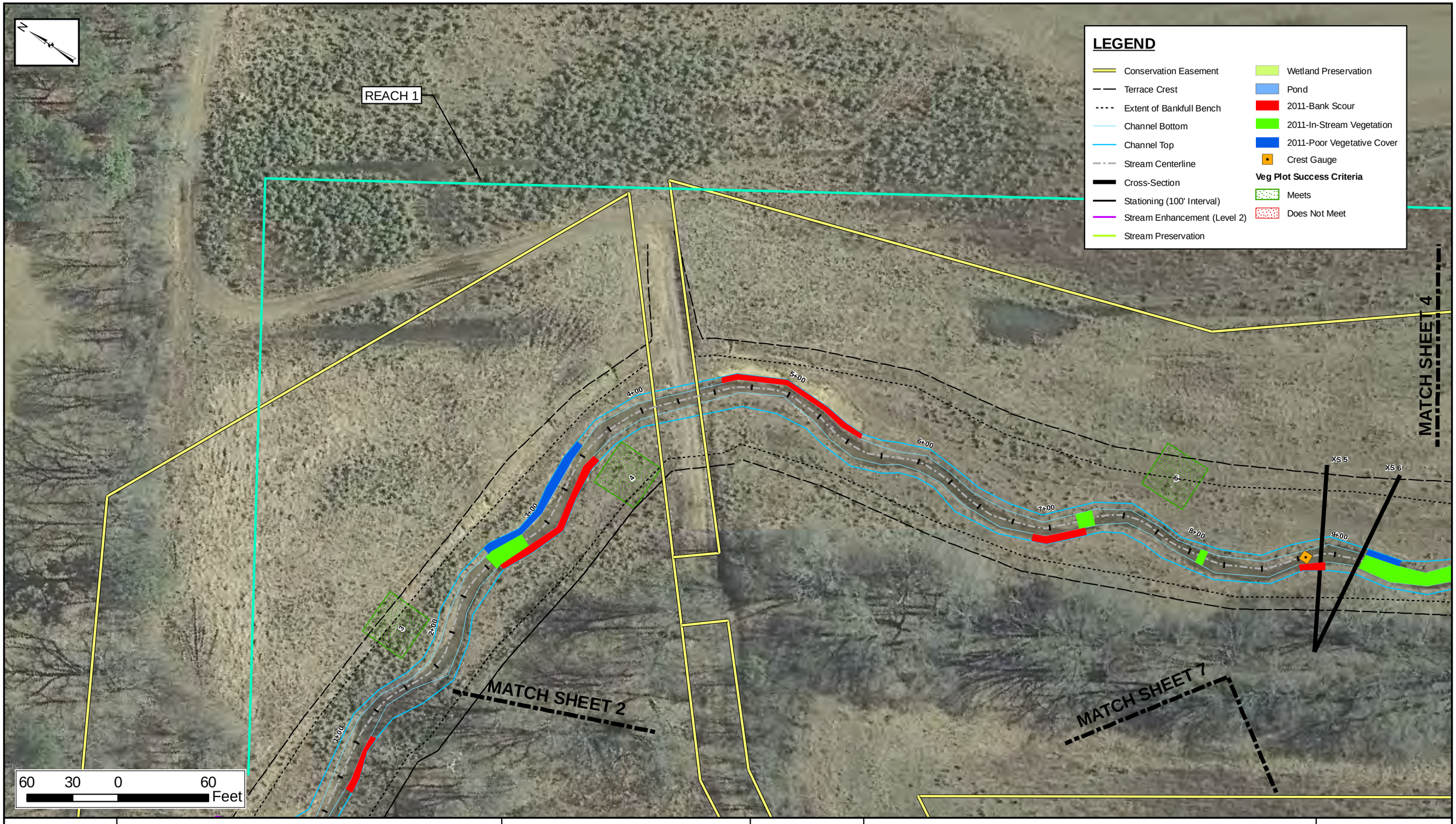
PROJECT NO. 92350
ANSON COUNTY
NORTH CAROLINA
MONITORING YEAR 5 OF 5

NC ECOSYSTEM ENHANCEMENT PROGRAM
CAMP BRANCH STREAM RESTORATION

CURRENT CONDITION PLAN VIEW

DATE: JANUARY 2012
SCALE: 1" = 60'
JOB NO.: JJX31100

FIGURE 2 OF 12



NOTES:
1. GENERAL SITE DATA ARE PROVIDED BY NCEEP.
2. ALL LOCATIONS ARE APPROXIMATE

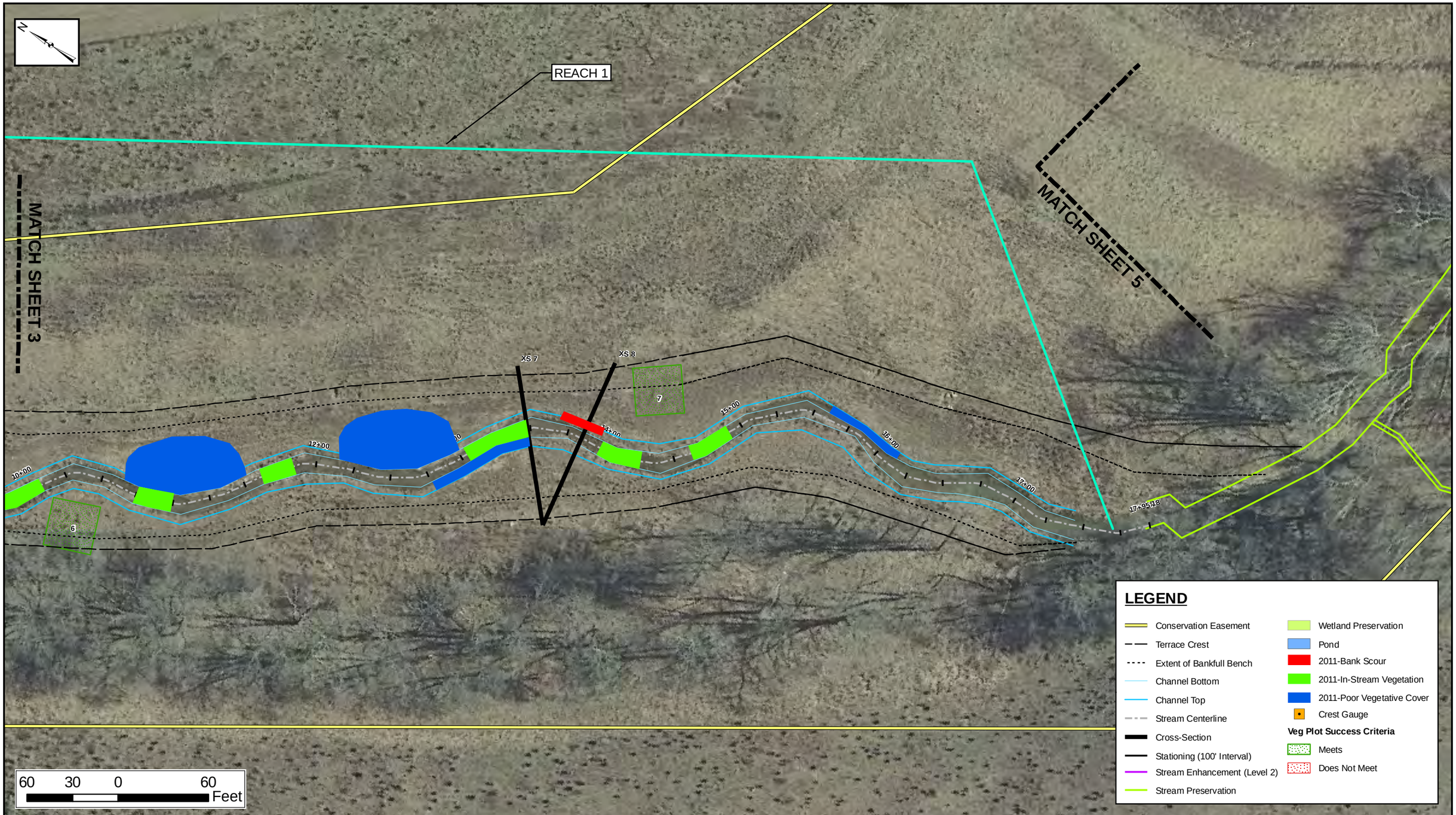
PROJECT NO. 92350
ANSON COUNTY
NORTH CAROLINA
MONITORING YEAR 5 OF 5

NC ECOSYSTEM ENHANCEMENT PROGRAM
CAMP BRANCH STREAM RESTORATION

CURRENT CONDITION PLAN VIEW

DATE: JANUARY 2012
SCALE: 1" = 60'
JOB NO.: JJX31100

FIGURE 3 OF 12



NOTES:
1. GENERAL SITE DATA ARE PROVIDED BY NCEEP.
2. ALL LOCATIONS ARE APPROXIMATE

PROJECT NO. 92350
ANSON COUNTY
NORTH CAROLINA
MONITORING YEAR 5 OF 5

NC ECOSYSTEM ENHANCEMENT PROGRAM
CAMP BRANCH STREAM RESTORATION

CURRENT CONDITION PLAN VIEW

DATE: JANUARY 2012
SCALE: 1" = 60'
JOB NO.: JJX31100

FIGURE 4 OF 12

NOTES:
1. GENERAL SITE DATA ARE PROVIDED BY NCEEP.
2. ALL LOCATIONS ARE APPROXIMATE

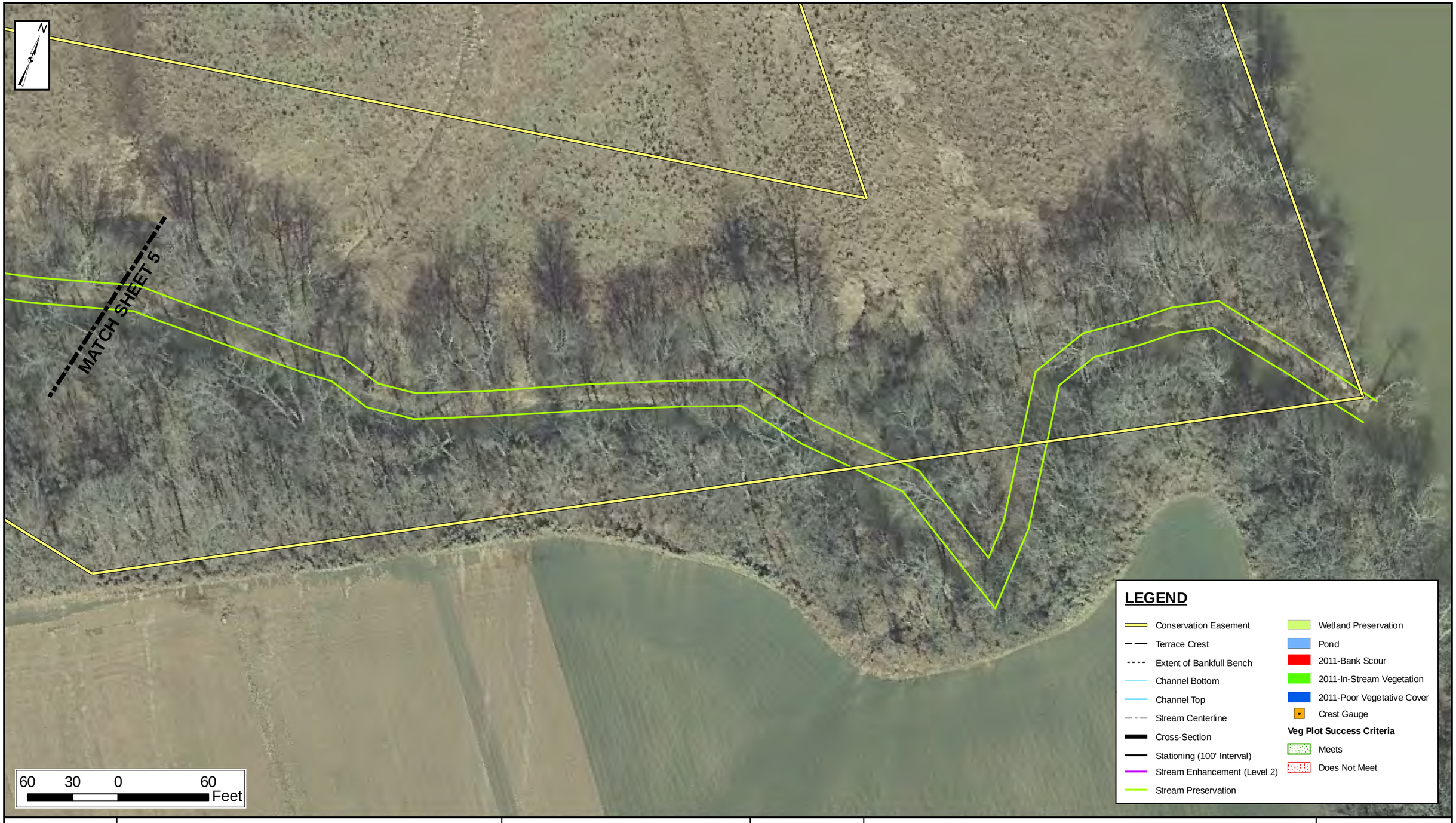
PROJECT NO. 92350
ANSON COUNTY
NORTH CAROLINA
MONITORING YEAR 5 OF 5

NC ECOSYSTEM ENHANCEMENT PROGRAM
CAMP BRANCH STREAM RESTORATION

CURRENT CONDITION PLAN VIEW

DATE: JANUARY 2012
SCALE: 1" = 60'
JOB NO.: JJX31100

FIGURE 5 OF 12



Ecosystem Enhancement Program

NOTES:
1. GENERAL SITE DATA ARE PROVIDED BY NCEEP.
2. ALL LOCATIONS ARE APPROXIMATE

PROJECT NO. 92350
ANSON COUNTY
NORTH CAROLINA
MONITORING YEAR 5 OF 5

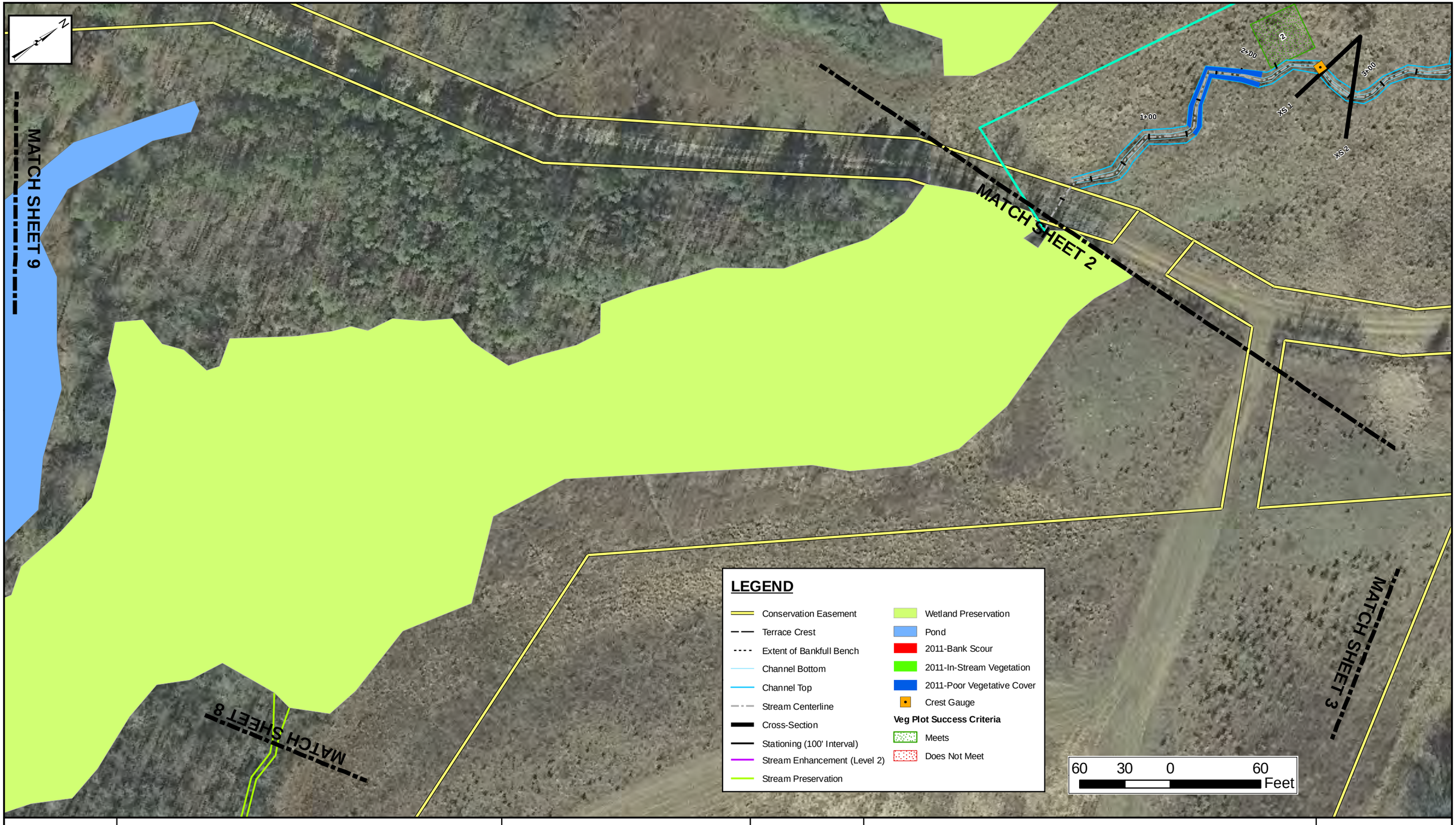
JJG

NC ECOSYSTEM ENHANCEMENT PROGRAM
CAMP BRANCH STREAM RESTORATION

CURRENT CONDITION PLAN VIEW

DATE: JANUARY 2012
SCALE: 1" = 60'
JOB NO.: JJX31100

FIGURE 6 OF 12



NOTES:
1. GENERAL SITE DATA ARE PROVIDED BY NCEEP.
2. ALL LOCATIONS ARE APPROXIMATE

PROJECT NO. 92350
ANSON COUNTY
NORTH CAROLINA
MONITORING YEAR 5 OF 5

NC ECOSYSTEM ENHANCEMENT PROGRAM
CAMP BRANCH STREAM RESTORATION

CURRENT CONDITION PLAN VIEW

DATE: JANUARY 2012
SCALE: 1" = 60'
JOB NO.: JJX31100

FIGURE 7 OF 12

Ecosystem Enhancement PROGRAM

NOTES:
1. GENERAL SITE DATA ARE PROVIDED BY NCEEP.
2. ALL LOCATIONS ARE APPROXIMATE

PROJECT NO. 92350
ANSON COUNTY
NORTH CAROLINA
MONITORING YEAR 5 OF 5

JJG

NC ECOSYSTEM ENHANCEMENT PROGRAM
CAMP BRANCH STREAM RESTORATION

CURRENT CONDITION PLAN VIEW

DATE: JANUARY 2012
SCALE: 1" = 60'
JOB NO.: JJX31100

FIGURE 8 OF 12

MATCH SHEET 10

MATCH SHEET 7

MATCH SHEET 8

LEGEND

- Conservation Easement
- Terrace Crest
- Extent of Bankfull Bench
- Channel Bottom
- Channel Top
- Stream Centerline
- Cross-Section
- Stationing (100' Interval)
- Stream Enhancement (Level 2)
- Stream Preservation
- Wetland Preservation
- Pond
- 2011-Bank Scour
- 2011-In-Stream Vegetation
- 2011-Poor Vegetative Cover
- Crest Gauge

