Camp Branch Stream Restoration
Project No. 92350
2009 Monitoring Report: Year 3 of 5

February 2010 (Revised April 2010)

Prepared for: NCDENR-EEP
1652 Mail Service Center
Raleigh, NC 27699-1652

Prepared by: Jordan, Jones & Goulding
9101 Southern Pine Blvd., Suite 160
Charlotte, NC 28273

Design Firm: EcoScience Corporation
1101 Haynes Street, Suite 101
Raleigh, NC 27604

Table of Contents

List of Appendices

SECTION 1
EXECUTIVE SUMMARY

SECTION 1

EXECUTIVE SUMMARY

The Camp Branch Stream Restoration Project (Site) is located in Anson County, North Carolina on property owned by Mr. John Bishop within the Piedmont Eco-Region of the Yadkin River Basin (USGS Subbasin HUC 03040105) (Appendix 1.1). 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 (NCDOT)-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 third 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 were dredged, straightened, and filled in to provide land for agricultural purposes. These activities are thought to have inhibited stream channel stability and water quality; therefore, producing an incised, eroded stream. Primary goals for the site were to restore stable dimension, pattern, and profile for impacted on-site stream reaches. Secondary Site restoration goals included stream channel enhancement and preservation. These goals were achieved via planting bare root seedlings to recreate pre-disturbance vegetative communities within their appropriate landscape contexts.

1. Priority II stream restoration (including all attendant benefits outlined in Rosgen 1996) via excavation of approximately 1,767 linear feet of a designed E/C-type stream of the main Camp Branch channel on new location, 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 linear feet and Priority II restoration of approximately 143 linear feet of a designed E/C-type stream of a 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 linear feet 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 2) and restoring approximately 403 lf (Restoration, Priority 1) and 143 lf (Restoration, Priority 2) of its tributary. Camp Branch (Reach 1) and its tributary (Reach 4) were designed as an E/C-type stream. Bankfull benches were created along Reach 1 and 4 to re-establish floodplain connection at the existing stream 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 vegetative communities within their appropriate landscape contexts. Appendix 2 provides more detailed project activity, history, contact information, and watershed/site background information for this project.

1.2 Vegetative Assessment

JJG conducted the 2009 (year 3 of 5) vegetative assessment and vegetative plot analysis in July 2009 per the 2006 CVS-EEP Level 2 protocol (Lee et al., 2006). The seven vegetative plots previously established in the design phase were selected randomly and represent the riparian buffer zone. Vegetative 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 and 260 stems/acre after the fifth and final year of project monitoring.

The survival rate for the woody vegetation monitored for 2009 is 97%. The monitoring data recorded an average of 38 planted live stems per plot. The site density is approximately 989 planted stems per acre, which exceeds the year 3 goal of 320 planted stems per acre. Although all plots met the vegetation success threshold with the exception of plot 1, the results from plot 1 did not affect the site's average survivability to be considered unsuccessful. Plot 1 is located in the preservation reach, which has an existing hardwood forest within the floodplain. The vigor of the live planted stems within the plots also appears to have been affected by wildlife activity and drought over the monitoring years. Planted stems that appeared dead or struggling in the 2008 growing season have either improved in vigor or have resprouted.

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 good. Per the success criterion for the 2009 monitoring year, the site has exceeded 320 stems per acre. Please refer to Appendix 3 for more detailed information on the 2009 vegetation data.

1.3 Stream Assessment

Results from the 2009 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.

Main Channel

Overall, the main channel is maintaining both lateral and vertical stability. The average bankfull width (20.9 ft) of the surveyed cross-sections falls within the proposed range of 16-22 ft. 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 the same for the surveyed reach, 0.0039 ft/ft. High sedimentation rates are evident at the lower end of the main channel, immediately upstream of the transition point from the restoration reach to the preservation reach. The shift in bankfull elevation and dimension from the restoration reach to the preservation reach could have resulted in high sediment deposition upstream of the convergence point. These areas will continue to be monitored closely for significant adjustments in the bed features and the channel thalweg.

Tributary

Based on current monitoring data and the visual inspection, the channel appears to be functioning properly and maintaining stability. No erosional failure was observed along this reach. The average bankfull width (6.8 ft) of the surveyed cross-sections is similar to the proposed width of 6.4 ft. 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, 0.0114 ft/ft and 0.0103 ft/ft, respectively.

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 2009 monitoring year, which was verified through visual indicators such as wrack lines.

1.5 Annual Monitoring Summary

In summary, the Site has met the stream and vegetation mitigation goals for monitoring year 3. The 2009 vegetation plot monitoring results indicate that the planted and naturally recruited vegetation is doing well at the site, although some minor vegetation problems were noted due to the severe drought experienced during the 2007 growing season. The pattern, profile, and dimension of the restored channel and the unnamed tributary appear to be maintaining vertical and lateral stability with minimal bank erosion. A few problem areas were observed, such as moderate bank erosion, moderate to poor streambank cover, loose matting, and aggradation. These areas of stream instability do not appear to have advanced from the previous monitoring years; however, these areas will continue to be monitored closely for shifts in the bed features and the channel thalweg.

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 1 - General Figures and Plan Views

Appendix 2 - General Project Tables

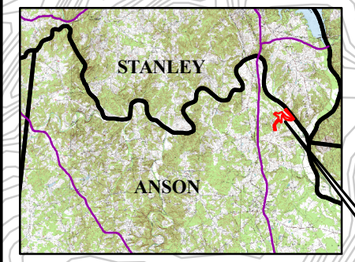
Appendix 3 - Vegetation Assessment Data

Appendix 4 – Stream Assessment Data

APPENDIX 1
GENERAL FIGURES AND PLAN VIEWS

Figure 1.1 - Vicinity Map

Figure 1.2 - Current Condition Plan View



Site Location

CARPENTER RD

ROCKY RIVER

Legend

- Stream Restoration (Priority 1)
- Stream Restoration (Priority 2)
- Stream Enhancement (Level 2)
- Stream Preservation
- Wetland Preservation
- Pond
- Project Area

400 200 0 400 Feet

Appendix 1. General Figures and Plan Views
Figure 1.1 Vicinity Map
Camp Branch Stream Restoration
Anson County, NC
Year 3 of 5

Project No. 92350
April 2010

END STREAM ENHANCEMENT LEVEL 2

BEGIN MAIN CHANNEL LONGITUDINAL PROFILE (STREAM RESTORATION P2)

END TRIBUTARY LONGITUDINAL PROFILE (END STREAM RESTORATION P2)

BEGIN STREAM ENHANCEMENT LEVEL 2

END STREAM PRESERVATION

BEGIN STREAM RESTORATION P2 END P1

BEGIN TRIBUTARY LONGITUDINAL PROFILE (BEGIN STREAM RESTORATION P1)

FIG 1 OF 4

FIG 2 OF 4

FIG 3 OF 4

FIG 4 OF 4

END MAIN CHANNEL LONGITUDINAL PROFILE (STREAM RESTORATION P2)

BEGIN STREAM PRESERVATION

CE

GRAPHIC SCALE

150 0 75 150 300 600

(IN FEET)

1 inch = 150 ft.

N

Ecosystem Enhancement PROGRAM

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

PROJECT NO. 92350
ANSON COUNTY
NORTH CAROLINA
MONITORING
YEAR 3 of 5

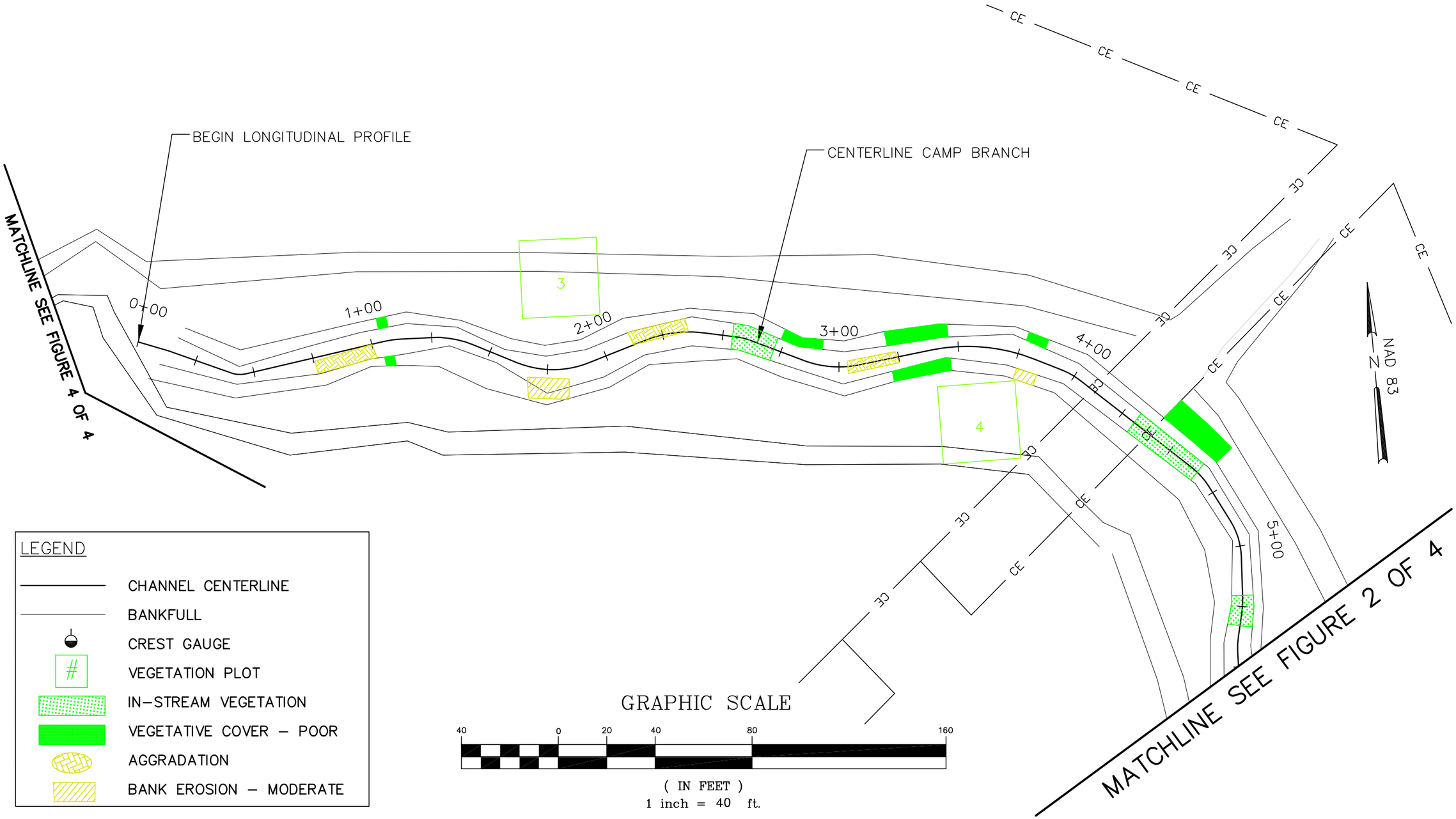
JJG

NC ECOSYSTEM ENHANCEMENT PROGRAM
CAMP BRANCH STREAM RESTORATION

FIGURE 1.2
CURRENT CONDITION PLAN VIEW

DATE : FEBRUARY 2010
SCALE : 1"=150'
JOB NO.: 03060005

FIGURE KEY



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

PROJECT NO. 92350
ANSON COUNTY
NORTH CAROLINA
MONITORING
YEAR 3 of 5

NC ECOSYSTEM ENHANCEMENT PROGRAM
CAMP BRANCH STREAM RESTORATION

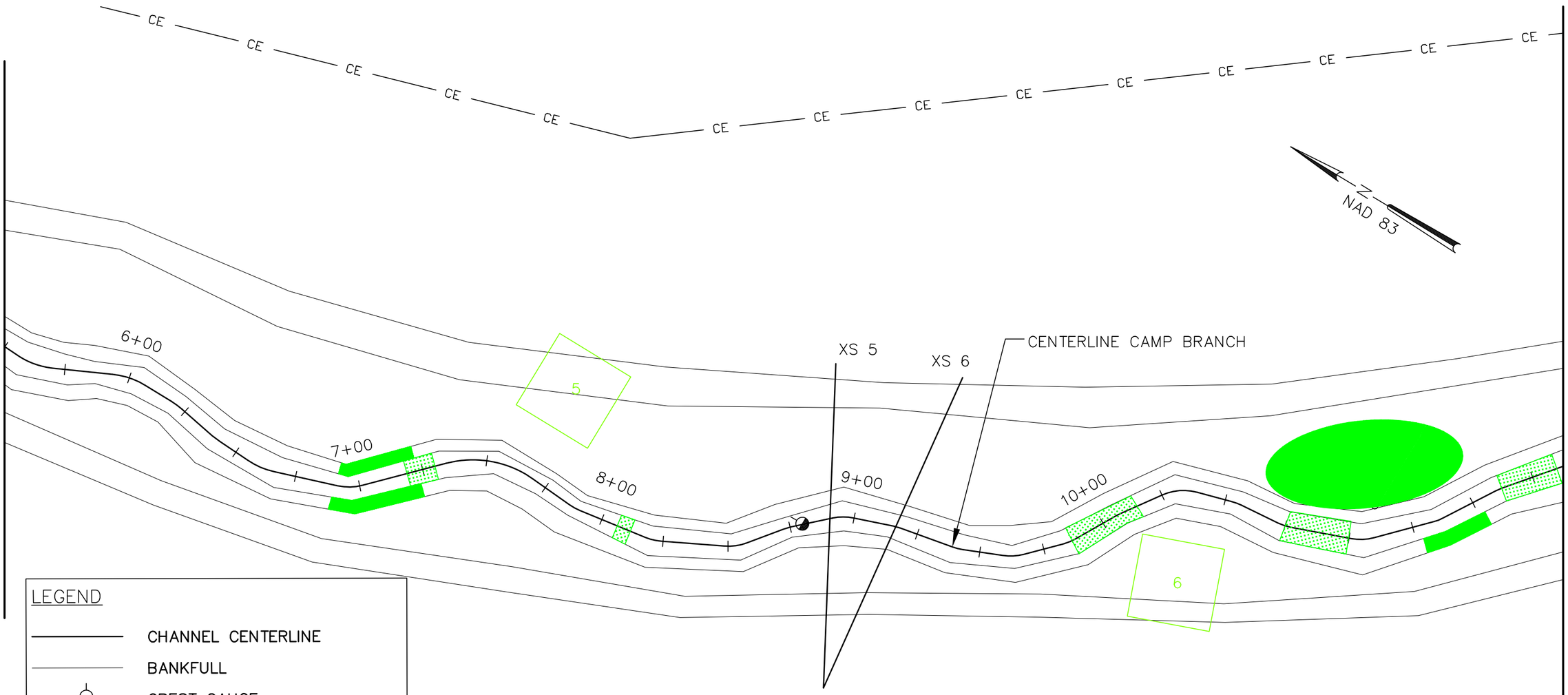
FIGURE 1.2
CURRENT CONDITION PLAN VIEW

DATE : FEBRUARY 2010
SCALE : 1"=40'
JOB NO.: 03060005

FIGURE 1 OF 4

MATCHLINE SEE FIGURE 1 OF 4

MATCHLINE SEE FIGURE 3 OF 4



LEGEND

- CHANNEL CENTERLINE
- BANKFULL
- CREST GAUGE
- # VEGETATION PLOT
- IN–STREAM VEGETATION
- VEGETATIVE COVER – POOR
- AGGRADATION
- BANK EROSION – MODERATE

GRAPHIC SCALE

40 0 20 40 80 160

(IN FEET)
1 inch = 40 ft.