Veg Plot Success Criteria

- Meets
- Does Not Meet

60 30 0 60 Feet

NOTES:
1. GENERAL SITE DATA ARE PROVIDED BY NCEEP.
2. ALL LOCATIONS ARE APPROXIMATE

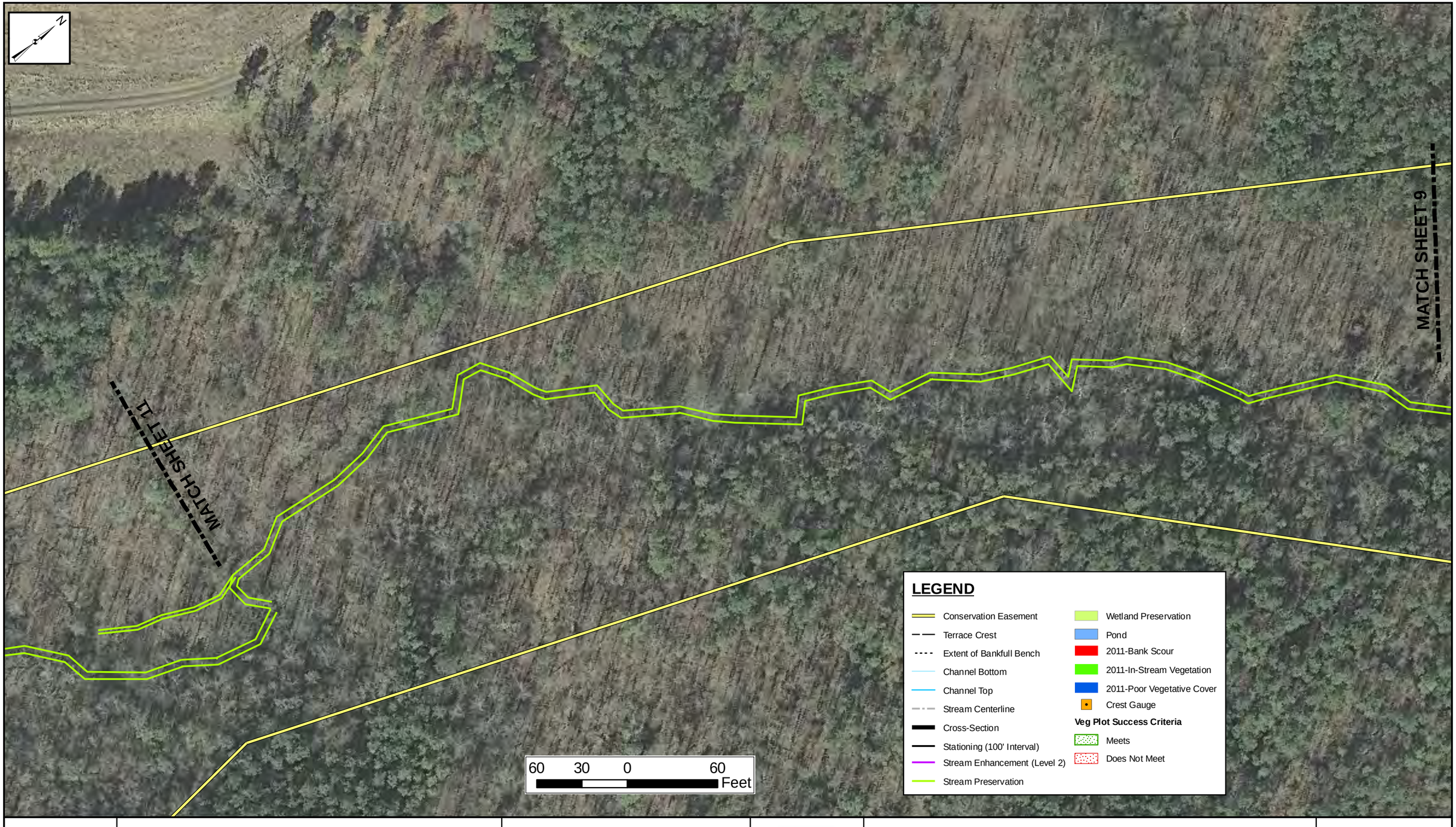
PROJECT NO. 92350
ANSON COUNTY
NORTH CAROLINA
MONITORING YEAR 5 OF 5

NC ECOSYSTEM ENHANCEMENT PROGRAM
CAMP BRANCH STREAM RESTORATION

CURRENT CONDITION PLAN VIEW

DATE: JANUARY 2012
SCALE: 1" = 60'
JOB NO.: JJX31100

FIGURE 9 OF 12



NOTES:
1. GENERAL SITE DATA ARE PROVIDED BY NCEEP.
2. ALL LOCATIONS ARE APPROXIMATE

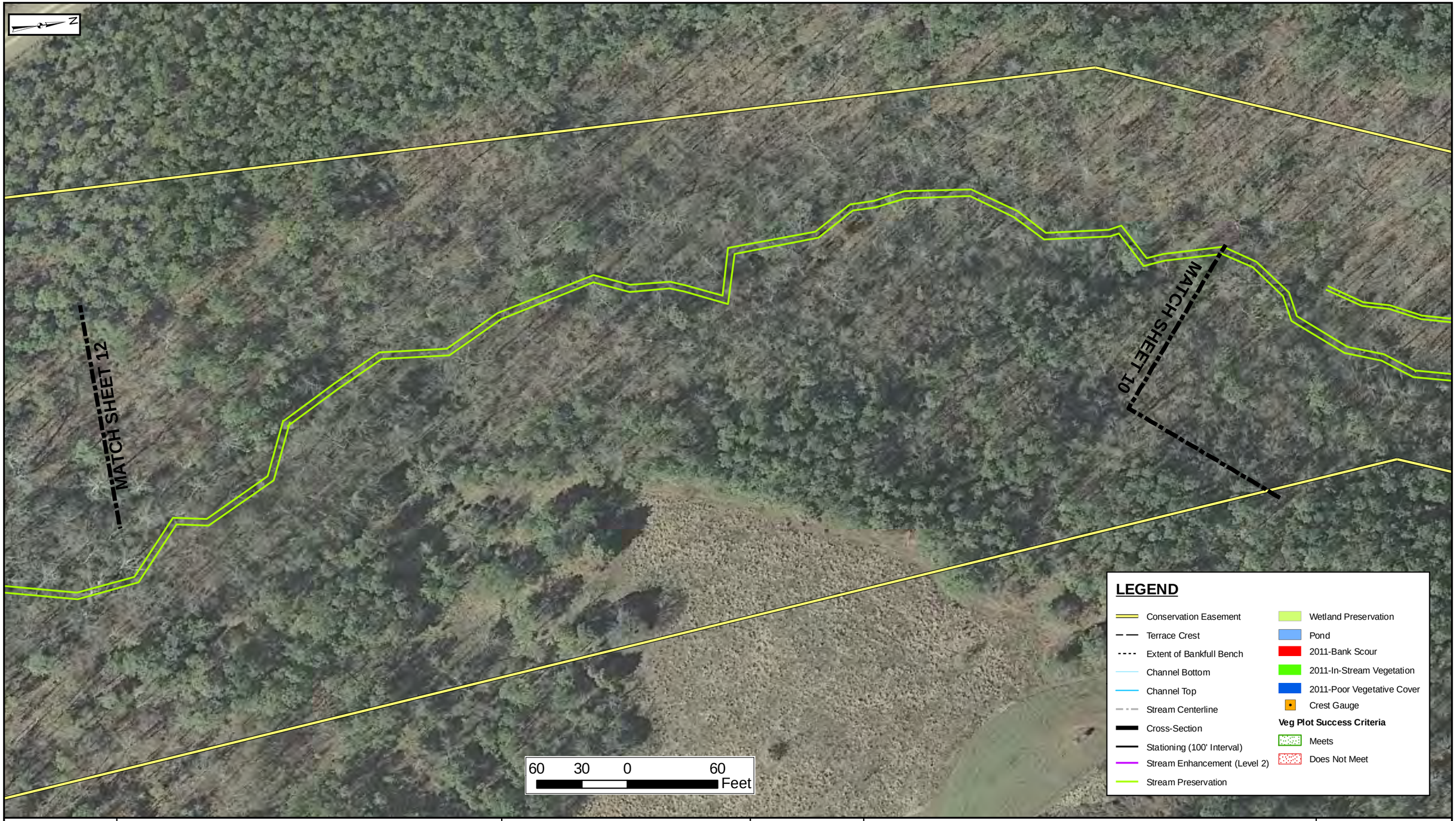
PROJECT NO. 92350
ANSON COUNTY
NORTH CAROLINA
MONITORING YEAR 5 OF 5

NC ECOSYSTEM ENHANCEMENT PROGRAM
CAMP BRANCH STREAM RESTORATION

CURRENT CONDITION PLAN VIEW

DATE: JANUARY 2012
SCALE: 1" = 60'
JOB NO.: JJX31100

FIGURE 10 OF 12



NOTES:
1. GENERAL SITE DATA ARE PROVIDED BY NCEEP.
2. ALL LOCATIONS ARE APPROXIMATE

PROJECT NO. 92350
ANSON COUNTY
NORTH CAROLINA
MONITORING YEAR 5 OF 5

NC ECOSYSTEM ENHANCEMENT PROGRAM
CAMP BRANCH STREAM RESTORATION

CURRENT CONDITION PLAN VIEW

DATE: JANUARY 2012
SCALE: 1" = 60'
JOB NO.: JJX31100

FIGURE 11 OF 12

NOTES:
1. GENERAL SITE DATA ARE PROVIDED BY NCEEP.
2. ALL LOCATIONS ARE APPROXIMATE

PROJECT NO. 92350
ANSON COUNTY
NORTH CAROLINA
MONITORING YEAR 5 OF 5

NC ECOSYSTEM ENHANCEMENT PROGRAM
CAMP BRANCH STREAM RESTORATION

CURRENT CONDITION PLAN VIEW

DATE: JANUARY 2012
SCALE: 1" = 60'
JOB NO.: JJX31100

FIGURE 12 OF 12

Appendix B. Visual Assessment Data

Table 5. Visual Stream Morphology Stability Assessment Table
Camp Branch Stream Restoration/EEP Project Number 92350
Main Channel Camp Branch (1810 linear feet)
Monitoring Year 5 of 5

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-Built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjust % for Stabilizing Woody Vegetation
1. Bed	**1. Vertical Stability (Riffle and Run units)**	Aggradation			9	204	90%			
		Degradation			0	0	80%			
	2. Riffle Condition	Texture/Substrate	20	24						
	3. Meander Pool Condition*	Depth Sufficient	23	24						
		Length Appropriate	20	24						
	4. Thalweg Position	Thalweg centering at upstream of meander bend (Run)	N/A	N/A						
		Thalweg centering at downstream of meander bend (Glide)	N/A	N/A						
2. Bank	**1. Scoured/Eroded**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			7	431	76%	0	0	76%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely Does NOT include undercuts that are modest, appear sustainable and are providing habitat			0	0	100%	0	0	100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%	0	0	100%
				Totals	7	431	29%	0	0	100%
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	9	9			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	9	9			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms	9	9			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%	9	9			100%			
	4. Habitat*	Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow	9	9			100%			

Appendix B. Visual Assessment Data

Table 5. Visual Stream Morphology Stability Assessment Table
Camp Branch Stream Restoration/EEP Project Number 92350
Unnamed Tributary to Camp Branch (556 linear feet)
Monitoring Year 5 of 5

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-Built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjust % for Stabilizing Woody Vegetation
1. Bed	**1. Vertical Stability (Riffle and Run units)**	Aggradation			0	0	100%			
		Degradation			0	0	100%			
	2. Riffle Condition	Texture/Substrate	16	16			100%			
	3. Meander Pool Condition*	Depth Sufficient	17	17			100%			
		Length Appropriate	17	17			100%			
	4. Thalweg Position	Thalweg centering at upstream of meander bend (Run)	N/A	N/A			N/A			
		Thalweg centering at downstream of meander bend (Glide)	N/A	N/A			N/A			
2. Bank	**1. Scoured/Eroded**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%	0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely Does NOT include undercuts that are modest, appear sustainable and are providing habitat			0	0	100%	0	0	100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%	0	0	100%
				Totals	0	0	100%	0	0	100%
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	1	1			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	1	1			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms	1	1			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%	1	1			100%			
	4. Habitat*	Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow	-	-			N/A			

Appendix B
Table 6: Vegetation Condition Assessment Table
Camp Branch Stream Restoration/EEP Project 92350
Monitoring Year 5 of 5

Planted Acreage **42**

Vegetation Category	Definitions	Mapping Threshold (acres)	Number of Polygons	Combined Acreage	% of Planted Acreage
Bare Areas	Very limited cover of both woody and herbaceous material	0.1	7	0.106	0.25%
Low Stem Density Areas	Woody stem densities clearly below target levels based on MY3, 4, or 5 stem count criteria.	0.1	0	0	0%
		Total	**0**	**0**	**0.25%**
Areas of Poor Growth Rates or Vigor	Areas with woody stems of a size class that are obviously small given the monitoring year.	0	0	0	0%

Easement Acreage **95**

Vegetation Category	Definitions	Mapping Threshold (SF)	Number of Polygons	Combined Acreage	% of Planted Acreage
Invasive Areas of Concern	Areas of points (if too small to render as polygons at map scale).	1000	0	0	0%
Easement Encroachment Areas	Areas of points (if too small to render as polygons at map scale).	none	0	0	0%

Appendix B
Table 6: Vegetation Condition Assessment Table
UT to Camp Branch Stream Restoration/EEP Project 92350
Monitoring Year 5 of 5

Planted Acreage **42**

Vegetation Category	Definitions	Mapping Threshold (acres)	Number of Polygons	Combined Acreage	% of Planted Acreage
Bare Areas	Very limited cover of both woody and herbaceous material	0.1	7	0.106	0.25%
Low Stem Density Areas	Woody stem densities clearly below target levels based on MY3, 4, or 5 stem count criteria.	0.1	0	0	0%
		Total	**0**	**0**	**0.25%**
Areas of Poor Growth Rates or Vigor	Areas with woody stems of a size class that are obviously small given the monitoring year.		0	0	0%

Easement Acreage **95**

Vegetation Category	Definitions	Mapping Threshold (SF)	Number of Polygons	Combined Acreage	% of Planted Acreage
Invasive Areas of Concern	Areas of points (if too small to render as polygons at map scale).	1000	0	0	0%
Easement Encroachment Areas	Areas of points (if too small to render as polygons at map scale).	none	0	0	0%

Cross Section 1: View Upstream
(MY 1 - 11/2006)

Cross Section 1: View Upstream
(MY 5 - 7/2011)

Cross Section 1: View Downstream
(MY 1 - 11/2006)

Cross Section 2: View Downstream
(MY 5 - 7/2011)

Prepared For:

Ecosystem Enhancement Program

Appendix B – Visual Assessment Data
Stream Station & Cross Section Photos
Camp Branch Stream Restoration Project EEP Project No. 92350
Monitoring Year 5 of 5

Prepared By:

JJG

Cross Section 2: View Upstream
(MY 1 - 11/2006)

Cross Section 2: View Upstream
(MY 5 - 7/2011)

Cross Section 2: View Downstream
(MY 1 - 11/2006)

Cross Section 2: View Downstream
(MY 5 - 7/2011)

Prepared For:

Ecosystem Enhancement Program

Appendix B – Visual Assessment Data
Stream Station & Cross Section Photos
Camp Branch Stream Restoration Project EEP Project No. 92350
Monitoring Year 5 of 5

Prepared By:

JJG

Cross Section 3: View Upstream
(MY 1 - 11/2006)

Cross Section 3: View Upstream
(MY 5 - 7/2011)

Cross Section 3: View Downstream
(MY 1 - 11/2006)

Cross Section 3: View Downstream
(MY 5 - 7/2011)

Prepared For:

Ecosystem Enhancement Program

Appendix B – Visual Assessment Data
Stream Station & Cross Section Photos
Camp Branch Stream Restoration Project EEP Project No. 92350
Monitoring Year 5 of 5

Prepared By:

JJG

Cross Section 4: View Upstream
(MY 1 - 11/2006)

Cross Section 4: View Upstream
(MY 5 - 7/2011)

Cross Section 4: View Downstream
(MY 1 - 11/2006)

Cross Section 4: View Downstream
(MY 5 - 7/2011)

Prepared For:

Ecosystem Enhancement Program

Appendix B – Visual Assessment Data
Stream Station & Cross Section Photos
Camp Branch Stream Restoration Project EEP Project No. 92350
Monitoring Year 5 of 5

Prepared By:

JJG

Cross Section 5: View Upstream
(MY 1 - 11/2006)

Cross Section 5: View Upstream
(MY 5 - 7/2011)

Cross Section 5: View Downstream
(MY 1 - 11/2006)

Cross Section 5: View Downstream
(MY 5 - 7/2011)

Prepared For:

Ecosystem Enhancement Program

Appendix B – Visual Assessment Data
Stream Station & Cross Section Photos
Camp Branch Stream Restoration Project EEP Project No. 92350
Monitoring Year 5 of 5

Prepared By:

JJG

Cross Section 6: View Upstream
(MY 1 - 11/2006)

Cross Section 6: View Upstream
(MY 5 - 7/2011)

Cross Section 6: View Downstream
(MY 1 - 11/2006)

Cross Section 6: View Downstream
(MY 5 - 7/2011)

)

Prepared For:

Ecosystem Enhancement Program

Appendix B – Visual Assessment Data
Stream Station & Cross Section Photos
Camp Branch Stream Restoration Project EEP Project No. 92350
Monitoring Year 5 of 5

Prepared By:

JJG

Cross Section 7: View Upstream
(MY 1 - 11/2006)

Cross Section 7: View Upstream
(MY 5 - 7/2011)

Cross Section 7: View Downstream
(MY 1 - 11/2006)

Cross Section 7: View Downstream
(MY 5 - 7/2011)

Prepared For:

Ecosystem Enhancement Program

Appendix B – Visual Assessment Data
Stream Station & Cross Section Photos
Camp Branch Stream Restoration Project EEP Project No. 92350
Monitoring Year 5 of 5

Prepared By:

JJG

Cross Section 8: View Upstream
(MY 1 - 11/2006)

Cross Section 8: View Upstream
(MY 5 - 7/2011)

Cross Section 8: View Downstream
(MY 1 - 11/2006)

Cross Section 8: View Downstream
(MY 5 - 7/2011)

Prepared For:

Ecosystem Enhancement Program

Appendix B – Visual Assessment Data
Stream Station & Cross Section Photos
Camp Branch Stream Restoration Project EEP Project No. 92350
Monitoring Year 5 of 5

Prepared By:

JJG

Vegetation Plot 1
(MY 1 - 4/2006)

Vegetation Plot 1
(MY 5 - 8/2011)

Vegetation Plot 1
(MY 5 - 8/2011)

Prepared For:

Ecosystem Enhancement Program

Appendix B – Visual Assessment Data
Vegetation Plot Photos
Camp Branch Stream Restoration Project EEP Project No. 92350
Monitoring Year 5 of 5

Prepared By:

JJG

Vegetation Plot 2
(MY 1 - 4/2006)

Vegetation Plot 2
(MY 5 - 8/2011)

Vegetation Plot 2
(MY 5 - 8/2011)

Vegetation Plot 2
(MY 5 - 8/2011)

Prepared For:

Ecosystem Enhancement Program

Appendix B – Visual Assessment Data
Vegetation Plot Photos
Camp Branch Stream Restoration Project EEP Project No. 92350
Monitoring Year 5 of 5

Prepared By:

JJG

Vegetation Plot 3
(MY 1 - 4/2006)

Vegetation Plot 3
(MY 5 - 5/2011)

Vegetation Plot 3
(MY 5 - 5/2011)

Vegetation Plot 4
No available photograph (MY 1 - 11/2010)

Vegetation Plot 4
(MY 5 - 5/2011)

Vegetation Plot 4
(MY 5 - 5/2011)

Vegetation Plot 5
(MY 1 - 4/2006)

Vegetation Plot 5
(MY 5 - 5/2011)

Vegetation Plot 5
(MY 5 - 5/2011)

Prepared For:

Ecosystem Enhancement Program

Appendix B – Visual Assessment Data
Vegetation Plot Photos
Camp Branch Stream Restoration Project EEP Project No. 92350
Monitoring Year 5 of 5

Prepared By:

JJG

Vegetation Plot 6
(MY 1 - 4/2006)

Vegetation Plot 6
(MY 5 - 5/2011)

Vegetation Plot 6
(MY 5 - 5/2011)

Vegetation Plot 7
(MY 3 - 6/2009)

Vegetation Plot 7
(MY 5 - 5/2011)

Vegetation Plot 7
(MY 5 - 5/2011)

APPENDIX C
VEGETATION PLOT DATA

Appendix C
Table 7 Vegetation Plot Mitigation Success
UT to Camp Branch Stream Restoration/EEP Project 92350
Monitoring Year 5 of 5

Vegetation Plot ID	Vegetation Survival Threshold Met (Y/N)
Plot 1	N
Plot 2	Y
Plot 3	Y
Plot 4	Y
Plot 5	Y
Plot 6	Y
Plot 7	Y

Appendix C
Table 8: CVS Vegetation Metadata Table
Camp Branch Stream Restoration/EEP Project 92350
Monitoring Year 5 of 5

Report Prepared By	Heath Caldwell	
Date Prepared	9/7/2011 15:20	
database name	Database1.mdb	
database location	J:\JJX31100\M5-Field Monitoring Data\MY 2011\VEGETATION\Bishop Sites	
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.	
ALL Stems by Plot and spp	A matrix of the count of total living stems of each species (planted and natural volunteers combined) for each plot; dead and missing stems are excluded.	
PROJECT SUMMARY----------		
Project Code	D05010S	
project Name	Bishop Site Stream and Wetland Restoration	
Description	Stream and wetland restoration/enhancement in Anson County	
length(ft)		
stream-to-edge width (ft)		
area (sq m)	100	
Required Plots (calculated)	7	
Sampled Plots	7	

Appendix C
Table 9: CVS Stem Count Total and Planted by Plot and Species
Camp Branch Stream Restoration/EEP Project 92350
Monitoring Year 5 of 5

			Current Data (MY5-2011)														Annual Means									
			Plot 1		Plot 2		Plot 3		Plot 4		Plot 5		Plot 6		Plot 7		Current Mean		MY1 - 2007		MY2 - 2008		MY3 - 2009		MY4 - 2010	
Species	Common Name	Type	P	T	P	T	P	T	P	T	P	T	P	T	P	T	P	T	P	T	P	T	P	T	P	T
Acer negundo	box elder	T			5	55				2							5	29	N/A	N/A	N/A	20	N/A	N/A	N/A	13
Acer rubra	red maple	T				17		8									N/A	13	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Alnus serrulata	hazel alder	S				2								1			N/A	2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	8
Asimina triloba	pawpaw	T	3	3													3	3	2	2	2	2	2	4	N/A	N/A
Baccharis hamilifolia	groundsel tree	S															N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	7
Betula nigra	river birch	T			6	28			10	14	6	16	10	13	7	8	8	16	6	6	9	9	9	8	9	13
Celtis laevigata	sugarberry	T				1							1	1			1	1	2	2	2	2	1	2	1	2
Cephalanthus occidentalis	common buttonbush	S									1	3	2	3	5	5	3	4	4	4	4	4	4	5	4	5
Cornus amomum	silky dogwood	T							11	11	5	12	8	8	10	10	9	10	9	9	8	8	9	9	8	8
Fraxinus pennsylvanica	green ash	T					2	3	3	6			2	5			2	5	9	9	8	8	N/A	N/A	2	3
Juniperus virginiana	eastern red cedar	S	1	1		1						1					1	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Liquidambar styraciflua	sweet gum	T				11				2							N/A	7	N/A	N/A	N/A	N/A	N/A	1	N/A	12
Nyssa biflora	swamp tupelo	T							1	1							1	1	1	1	1	1	1	1	1	2
Pinus taeda	loblolly pine	T				39											N/A	39	N/A	N/A	N/A	N/A	N/A	N/A	N/A	25
Platanus occidentalis	American sycamore	T			2	6	2	2	1	2		1	1	1			2	2	2	2	1	3	1	2	N/A	2
Quercus michauxii	swamp chestnut oak	T			2	2	1	2				1			1	1	1	2	2	2	2	2	2	2	2	3
Quercus nigra	water oak	T						2							1	1	1	2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Quercus pagoda	cherrybark oak	T			3	3			2	2	1	1	1	3	3	3	2	2	2	2	2	2	2	2	2	2
Quercus phellos	willow oak	T			2	2	4	4			2	3	1	1			2	3	2	2	3	3	2	2	2	2
Salix nigra	black willow	T												2			N/A	2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1
Ulmus americana	American elm	T					5	6	1	1			1	1	1	1	2	2	3	3	3	3	2	3	2	2
	Plot Area (acres)		0.0247																							
	Species Count		2	2	6	12	5	7	7	9	5	8	9	11	7	7	15	20	12	12	12	13	11	12	10	17
	Stem Count		4	4	20	167	14	27	29	41	15	38	27	39	28	29	42	143	44	44	45	67	35	41	34	110
	Stems per Acre		162	162	810	6761	567	1093	1174	1660	607	1538	1093	1579	1134	1174	742	2065	1087	1087	995	1215	989	1001	931	2296

Type=**S**hrub or **T**ree
P = Planted
T = Total

APPENDIX D
STREAM SURVEY DATA

Figures 3a-h **Cross-sections with Annual Overlays**

Figures 4a,b **Longitudinal Profiles with Annual Overlays**

Figures 5a-h **Pebble Count Plots with Annual Overlays**

Tables 10a,b **Baseline – Stream Data Summary Tables**

Table 11a **Monitoring – Cross-Section Morphology Data Table**

Table 11b **Monitoring – Stream Reach Morphology Data Table**

Appendix D. Stream Survey Data
Figure 3a: Cross-Section Plots and Raw Data
Camp Branch Stream Restoration/EEP Project No. 92350
Camp Branch Tributary
Monitoring Year 5 of 5

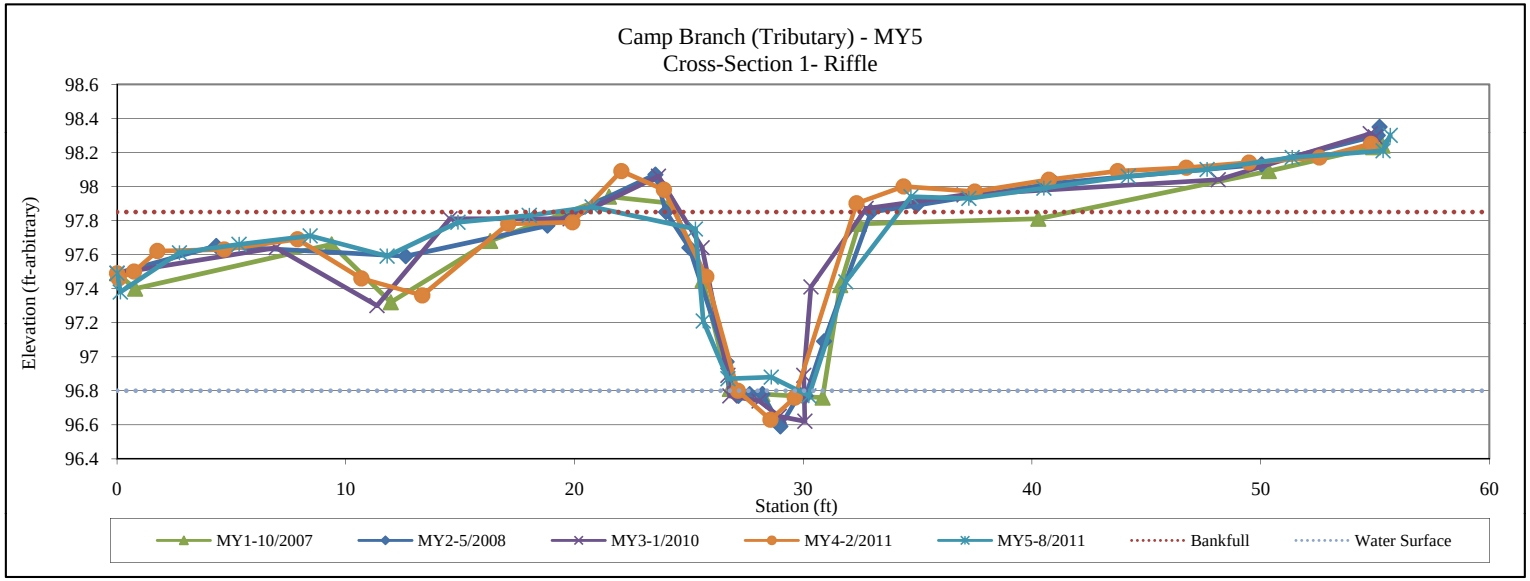
Project Name	**Camp Branch**
EEP Project Number	**92350**
Cross-Section ID	**XS-1, Riffle, 02+50**
Survey Date	**7/2011**

SUMMARY DATA	
Bankfull Elevation (ft)	97.85
Bankfull Cross-Sectional Area (ft^2)	6.39
Bankfull Width (ft)	12.38
Flood Prone Area Elevation (ft)	98.93
Flood Prone Width (ft)	55.67
Bankfull Mean Depth (ft)	0.52
Bankfull Max Depth (ft)	1.08
W/D Ratio	23.81
Entrenchment Ratio	4.50
Bank Height Ratio	1.00

XS-1: View Upstream

XS-1: View Downstream

Station	Elevation	Notes
0	97.49	xs1-lpt
0.15	97.38	xs1
2.73	97.61	xs1
5.34	97.66	xs1
8.44	97.71	xs1
11.81	97.59	xs1
14.91	97.79	xs1
18.03	97.83	xs1
20.77	97.88	xs1
25.29	97.75	xs1
25.63	97.21	xs1
26.71	96.87	xs1
28.6	96.88	xs1
30.25	96.77	xs1
31.86	97.44	xs1
34.71	97.94	xs1
37.24	97.93	xs1
40.52	97.99	xs1
44.22	98.06	xs1
47.66	98.1	xs1
51.38	98.17	xs1
55.35	98.21	xs1
55.67	98.3	xs1-rpt



Appendix D. Stream Survey Data
Figure 3b: Cross-Section Plots and Raw Data
Camp Branch Stream Restoration/EEP Project No. 92350
Camp Branch Tributary
Monitoring Year 5 of 5

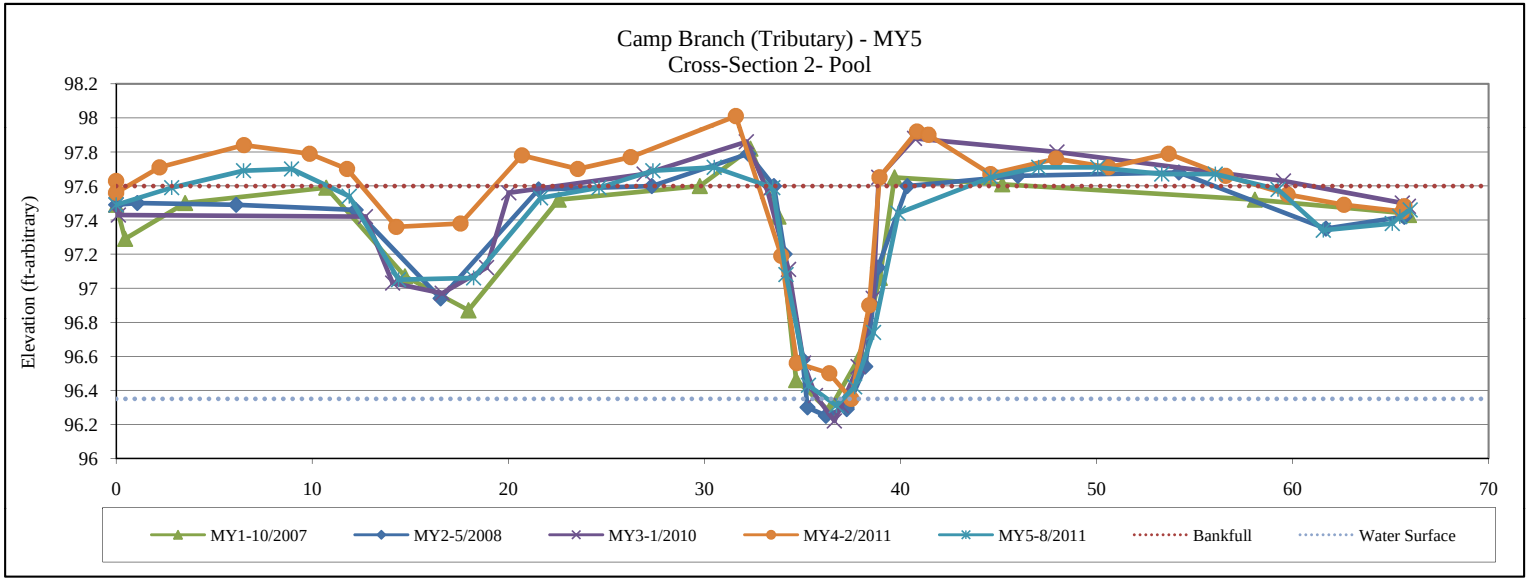
Project Name	**Camp Branch**
EEP Project Number	**92350**
Cross-Section ID	**XS-2, Pool, 02+77**
Survey Date	**7/2011**

SUMMARY DATA	
Bankfull Elevation (ft)	97.60
Bankfull Cross-Sectional Area (ft^2)	5.96
Bankfull Width (ft)	10.25
Flood Prone Area Elevation (ft)	98.89
Flood Prone Width (ft)	66.00
Bankfull Mean Depth (ft)	0.58
Bankfull Max Depth (ft)	1.29
W/D Ratio	17.67
Entrenchment Ratio	6.44
Bank Height Ratio	1.00

XS-2: View Upstream

XS-2: View Downstream

Station	Elevation	Notes
0	97.49	xs2-lpt
2.83	97.59	xs2
6.49	97.69	xs2
8.94	97.7	xs2
11.89	97.54	xs2
14.4	97.05	xs2
18.23	97.06	xs2
21.65	97.53	xs2
24.63	97.59	xs2
27.38	97.69	xs2
30.5	97.71	xs2
33.49	97.59	xs2
34.17	97.08	xs2
35.31	96.43	xs2
36.74	96.31	xs2
37.67	96.42	xs2
38.63	96.74	xs2
39.89	97.44	xs2
44.61	97.65	xs2
47.05	97.71	xs2
50.06	97.71	xs2
53.33	97.67	xs2
56.06	97.67	xs2
59.26	97.58	xs2
61.57	97.34	xs2
65.09	97.38	xs2
65.47	97.42	xs2
66	97.46	xs2-rpt



Appendix D. Stream Survey Data
Figure 3c: Cross-Section Plots and Raw Data
Camp Branch Stream Restoration/EEP Project No. 92350
Camp Branch Tributary
Monitoring Year 5 of 5

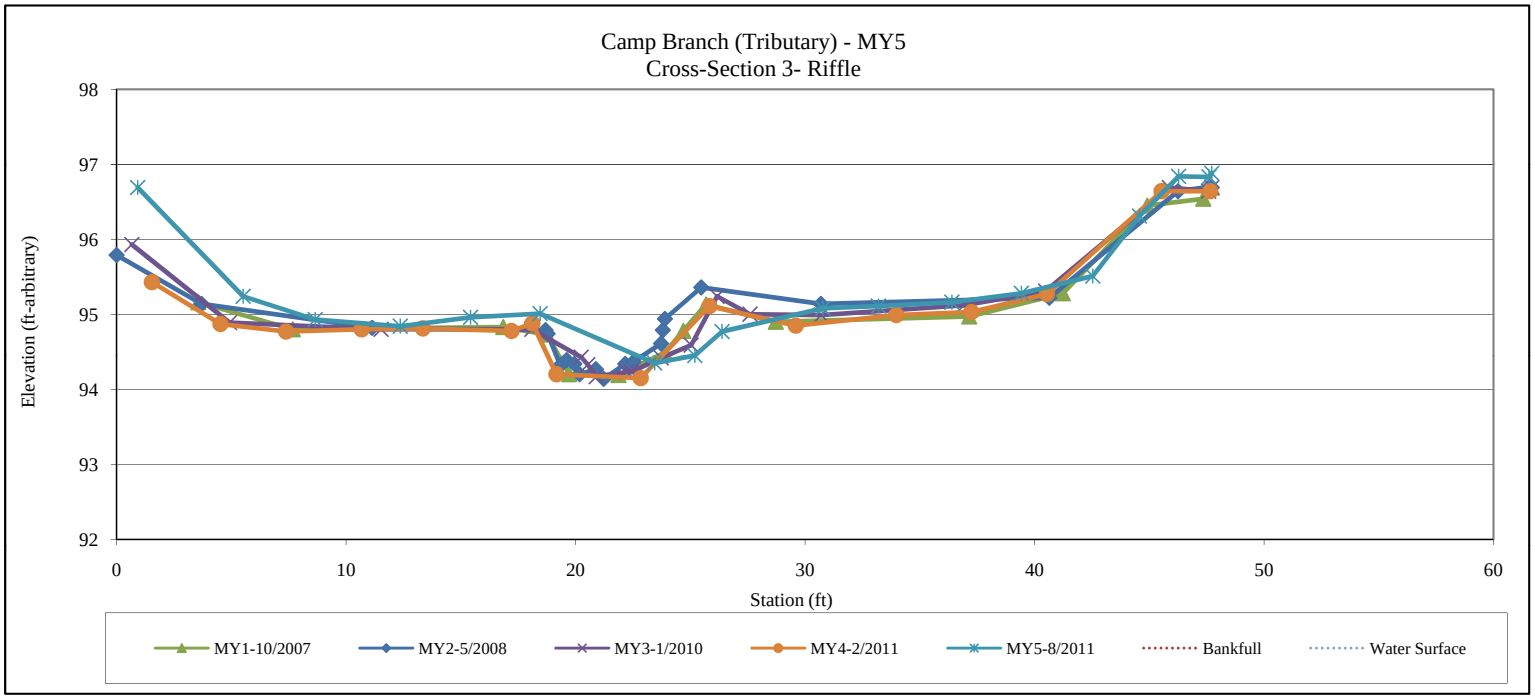
Project Name	**Camp Branch**
EEP Project Number	**92350**
Cross-Section ID	**XS-3, Riffle, 04+68**
Survey Date	**7/2011**

SUMMARY DATA	
Bankfull Elevation (ft)	94.79
Bankfull Cross-Sectional Area (ft^2)	1.63
Bankfull Width (ft)	6.55
Flood Prone Area Elevation (ft)	95.23
Flood Prone Width (ft)	32.55
Bankfull Mean Depth (ft)	0.25
Bankfull Max Depth (ft)	0.44
W/D Ratio	26.20
Entrenchment Ratio	4.97
Bank Height Ratio	1.00

XS-3: View Upstream

XS-3: View Downstream

Station	Elevation	Notes
-2.29	97.47	xs3-lpt
-1.83	97.4	xs3
0.92	96.69	xs3
5.51	95.24	xs3
8.65	94.93	xs3
12.36	94.84	xs3
15.42	94.96	xs3
18.45	95.01	xs3
23.44	94.35	xs3
25.19	94.45	xs3
26.38	94.77	xs3
30.77	95.08	xs3
33.2	95.11	xs3
36.4	95.16	xs3
39.42	95.28	xs3
42.53	95.51	xs3
44.57	96.31	xs3
46.28	96.84	xs3
47.6	96.83	xs3
47.72	96.88	xs3-rpt



Appendix D. Stream Survey Data
Figure 3d: Cross-Section Plots and Raw Data
Camp Branch Stream Restoration/EEP Project No. 92350
Camp Branch Tributary
Monitoring Year 5 of 5

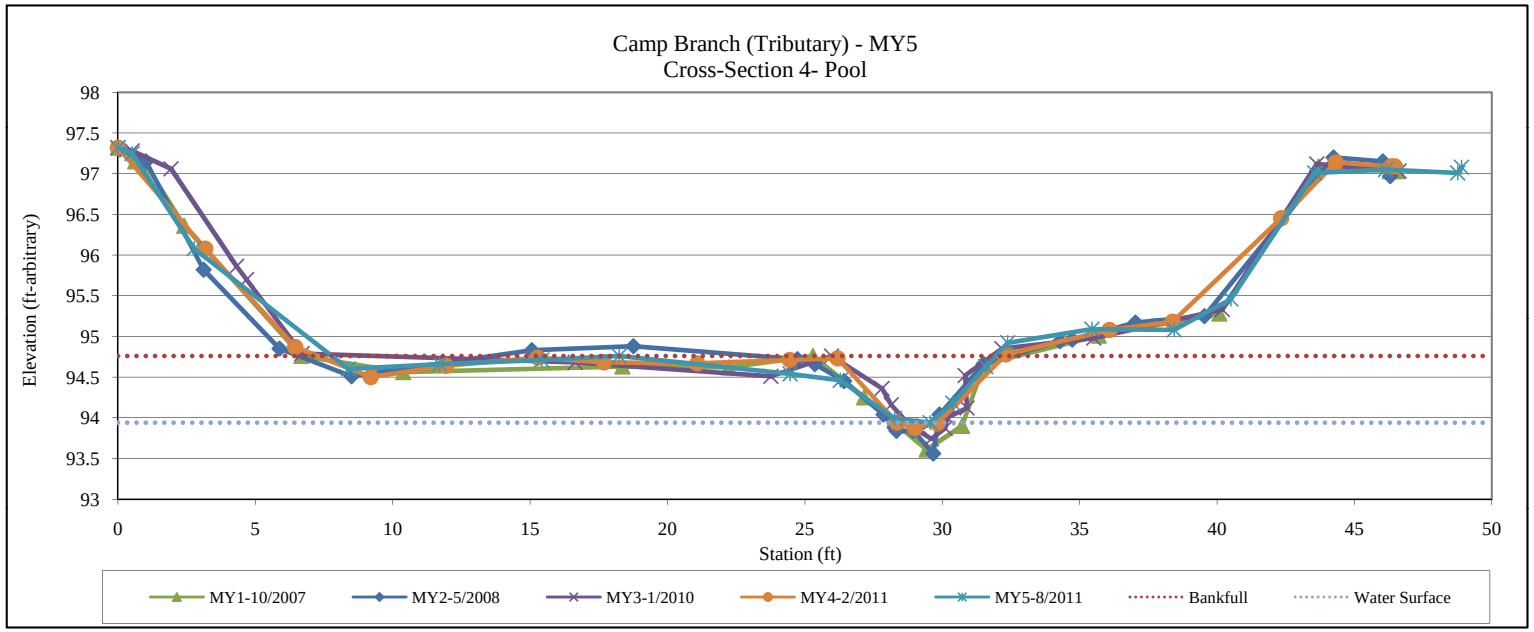
Project Name	**Camp Branch**
EEP Project Number	**92350**
Cross-Section ID	**XS-4, Pool, 04+84**
Survey Date	**7/2011**

SUMMARY DATA	
Bankfull Elevation (ft)	94.76
Bankfull Cross-Sectional Area (ft^2)	4.27
Bankfull Width (ft)	13.70
Flood Prone Area Elevation (ft)	95.58
Flood Prone Width (ft)	36.08
Bankfull Mean Depth (ft)	0.31
Bankfull Max Depth (ft)	0.82
W/D Ratio	44.19
Entrenchment Ratio	2.63
Bank Height Ratio	1.00