Ecosystem Enhancement PROGRAM

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

PROJECT NO. 92350
ANSON COUNTY
NORTH CAROLINA
MONITORING
YEAR 3 of 5

JJG

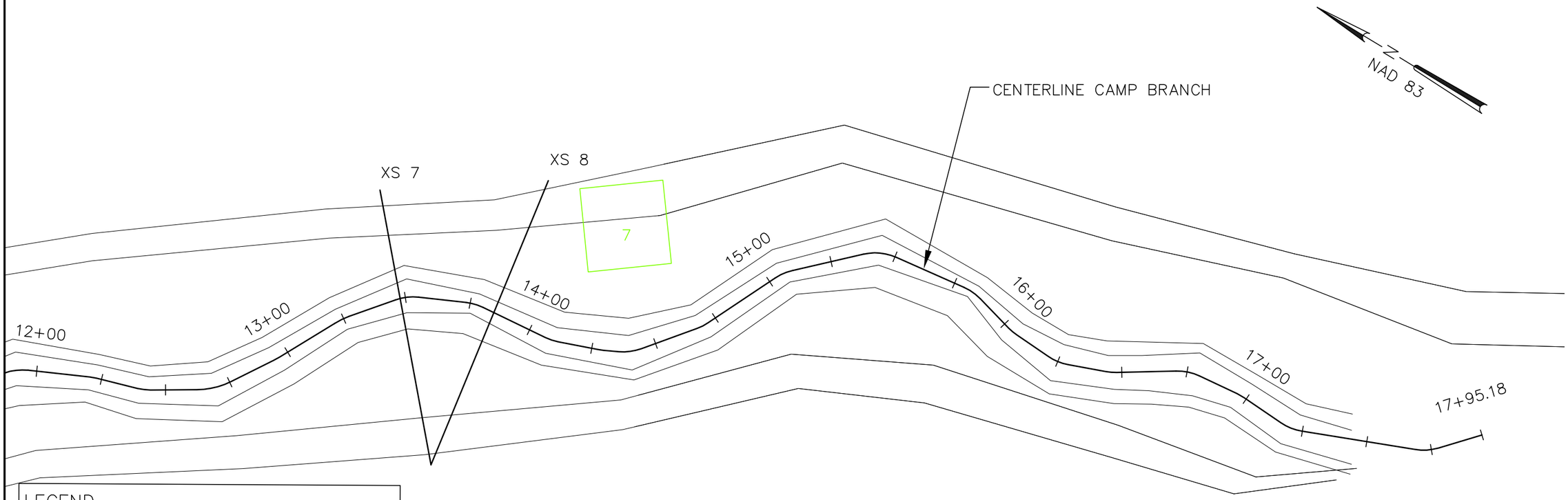
NC ECOSYSTEM ENHANCEMENT PROGRAM
CAMP BRANCH STREAM RESTORATION

FIGURE 1.2
CURRENT CONDITION PLAN VIEW

DATE : FEBRUARY 2010
SCALE : 1"=40'
JOB NO.: 03060005

FIGURE 2 OF 4

MATCHLINE SEE FIGURE 2 OF 4



LEGEND

- CHANNEL CENTERLINE
- BANKFULL
- CREST GAUGE
- # VEGETATION PLOT
- IN-STREAM VEGETATION
- VEGETATIVE COVER – POOR
- AGGRADATION
- BANK EROSION – MODERATE

GRAPHIC SCALE

40 0 20 40 80 160

(IN FEET)
1 inch = 40 ft.

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

PROJECT NO. 92350
ANSON COUNTY
NORTH CAROLINA
MONITORING
YEAR 3 of 5

NC ECOSYSTEM ENHANCEMENT PROGRAM
CAMP BRANCH STREAM RESTORATION

FIGURE 1.2
CURRENT CONDITION PLAN VIEW

DATE : FEBRUARY 2010
SCALE : 1"=40'
JOB NO.: 03060005

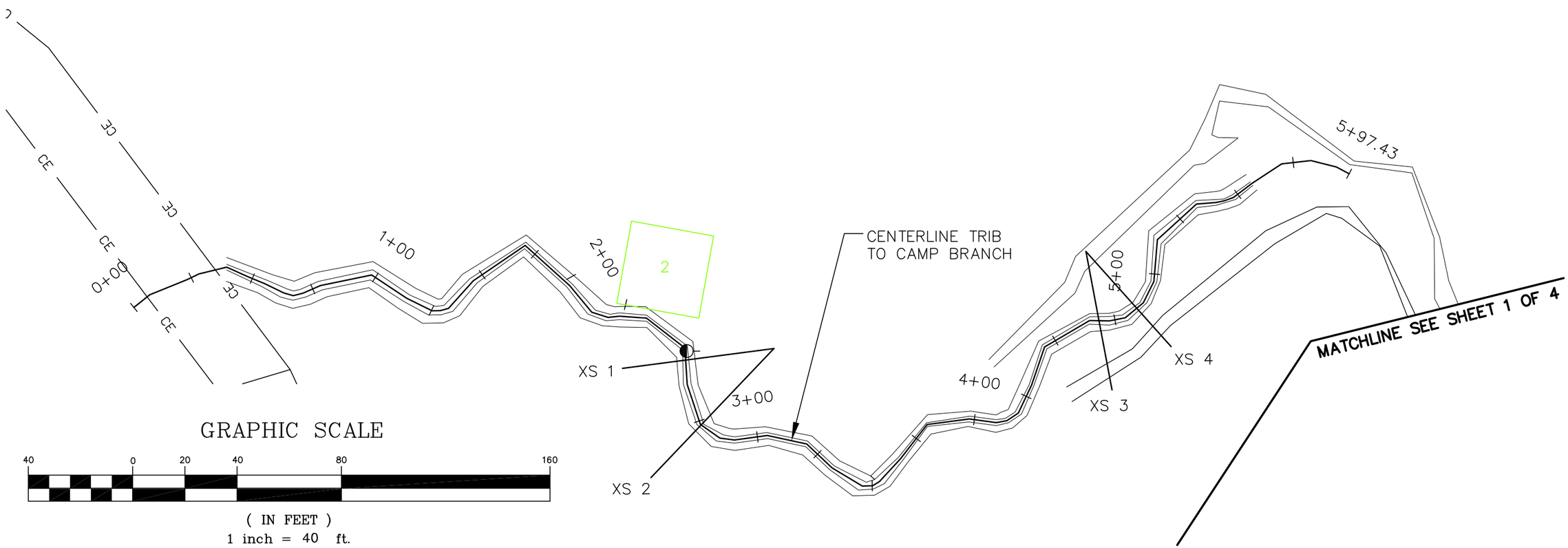
FIGURE 3 OF 4

LEGEND

- CHANNEL CENTERLINE
- BANKFULL
- CREST GAUGE
- # VEGETATION PLOT
- IN-STREAM VEGETATION
- VEGETATIVE COVER - POOR
- AGGRADATION
- BANK EROSION - MODERATE

N

NAD 83



GRAPHIC SCALE

40 0 20 40 80 160

(IN FEET)
1 inch = 40 ft.

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

PROJECT NO. 92350
ANSON COUNTY
NORTH CAROLINA
MONITORING
YEAR 3 of 5

NC ECOSYSTEM ENHANCEMENT PROGRAM
CAMP BRANCH STREAM RESTORATION

FIGURE 1.2
CURRENT CONDITION PLAN VIEW

DATE : FEBRUARY 2010
SCALE : 1"=40'
JOB NO.: 03060005

FIGURE 4 OF 4

APPENDIX 2
GENERAL PROJECT TABLES

Table 2.1 - Project Restoration Components

Table 2.2 - Project Activity and Reporting History

Table 2.3 - Project Contacts Table

Table 2.4 - Project Attribute Table

Table 2.1 Project Activity and Reporting History

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	TBD	TBD
Year 5 Monitoring	TBD	TBD

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

Table 2.2 Project Restoration Components

Segment/Reach	Mitigation Type	Approach	Linear Footage or Acres	Stationing (ft)	Comments
Reach 1-Camp Branch	R	P2	1,767 lf	0+00 – 17+94	Channel restoration, relocation. Total lf includes 27 lf gap in easement at channel ford.
Reach 2-Camp Branch	E2	N/A	945 lf	N/A*	Channel enhancement. Enhancement reaches not stationed.
Reach 3-UT Camp Branch	R	P1	403 lf	0+00 – 4+33	Channel restoration, relocation. Total lf does not include 30 lf gap in easement at channel ford.
Reach 4-UT Camp Branch	R	P2	143 lf	4+33 – 5+76	
Stream Preservation**	P	N/A	6,563 lf	N/A*	
Wetland Preservation	P	N/A	5.2 ac	N/A	

Component Summations						
		Wetland (ac)				
Restoration Level	Stream (lf)	Riparian	Non-Riparian	Upland (ac)	Buffer (ac)	BMP
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**

Table 2.3 Project Contacts Table

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 9101 Southern Pine Blvd., Suite 160 Charlotte, NC 28273
Stream Monitoring, POC	Kirsten Young, 704-527-4106 ext.246
Vegetation Monitoring, POC	

Table 2.4 Project Attribute Table

Project County	Anson County, North Carolina
Drainage Area	2.9 square miles
Impervious cover estimate (%)	<1 percent
Stream Orders (per USGS Topo Quad Map):	
Camp Branch/UT to Camp Branch	2nd/1st
Physiographic Region	Piedmont
EcoRegion (Griffith and Omernik)	Triassic Basins
Rosgen Classifications of As-built:	C4 E/C4
Camp Branch/UT to Camp Branch	
Cowardin Classification	Streams: R2UB12/R4SB23
Camp Branch/UT to Camp Branch	
Dominant soil types	Badin Channery Silt Loam (BaB, BaC) Badin-Goldston Complex (BgD) McQueen (MrB) Shellbluff (ShA) Tetotum (ToA) Chewacla (ChA)
Reference Site ID	N/A* (reference areas established on-Site)
USGS HUCs for Project and Reference	3040105
NCDWQ Sub-basins for Project and Reference	03-07-14
NCDWQ classification for Project and Reference	C
Any portion of any project segment 303d listed?	No
Any portion of any project segment upstream of a 303d listed segment?	No
Reasons for 303d listing or stressor	N/A
Percent of project easement fenced	No fencing along easement

*N/A – Not Applicable

APPENDIX 3
VEGETATION ASSESSMENT DATA

Table 3.1 - Vegetation Plot Mitigation Success Summary Table

Photos - Vegetation Monitoring Plot Photos

Table 3.2 - Vegetation Metadata Table

Table 3.3 - Planted and Total Stem Counts Table

Table 3.1 Vegetation Plot Mitigation Success Summary Table

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

Monitoring Plot 1 (7/2009)

Monitoring Plot 2 (7/2009)

Monitoring Plot 3 (7/2009)

Monitoring Plot 4 (7/2009)

Prepared For: Ecosystem Enhancement Program	Camp Branch Stream Restoration Year 3 of 5	Date: February 2010 Project No.: 92350
	Appendix 3. Vegetation Assessment Data **Vegetation Monitoring Plot Photos**	JJG

Monitoring Plot 5 (7/2009)

Monitoring Plot 6 (7/2009)

Monitoring Plot 7 (7/2009)

Prepared For:	Camp Branch Stream Restoration Year 3 of 5	Date: February 2010 Project No.: 92350
	Appendix 3. Vegetation Assessment Data **Vegetation Monitoring Plot Photos**	

Table 3.2 Vegetation Metadata

Report Prepared By	Kirsten Young
Date Prepared	7/29/2009 16:34
database name	cvs-eep-entrytool-v2.2.7.mdb
database location	P:\03\03060\005\M6-Field Monitoring Data\MY-2009\Vegetation\Bishop Site
DESCRIPTION OF WORKSHEETS IN THIS DOCUMENT----------	
Metadata	Description of database file, the report worksheets, and a summary of project(s) and project data.
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.
Stem Count 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	Camp Branch (Bishop Site)
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