XS-4: View Upstream

XS-4: View Downstream

Station	Elevation	Notes
0	97.32	xs4-lpt
0.52	97.25	xs4
2.77	96.08	xs4
8.39	94.6	xs4
11.71	94.66	xs4
15.43	94.71	xs4
18.24	94.76	xs4
24.46	94.54	xs4
26.29	94.46	xs4
28.27	93.99	xs4
29.56	93.94	xs4
30.39	94.18	xs4
31.58	94.63	xs4
32.38	94.92	xs4
35.45	95.09	xs4
38.44	95.08	xs4
40.51	95.46	xs4
43.55	97.01	xs4
46.14	97.05	xs4
48.76	97.01	xs4
48.9	97.08	xs4-rpt



Appendix D. Stream Survey Data
Figure 3e: Cross-Section Plots and Raw Data
Camp Branch Stream Restoration/EEP Project No. 92350
Camp Branch Main Channel
Monitoring Year 5 of 5

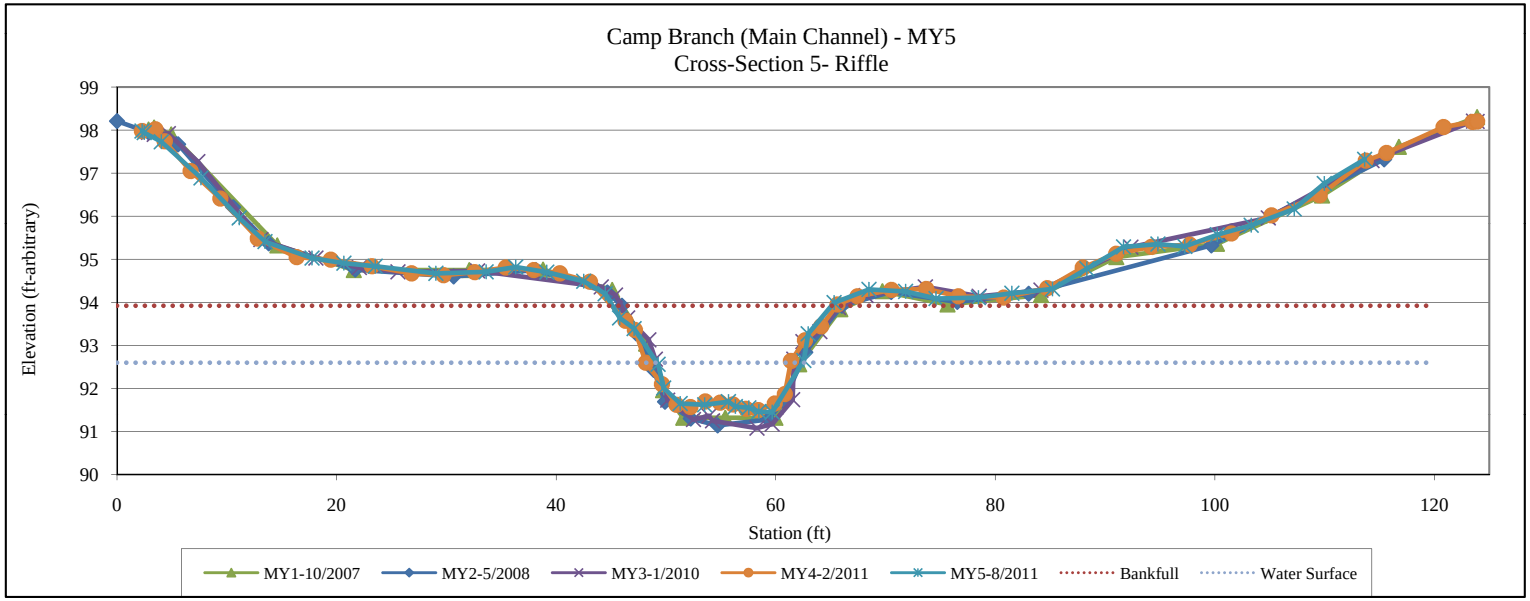
Project Name	**Camp Branch**
EEP Project Number	**92350**
Cross-Section ID	**XS-5, Riffle, 08+95**
Survey Date	**7/2011**

SUMMARY DATA	
Bankfull Elevation (ft)	93.92
Bankfull Cross-Sectional Area (ft^2)	32.65
Bankfull Width (ft)	19.95
Flood Prone Area Elevation (ft)	96.39
Flood Prone Width (ft)	98.74
Bankfull Mean Depth (ft)	1.64
Bankfull Max Depth (ft)	2.47
W/D Ratio	12.16
Entrenchment Ratio	4.95
Bank Height Ratio	1.00

XS-5: View Upstream

XS-5: View Downstream

Station	Elevation	Notes
0	97.98	xs5-lpt
0.18	97.94	xs5
1.74	97.73	xs5
5.35	96.89	xs5
8.84	95.96	xs5
11.19	95.41	xs5
15.47	95.03	xs5
18.37	94.91	xs5
21.22	94.84	xs5
26.75	94.67	xs5
31.33	94.71	xs5
34.02	94.82	xs5
36.85	94.7	xs5
40.21	94.49	xs5
42.19	94.2	xs5
43.5	93.64	xs5
44.8	93.39	xs5
46.99	92.56	lew
47.5	92.01	xs5
49.01	91.65	xs5
51.23	91.62	xs5
53.41	91.69	xs5
54.03	91.58	xs5
55.25	91.55	xs5
56.18	91.46	xs5
57.38	91.45	xs5
60.27	92.65	rew
60.66	93.27	xs5
63.02	93.99	xs5



Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes
66.2	94.3	rb	89.39	95.29	xs5	111.35	97.32	rpt
69.54	94.25	xs5	92.52	95.35	xs5			
72.3	94.09	xs5	94.97	95.3	xs5			
76.17	94.11	xs5	97.93	95.57	xs5			
79.21	94.21	xs5	101.02	95.79	xs5			
82.92	94.31	xs5	104.94	96.17	xs5			
86.05	94.78	xs5	107.68	96.76	xs5			

Appendix D. Stream Survey Data
Figure 3f: Cross-Section Plots and Raw Data
Camp Branch Stream Restoration/EEP Project No. 92350
Camp Branch Main Channel
Monitoring Year 5 of 5

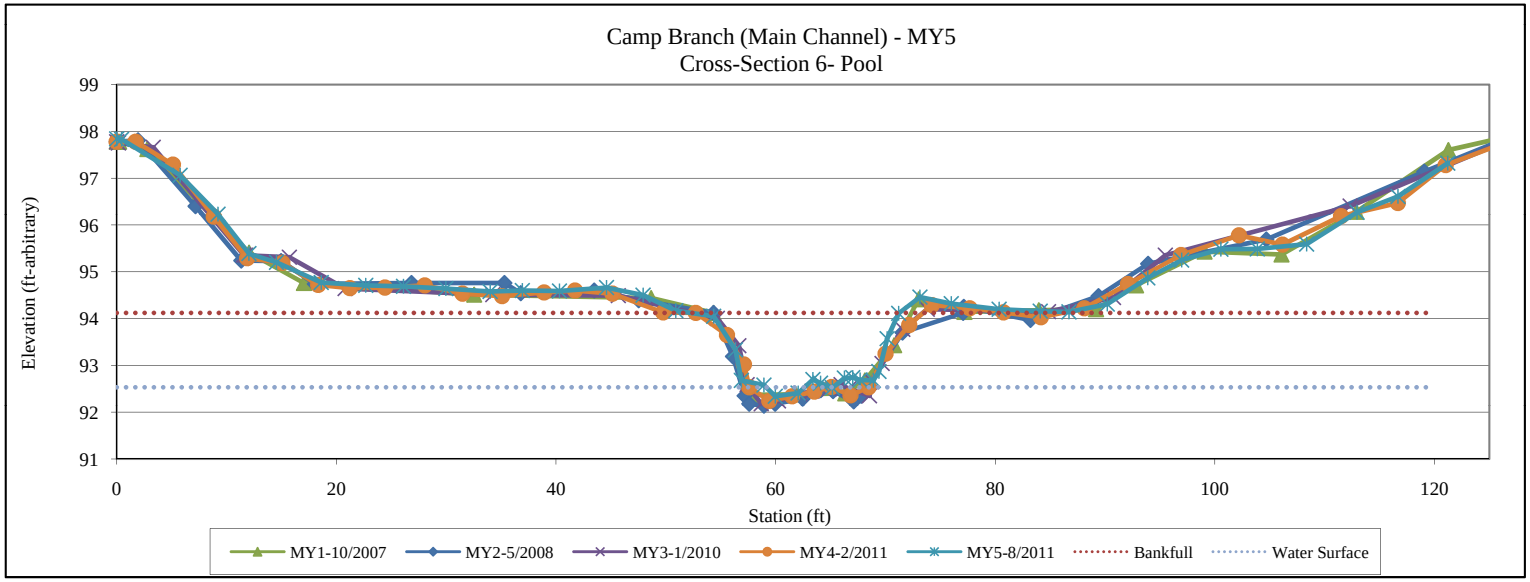
Project Name	**Camp Branch**
EEP Project Number	**92350**
Cross-Section ID	**XS-6, Pool**
Survey Date	**7/2011**

SUMMARY DATA	
Bankfull Elevation (ft)	94.12
Bankfull Cross-Sectional Area (ft^2)	21.74
Bankfull Width (ft)	18.60
Flood Prone Area Elevation (ft)	95.90
Flood Prone Width (ft)	100.13
Bankfull Mean Depth (ft)	1.17
Bankfull Max Depth (ft)	1.78
W/D Ratio	15.90
Entrenchment Ratio	5.38
Bank Height Ratio	1.00

XS-6: View Upstream

XS-6: View Downstream

Station	Elevation	Notes
0	97.84	xs6-lpt
0.43	97.83	xs-6
5.77	97.06	xs-6
9.22	96.23	xs-6
12.03	95.39	xs-6
14.53	95.2	xs-6
18.62	94.77	xs-6
22.67	94.71	xs-6
26.11	94.69	xs-6
29.97	94.64	xs-6
34.01	94.58	xs-6
36.93	94.6	xs-6
40.31	94.59	xs-6
44.6	94.66	xs-6
47.94	94.5	xs-6
50.91	94.17	xs-6
54.36	94.05	xs-6
56.34	93.33	xs-6
56.88	92.68	lew
58.94	92.58	xs-6
59.97	92.34	xs-6
62.06	92.41	xs-6
63.4	92.7	xs-6
64.1	92.62	xs-6
65.18	92.52	xs-6
66.27	92.73	xs-6
67.02	92.74	xs-6
67.7	92.69	xs-6
68.9	92.68	rew



Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes
69.42	92.87	xs-6	86.73	94.14	xs-6	112.96	96.27	xs-6			
70.15	93.57	xs-6	90.2	94.31	xs-6	116.68	96.61	xs-6			
71.2	94.11	xs-6	93.89	94.87	xs-6	121.22	97.32	rpt			
73.14	94.46	rb	96.98	95.25	xs-6						
76	94.32	xs-6	100.55	95.48	xs-6						
80.36	94.2	xs-6	103.88	95.49	xs-6						
84.1	94.16	xs-6	108.36	95.59	xs-6						

Appendix D. Stream Survey Data
Figure 3g: Cross-Section Plots and Raw Data
Camp Branch Stream Restoration/EEP Project No. 92350
Camp Branch Main Channel
Monitoring Year 5 of 5

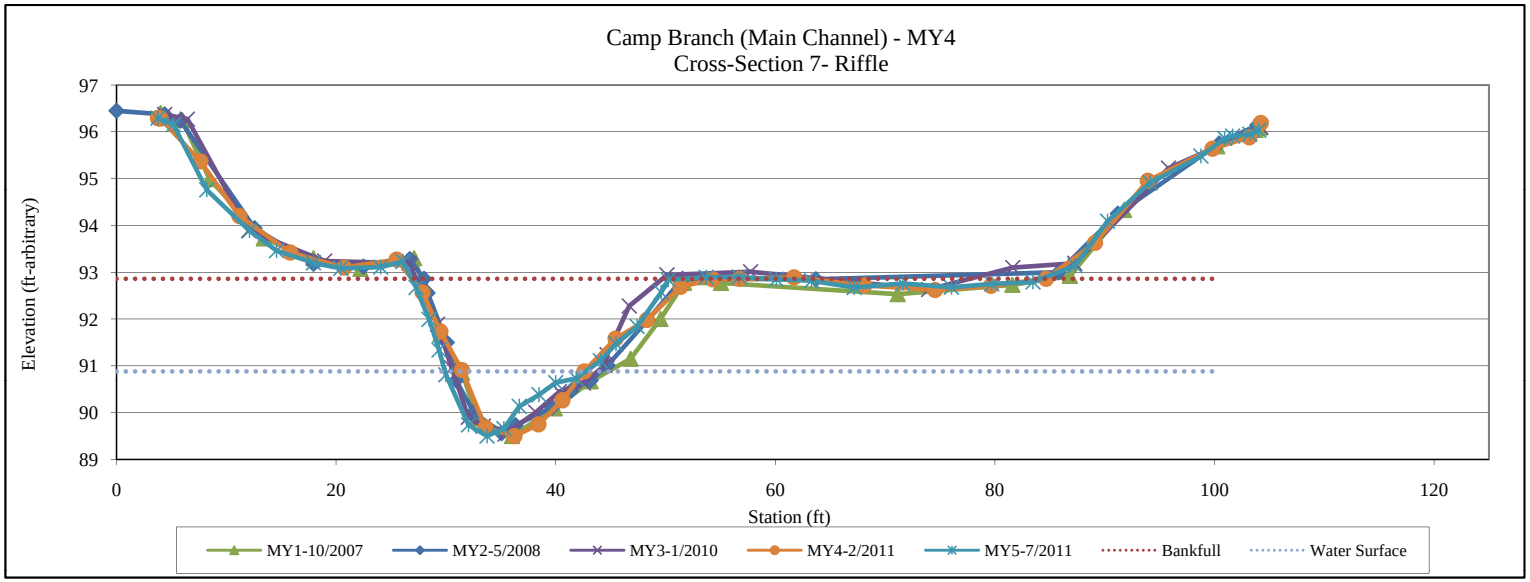
Project Name	**Camp Branch**
EEP Project Number	**92350**
Cross-Section ID	**XS-7, Riffle**
Survey Date	**7/2011**

SUMMARY DATA	
Bankfull Elevation (ft)	92.86
Bankfull Cross-Sectional Area (ft^2)	45.51
Bankfull Width (ft)	23.41
Flood Prone Area Elevation (ft)	96.22
Flood Prone Width (ft)	99.56
Bankfull Mean Depth (ft)	1.94
Bankfull Max Depth (ft)	3.36
W/D Ratio	12.07
Entrenchment Ratio	4.25
Bank Height Ratio	1.00

XS-7: View Upstream

XS-7: View Downstream

Station	**Elevation**	**Notes**
3.77	96.29	xs7-lpt
5.19	96.15	xs-7
8.22	94.76	xs-7
12.11	93.89	xs-7
14.57	93.46	xs-7
17.93	93.2	xs-7
20.43	93.08	xs-7
24.05	93.11	xs-7
26.08	93.23	xs-7
27.28	92.67	xs-7
28.48	91.99	xs-7
29.37	91.34	xs-7
30.01	90.81	lew
32.06	89.74	xs-7
33.75	89.5	xs-7
35.28	89.66	xs-7
36.68	90.13	xs-7
38.49	90.38	xs-7
40	90.64	xs-7
41.86	90.73	rew
44.06	91.11	xs-7
45.5	91.47	xs-7
47.42	91.84	xs-7
49.6	92.57	xs-7
50.26	92.84	rb
53.7	92.89	xs-7
56.71	92.9	xs-7
60.09	92.85	xs-7
63.3	92.82	xs-7



Station	**Elevation**	**Notes**	**Station**	**Elevation**	**Notes**
67.2	92.67	xs-7	94.14	94.91	xs-7
71.61	92.76	xs-7	98.78	95.48	xs-7
76.06	92.68	xs-7	100.93	95.86	xs-7
79.73	92.75	xs-7	101.66	95.91	xs-7
83.47	92.79	xs-7	103.22	95.95	xs-7
87.3	93.14	xs-7	104.04	96.03	xs7-rpt
90.26	94.09	xs-7			

Appendix D. Cross-Section Plots and Raw Data Tables
Figure 3h: Cross-Section Plots and Raw Data
Camp Branch Stream Restoration/EEP Project No. 92350
Camp Branch Main Channel
Monitoring Year 5 of 5

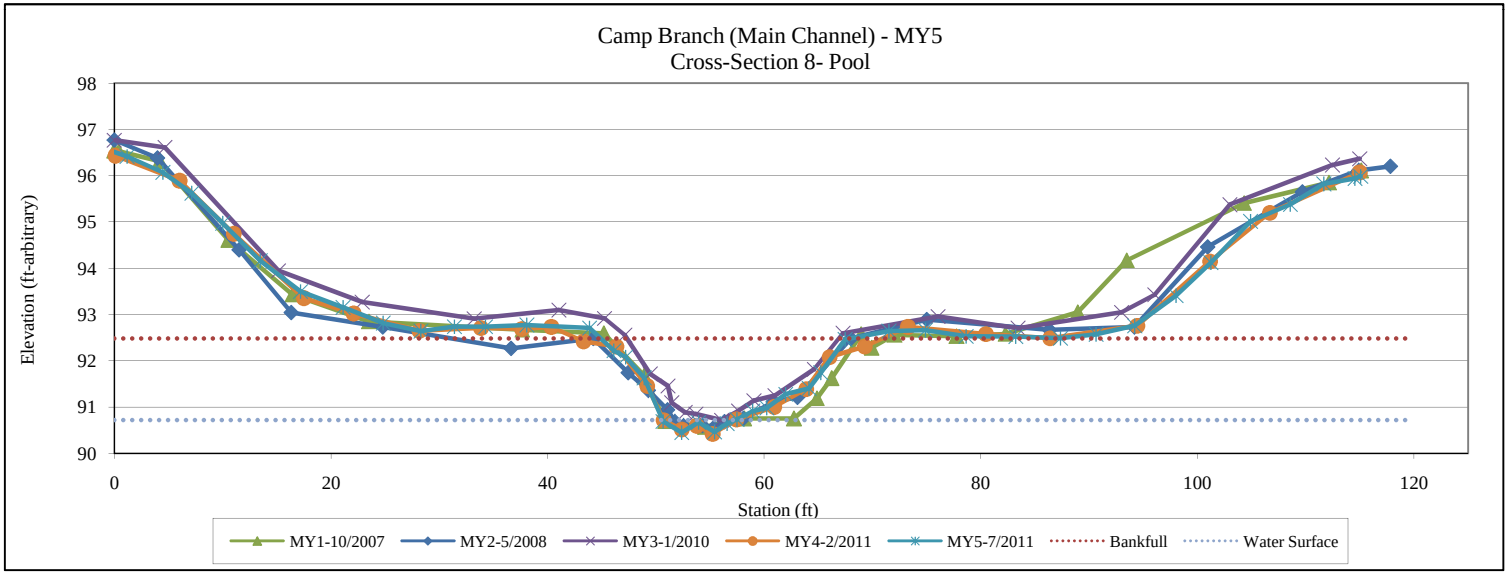
Project Name	**Camp Branch**
EEP Project Number	**92350**
Cross-Section ID	**XS-8, Pool**
Survey Date	**7/2011**

SUMMARY DATA	
Bankfull Elevation (ft)	92.48
Bankfull Cross-Sectional Area (ft^2)	27.92
Bankfull Width (ft)	23.02
Flood Prone Area Elevation (ft)	94.51
Flood Prone Width (ft)	90.89
Bankfull Mean Depth (ft)	1.21
Bankfull Max Depth (ft)	2.03
W/D Ratio	19.02
Entrenchment Ratio	3.95
Bank Height Ratio	1.00

XS-8: View Upstream

XS-8: View Downstream

Station	Elevation	Notes
-4.6	96.77	xs8-lpt
-4.04	96.75	xs-8
-1.8	96.66	xs-8
1.18	96.42	xs-8
4.49	96.07	xs-8
7.14	95.62	xs-8
10.01	94.97	xs-8
13.45	94.16	xs-8
17.19	93.5	xs-8
21.13	93.15	xs-8
24.8	92.81	xs-8
28.29	92.64	xs-8
31.4	92.74	xs-8
34.26	92.74	xs-8
38.06	92.77	xs-8
43.86	92.71	xs-8
46.1	92.22	xs-8
47.21	92.08	xs-8
48.92	91.63	xs-8
50.67	90.69	lew
52.37	90.45	xs-8
53.95	90.67	xs-8
55.42	90.46	xs-8
56.58	90.64	rew
57.49	90.73	xs-8
58.93	90.91	xs-8
60.22	90.98	xs-8
61.97	91.28	xs-8
64.13	91.4	xs-8



Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes
65.23	91.74	xs-8	90.62	92.57	xs-8	114.53	95.94	xs-8
67.48	92.46	rb	94.21	92.76	xs-8	115.07	95.99	xs8-rpt
71.52	92.64	xs-8	98.02	93.41	xs-8			
74.89	92.66	xs-8	101.25	94.12	xs-8			
78.64	92.53	xs-8	104.91	95.01	xs-8			
83.21	92.52	xs-8	108.56	95.38	xs-8			
87.36	92.49	xs-8	111.67	95.82	xs-8			