Table 3.3 Planted and Total Stem counts (Species by Plot with Annual Means)

			Current Data (MY3-2009)														Annual Means					
			Plot 1		Plot 2		Plot 3		Plot 4		Plot 5		Plot 6		Plot 7		Current Mean		MY1 - 2007		MY2 - 2008	
Species	**Common Name**	**Type**	P	T	P	T	P	T	P	T	P	T	P	T	P	T	P	T	P	T	P	T
Acer negundo	boxelder	T															**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**20**
Asimina triloba	pawpaw	T	3	3					1	1							**2**	**4**	**2**	**2**	**2**	**2**
Betula nigra	river birch	T			8	8			10	10	10	10	10	10	7	7	**9**	**8**	**6**	**6**	**9**	**9**
Celtis laevigata	sugarberry	T	1	1	1	1	3	3					1	1	1	1	**1**	**2**	**2**	**2**	**2**	**2**
Cephalanthus occidentalis	common buttonbush	T			3	3			1	1	7	7	2	2	6	6	**4**	**5**	**4**	**4**	**4**	**4**
Cornus amomum	silky dogwood	T			5	5			12	12	9	9	8	8	10	10	**9**	**9**	**9**	**9**	**8**	**8**
Fraxinus pennsylvanica	green ash	T			1	1	3	3	3	3			2	2			**2**	**2**	**2**	**2**	**2**	**2**
Liquidambar styraciflua	sweet gum	T												1			**N/A**	**1**	**N/A**		**N/A**	
Nyssa biflora	swamp tupelo	T							1	1							**1**	**1**	**1**	**1**	**1**	**1**
Platanus occidentalis	American sycamore	T			2	2	2	2	1	1	1	1	1	2			**1**	**2**	**2**	**2**	**1**	**3**
Quercus michauxii	swamp chestnut oak	T			5	5	1	1			1	1			1	1	**2**	**2**	**2**	**2**	**2**	**2**
Quercus pagoda	cherrybark oak	T			3	3			2	2	1	1	1	1			**2**	**2**	**2**	**2**	**2**	**2**
Quercus phellos	willow oak	T			2	2	4	4			3	3	1	1	1	1	**2**	**2**	**2**	**2**	**3**	**3**
Ulmus americana	American elm	T					6	6	1	1			1	1	1	1	**2**	**3**	**3**	**3**	**3**	**3**
Plot Area (acres)			**0.0247**																			
Species Count			**2**	**2**	**9**	**9**	**6**	**6**	**9**	**9**	**7**	**7**	**9**	**10**	**7**	**7**	**12**	**13**	**7**	**7**	**7**	**7**
Stem Count			**4**	**4**	**30**	**30**	**19**	**19**	**32**	**32**	**32**	**32**	**27**	**29**	**27**	**27**	**38**	**42**	**27**	**27**	**25**	**30**
Stems per Acre			**162**	**162**	**1215**	**1215**	**769**	**769**	**1296**	**1296**	**1296**	**1296**	**1093**	**1174**	**1093**	**1093**	**989**	**1001**	**1087**	**1087**	**995**	**1215**

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

APPENDIX 4
STREAM ASSESSMENT DATA

Photos - Stream Station Photos

Table 4.1 - Visual Morphological Stability Assessment

Table 4.2 - Verification of Bankfull Events

Figure 4.1 - Cross-Sections with Annual Overlays

Figure 4.2 - Longitudinal Profiles with Annual Overlays

Figure 4.3 - Pebble Count Plots with Annual Overlays

Cross-Section 1-View Upstream
Tributary (1/2010)

Cross-Section 1-View Downstream
Tributary (1/2010)

Cross-Section 2-View Upstream
Tributary (1/2010)

Cross-Section 2-View Downstream
Tributary (1/2010)

Prepared For: Ecosystem Enhancement Program	Camp Branch Stream Restoration Year 3 of 5	Date: February 2010 Project No.: 92350
	Appendix 4. Stream Assessment Data **Stream Cross-Section Photos**	JJG

Cross-Section 3-View Upstream
Tributary (1/2010)

Cross-Section 3-View Downstream
Tributary(1/2010)

Cross-Section 4-View Upstream
Tributary (1/2010)

Cross-Section 4-View Downstream
Tributary (1/2010)

Prepared For:	Camp Branch Stream Restoration Year 3 of 5	Date: February 2010 Project No.: 92350
	Appendix 4. Stream Assessment Data **Stream Cross-Section Photos**	

Cross-Section 5-View Upstream
Main Channel (1/2010)

Cross-Section 5-View Downstream
Main Channel (1/2010)

Cross-Section 6-View Upstream
Main Channel (1/2010)

Cross-Section 6-View Downstream
Main Channel (1/2010)

Prepared For:	Camp Branch Stream Restoration Year 3 of 5	Date: February 2010 Project No.: 92350
	Appendix 4. Stream Assessment Data **Stream Cross-Section Photos**	

Cross-Section 7-View Upstream
Main Channel (1/2010)

Cross-Section 7-View Downstream
Main Channel (1/2010)

Cross-Section 8-View Upstream
Main Channel (1/2010)

Cross-Section 8-View Downstream
Main Channel (1/2010)

Prepared For: Ecosystem Enhancement Program	Camp Branch Stream Restoration Year 3 of 5	Date: February 2010 Project No.: 92350
	Appendix 4. Stream Assessment Data **Stream Cross-Section Photos**	JJG

Table 4.1a. Visual Morphological Stability Assessment
Main Channel-1767 linear feet

Feature Category		(# Stable) Number Performing as Intended	Total Number assessed per as-built survey	Total Number/ feet in unstable state	% Perform in Stable Condition	Feature Perform Mean or Total
A. Riffles	1. Present?	21	24	N/A	88%	**90%**
	2. Armor Stable?	21			100%	
	3. Facet grade appears stable?	18			88%	
	4. Minimal evidence of embedding/fining?	21			88%	
	5. Length appropriate?	21			88%	
B. Pools	1. Present?	19	24	N/A	79%	**79%**
	2. Sufficiently deep?	19			79%	
	3. Length Appropriate?	19			79%	
C. Thalweg	1. Upstream of meander bend centering?	N/A			100%	**100%**
	2. Downstream of meander centering?				100%	
D. Meanders	1. Outer bend in state of limited/controlled erosion?	N/A			100%	**100%**
	2. Of those eroding, # w/concomitant point bar formation?				100%	
	3. Apparent Rc within spec?				100%	
	4. Sufficient floodplain access and relief?				100%	
E. Bed General	1. General channel bed aggradation areas (bar formation)?	N/A		0	100%	**100%**
	2. Channel bed degradation - areas of increasing down-cutting or head cutting?			0	100%	
F. Bank	1. Actively eroding, wasting, or slumping bank	N/A		0	100%	**100%**
G. Vanes	1. Free of back or arm scour?	N/A				
	2. Height appropriate?					
	3. Angle and geometry appear appropriate?					
	4. Free of piping or other structural failures?					
H. Wads/ Boulders	1. Free of scour?	N/A				
	2. Footing stable?					

Table 4.1b. Visual Morphological Stability Assessment
Tributary-546 linear feet

Feature Category		(# Stable) Number Performing as Intended	Total Number assessed per as-built survey	Total Number/ feet in unstable state	% Perform in Stable Condition	Feature Perform Mean or Total
A. Riffles	1. Present?	16	16	N/A	100%	**100%**
	2. Armor Stable?	16			100%	
	3. Facet grade appears stable?	16			100%	
	4. Minimal evidence of embedding/fining?	16			100%	
	5. Length appropriate?	16			100%	
B. Pools	1. Present?	17	17	N/A	100%	**100%**
	2. Sufficiently deep?	17			100%	
	3. Length Appropriate?	17			100%	
C. Thalweg	1. Upstream of meander bend centering?	N/A			100%	**100%**
	2. Downstream of meander centering?				100%	
D. Meanders	1. Outer bend in state of limited/controlled erosion?	N/A			100%	**100%**
	2. Of those eroding, # w/concomitant point bar formation?				100%	
	3. Apparent Rc within spec?				100%	
	4. Sufficient floodplain access and relief?				100%	
E. Bed General	1. General channel bed aggradation areas (bar formation)?	N/A		0	100%	**100%**
	2. Channel bed degradation - areas of increasing down-cutting			0	100%	
F. Bank	1. Actively eroding, wasting, or slumping bank	N/A		0	100%	**100%**
G. Vanes	1. Free of back or arm scour?	N/A				
	2. Height appropriate?					
	3. Angle and geometry appear appropriate?					
	4. Free of piping or other structural failures?					
H. Wads/ Boulders	1. Free of scour?	N/A				
	2. Footing stable?					

Table 4.2 - Verification of Bankfull Events

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

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

Figure 4.1a. Cross-Sections with Annual Overlays

Project Name: Camp Branch Tributary		
Cross-Section: 1		
Feature: Riffle		
1/2010		
Station	**Elevation**	**Notes**
0	97.49	x1-lpt
6.95	97.64	x1
11.37	97.3	x1
14.56	97.81	x1
19.81	97.81	x1
23.67	98.06	x1
25.58	97.64	x1
26.71	96.93	x1)ew
26.79	96.77	x1
28.07	96.74	x1
28.95	96.65	x1
30.07	96.62	x1
30.02	96.89	x1-rew
30.34	97.41	x1
32.75	97.87	x1
37.03	97.95	x1
48.15	98.04	x1
54.79	98.31	x1-rpt
55.02	98.29	x1-rpg

Summary Data	
Bankfull Cross-sectional Area (ft^2)	5.46
Bankfull Width (ft)	8.22
Bankfull Mean Depth (ft)	0.66
Bankfull Max Depth (ft)	1.25
Width/Depth Ratio	12.45
Entrenchment Ratio	6.7

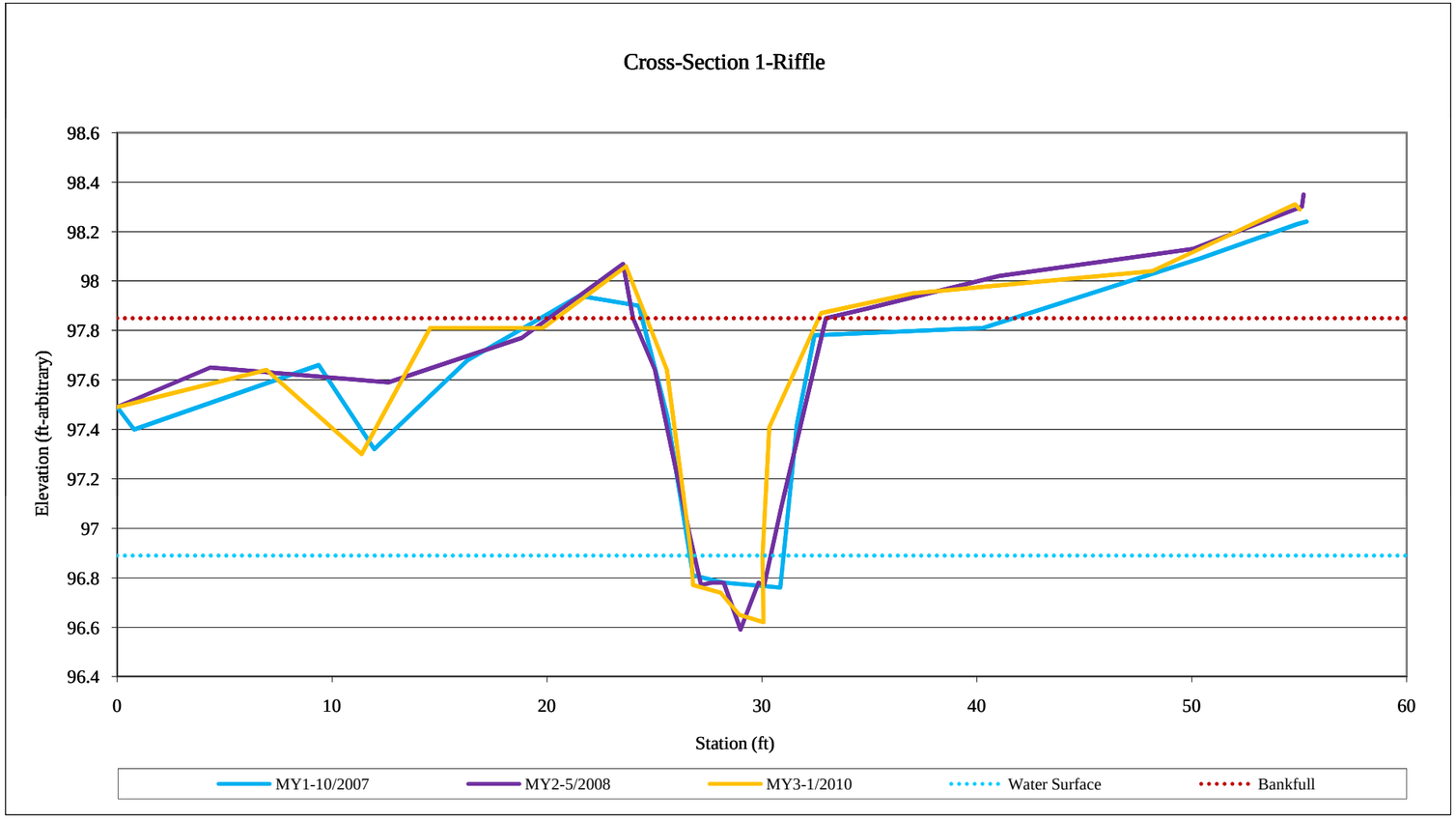


Figure 4.1b. Cross-Sections with Annual Overlays

Project Name: Camp Branch Tributary		
Cross-Section: 2		
Feature: Pool		
1/2010		
Station	**Elevation**	**Notes**
0	97.49	x2-lpt
0.11	97.43	x2
12.71	97.42	x2
14.1	97.03	x2
16.63	96.97	x2
18.89	97.12	x2
20.02	97.56	x2
26.93	97.67	x2
32.14	97.86	x2
33.23	97.57	x2
34.3	97.11	x2
35.06	96.56	x2-lew
35.67	96.37	x2
36.63	96.22	x2
36.98	96.31	x
37.84	96.54	x2-rew
38.61	96.94	x2
38.89	97.65	x2
40.72	97.88	x2
47.98	97.8	x2
59.54	97.63	x2-rpg
65.6	97.5	x2-rpt
65.91	97.48	x2-rpg

Summary Data	
Bankfull Cross-sectional Area (ft^2)	4.86
Bankfull Width (ft)	5.63
Bankfull Mean Depth (ft)	0.86
Bankfull Max Depth (ft)	1.35
Width/Depth Ratio	6.55
Entrenchment Ratio	11.71

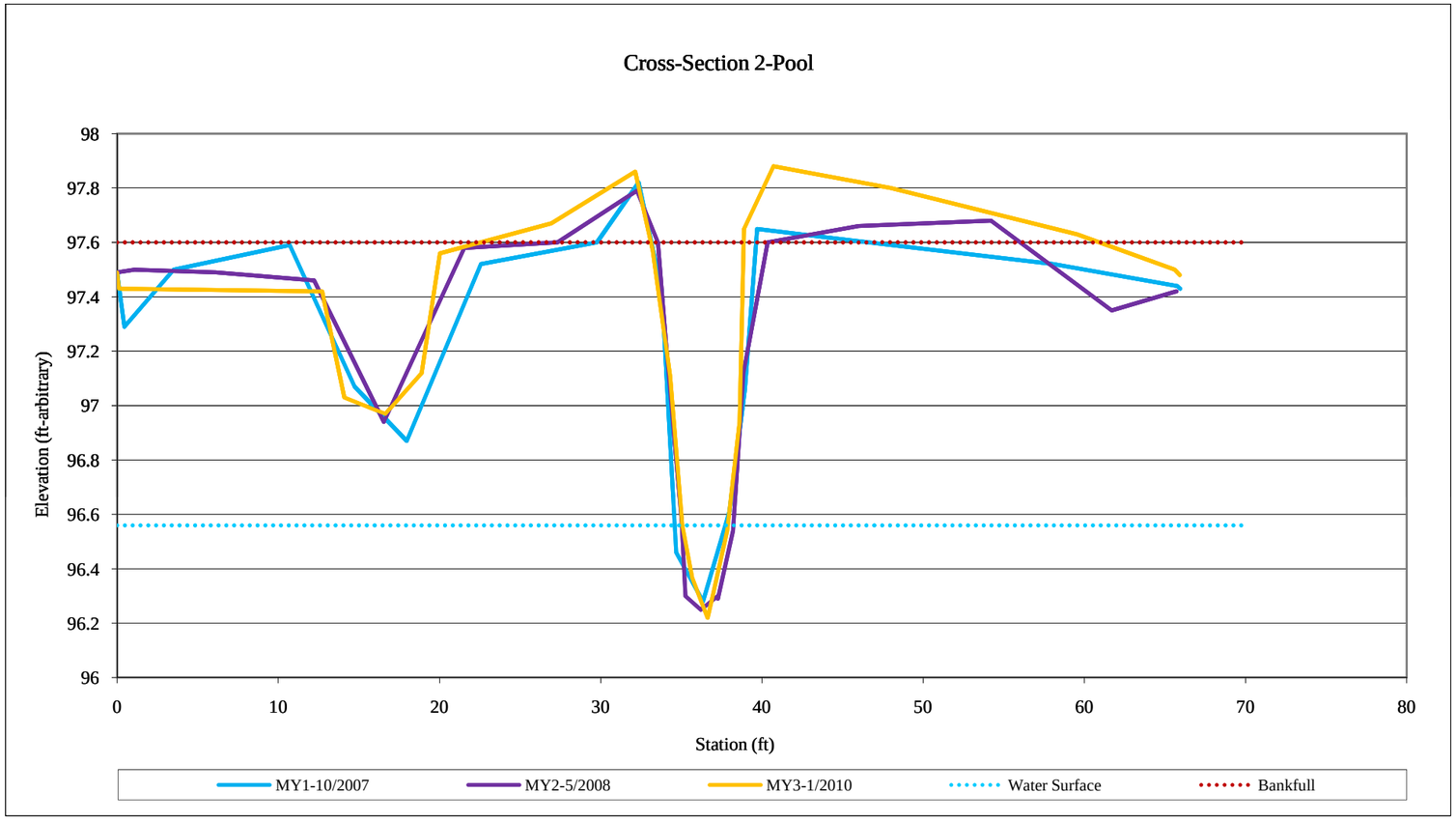


Figure 4.1c. Cross-Sections with Annual Overlays

Project Name: Camp Branch Tributary		
Cross-Section: 3		
Feature: Riffle		
1/2010		
Station	**Elevation**	**Notes**
-3.58	97.36	x3-lpt
-3.36	97.32	x3-lpg
-1.98	97.13	x3
0.66	95.93	x3
4.92	94.89	x3
11.52	94.8	x3
16.09	94.69	x3
20.24	94.43	x3-lew
20.53	94.33	x3
20.9	94.17	x3
22.24	94.23	x3
22.42	94.23	x3
23.73	94.42	x3-rew
25.03	94.59	x3
26.16	95.24	x3
27.6	95	x3
30.7	94.99	x3
36.92	95.12	x3
40.48	95.31	x3
45.87	96.69	x3
47.59	96.64	x3-rpg
47.72	96.69	x3-rpt

Summary Data	
Bankfull Cross-sectional Area (ft^2)	2.67
Bankfull Width (ft)	7.31
Bankfull Mean Depth (ft)	0.37
Bankfull Max Depth (ft)	0.63
Width/Depth Ratio	19.76
Entrenchment Ratio	5.23

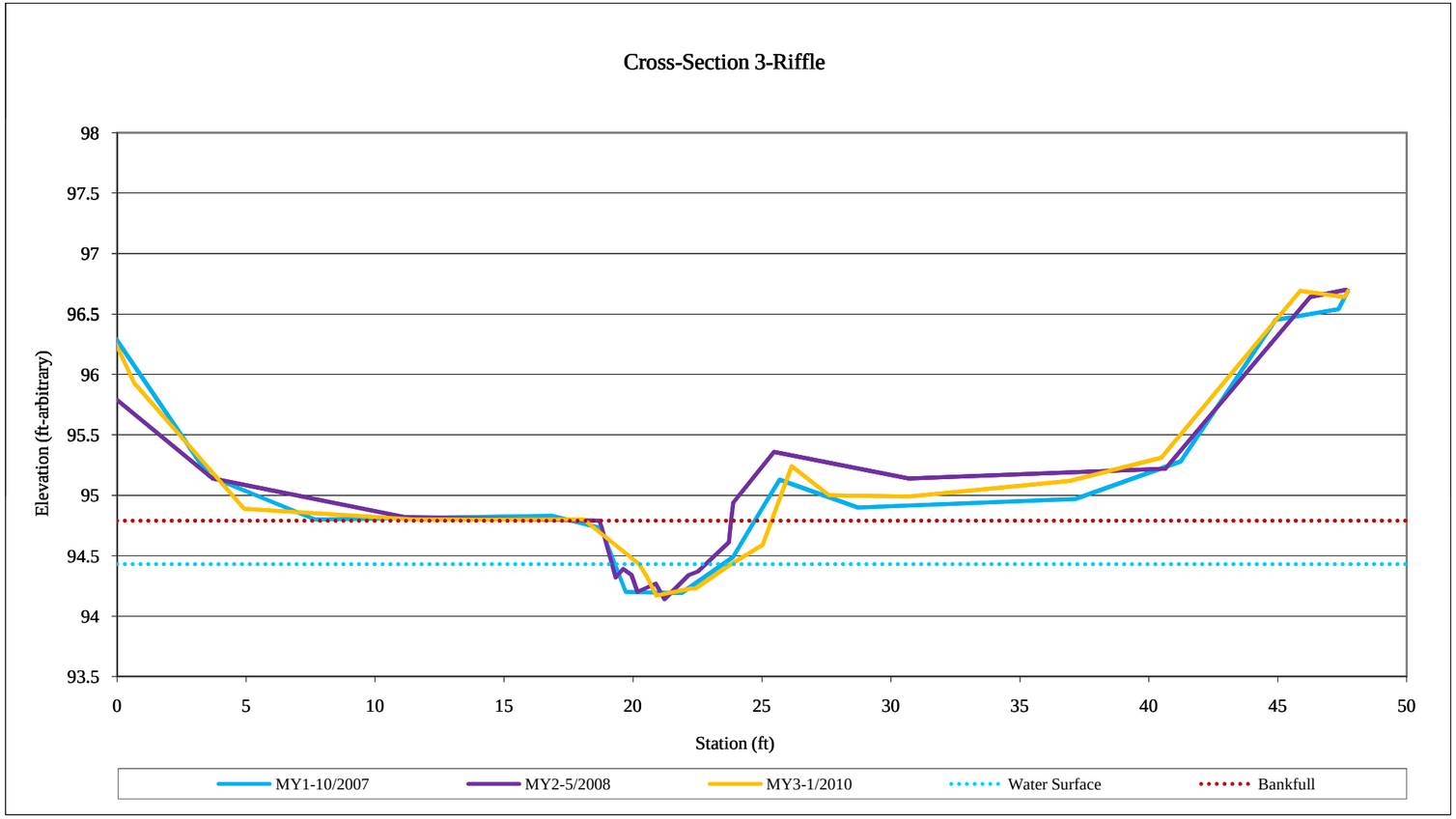


Figure 4.1d. Cross-Sections with Annual Overlays

Project Name: Camp Branch Tributary		
Cross-Section: 4		
Feature: Pool		
1/2010		
Station	**Elevation**	**Notes**
0	97.32	x4-lpt
0.52	97.28	x4
1.93	97.06	x3
4.32	95.86	x3
4.68	95.7	x4
6.7	94.79	x4
16.64	94.68	x4
23.76	94.51	x4
25.97	94.76	x4
27.81	94.36	x4
28.14	94.16	x4-lew
28.84	93.9	x4
29.6	93.74	x4
30.1	93.87	x4
30.18	94	x4
30.9	94.12	x4-rew
30.83	94.52	x4
32.17	94.85	x4
35.51	94.98	x4
40.19	95.33	x4
43.63	97.12	x4
46.62	97.03	x4-rpt

Summary Data	
Bankfull Cross-sectional Area (ft^2)	2.94
Bankfull Width (ft)	5.90
Bankfull Mean Depth (ft)	0.50
Bankfull Max Depth (ft)	1.02
Width/Depth Ratio	11.80
Entrenchment Ratio	6.19

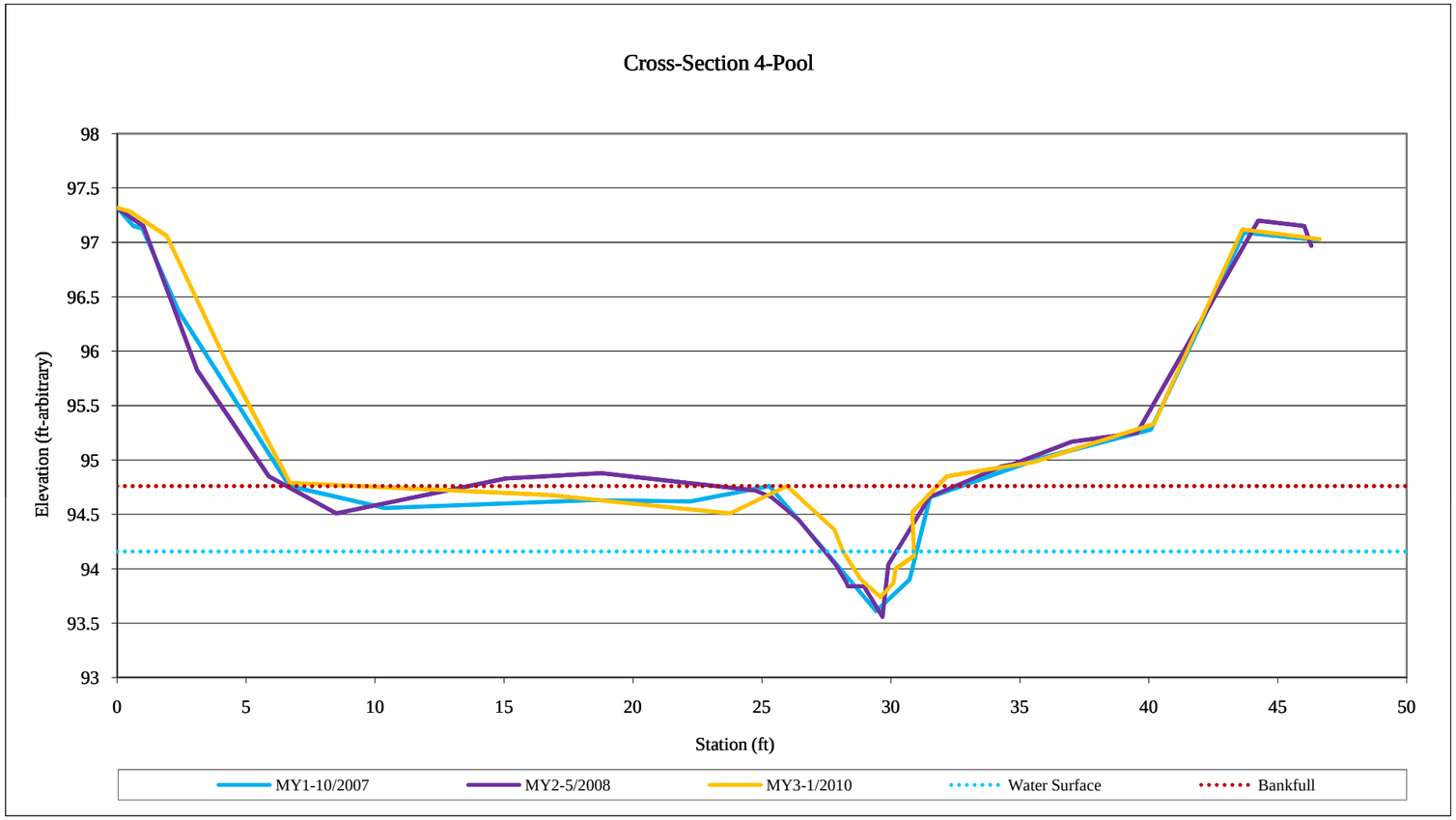


Figure 4.1e. Cross-Sections with Annual Overlays

Project Name: Camp Branch-Main Channel					
Cross-Section: 5					
Feature: Riffle					
1/2010					
Station	**Elevation**	**Notes**	**Station**	**Elevation**	**Notes**
2.88	97.95	x5-lpt	62.48	93.09	x5
3.4	97.9	x5-lpg	64.02	93.32	x5
4.68	97.92	x5	65.73	93.88	x5
7.36	97.27	x5	68.24	94.16	x5
13.11	95.46	x5	73.65	94.36	x5
18.12	95.03	x5	78.54	94.14	x5
22.09	94.81	x5	84.17	94.28	x5
25.6	94.71	x5	92.35	95.28	x5
32.85	94.73	x5	104.87	95.96	x5
44.12	94.36	x5	114.32	97.29	x5
45.42	94.17	x5	123.56	98.21	x5-rpg
46.53	93.64	x5	123.89	98.2	x5-rpt
48.45	93.13	x5			
49.04	92.68	x5-lew			
50.16	91.73	x5			
52.51	91.28	x5			
53.92	91.36	x5			
54.25	91.25	x5			
58.3	91.08	x5			
59.68	91.17	x5			
61.55	91.74	x5			
61.65	92.68	x5-rew			