Appendix D
Figure 4a. Longitudinal Profiles with Annual Overlays
Camp Branch-Main Channel
Longitudinal Profile
2011 Monitoring Year
MY 5 of 5

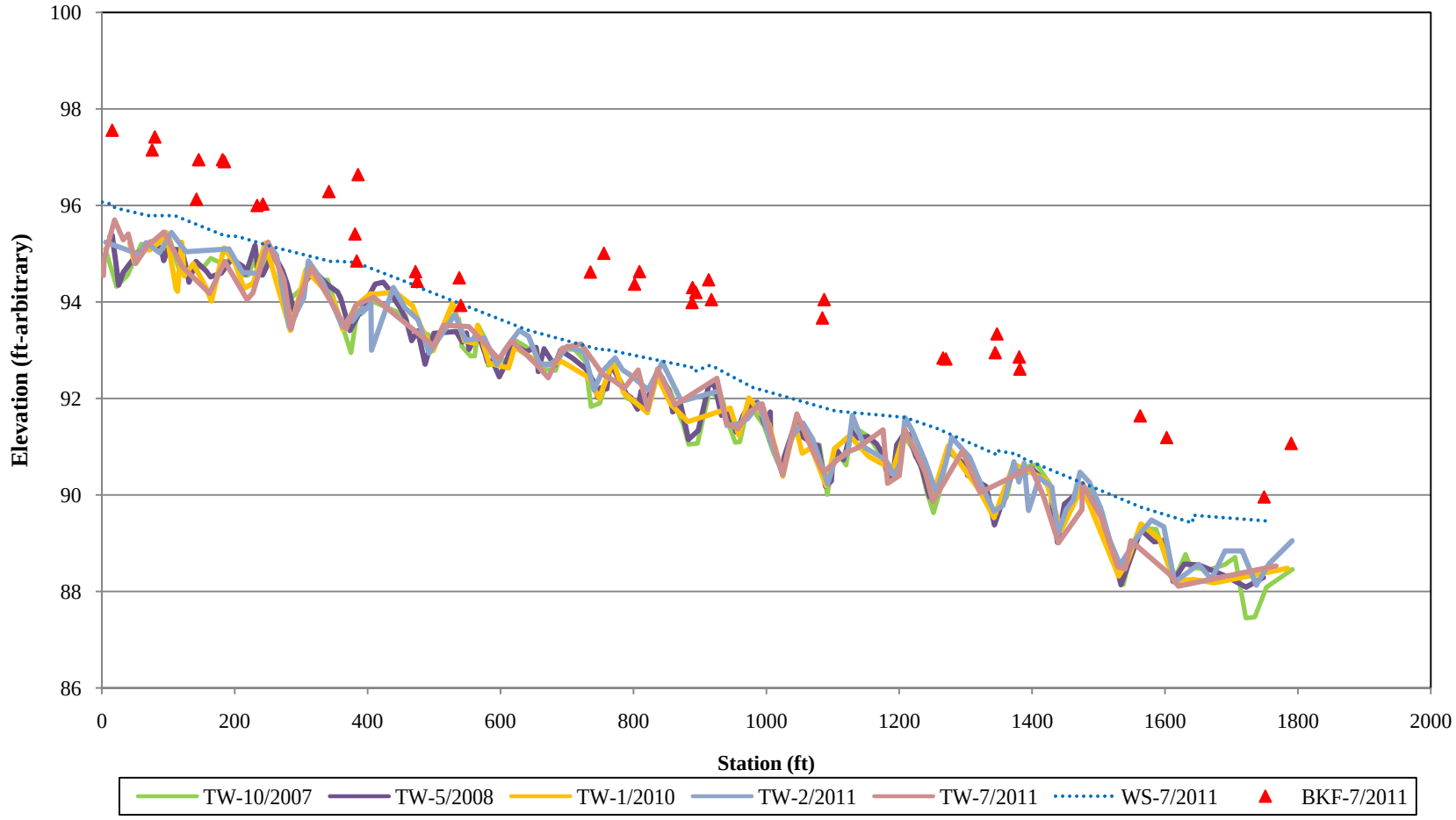
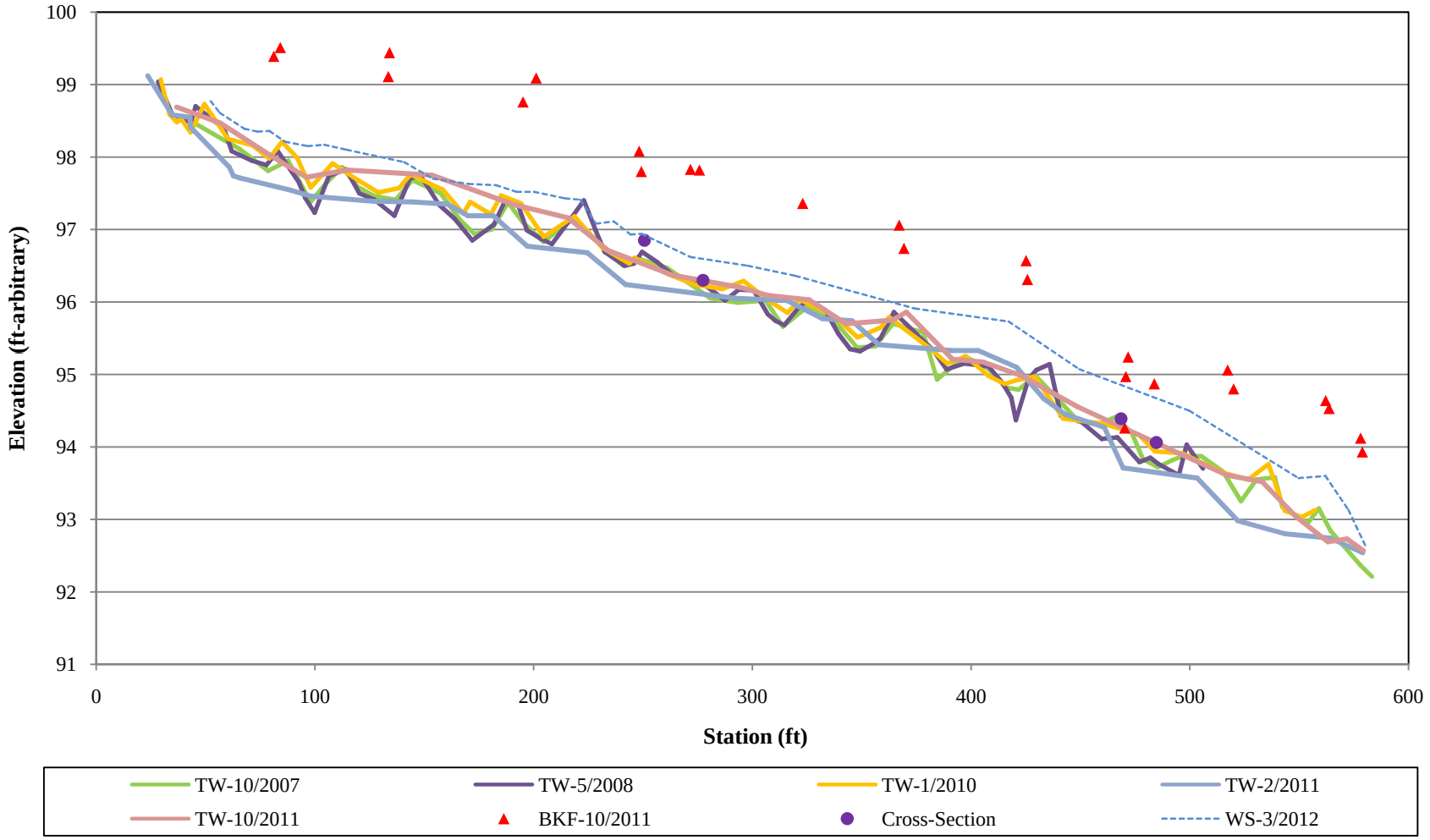


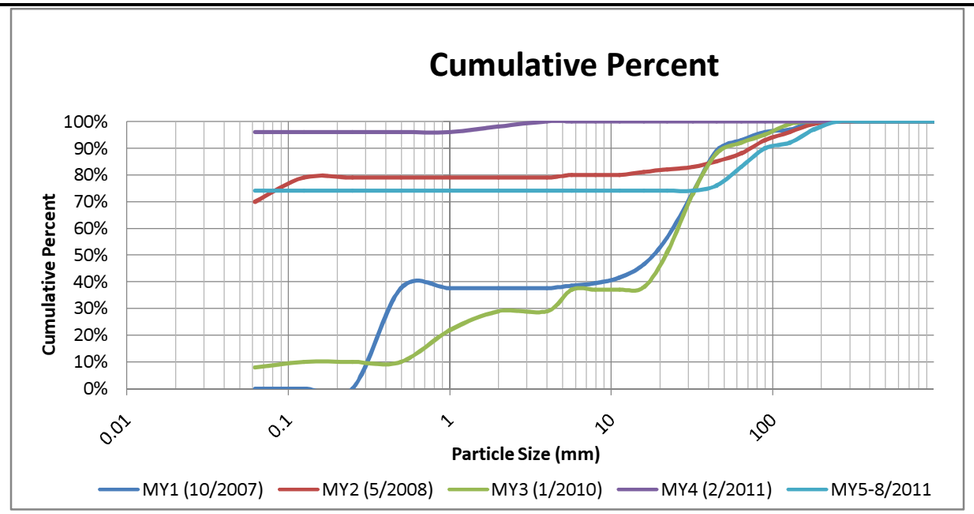
Figure 4.2b. Longitudinal Profiles with Annual Overlays
Camp Branch-Tributary
Longitudinal Profile
2011 Monitoring Year
MY 5 of 5

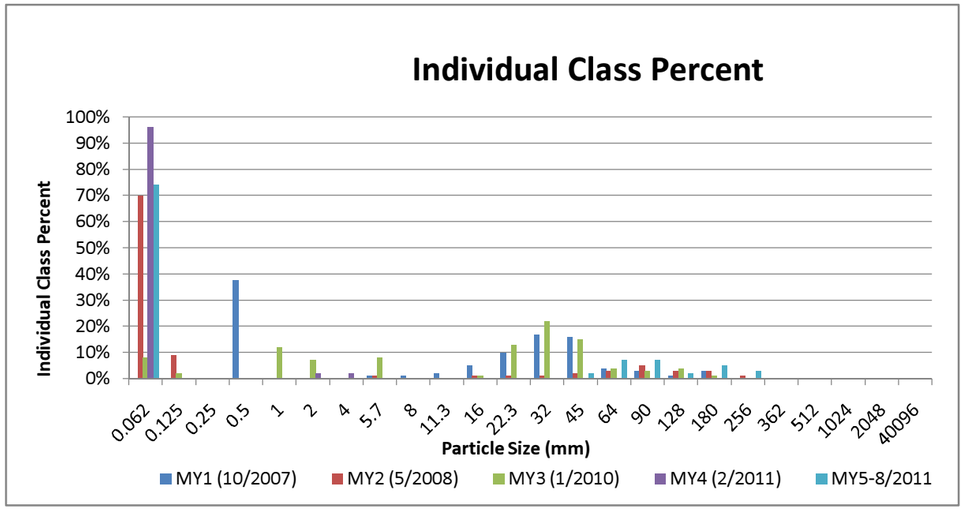


Appendix D. Stream Survey Data
Figure 5a: Pebble Count Plots with Annual Overlays
Camp Branch Stream Restoration/EEP Project No. 92350
Camp Branch Tributary
Monitoring Year 5 of 5

Project Name: Camp Branch-Tributary					
Cross-Section: 1					
Feature: Riffle					
			MY5-8/2011		
Description	**Material**	**Size (mm)**	**Total #**	**Item %**	**Cum %**
Silt/Clay	silt/clay	0.062	74	74%	74%
Sand	very fine sand	0.125	0	0%	74%
	fine sand	0.250	0	0%	74%
	medium sand	0.50	0	0%	74%
	coarse sand	1.00	0	0%	74%
	very coarse sand	2.0	0	0%	74%
Gravel	very fine gravel	4.0	0	0%	74%
	fine gravel	5.7	0	0%	74%
	fine gravel	8.0	0	0%	74%
	medium gravel	11.3	0	0%	74%
	medium gravel	16.0	0	0%	74%
	course gravel	22.3	0	0%	74%
	course gravel	32.0	0	0%	74%
	very coarse gravel	45	2	2%	76%
	very coarse gravel	64	7	7%	83%
Cobble	small cobble	90	7	7%	90%
	medium cobble	128	2	2%	92%
	large cobble	180	5	5%	97%
	very large cobble	256	3	3%	100%
Boulder	small boulder	362	0	0%	100%
	small boulder	512	0	0%	100%
	medium boulder	1024	0	0%	100%
	large boulder	2048	0	0%	100%
Bedrock	bedrock	40096	0	0%	100%
TOTAL % of whole count			100	100%	100%

Summary Data	
D50	0.04
D84	67.71
D95	159.2

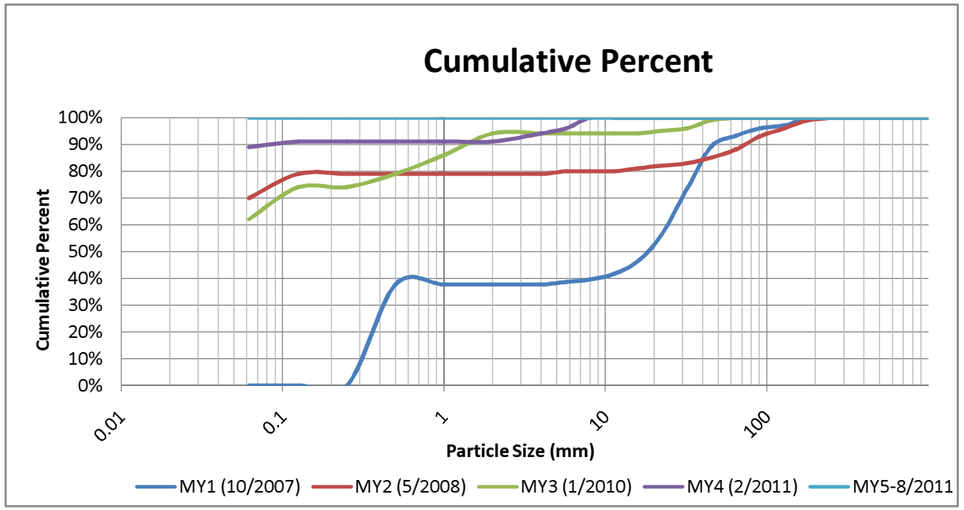


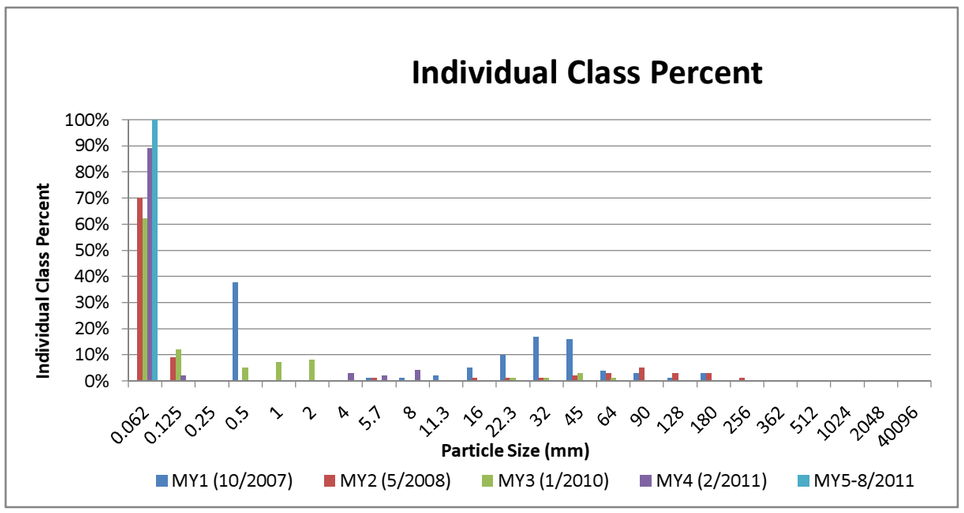


Appendix D. Stream Survey Data
Figure 5b: Pebble Count Plots with Annual Overlays
Camp Branch Stream Restoration/EEP Project No. 92350
Camp Branch Tributary
Monitoring Year 5 of 5

Project Name: Camp Branch-Tributary					
Cross-Section: 2					
Feature: Pool					
			MY5-8/2011		
Description	Material	Size (mm)	Total #	Item %	Cum %
Silt/Clay	silt/clay	0.062	100	100%	100%
Sand	very fine sand	0.125	0	0%	100%
	fine sand	0.250	0	0%	100%
	medium sand	0.50	0	0%	100%
	coarse sand	1.00	0	0%	100%
	very coarse sand	2.0	0	0%	100%
Gravel	very fine gravel	4.0	0	0%	100%
	fine gravel	5.7	0	0%	100%
	fine gravel	8.0	0	0%	100%
	medium gravel	11.3	0	0%	100%
	medium gravel	16.0	0	0%	100%
	course gravel	22.3	0	0%	100%
	course gravel	32.0	0	0%	100%
	very coarse gravel	45	0	0%	100%
	very coarse gravel	64	0	0%	100%
Cobble	small cobble	90	0	0%	100%
	medium cobble	128	0	0%	100%
	large cobble	180	0	0%	100%
	very large cobble	256	0	0%	100%
Boulder	small boulder	362	0	0%	100%
	small boulder	512	0	0%	100%
	medium boulder	1024	0	0%	100%
	large boulder	2048	0	0%	100%
Bedrock	bedrock	40096	0	0%	100%
TOTAL % of whole count			100	100%	100%

Summary Data	
D50	0.03
D84	0.05
D95	0.06

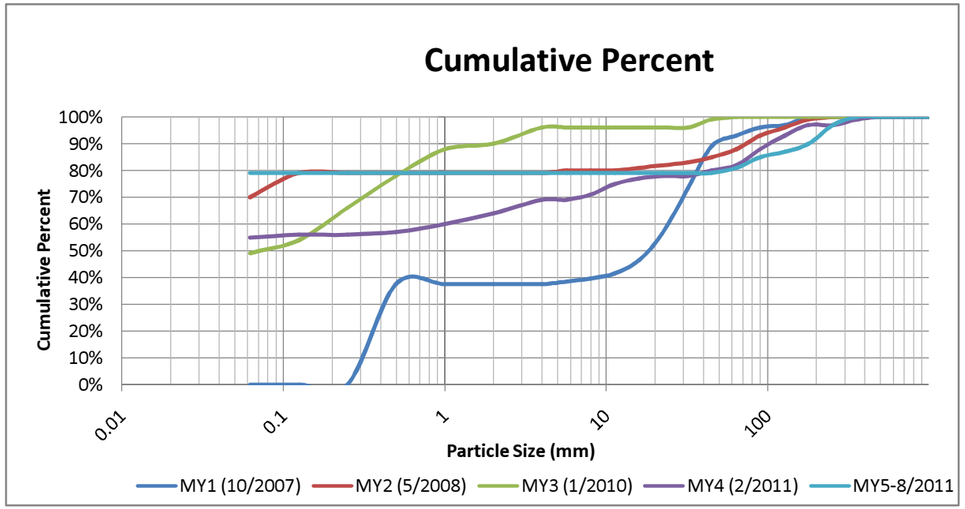


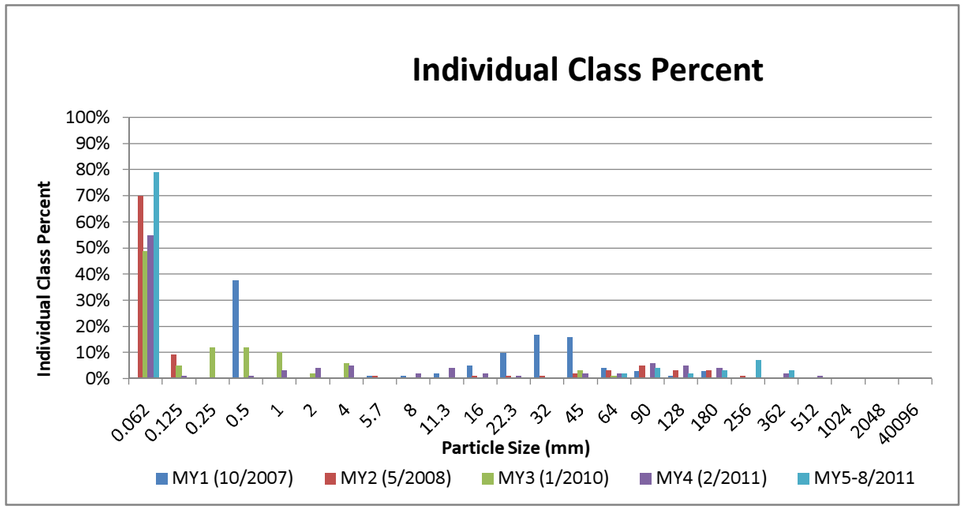


Appendix D. Stream Survey Data
Figure 5c: Pebble Count Plots with Annual Overlays
Camp Branch Stream Restoration/EEP Project No. 92350
Camp Branch Tributary
Monitoring Year 5 of 5

Project Name: Camp Branch-Tributary					
Cross-Section: 3					
Feature: Riffle					
			MY5-8/2011		
Description	**Material**	**Size (mm)**	**Total #**	**Item %**	**Cum %**
Silt/Clay	silt/clay	0.062	79	79%	79%
Sand	very fine sand	0.125	0	0%	79%
	fine sand	0.250	0	0%	79%
	medium sand	0.50	0	0%	79%
	coarse sand	1.00	0	0%	79%
	very coarse sand	2.0	0	0%	79%
Gravel	very fine gravel	4.0	0	0%	79%
	fine gravel	5.7	0	0%	79%
	fine gravel	8.0	0	0%	79%
	medium gravel	11.3	0	0%	79%
	medium gravel	16.0	0	0%	79%
	course gravel	22.3	0	0%	79%
	course gravel	32.0	0	0%	79%
	very coarse gravel	45	0	0%	79%
	very coarse gravel	64	2	2%	81%
Cobble	small cobble	90	4	4%	85%
	medium cobble	128	2	2%	87%
	large cobble	180	3	3%	90%
	very large cobble	256	7	7%	97%
Boulder	small boulder	362	3	3%	100%
	small boulder	512	0	0%	100%
	medium boulder	1024	0	0%	100%
	large boulder	2048	0	0%	100%
Bedrock	bedrock	40096	0	0%	100%
TOTAL % of whole count			100	100%	100%

Summary Data	
D50	0.04
D84	83.5
D95	234.29

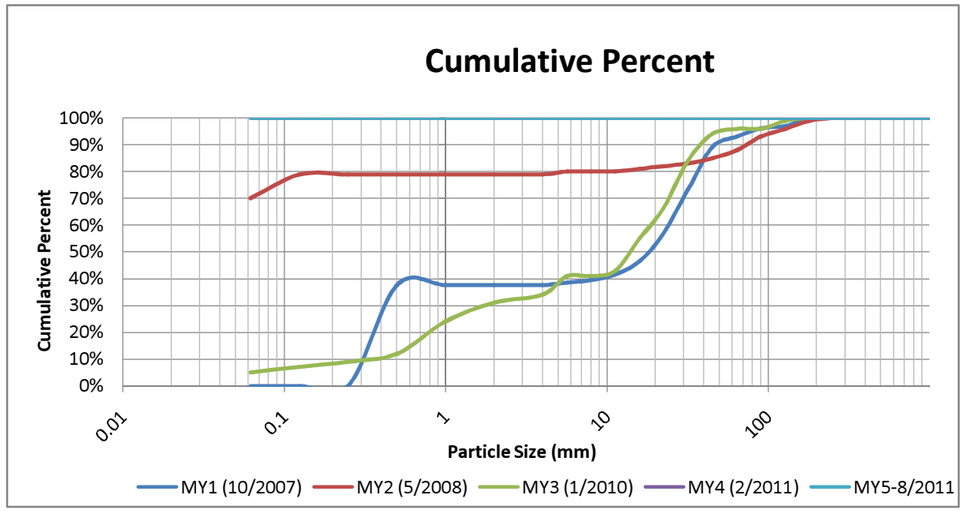


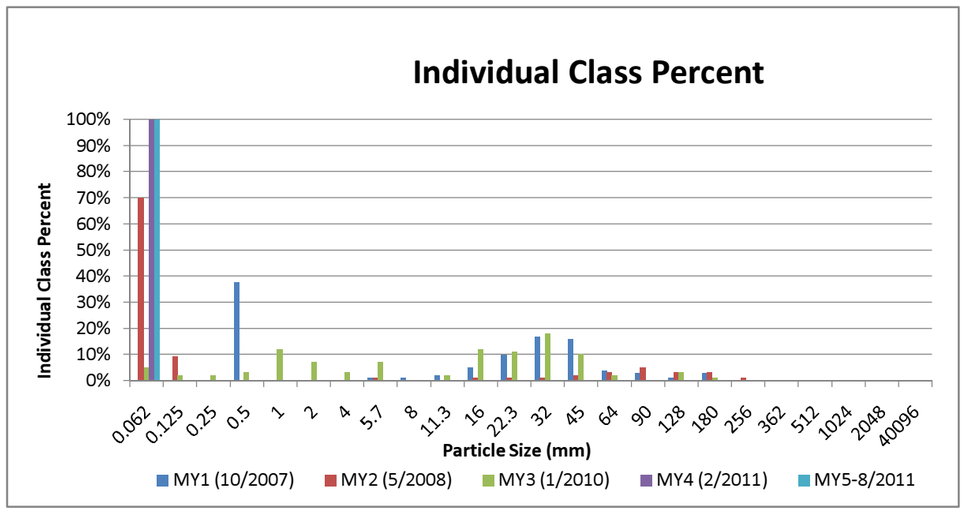


Appendix D. Stream Survey Data
Figure 5d: Pebble Count Plots with Annual Overlays
Camp Branch Stream Restoration/EEP Project No. 92350
Camp Branch Tributary
Monitoring Year 5 of 5

Project Name: Camp Branch-Tributary					
Cross-Section: 4					
Feature: Pool					
			MY5-8/2011		
Description	Material	Size (mm)	Total #	Item %	Cum %
Silt/Clay	silt/clay	0.062	100	100%	100%
Sand	very fine sand	0.125	0	0%	100%
	fine sand	0.250	0	0%	100%
	medium sand	0.50	0	0%	100%
	coarse sand	1.00	0	0%	100%
	very coarse sand	2.0	0	0%	100%
Gravel	very fine gravel	4.0	0	0%	100%
	fine gravel	5.7	0	0%	100%
	fine gravel	8.0	0	0%	100%
	medium gravel	11.3	0	0%	100%
	medium gravel	16.0	0	0%	100%
	course gravel	22.3	0	0%	100%
	course gravel	32.0	0	0%	100%
	very coarse gravel	45	0	0%	100%
	very coarse gravel	64	0	0%	100%
Cobble	small cobble	90	0	0%	100%
	medium cobble	128	0	0%	100%
	large cobble	180	0	0%	100%
	very large cobble	256	0	0%	100%
Boulder	small boulder	362	0	0%	100%
	small boulder	512	0	0%	100%
	medium boulder	1024	0	0%	100%
	large boulder	2048	0	0%	100%
Bedrock	bedrock	40096	0	0%	100%
TOTAL % of whole count			100	100%	100%

Summary Data	
D50	0.03
D84	0.05
D95	0.06

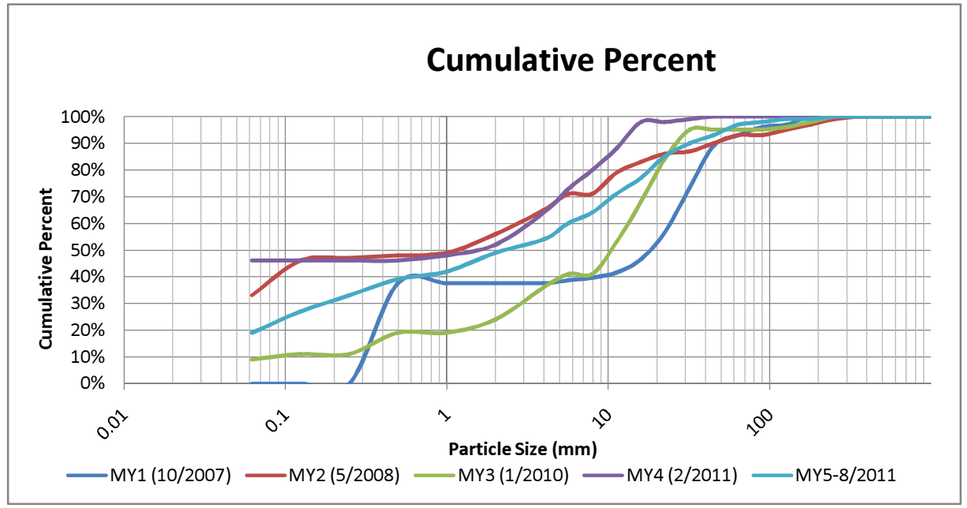


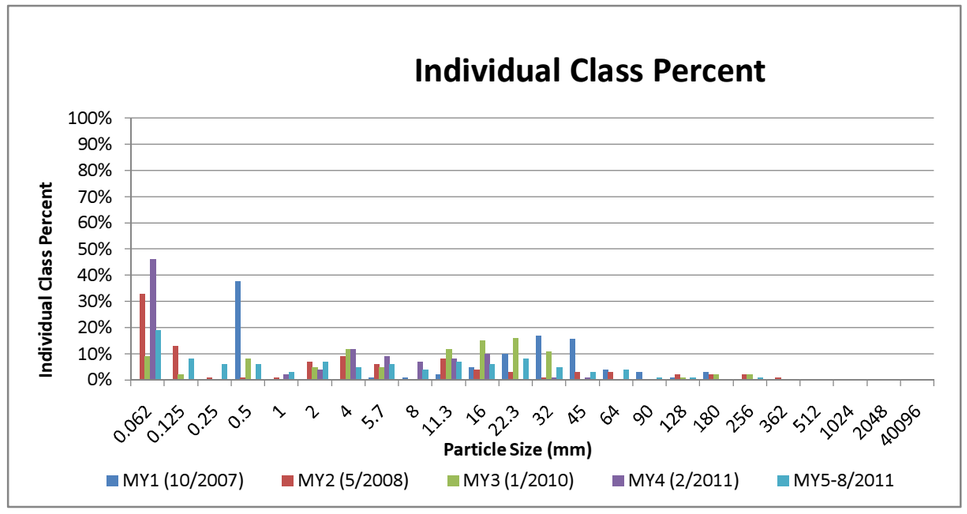


Appendix D. Stream Survey Data
Figure 5e: Pebble Count Plots with Annual Overlays
Camp Branch Stream Restoration/EEP Project No. 92350
Camp Branch Tributary
Monitoring Year 5 of 5

Project Name: Camp Branch-Main Channel					
Cross-Section: 5					
Feature: Riffle					
			MY5-8/2011		
Description	**Material**	**Size (mm)**	**Total #**	**Item %**	**Cum %**
Silt/Clay	silt/clay	0.062	19	19%	19%
Sand	very fine sand	0.125	8	8%	27%
	fine sand	0.250	6	6%	33%
	medium sand	0.50	6	6%	39%
	coarse sand	1.00	3	3%	42%
	very coarse sand	2.0	7	7%	49%
Gravel	very fine gravel	4.0	5	5%	54%
	fine gravel	5.7	6	6%	60%
	fine gravel	8.0	4	4%	64%
	medium gravel	11.3	7	7%	71%
	medium gravel	16.0	6	6%	77%
	course gravel	22.3	8	8%	85%
	course gravel	32.0	5	5%	90%
	very coarse gravel	45	3	3%	93%
	very coarse gravel	64	4	4%	97%
Cobble	small cobble	90	1	1%	98%
	medium cobble	128	1	1%	99%
	large cobble	180	0	0%	99%
	very large cobble	256	1	1%	100%
Boulder	small boulder	362	0	0%	100%
	small boulder	512	0	0%	100%
	medium boulder	1024	0	0%	100%
	large boulder	2048	0	0%	100%
Bedrock	bedrock	40096	0	0%	100%
TOTAL % of whole count			100	100%	100%

Summary Data	
D50	2.4
D84	21.78
D95	54.5

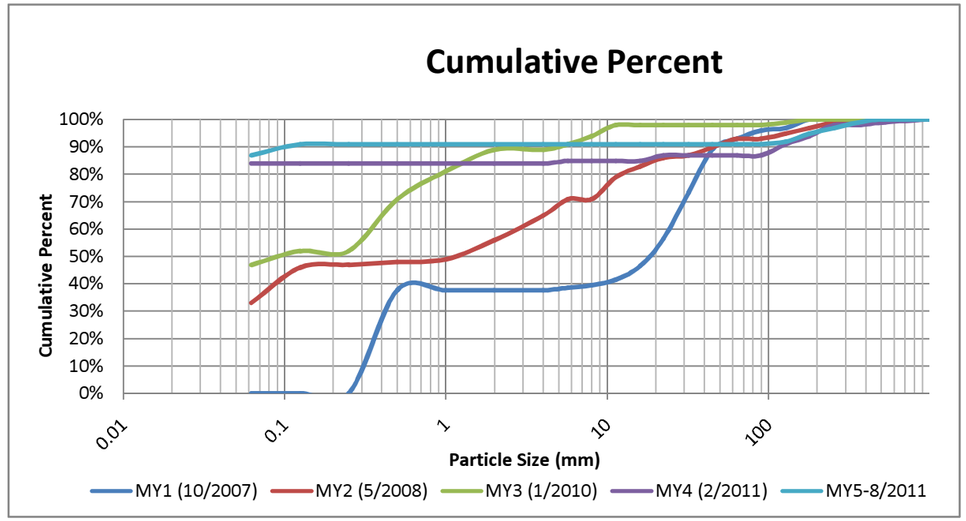


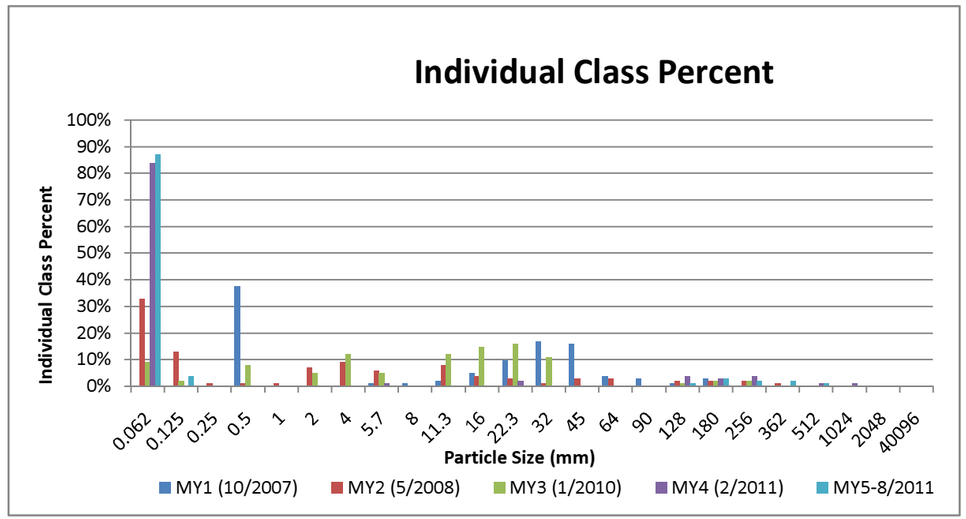


Appendix D. Stream Survey Data
Figure 5f: Pebble Count Plots with Annual Overlays
Camp Branch Stream Restoration/EEP Project No. 92350
Camp Branch Tributary
Monitoring Year 5 of 5

Project Name: Camp Branch-Main Channel					
Cross-Section: 6					
Feature: Pool					
			MY5-8/2011		
Description	Material	Size (mm)	Total #	Item %	Cum %
Silt/Clay	silt/clay	0.062	87	87%	87%
Sand	very fine sand	0.125	4	4%	91%
	fine sand	0.250	0	0%	91%
	medium sand	0.50	0	0%	91%
	coarse sand	1.00	0	0%	91%
	very coarse sand	2.0	0	0%	91%
Gravel	very fine gravel	4.0	0	0%	91%
	fine gravel	5.7	0	0%	91%
	fine gravel	8.0	0	0%	91%
	medium gravel	11.3	0	0%	91%
	medium gravel	16.0	0	0%	91%
	course gravel	22.3	0	0%	91%
	course gravel	32.0	0	0%	91%
	very coarse gravel	45	0	0%	91%
	very coarse gravel	64	0	0%	91%
Cobble	small cobble	90	0	0%	91%
	medium cobble	128	1	1%	92%
	large cobble	180	3	3%	95%
	very large cobble	256	2	2%	97%
Boulder	small boulder	362	2	2%	99%
	small boulder	512	1	1%	100%
	medium boulder	1024	0	0%	100%
	large boulder	2048	0	0%	100%
Bedrock	bedrock	40096	0	0%	100%
TOTAL % of whole count			100	100%	100%

Summary Data	
D50	0.04
D84	0.06
D95	180

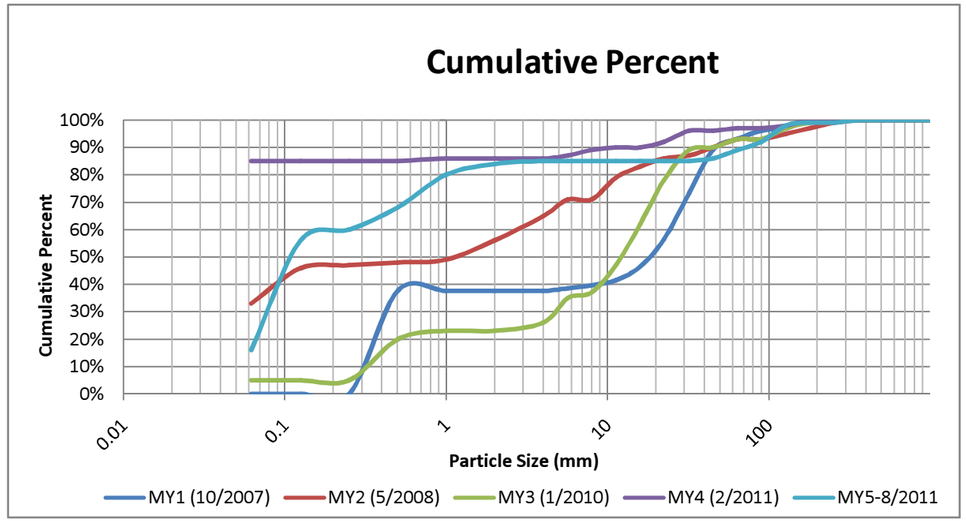


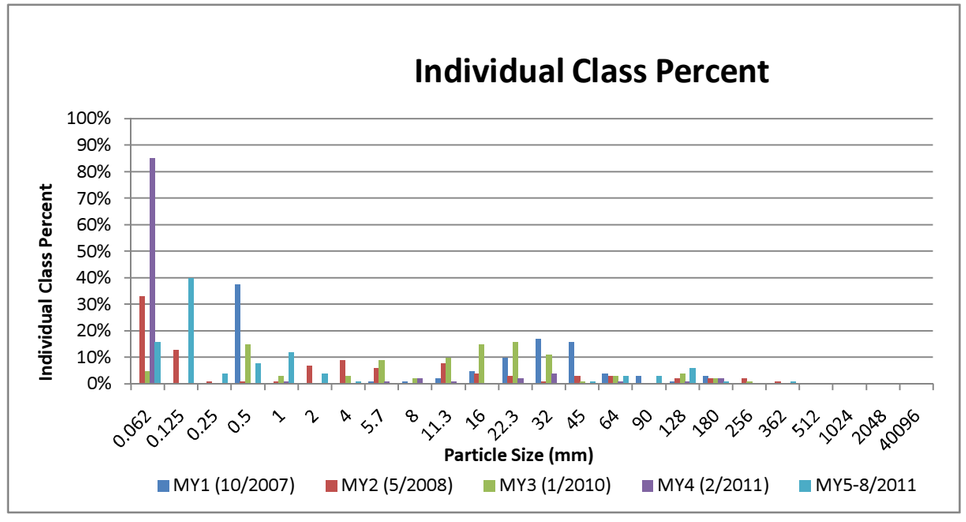


Appendix D. Stream Survey Data
Figure 5g: Pebble Count Plots with Annual Overlays
Camp Branch Stream Restoration/EEP Project No. 92350
Camp Branch Tributary
Monitoring Year 5 of 5

Project Name: Camp Branch-Main Channel					
Cross-Section: 7					
Feature: Riffle					
			MY5-8/2011		
Description	**Material**	**Size (mm)**	**Total #**	**Item %**	**Cum %**
Silt/Clay	silt/clay	0.062	16	16%	16%
Sand	very fine sand	0.125	40	40%	56%
	fine sand	0.250	4	4%	60%
	medium sand	0.50	8	8%	68%
	coarse sand	1.00	12	12%	80%
	very coarse sand	2.0	4	4%	84%
Gravel	very fine gravel	4.0	1	1%	85%
	fine gravel	5.7	0	0%	85%
	fine gravel	8.0	0	0%	85%
	medium gravel	11.3	0	0%	85%
	medium gravel	16.0	0	0%	85%
	course gravel	22.3	0	0%	85%
	course gravel	32.0	0	0%	85%
	very coarse gravel	45	1	1%	86%
	very coarse gravel	64	3	3%	89%
Cobble	small cobble	90	3	3%	92%
	medium cobble	128	6	6%	98%
	large cobble	180	1	1%	99%
	very large cobble	256	0	0%	99%
Boulder	small boulder	362	1	1%	100%
	small boulder	512	0	0%	100%
	medium boulder	1024	0	0%	100%
	large boulder	2048	0	0%	100%
Bedrock	bedrock	40096	0	0%	100%
TOTAL % of whole count			100	100%	100%