Summary Data	
Bankfull Cross-sectional Area (ft^2)	36.18
Bankfull Width (ft)	20.43
Bankfull Mean Depth (ft)	1.77
Bankfull Max Depth (ft)	2.84
Width/Depth Ratio	11.54
Entrenchment Ratio	4.97

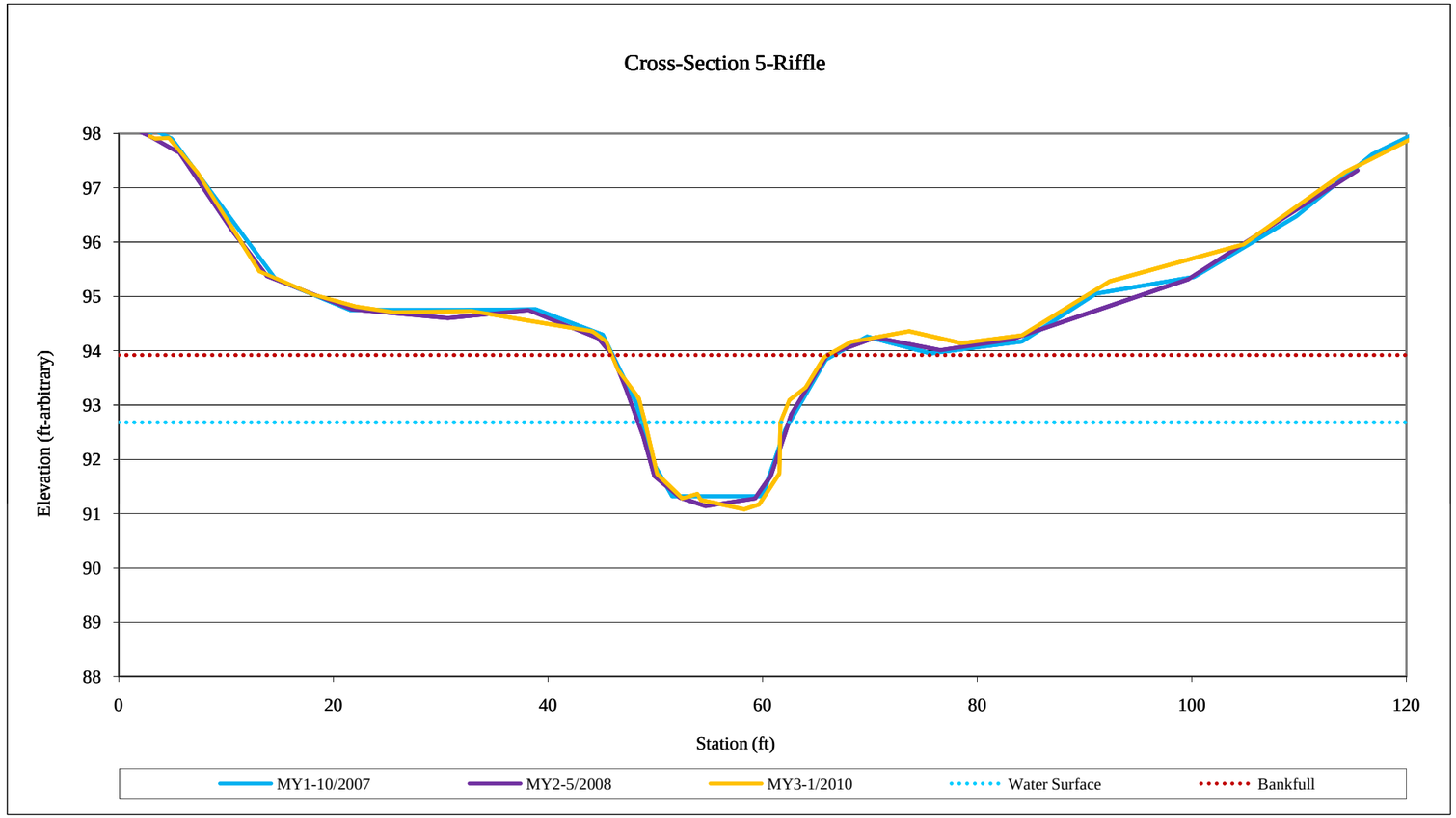


Figure 4.1f. Cross-Sections with Annual Overlays

Project Name: Camp Branch-Main Channel					
Cross-Section: 6					
Feature: Pool					
1/2010					
Station	**Elevation**	**Notes**	**Station**	**Elevation**	**Notes**
0	97.78	x6-lpt	71.59	93.77	x6
0.16	97.75	x6-lpg	73.82	94.2	x6
3.32	97.66	x6	84.86	94.15	x6
11.57	95.36	x6	90.78	94.45	x6
11.75	95.35	x6	95.5	95.35	x6
15.71	95.31	x6	112.33	96.4	x6
20.79	94.64	x6	130.4	98.18	x6-rpg
34.24	94.51	x6			
45.68	94.49	x6			
54.69	94	x6			
56.65	93.42	x6			
57.41	92.59	x6-lew			
58.69	92.18	x6			
60.26	92.24	x6			
62.2	92.39	x6			
63.32	92.45	x6			
64.89	92.5	x6			
65.96	92.59	x6			
66.67	92.5	x6			
68.56	92.35	x6			
68.77	92.65	x6-rew			
69.71	93.04	x6			

Summary Data	
Bankfull Cross-sectional Area (ft^2)	24.20
Bankfull Width (ft)	20.95
Bankfull Mean Depth (ft)	1.16
Bankfull Max Depth (ft)	1.94
Width/Depth Ratio	18.06
Entrenchment Ratio	4.67

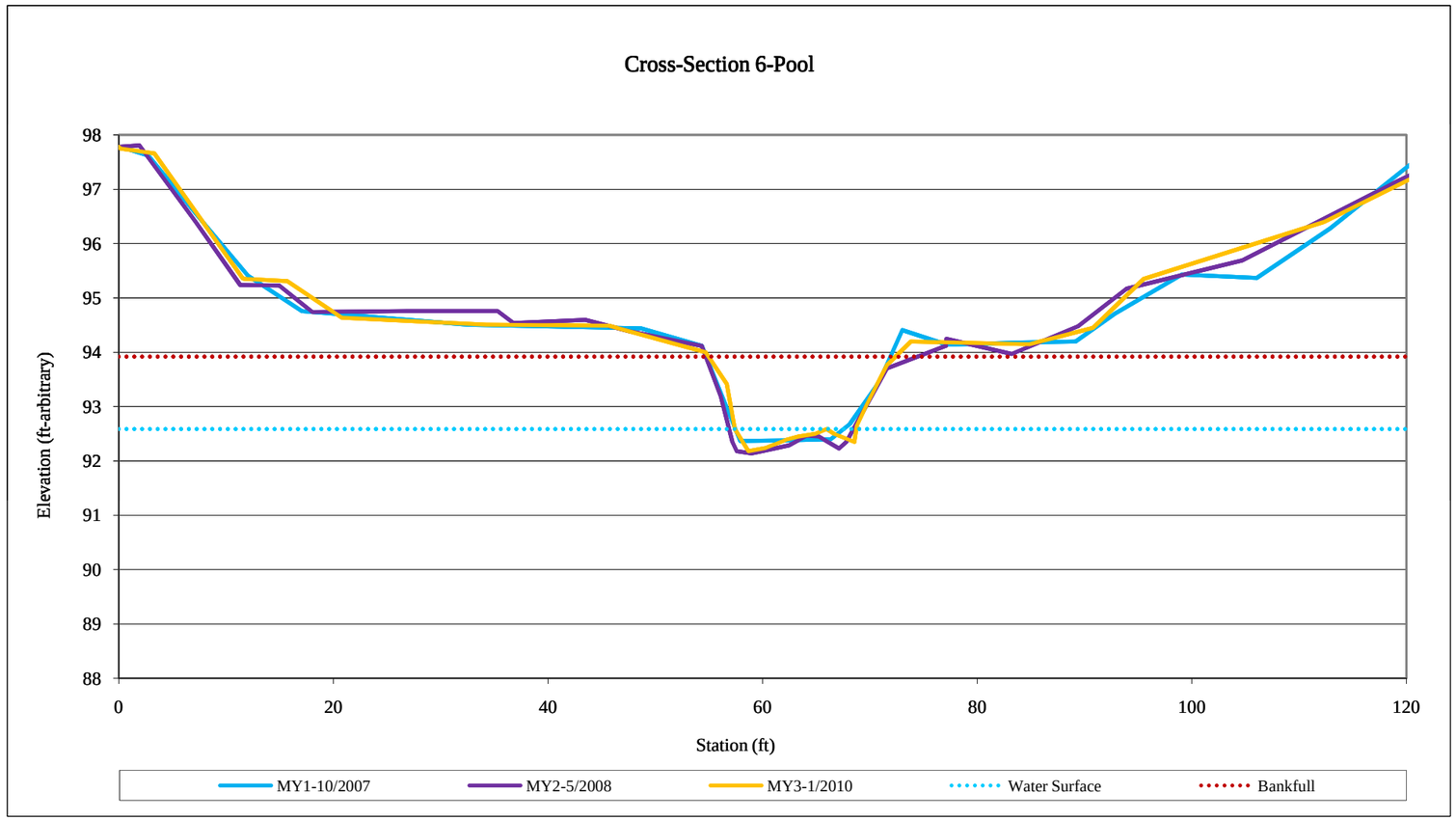


Figure 4.1g. Cross-Sections with Annual Overlays

Project Name: Camp Branch Main Channel		
Cross-Section: 7		
Feature: Riffle		
9/2010		
Station	**Elevation**	**Notes**
4.16	96.29	x7-lp
4.39	96.37	x7-lpt
6.45	96.27	x7
12.02	93.89	x7
18.95	93.24	x7
26.64	93.19	x7
29.23	91.89	x7
30.51	90.96	x7
32.04	89.9	x7
33.42	89.71	x7
35.38	89.54	x7
38.2	90.01	x7
40.34	90.45	x7
42.53	90.63	x7
44.48	91.01	x7-rew
44.68	91.24	x7
46.7	92.28	x7
50.15	92.94	x7
57.75	93.01	x7
73.99	92.63	x7
81.63	93.1	x7
87.28	93.19	x7
95.81	95.22	x7
104.22	96.1	x7-rpt

Summary Data	
Bankfull Cross-sectional Area (ft^2)	43.91
Bankfull Width (ft)	22.53
Bankfull Mean Depth (ft)	1.95
Bankfull Max Depth (ft)	3.32
Width/Depth Ratio	11.55
Entrenchment Ratio	4.33