Summary Data	
D50	0.12
D84	2
D95	109

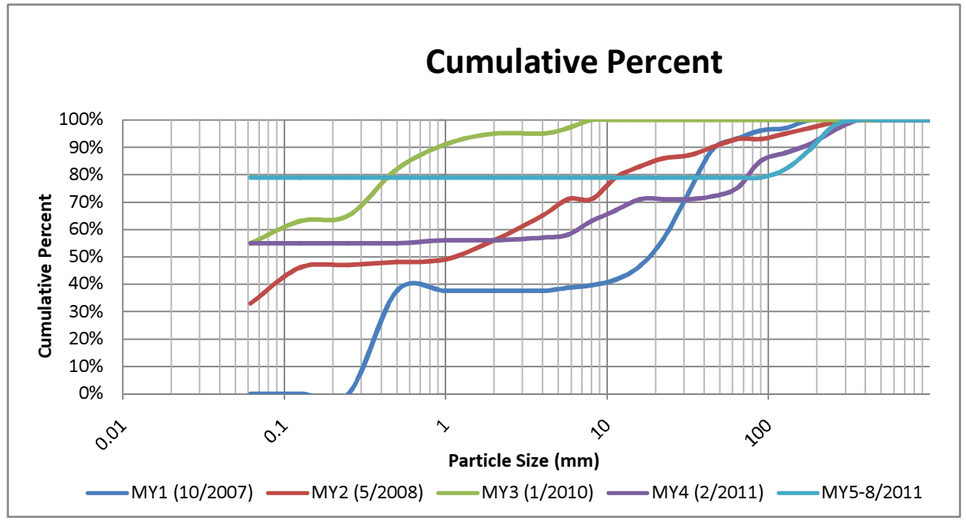




Appendix D. Stream Survey Data
Figure 5h: Pebble Count Plots with Annual Overlays
Camp Branch Stream Restoration/EEP Project No. 92350
Camp Branch Tributary
Monitoring Year 5 of 5

Project Name: Camp Branch-Main Channel					
Cross-Section: 8					
Feature: Pool					
			MY5-8/2011		
Description	**Material**	**Size (mm)**	**Total #**	**Item %**	**Cum %**
Silt/Clay	silt/clay	0.062	79	79%	79%
Sand	very fine sand	0.125	0	0%	79%
	fine sand	0.250	0	0%	79%
	medium sand	0.50	0	0%	79%
	coarse sand	1.00	0	0%	79%
	very coarse sand	2.0	0	0%	79%
Gravel	very fine gravel	4.0	0	0%	79%
	fine gravel	5.7	0	0%	79%
	fine gravel	8.0	0	0%	79%
	medium gravel	11.3	0	0%	79%
	medium gravel	16.0	0	0%	79%
	course gravel	22.3	0	0%	79%
	course gravel	32.0	0	0%	79%
	very coarse gravel	45	0	0%	79%
	very coarse gravel	64	0	0%	79%
Cobble	small cobble	90	0	0%	79%
	medium cobble	128	3	3%	82%
	large cobble	180	7	7%	89%
	very large cobble	256	9	9%	98%
Boulder	small boulder	362	2	2%	100%
	small boulder	512	0	0%	100%
	medium boulder	1024	0	0%	100%
	large boulder	2048	0	0%	100%
Bedrock	bedrock	40096	0	0%	100%
TOTAL % of whole count			100	100%	100%

Summary Data	
D50	0.04
D84	143
D95	362



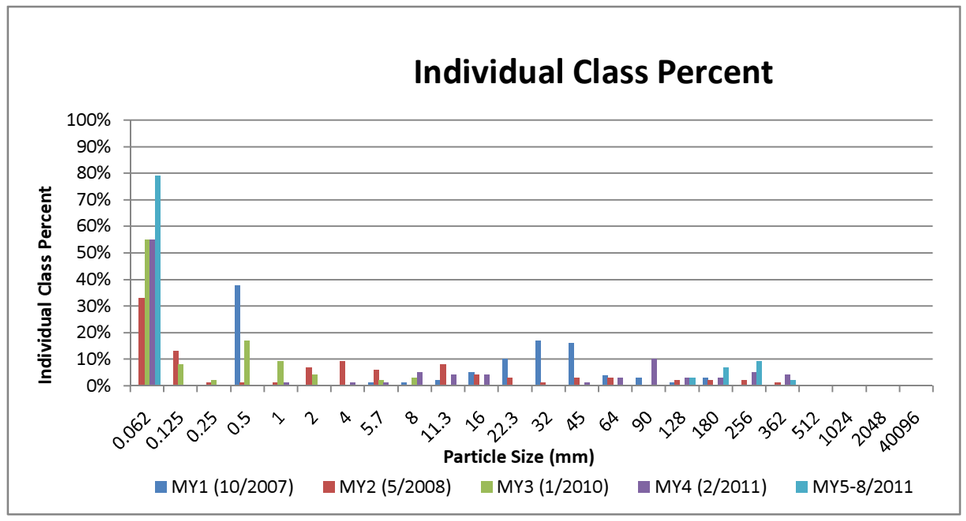


Table 10a. Baseline Stream Data Summary

Camp Branch Stream Restoration/EEP Project Number 92350

Main Channel Camp Branch (1810 linear feet)

Parameter	Gauge	Regional Curve			Pre-Existing Condition						Reference Reach Data						Design			Monitoring Baseline					
Dimension and Substrate - Riffle	-	**LL**	**UL**	**Eq.**	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Med	Max	Min	Mean	Med	Max	SD	n
Bankfull Width (ft)	-	-	-	18.8	16	17.8	17.8	19.5	-	-	21.3	21.3	21.3	21.3	-	-	16	19	22	18.1	20.5	20.4	22.8	-	-
Floodprone Width (ft)					17.2	20.8	20.8	24.3	-	-	NA	NA	NA	NA	-	-	70	90	300	91.3	95.6	95.2	99.9	-	-
Bankfull Mean Depth (ft)	-	-	-	2.1	2.2	2.4	2.4	2.6	-	-	1.8	1.8	1.8	1.8	-	-	1.4	1.6	1.9	1.3	1.4	1.4	1.4	-	-
Bankfull Max Depth (ft)	-				2.5	2.8	2.8	3	-	-	2.7	2.7	2.7	2.7	-	-	1.8	2	2.3	1.8	1.9	1.9	2	-	-
Bankfull Cross-Sectional Area (ft^2)	-	-	-	44.2	42	42.0	42	42	-	-	38.7	38.7	38.7	38.7	-	-	30	30	30	24	27.8	27.8	31.6	-	-
Width/Depth Ratio	-				6.2	7.6	7.6	8.9	-	-	11.8	11.8	11.8	11.8	-	-	10	11.9	13.8	13.6	15.0	14.9	16.3	-	-
Entrenchment Ratio	-				1.1	1.2	1.1	1.2	-	-	NA	NA	NA	NA	-	-	3.7	4.7	15.8	4.5	4.7	4.7	4.9	-	-
Bank Height Ratio	-				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pattern																									
Channel Beltwidth (ft)					19	49.0	37	79	-	-	-	-	-	-	-	-	45	62	77	45	62.5	62	80	-	-
Radius of Curvature (ft)					-	-	-	-	-	-	-	-	-	-	-	-	40	51.1	76	40	58.0	51.1	76	-	-
Rc:Bankfull width (ft/ft)					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Meander Wavelength (ft)					-	-	-	-	-	-	-	-	-	-	-	-	102	137.8	171	102	136.5	137.8	171	-	-
Meander Width Ratio					-	-	-	-	-	-	-	-	-	-	-	-	2.4	3.3	4.1	2.2	3.1	3	3.9	-	-
Profile																									
Riffle Length (ft)					-	-	-	-	-	-	-	-	-	-	-	-	9	21.9	37	10.2	26.8	23.4	43.3	-	-
Riffle Slope (ft/ft)					0.001	0.03	0.01	0.06	-	-	0.008	-	0.02	-	-	-	0.003	0.005	0.009	0.000	0.010	0.010	0.020	-	-
Pool Length (ft)					-	-	-	-	-	-	-	-	-	-	-	-	23	29.5	38	11.6	24.3	23	37	-	-
Pool Max Depth (ft)					-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pool Spacing (ft)					-	-	-	-	-	-	-	-	-	-	-	-	48	72.5	122	44.8	109.1	86.5	173.4	-	-
Transport Parameters																									
Reach Shear Stress (competency) lb/ft^2					-	-	-	0.31	-	-	-	-	-	0.81	-	-	-	-	0.29	-	-	-	-	-	-
Max part size (mm) mobilized at bankful					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Stream Power (transport capacity) W/m^2					-	-	-	30.40	-	-	-	-	-	30.48	-	-	-	-	32.50	-	-	-	-	-	-
Additional Reach Parameters																									
Rosgen Classification	-				G4						E/C4						C4			C4					
Bankful Velocity (fps)	-	-	-	-	-						3.5						-			-					
Bankful Discharge (cfs)	-	-	-	-	-						38						-			-					
Valley Length (ft)					1640						-						1640			1640					
Channel Thalweg Length (ft)					1722						-						1807			1810					
Sinuosity (ft)					1.05						1.18						1.1			1.1					
Water Surface Slope (ft/ft)	-				0.0041						0.0029						N/A			N/A					
BF slope (ft/ft)	-				-						0.0029						0.004 (0.0035-0.0055)			0.0034					
Bankful Floodplain Area (acres)					-						-						-			-					
% of Reach with Eroding Banks					-						-						-			-					
Channel Stability or Habitat Metric					-						-						-			-					
Biological or Other					-						-						-			-					

Table 10a. Baseline Stream Data Summary

Camp Branch Stream Restoration/EEP Project Number 92350

Unnamed Tributary to Camp Branch (556 linear feet)

Parameter	Gauge	Regional Curve			Pre-Existing Condition						Reference Reach Data						Design			Monitoring Baseline					
Dimension and Substrate - Riffle	-	**LL**	**UL**	**Eq.**	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Med	Max	Min	Mean	Med	Max	SD	n
Bankfull Width (ft)	-	-	-	6.00	-	-	-	-	-	-	-	-	-	-	-	-	5	6	7	6.8	-	7.9	8	-	-
Floodprone Width (ft)					-	-	-	-	-	-	-	-	-	-	-	-	35	200	500	35	-	200	500	-	-
Bankfull Mean Depth (ft)	-	-	-	0.90	-	-	-	-	-	-	-	-	-	-	-	-	0.5	0.6	0.7	0.4	-	0.6	0.7	-	-
Bankfull Max Depth (ft)	-				-	-	-	-	-	-	-	-	-	-	-	-	0.7	0.8	1	0.6	-	0.8	1	-	-
Bankfull Cross-Sectional Area (ft^2)	-	-	-	7.20	-	-	-	-	-	-	-	-	-	-	-	-	6.4	6.4	6.4	3	-	4.4	5.8	-	-
Width/Depth Ratio	-				-	-	-	-	-	-	-	-	-	-	-	-	8.6	10	12	11.2	-	13.1	19.8	-	-
Entrenchment Ratio	-				-	-	-	-	-	-	-	-	-	-	-	-	5.8	33	83	4.4	-	25.3	63.3	-	-
Bank Height Ratio	-				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pattern																									
Channel Beltwidth (ft)					-	-	-	-	-	-	-	-	-	-	-	-	32	37	42	32	-	37	42	-	-
Radius of Curvature (ft)					-	-	-	-	-	-	-	-	-	-	-	-	14	18	30	14	-	18	30	-	-
Rc:Bankfull width (ft/ft)					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Meander Wavelength (ft)					-	-	-	-	-	-	-	-	-	-	-	-	59	60.6	62	59	-	60.6	62	-	-
Meander Width Ratio					-	-	-	-	-	-	-	-	-	-	-	-	5.3	6.2	7	4.1	-	4.7	5.3	-	-
Profile																									
Riffle Length (ft)					-	-	-	-	-	-	-	-	-	-	-	-	7	11.3	18	-	-	-	-	-	-
Riffle Slope (ft/ft)					-	-	-	-	-	-	-	-	-	-	-	-	0.007	0.01	0.02	-	-	-	-	-	-
Pool Length (ft)					-	-	-	-	-	-	-	-	-	-	-	-	8	14.8	24	-	-	-	-	-	-
Pool Max Depth (ft)					-	-	-	-	-	-		-	-	-	-	-				-	-	-	-	-	-
Pool Spacing (ft)					-	-	-	-	-	-	-	-	-	-	-	-	21	37.2	46.8	-	-	-	-	-	-
Transport Parameters																									
Reach Shear Stress (competency) lb/ft^2					-	-	-	0.31	-	-	-	-	-	0.81	-	-	-	-	0.29	-	-	-	-	-	0.95
Max part size (mm) mobilized at bankfull					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Stream Power (transport capacity) W/m^2					-	-	-	30.40	-	-	-	-	-	30.48	-	-	-	-	32.50	-	-	-	-	-	-
Additional Reach Parameters																									
Rosgen Classification	-				G						-						E4/5			C4/5					
Bankful Velocity (fps)	-	-	-	-	-						-						-			-					
Bankful Discharge (cfs)	-	-	-	-	-						-						-			-					
Valley Length (ft)					-						-						749			667					
Channel Thalweg Length (ft)					-						-						624			556					
Sinuosity (ft)					-						-						1.2			1.2					
Water Surface Slope (ft/ft)	-				-						-						-			-					
BF slope (ft/ft)	-				-						-						0.01 (0.004-0.013)			0.01					
Bankful Floodplain Area (acres)					-						-						-			-					
% of Reach with Eroding Banks					-						-						-			-					
Channel Stability or Habitat Metric					-						-						-			-					
Biological or Other					-						-						-			-					

Appendix D. Stream Survey Data

Table 10b. Baseline Stream Data Summary (Substrate, Bed, Bank and Hydrologic Containment Parameter Distributions)

Camp Branch Stream Restoration/EEP Project No. 370

Main Channel Camp Branch (1810 linear feet)

Parameter	Pre-Existing Condition	Reference Reach Data	Design	As-built/Baseline
Ri%/Ru%/P%/G%/S%	-	-	-	-
SC% / Sa% / G% / C% / B% / Be%	-	-	-	24.5/35.75/36.75/3.25/0/0
d16 / d35 / d50 / d84 / d95 (mm)	0.12/0.83/2.36/11.03/22.6	-	-	1.45/5.85/8.29/25.06/47.52
Entrenchment Class<1.5/1.5-1.99/2.0-4.9/5.0-9.9/>10	100% <1.5 (1.13)	100% > 10 (15.66)	100% > 10 (16.67)	5.0 < 100% < 9.9 (5.35, 6.30)
Incision Class <1.2/1.2-1.49/1.5-1.99/>2.0	(2.53) 100% > 2.0	1.2=(1.2) 100% <1.49	(1.0) 100%< 1.2	(1.0) 100%< 1.2

Appendix D. Stream Survey Data

Table 10b. Baseline Stream Data Summary (Substrate, Bed, Bank and Hydrologic Containment Parameter Distributions)

Camp Branch Stream Restoration/EEP Project No. 370

Unnamed Tributary to Camp Branch (556 linear feet)

Parameter	Pre-Existing Condition	Reference Reach Data	Design	As-built/Baseline
Ri%/Ru%/P%/G%/S%	-	-	-	-
SC% / Sa% / G% / C% / B% / Be%	-	-	-	-
d16 / d35 / d50 / d84 / d95 (mm)	-	-	-	-
Entrenchment Class<1.5/1.5-1.99/2.0-4.9/5.0-9.9/>10	-	-	-	-
Incision Class <1.2/1.2-1.49/1.5-1.99/>2.0	-	-	-	-

Table 11a: Morphologic and Hydraulic Monitoring Summary										
Camp Branch Stream Restoration/EEP Project Number 92350										
Main Channel Camp Branch (1810 linear feet)										
PARAMETER	**Cross-Section 5 Riffle**					**Cross-Section 6 Pool**				
DIMENSION	**MY1-2007**	**MY2-2008**	**MY3-2009**	**MY4-2010**	**MY5-2011**	**MY1-2007**	**MY2-2008**	**MY3-2009**	**MY4-2010**	**MY5-2011**
Bankfull Width (ft)	21.0	20.0	20.4	20.5	20.0	18.1	22.7	21.0	20.7	18.6
Floodprone Width (ft)	97.2	101.7	101.7	98.5	98.7	99.9	100.5	100.5	100.4	100.1
Bankfull Mean Depth	1.8	1.9	1.8	1.6	1.6	1.3	1.2	1.2	1.2	1.2
Bankfull Max Depth (ft)	2.5	2.8	2.8	2.4	2.5	1.8	2.0	1.9	1.9	1.8
Bankfull Cross-sectional Area (ft^2)	37.8	37.3	36.2	32.9	32.7	24.0	27.0	24.2	24.3	21.7
Bankfull Width/Depth Ratio	11.6	10.8	11.5	12.8	12.2	13.6	19.1	18.1	17.5	15.9
Bankfull Entrenchment Ratio	4.6	5.1	5.0	4.8	5.0	5.5	4.4	4.7	4.9	5.4
Bankfull Bankheight Ratio	*	1.0	1.0	1.0	1.0	*	1.0	1.0	1.0	1.0
Cross Sectional Area between end pins (ft^2)	410.6	410.9	398.9	398.5	368.0	395.6	397.3	407.4	413.3	366.4
d50 (mm)	31.0	1.1	10.5	10.5	2.4	0.4	1.1	0.1	0.1	0.1
PARAMETER	**Cross-Section 7 Riffle**					**Cross-Section 8 Pool**				
DIMENSION	**MY1-2007**	**MY2-2008**	**MY3-2009**	**MY4-2010**	**MY5-2011**	**MY1-2007**	**MY2-2008**	**MY3-2009**	**MY4-2010**	**MY5-2011**
Bankfull Width (ft)	23.9	23.6	22.5	24.4	23.4	22.8	23.8	19.5	24.4	23.0
Floodprone Width (ft)	85.2	97.9	97.6	98.9	99.6	91.3	89.3	85.0	91.3	90.9
Bankfull Mean Depth	2.0	2.0	2.0	1.9	1.9	1.4	1.2	1.1	1.2	1.2
Bankfull Max Depth (ft)	3.3	3.3	3.3	3.4	3.4	2.0	1.9	1.8	2.1	2.0
Bankfull Cross-sectional Area (ft^2)	47.4	46.7	43.9	45.7	45.5	31.6	28.5	21.5	28.7	27.9
Bankfull Width/Depth Ratio	12.0	11.9	11.6	13.1	12.1	16.3	19.8	17.7	20.7	19.0
Bankfull Entrenchment Ratio	3.6	4.2	4.3	4.1	4.3	4.0	3.8	4.4	3.7	4.0
Bankfull Bankheight Ratio	*	1.0	1.0	1.0	1.0	*	1.0	1.0	1.0	1.0
Cross Sectional Area between end pins (ft^2)	326.4	338.3	327.2	327.5	333.2	375.9	420.5	377.1	381.8	413.1
d50 (mm)	0.4	1.1	12.2	12.2	0.1	27.0	1.1	0.6	0.6	0.1

* Data was not provided

Table 11a: Morphologic and Hydraulic Monitoring Summary										
Camp Branch Stream Restoration/EEP Project Number 92350										
Unnamed Tributary to Camp Branch (556 linear feet)										
PARAMETER	**Cross-Section 1 (Riffle)**					**Cross-Section 2 (Pool)**				
DIMENSION	**MY1-2007**	**MY2-2008**	**MY3-2009**	**MY4-2010**	**MY5-2011**	**MY1-2007**	**MY2-2008**	**MY3-2009**	**MY4-2010**	**MY5-2011**
Bankfull Width (ft)	8.0	9.0	8.2	7.8	8.95	6.80	6.80	5.63	6.14	5.96
Floodprone Width (ft)	>55	55.2	55.0	54.8	55.67	>66	65.72	65.91	65.71	66.00
Bankfull Mean Depth	0.7	0.7	0.7	0.7	0.69	0.90	0.84	0.86	0.81	0.58
Bankfull Max Depth (ft)	1.0	1.3	1.3	1.2	1.08	1.40	1.35	1.35	1.25	1.29
Bankfull Cross-sectional Area (ft^2)	5.8	6.3	5.5	5.5	6.22	5.90	5.68	4.86	4.97	5.96
Bankfull Width/Depth Ratio	11.4	12.6	12.5	11.2	12.97	7.60	8.10	6.55	7.58	17.67
Bankfull Entrenchment Ratio	>6.9	6.2	6.7	7.0	6.22	>9.7	9.7	11.7	10.71	6.44
Bankfull Bankheight Ratio	*	1.0	1.0	1.0	1.0	*	1.0	1.0	1.0	1.0
Cross Sectional Area between end pins (ft^2)	31.7	32.0	30.9	27.9	26.3	26.6	23.9	23.8	26.40	18.6
d50 (mm)	69.0	0.04	22.1	5.7	0.04	0.4	0.04	0.05	0.04	0.04
PARAMETER	**Cross-Section 3 (Pool)**					**Cross-Section 4 (Riffle)**				
DIMENSION	**MY1-2007**	**MY2-2008**	**MY3-2009**	**MY4-2010**	**MY5-2011**	**MY1-2007**	**MY2-2008**	**MY3-2009**	**MY4-2010**	**MY5-2011**
Bankfull Width (ft)	7.90	5.44	7.31	6.58	6.55	5.90	6.14	5.90	6.03	5.74
Floodprone Width (ft)	35.00	39.52	38.25	39.58	32.55	38.00	37.48	36.55	35.50	36.42
Bankfull Mean Depth	0.40	0.42	0.37	0.48	0.25	0.60	0.48	0.50	0.53	0.57
Bankfull Max Depth (ft)	0.60	0.65	0.63	0.64	0.44	1.10	1.10	1.02	0.89	0.85
Bankfull Cross-sectional Area (ft^2)	3.00	2.16	2.67	3.17	1.63	3.50	2.94	2.94	3.19	3.29
Bankfull Width/Depth Ratio	*	12.2	19.8	13.7	26.20	*	12.8	11.8	11.38	10.07
Bankfull Entrenchment Ratio	*	7.7	5.2	6.0	4.97	*	6.1	6.2	5.89	6.34
Bankfull Bankheight Ratio	*	1.0	1.0	1.0	1.0	*	1.0	1.0	1.0	1.0
Cross Sectional Area between end pins (ft^2)	99.9	72.3	104.8	74.6	103.1	96.3	97.5	100.0	101.00	98.5
d50 (mm)	15.0	0.04	0.07	0.06	0.04	0.4	0.04	14.0	0.03	0.03