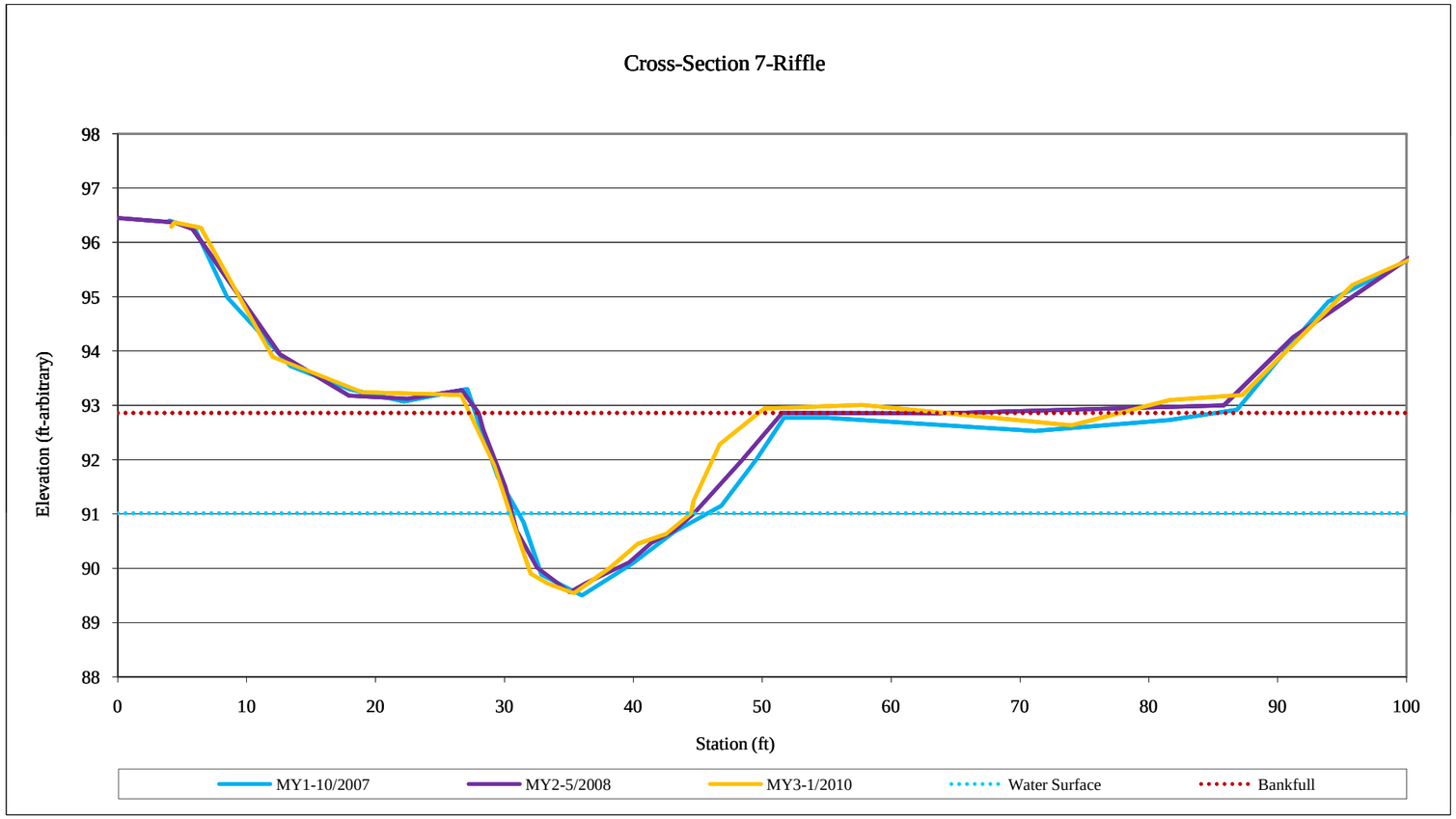


Figure 4.1h. Cross-Sections with Annual Overlays

Project Name: Camp Branch Main Channel		
Cross-Section: 8		
Feature: Pool		
9/2010		
Station	**Elevation**	**Notes**
0	96.77	x8-lpt
4.65	96.61	x8
15.14	93.95	x8
22.89	93.27	x8
33.23	92.91	x8
41.02	93.1	x8
45.26	92.92	x8
47.1	92.56	x8
49.49	91.71	x8
51.09	91.46	x8
51.47	91.09	x8-lew
52.69	90.88	x8
53.67	90.85	x8
56.07	90.72	x8
57.59	90.92	x8
59.06	91.14	x8-rew
61.01	91.25	x8
64.59	91.82	x8
67.25	92.59	x8
76.03	92.96	x8
83.42	92.7	x8
93	93.05	x8
96.08	93.43	x8
102.98	95.37	x8
112.48	96.23	x8
114.98	96.37	x8-rpt

Summary Data	
Bankfull Cross-sectional Area (ft^2)	21.48
Bankfull Width (ft)	19.50
Bankfull Mean Depth (ft)	1.10
Bankfull Max Depth (ft)	1.76
Width/Depth Ratio	17.73
Entrenchment Ratio	4.36

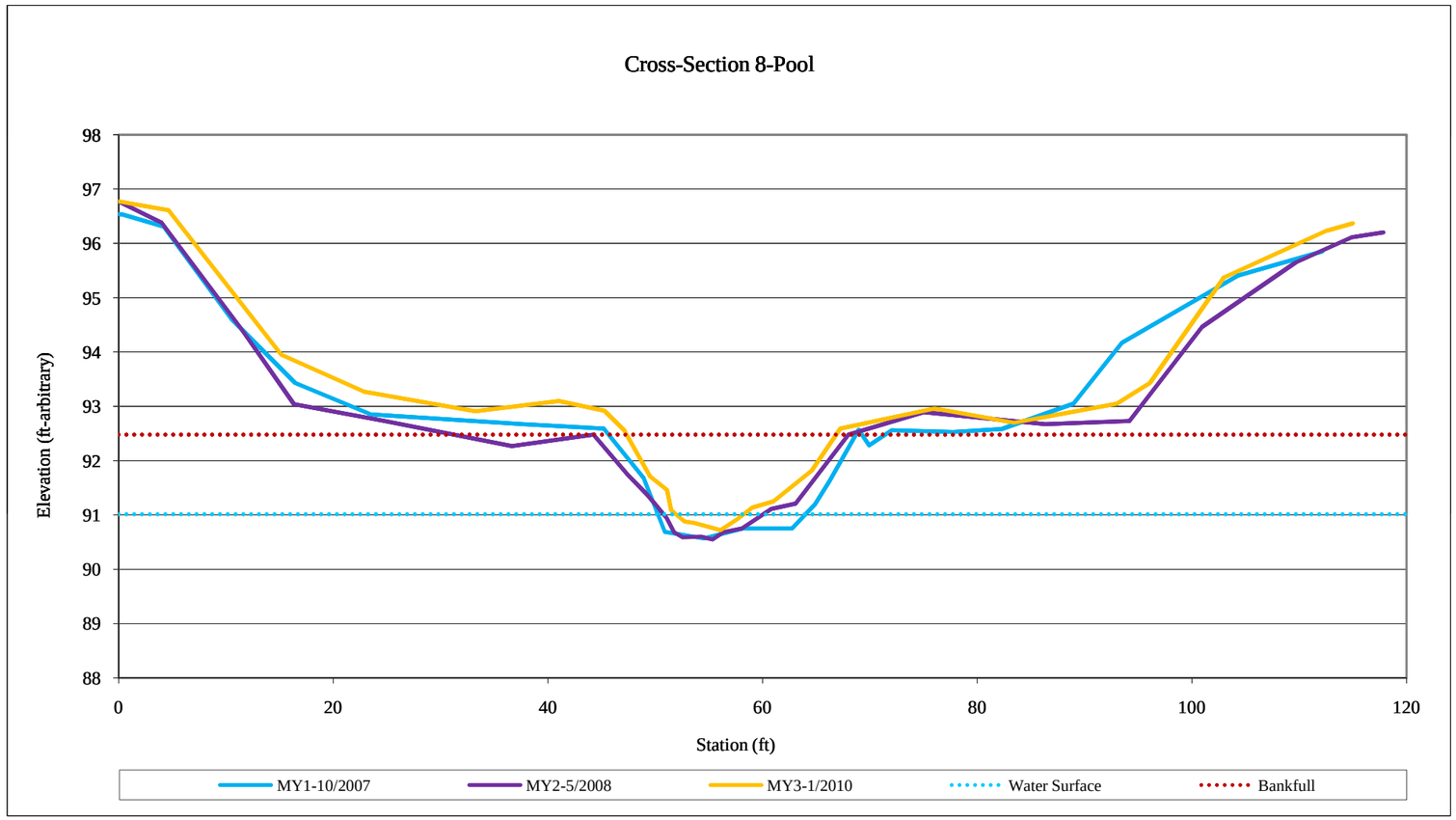


Figure 4.2a. Longitudinal Profiles with Annual Overlays
Camp Branch-Main Channel
Longitudinal Profile
2009 Monitoring Year

Bankfull/Top of Bank = -0.0039*STA + 97.77
Water Surface = -0.0039*STA + 96.116

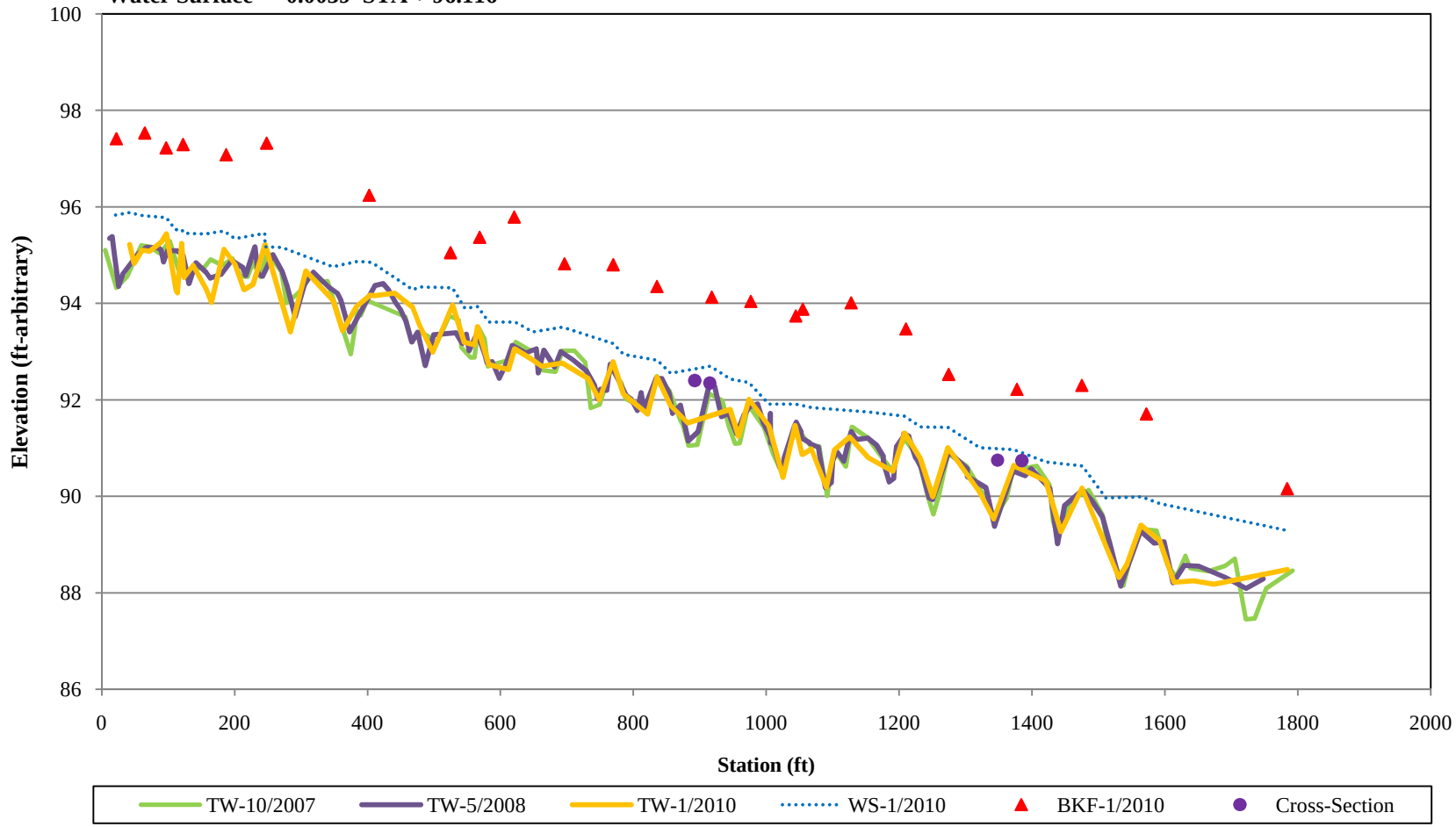


Figure 4.2b. Longitudinal Profiles with Annual Overlays
Camp Branch-Tributary
Longitudinal Profile
2009 Monitoring Year

Bankfull/Top of Bank = -0.0114*STA + 100.8
Water Surface = -0.0103*STA + 99.44

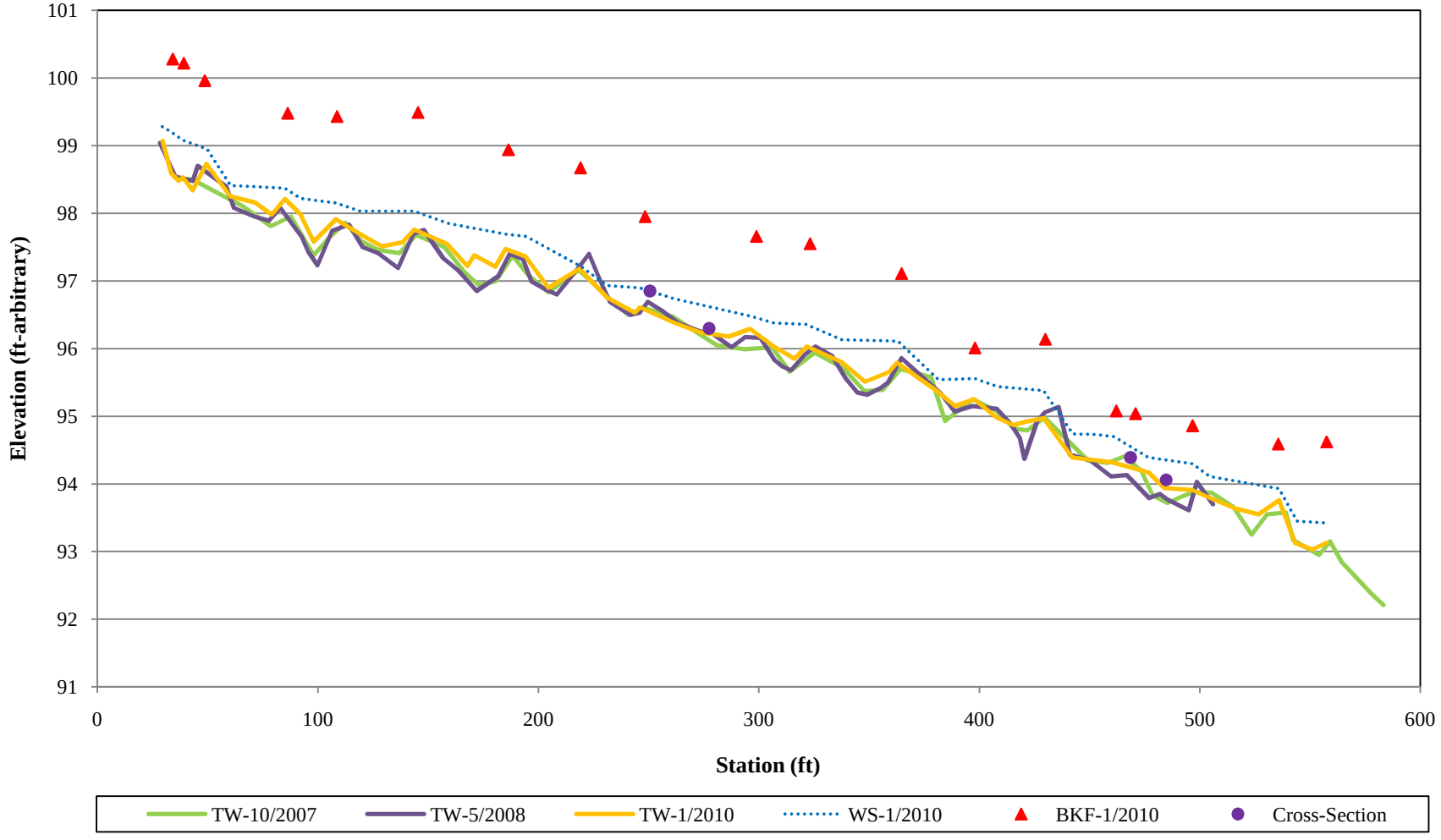
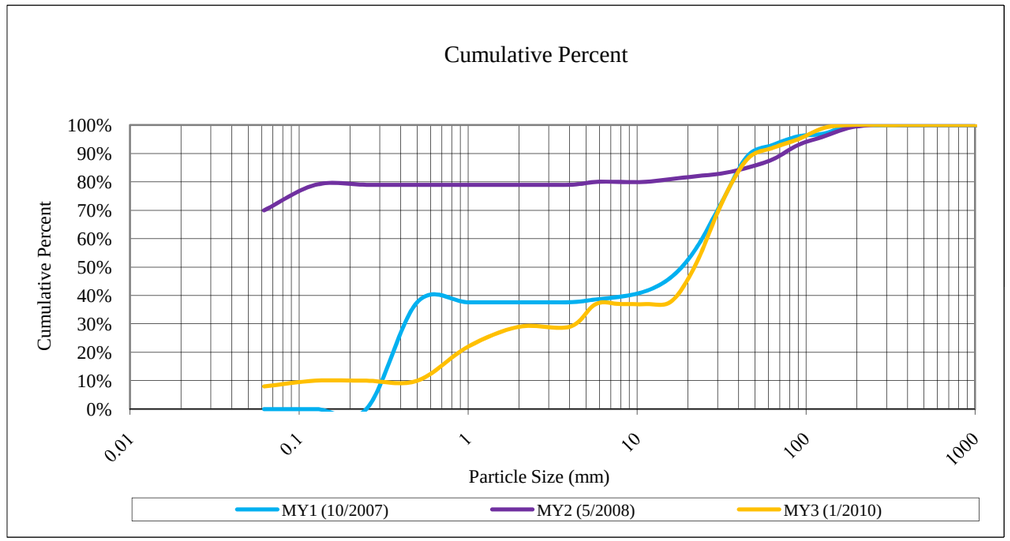


Figure 4.3a - Pebble Count Plots with Annual Overlays

Project Name: Camp Branch-Tributary					
Cross-Section: 1					
Feature: Riffle					
			MY3-1/2010		
Description	**Material**	**Size (mm)**	**Total #**	**Item %**	**Cum %**
Silt/Clay	silt/clay	0.062	8	8%	8%
Sand	very fine sand	0.125	2	2%	2%
	fine sand	0.250	0	0%	0%
	medium sand	0.50	0	0%	0%
	coarse sand	1.00	12	12%	12%
	very coarse sand	2.0	7	7%	7%
Gravel	very fine gravel	4.0	0	0%	0%
	fine gravel	5.7	8	8%	8%
	fine gravel	8.0	0	0%	0%
	medium gravel	11.3	0	0%	0%
	medium gravel	16.0	1	1%	1%
	course gravel	22.3	13	13%	13%
	course gravel	32.0	22	22%	22%
	very coarse gravel	45	15	15%	15%
	very coarse gravel	64	4	4%	4%
Cobble	small cobble	90	3	3%	3%
	medium cobble	128	4	4%	4%
	large cobble	180	1	1%	1%
	very large cobble	256	0	0%	0%
Boulder	small boulder	362	0	0%	0%
	small boulder	512	0	0%	0%
	medium boulder	1024	0	0%	0%
	large boulder	2048	0	0%	0%
Bedrock	bedrock	40096	0	0%	0%
TOTAL % of whole count			100	100%	100%

Summary Data	
D50	22.09
D84	41.53
D95	90



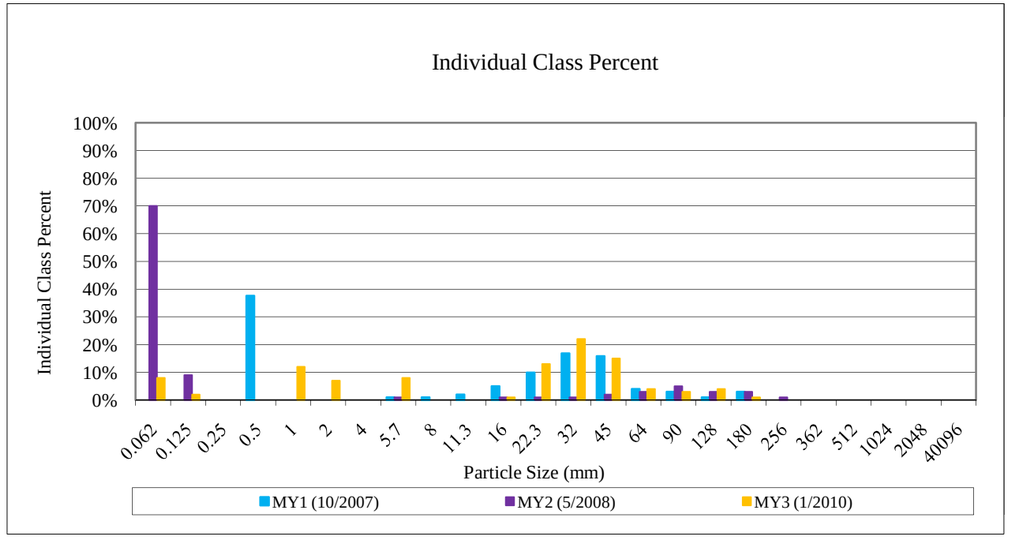
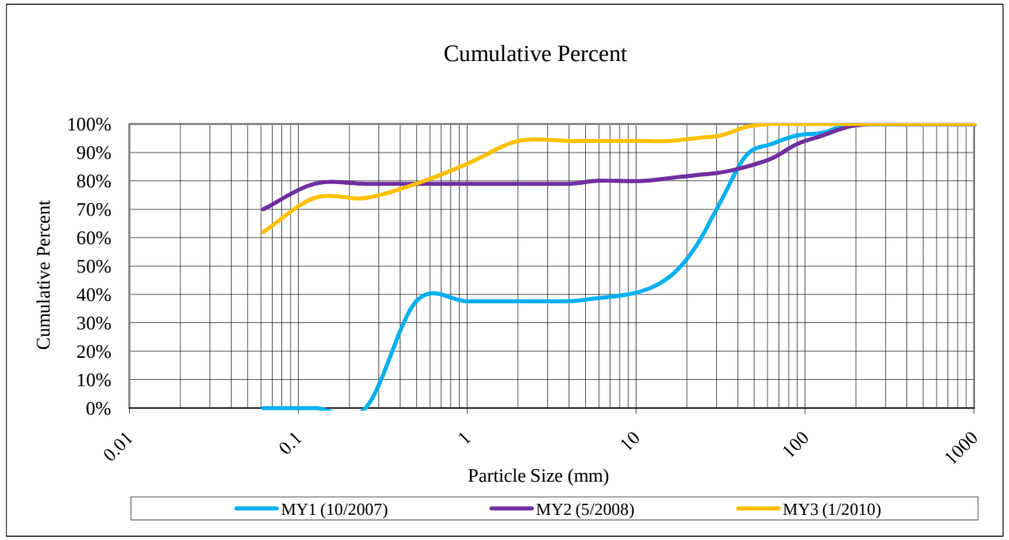


Figure 4.3b - Pebble Count Plots with Annual Overlays

Project Name: Camp Branch-Tributary					
Cross-Section: 2					
Feature: Pool					
			MY3-1/2010		
Description	**Material**	**Size (mm)**	**Total #**	**Item %**	**Cum %**
Silt/Clay	silt/clay	0.062	62	62%	62%
Sand	very fine sand	0.125	12	12%	12%
	fine sand	0.250	0	0%	0%
	medium sand	0.50	5	5%	5%
	coarse sand	1.00	7	7%	7%
	very coarse sand	2.0	8	8%	8%
Gravel	very fine gravel	4.0	0	0%	0%
	fine gravel	5.7	0	0%	0%
	fine gravel	8.0	0	0%	0%
	medium gravel	11.3	0	0%	0%
	medium gravel	16.0	0	0%	0%
	course gravel	22.3	1	1%	1%
	course gravel	32.0	1	1%	1%
	very coarse gravel	45	3	3%	3%
	very coarse gravel	64	1	1%	1%
Cobble	small cobble	90	0	0%	0%
	medium cobble	128	0	0%	0%
	large cobble	180	0	0%	0%
	very large cobble	256	0	0%	0%
Boulder	small boulder	362	0	0%	0%
	small boulder	512	0	0%	0%
	medium boulder	1024	0	0%	0%
	large boulder	2048	0	0%	0%
Bedrock	bedrock	40096	0	0%	0%
TOTAL % of whole count			100	100%	100%

Summary Data	
D50	0.05
D84	0.86
D95	22.6



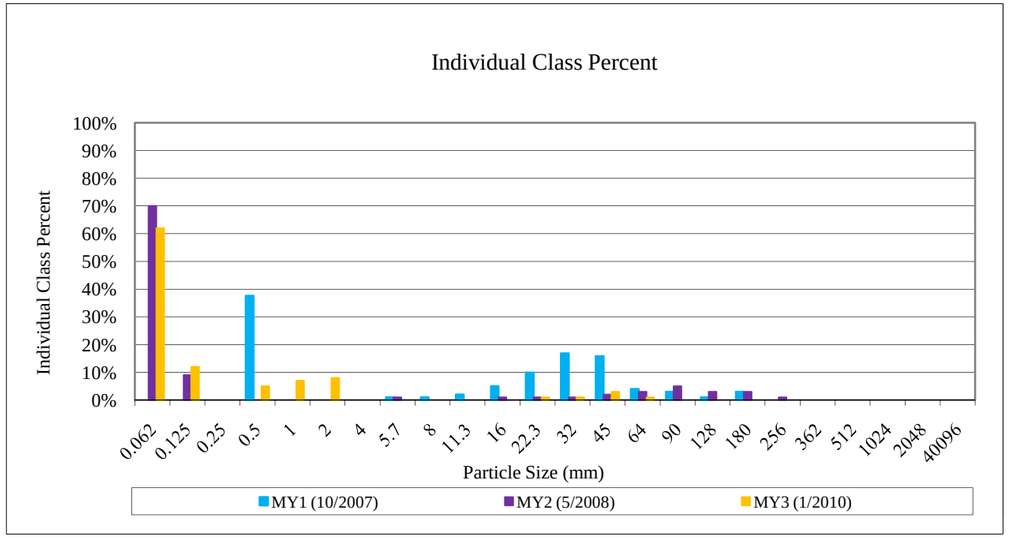
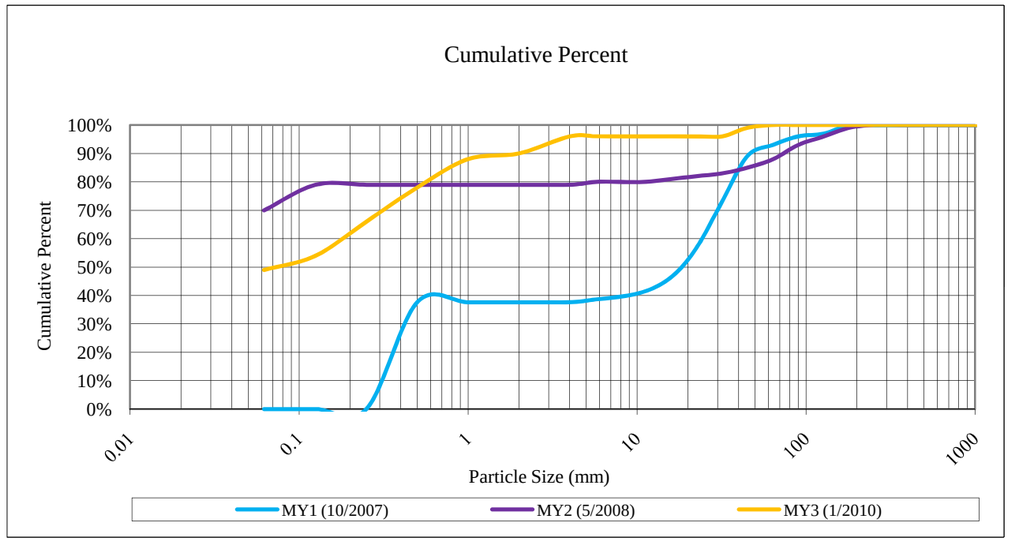