* Data was not provided

Appendix D. Stream Survey Data
Table 11b. Monitoring Data - Stream Reach Data Summary, Main Channel Camp Branch (1810 linear feet)
Camp Branch Stream Restoration/EEP Project No. 370
Main Channel Camp Branch (1810 linear feet)

Parameter	Baseline						MY 1 2007						MY 2 2008					
DIMENSION	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n
Bankfull Width (ft)	18.10	-	20.4	22.80	-	-	18.10	21.45	21.90	23.90	2.53	4	20.03	22.52	23.15	23.76	1.72	4
Floodprone Width (ft)	91.30	-	95.2	99.90	-	-	85.20	93.40	94.25	99.90	6.54	4	89.26	97.32	99.19	101.65	5.60	4
Bankfull Mean Depth (ft)	1.30	-	1.4	1.40	-	-	1.30	1.63	1.60	2.00	0.33	4	1.19	1.56	1.53	1.98	0.42	4
Bankfull Max Depth (ft)	1.80	-	1.9	2.00	-	-	1.80	2.40	2.25	3.30	0.67	4	1.93	2.50	2.38	3.30	0.66	4
Bankfull Cross Sectional Area (ft2)	24.00	-	27.8	31.60	-	-	24.00	35.20	34.70	47.40	9.90	4	27.00	34.87	32.89	46.70	9.11	4
Width/Depth Ratio		-			-	-	11.60	13.38	12.80	16.30	2.13	4	10.77	15.40	15.51	19.80	4.72	4
Entrenchment Ratio	4.50	-	4.7	4.90	-	-	3.60	4.43	4.30	5.50	0.83	4	3.76	4.35	4.29	5.07	0.55	4
Bank Height Ratio		-			-	-	1.00	1.00	1.00	1.00	1.00	4	1.00	1.00	1.00	1.00	0.00	4
Bankfull Velocity (fps)		-			-	-	-	-	-	-	-	-	-	-	-	-	-	-
PROFILE																		
Riffle Length (ft)	10.20	-	23.40	43.30	-	-	-	-	-	-	-	-	9.48	-	21.39	39.32	-	3
Riffle Slope (ft/ft)	0	-	0.01	0.02	-	-	-	-	-	-	-	-	0.0019	-	0.0185	0.0327	-	3
Pool Length (ft)	11.60	-	23.00	37.00	-	-	-	-	-	-	-	-	19.35	-	46.59	72.39	-	3
Pool Max depth	-	-	-	-	-	-	-	-	-	-	-	-	2.20	2.80	2.83	3.51	0.33	24
Pool Spacing (ft)	44.80	-	86.50	173.40	-	-	-	-	-	-	-	-	45.68	-	75.65	117.05	-	3
PATTERN																		
Channel Beltwidth (ft)	45.00	-	62.00	80.00	-	-												
Radius of Curvature (ft)	40.00	-	51.10	76.00	-	-												
Meander Wavelength (ft)	102.00	-	137.80	171.00	-	-												
Meander Width Ratio	2.20	-	3.00	3.90	-	-												
ADDITIONAL REACH PARAMETERS																		
Rosgen Classification	C4						C4						C4					
Channel Thalweg length (ft)	1810						1810						1810					
Sinuosity (ft)	1.10						1.10						1.10					
Water Surface Slope (Channel) (ft/ft)	-						-						0.0039					
BF slope (ft/ft)	0.0034						0.0034						0.0036					
Ri%/Ru%/P%/G%/S%																		
SC%/Sa%/G%/C%/B%/Be%																		
d16 / d35 / d50 / d84 / d95																		
% of reach with eroding banks	-						-						-					
Channel Stability or Habitat Metric	-						-						-					
Biological or Other	-						-						-					

Parameter	MY 3 2009						MY 4 2010						MY 5 2011					
DIMENSION	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n
Bankfull Width (ft)	19.50	20.85	20.69	22.53	1.27	4	20.47	22.50	22.54	24.44	2.22	4	18.60	21.25	21.49	23.41	2.35	4
Floodprone Width (ft)	84.96	96.18	99.03	101.70	7.68	4	91.26	97.27	98.71	100.40	4.09	4	90.89	97.33	99.15	100.13	4.33	4
Bankfull Mean Depth (ft)	1.10	1.50	1.47	1.95	0.43	4	1.18	1.46	1.40	1.87	0.33	4	1.17	1.49	1.43	1.94	0.37	4
Bankfull Max Depth (ft)	1.76	2.47	2.39	3.32	0.74	4	1.88	2.44	2.26	3.36	0.65	4	1.78	2.41	2.25	3.36	0.69	4
Bankfull Cross Sectional Area (ft2)	21.48	31.44	30.19	43.91	10.48	4	24.28	32.89	30.80	45.66	9.22	4	21.74	31.96	30.29	45.51	10.08	4
Width/Depth Ratio	11.54	14.72	14.64	18.06	3.67	4	12.79	16.02	15.30	20.70	3.80	4	12.07	14.79	14.03	19.02	3.34	4
Entrenchment Ratio	4.33	4.58	4.52	4.97	0.30	4	3.73	4.36	4.43	4.86	0.56	4	3.95	4.63	4.60	5.38	0.65	4
Bank Height Ratio	1.00	1.00	1.00	1.00	0.00	4	1.00	1.00	1.00	1.00	0.00	4	1.00	1.00	1.00	1.00	0.00	4
Bankfull Velocity (fps)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PROFILE																		
Riffle Length (ft)	7.50	-	26.40	49.53	-	-	7.50	28.70	26.40	49.53	11.90	21	11.67	35.12	-	66.11	-	-
Riffle Slope (ft/ft)	0.0007	-	0.0069	0.0220	-	-	0.00067	0.009	0.0069	0.022	0.01	21	0.00047	0.00558	-	0.01679	-	-
Pool Length (ft)	18.57	-	45.00	117.03	-	-	18.57	51.27	45.00	117.03	24.59	19	21.39	77.56	-	198.34	-	-
Pool Max depth	1.96	2.91	2.91	3.7	0.41	24	2.12	2.73	2.77	3.42	0.32	23	2.08	2.64	2.49	3.47	0.41	21
Pool Spacing (ft)	34.29	-	76.38	138.42	-	-	34.29	81.85	76.37	138.42	31.04	18	36.95	115.56	-	266.40	-	-
PATTERN																		
Channel Beltwidth (ft)																		
Radius of Curvature (ft)																		
Meander Wavelength (ft)																		
Meander Width Ratio																		
ADDITIONAL REACH PARAMETERS																		
Rosgen Classification	C4						C4						C4					
Channel Thalweg length (ft)	1810						1810						1810					
Sinuosity (ft)	1.10						1.10						1.10					
Water Surface Slope (Channel) (ft/ft)	0.0039						0.0036						0.0038					
BF slope (ft/ft)	0.0039						0.0041						0.0041					
Ri%/Ru%/P%/G%/S%																		
SC%/Sa%/G%/C%/B%/Be%																		
d16 / d35 / d50 / d84 / d95																		
% of reach with eroding banks	-						-						-					
Channel Stability or Habitat Metric	-						-						-					
Biological or Other	-						-						-					

*Insufficient water in channel to estimate an approximate value

Appendix D. Stream Survey Data
Table 11b. Monitoring Data - Stream Reach Data Summary, Unnamed Tributary to Camp Branch (556 linear feet)
Camp Branch Stream Restoration/EEP Project No. 370
Unnamed Tributary to Camp Branch (556 linear feet)

Parameter	Baseline						MY 1 2007						MY 2 2008					
DIMENSION	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n
Bankfull Width (ft)	6.80	7.40	7.9	8	0.85	2	5.90	7.15	7.35	8.00	0.99	4	5.44	6.84	6.47	8.97	1.53	4
Floodprone Width (ft)	35.00	267.50	200	500	-	2	35.00	36.50	36.50	38.00	2.12	4	37.48	49.48	47.36	65.72	13.41	4
Bankfull Mean Depth (ft)	0.40	0.55	0.6	0.7	-	2	0.40	0.65	0.65	0.90	0.21	4	0.42	0.61	0.60	0.84	0.20	4
Bankfull Max Depth (ft)	0.60	0.80	0.8	1	-	2	0.60	1.03	1.05	1.40	0.33	4	0.65	1.09	1.18	1.35	0.31	4
Bankfull Cross Sectional Area (ft2)	3.00	4.40	4.4	5.8	-	2	3.00	4.55	4.65	5.90	1.52	4	2.16	4.28	4.31	6.33	2.04	4
Width/Depth Ratio	11.20	15.50	13.1	19.8	-	2	7.60	9.50	9.50	11.40	2.69	4	8.10	11.42	12.40	12.79	2.23	4
Entrenchment Ratio	4.40	33.85	25.3	63.3	-	2	-	-	-	-	-	-	6.10	7.41	6.94	9.66	1.68	4
Bank Height Ratio	1.00	1.00	1.00	1.00	-	2	1.00	1.00	1.00	1.00	1.00	4	1.00	1.00	1.00	1.00	0.00	4
Bankfull Velocity (fps)	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-
PROFILE																		
Riffle Length (ft)	-	-	-	-	-	2	-	-	-	-	-	-	5.16	-	27.10	9.46	-	-
Riffle Slope (ft/ft)	-	-	-	-	-	2	-	-	-	-	-	-	0.00602	-	0.10026	0.02148	-	-
Pool Length (ft)	-	-	-	-	-	2	-	-	-	-	-	-	11.18	-	29.25	21.08	-	-
Pool Max depth	-	-	-	-	-	2	-	-	-	-	-	-	1.05	1.71	1.87	2.23	0.42	10
Pool Spacing (ft)	-	-	-	-	-	2	-	-	-	-	-	-	7.84	-	72.26	36.13	-	-
PATTERN																		
Channel Beltwidth (ft)	32.00	-	37.00	42.00	-	2												
Radius of Curvature (ft)	14.00	-	18.00	30.00	-	2												
Meander Wavelength (ft)	59.00	-	60.60	62.00	-	2												
Meander Width Ratio	4.10	-	4.70	5.30	-	2												
ADDITIONAL REACH PARAMETERS																		
Rosgen Classification	C4/5						C4						C4					
Channel Thalweg length (ft)	556						556						556					
Sinuosity (ft)	1.20						1.20						1.20					
Water Surface Slope (Channel) (ft/ft)	-						-						0.0114					
BF slope (ft/ft)	0.01						0.01						0.0103					
Ri%/Ru%/P%/G%/S%																		
SC%/Sa%/G%/C%/B%/Be%																		
d16 / d35 / d50 / d84 / d95																		
% of reach with eroding banks	-						-						-					
Channel Stability or Habitat Metric	-						-						-					
Biological or Other	-						-						-					

Parameter	MY 3 2009						MY 4 2010						MY 5 2011					
DIMENSION	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n
Bankfull Width (ft)	5.63	6.77	6.61	8.22	1.22	4	6.03	6.65	6.36	7.83	0.82	4	5.74	6.80	6.26	8.95	1.47	4
Floodprone Width (ft)	36.55	48.93	46.64	65.91	14.06	4	35.50	48.91	47.21	65.71	13.95	4	32.55	47.66	46.05	66.00	15.87	4
Bankfull Mean Depth (ft)	0.37	0.60	0.58	0.86	0.21	4	0.48	0.63	0.62	0.81	0.15	4	0.25	0.52	0.58	0.69	0.19	4
Bankfull Max Depth (ft)	0.63	1.06	1.14	1.35	0.32	4	0.64	1.00	1.06	1.25	0.29	4	0.44	0.92	0.97	1.29	0.36	4
Bankfull Cross Sectional Area (ft2)	2.67	3.98	3.90	5.46	1.39	4	3.17	4.21	4.08	5.50	1.21	4	1.63	4.28	4.63	6.22	2.21	4
Width/Depth Ratio	6.55	12.64	12.13	19.76	5.43	4	7.58	10.97	11.29	13.71	2.53	4	10.07	16.73	15.32	26.20	7.05	4
Entrenchment Ratio	5.23	7.46	6.45	11.71	2.90	4	5.89	7.41	6.51	10.71	2.26	4	4.97	5.99	6.28	6.44	0.69	4
Bank Height Ratio	1.00	1.00	1.00	1.00	0.00	4	1.00	1.00	1.00	1.00	0.00	4	1.00	1.00	1.00	1.00	1.00	4
Bankfull Velocity (fps)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PROFILE																		
Riffle Length (ft)	6.42	-	17.97	11.13	-	-	6.42	11.66	11.13	17.97	3.32	16	5.11	16.15	15.33	27.82	7.45	11
Riffle Slope (ft/ft)	0.00432	-	0.0589	0.01931	-	-	0.00432	0.0241	0.01931	0.0589	0.02	16	0.0043	0.0191	0.0119	0.0648	0.02	11
Pool Length (ft)	15.41	-	34.24	24.39	-	-	15.41	23.26	24.39	34.24	6.08	11	7.95	16.46	12.49	43.15	11.22	9
Pool Max depth	1.10	1.74	1.70	1.92	0.14	17	1.20	1.61	1.53	2.00	0.25	16	1.06	1.29	1.29	1.68	0.21	9
Pool Spacing (ft)	19.26	-	81.74	32.10	-	-	19.26	40.34	32.10	81.74	19.60	11	28.96	46.22	45.99	73.25	12.63	10
PATTERN																		
Channel Beltwidth (ft)																		
Radius of Curvature (ft)																		
Meander Wavelength (ft)																		
Meander Width Ratio																		
ADDITIONAL REACH PARAMETERS																		
Rosgen Classification	C4						C4						C4					
Channel Thalweg length (ft)	556						556						556					
Sinuosity (ft)	1.20						1.20						1.20					
Water Surface Slope (Channel) (ft/ft)	0.0114						0.0111						0.0102					
BF slope (ft/ft)	0.0103						0.0110						0.0116					
Ri%/Ru%/P%/G%/S%																		
SC%/Sa%/G%/C%/B%/Be%																		
d16 / d35 / d50 / d84 / d95																		
% of reach with eroding banks	-						-						-					
Channel Stability or Habitat Metric	-						-						-					
Biological or Other	-						-						-					

APPENDIX E
HYDROLOGIC DATA

Tables 12 **Verification of Bankfull Events**

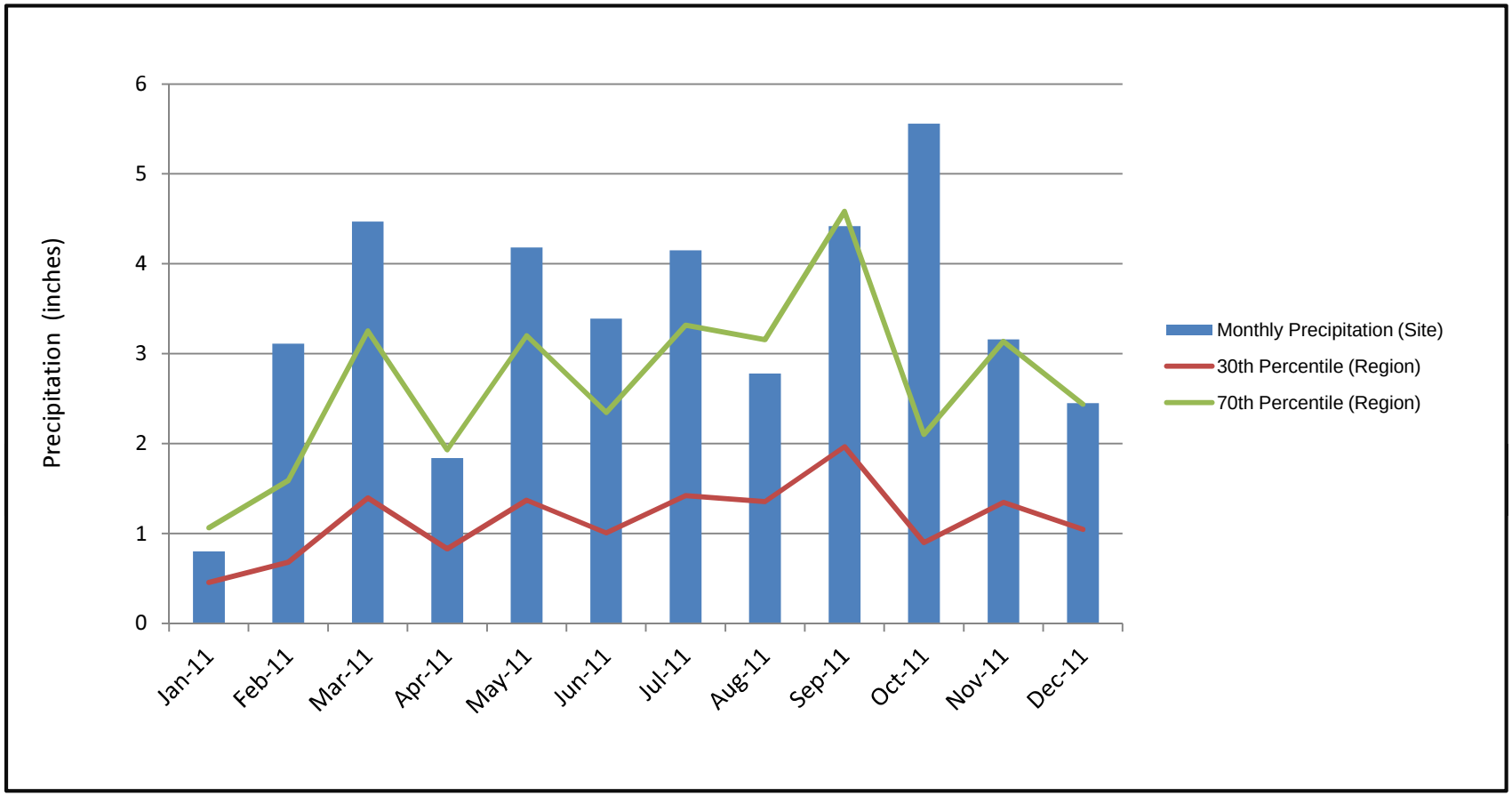
Figure 6 **Monthly Rainfall Data**

Appendix E. Hydrologic Data
Table 12. Verification of Bankfull Events
Camp Branch Stream Restoration/EEP Project No. 92350
Main Channel
Monitoring Year 5 of 5

Date of Collection	Date of Occurrence	Method	Photo # (if available)
Mar-12	Unknown	Crest Gauge (Main Channel and Tributary)	N/A
Jul-11	Unknown	Crest Gauge (Main Channel and Tributary)	N/A
Jun-11	Unknown	Crest Gauge (Main Channel and Tributary)	N/A
Apr-11	Unknown	Crest Gauge (Main Channel and Tributary)	N/A
Feb-11	2010	Visual	N/A
Jan-10	2009	Visual Assessment-wrack lines	N/A
Aug-08	Unknown	Crest Gauge (Main Channel and Tributary)	N/A
Dec-07	N/A*	Crest Gauge (Main Channel and Tributary)	N/A

*Note from previous monitoring report: No bankfull events were observed to have occurred during the Year-1 (2007) monitoring period.

Appendix E. Hydrologic Data
Figure 6: Monthly Rainfall Data
Camp Branch/EEP Project No.92350
Monitoring Year 5 of 5



*Regional rainfall data referenced from NC Cronos Database Divisonal Data for the Southern Piedmont of North Carolina - Data Period January 2011 through December 2011.
Monthly precipitation referenced from the USGS 351218080331345 CRN-29 rain gage Real-Time daily data, January 2011 through December 2011.