Figure 4.3c - Pebble Count Plots with Annual Overlays

Project Name: Camp Branch-Tributary					
Cross-Section: 3					
Feature: Riffle					
			MY3-1/2010		
Description	**Material**	**Size (mm)**	**Total #**	**Item %**	**Cum %**
Silt/Clay	silt/clay	0.062	49	49%	49%
Sand	very fine sand	0.125	5	5%	5%
	fine sand	0.250	12	12%	12%
	medium sand	0.50	12	12%	12%
	coarse sand	1.00	10	10%	10%
	very coarse sand	2.0	2	2%	2%
Gravel	very fine gravel	4.0	6	6%	6%
	fine gravel	5.7	0	0%	0%
	fine gravel	8.0	0	0%	0%
	medium gravel	11.3	0	0%	0%
	medium gravel	16.0	0	0%	0%
	course gravel	22.3	0	0%	0%
	course gravel	32.0	0	0%	0%
	very coarse gravel	45	3	3%	3%
	very coarse gravel	64	1	1%	1%
Cobble	small cobble	90	0	0%	0%
	medium cobble	128	0	0%	0%
	large cobble	180	0	0%	0%
	very large cobble	256	0	0%	0%
Boulder	small boulder	362	0	0%	0%
	small boulder	512	0	0%	0%
	medium boulder	1024	0	0%	0%
	large boulder	2048	0	0%	0%
Bedrock	bedrock	40096	0	0%	0%
TOTAL % of whole count			100	100%	100%

Summary Data	
D50	0.07
D84	0.8
D95	3.67



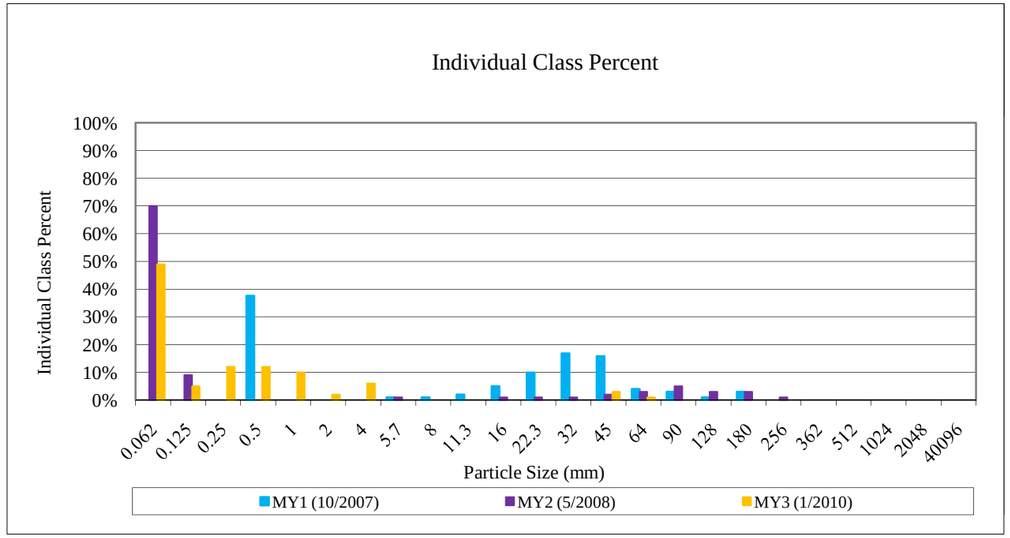
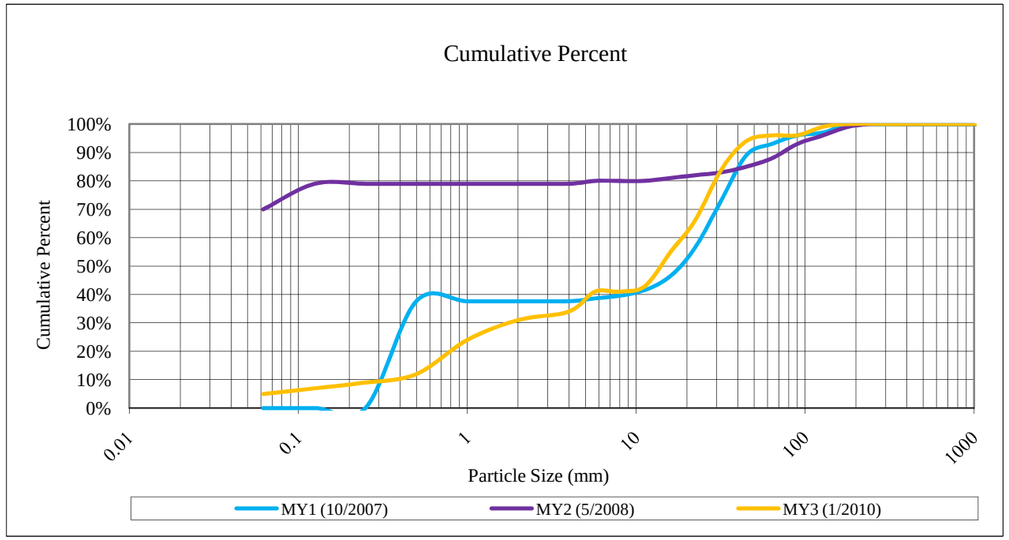


Figure 4.3d - Pebble Count Plots with Annual Overlays

Project Name: Camp Branch-Tributary					
Cross-Section: 4					
Feature: Pool					
			MY3-1/2010		
Description	**Material**	**Size (mm)**	**Total #**	**Item %**	**Cum %**
Silt/Clay	silt/clay	0.062	5	5%	5%
Sand	very fine sand	0.125	2	2%	2%
	fine sand	0.250	0	0%	0%
	medium sand	0.50	3	3%	3%
	coarse sand	1.00	8	8%	8%
	very coarse sand	2.0	9	9%	9%
Gravel	very fine gravel	4.0	5	5%	5%
	fine gravel	5.7	9	9%	9%
	fine gravel	8.0	0	0%	0%
	medium gravel	11.3	2	2%	2%
	medium gravel	16.0	12	12%	12%
	course gravel	22.3	11	11%	11%
	course gravel	32.0	18	18%	18%
	very coarse gravel	45	10	10%	10%
	very coarse gravel	64	2	2%	2%
Cobble	small cobble	90	0	0%	0%
	medium cobble	128	3	3%	3%
	large cobble	180	1	1%	1%
	very large cobble	256	0	0%	0%
Boulder	small boulder	362	0	0%	0%
	small boulder	512	0	0%	0%
	medium boulder	1024	0	0%	0%
	large boulder	2048	0	0%	0%
Bedrock	bedrock	40096	0	0%	0%
TOTAL % of whole count			100	100%	100%

Summary Data	
D50	14.04
D84	32
D95	54.5



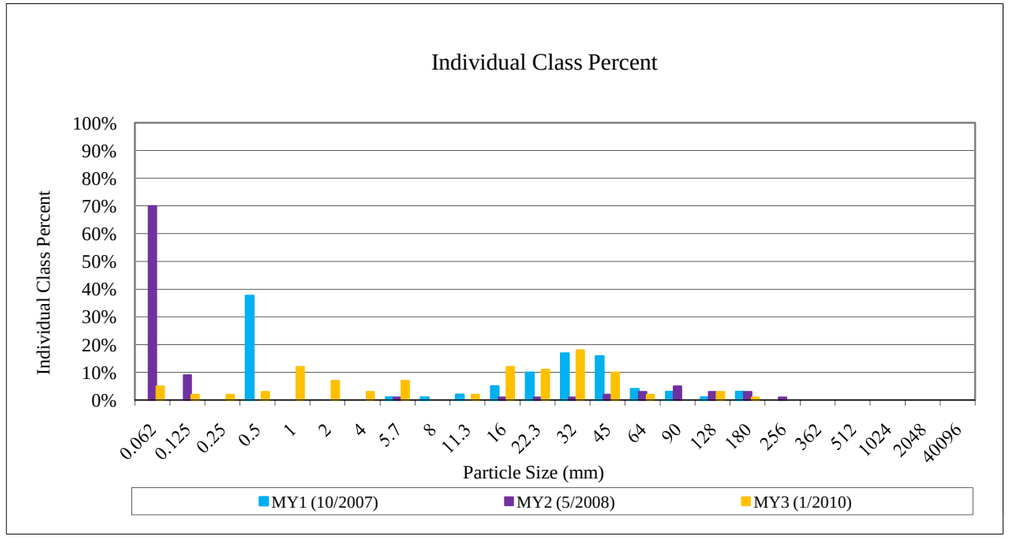
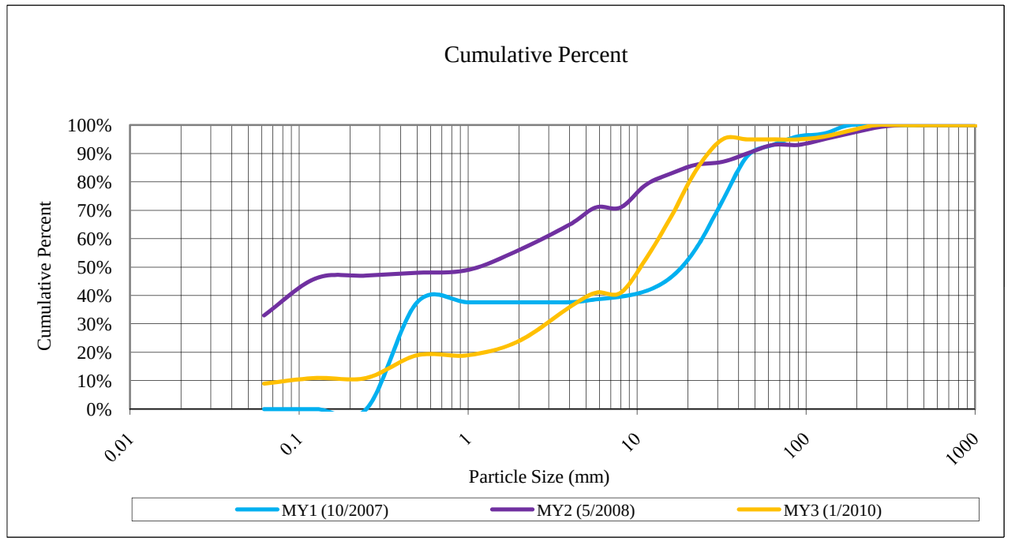


Figure 4.3e - Pebble Count Plots with Annual Overlays

Project Name: Camp Branch-Main Channel					
Cross-Section: 5					
Feature: Riffle					
			MY3-1/2010		
Description	**Material**	**Size (mm)**	**Total #**	**Item %**	**Cum %**
Silt/Clay	silt/clay	0.062	9	9%	9%
Sand	very fine sand	0.125	2	2%	2%
	fine sand	0.250	0	0%	0%
	medium sand	0.50	8	8%	8%
	coarse sand	1.00	0	0%	0%
	very coarse sand	2.0	5	5%	5%
Gravel	very fine gravel	4.0	12	12%	12%
	fine gravel	5.7	5	5%	5%
	fine gravel	8.0	0	0%	0%
	medium gravel	11.3	12	12%	12%
	medium gravel	16.0	15	15%	15%
	course gravel	22.3	16	16%	16%
	course gravel	32.0	11	11%	11%
	very coarse gravel	45	0	0%	0%
	very coarse gravel	64	0	0%	0%
Cobble	small cobble	90	0	0%	0%
	medium cobble	128	1	1%	1%
	large cobble	180	2	2%	2%
	very large cobble	256	2	2%	2%
Boulder	small boulder	362	0	0%	0%
	small boulder	512	0	0%	0%
	medium boulder	1024	0	0%	0%
	large boulder	2048	0	0%	0%
Bedrock	bedrock	40096	0	0%	0%
TOTAL % of whole count			100	100%	100%

Summary Data	
D50	10.48
D84	22.6
D95	32



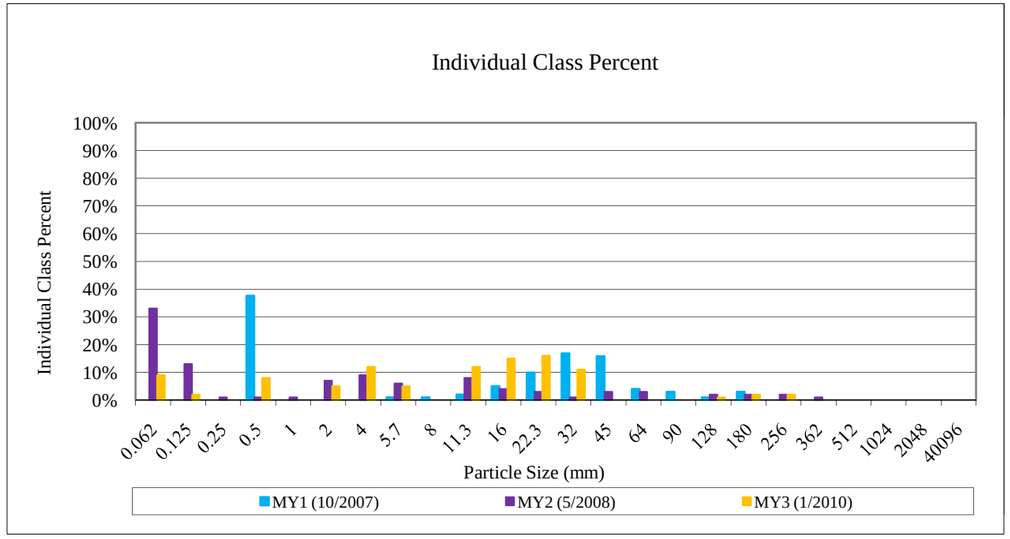
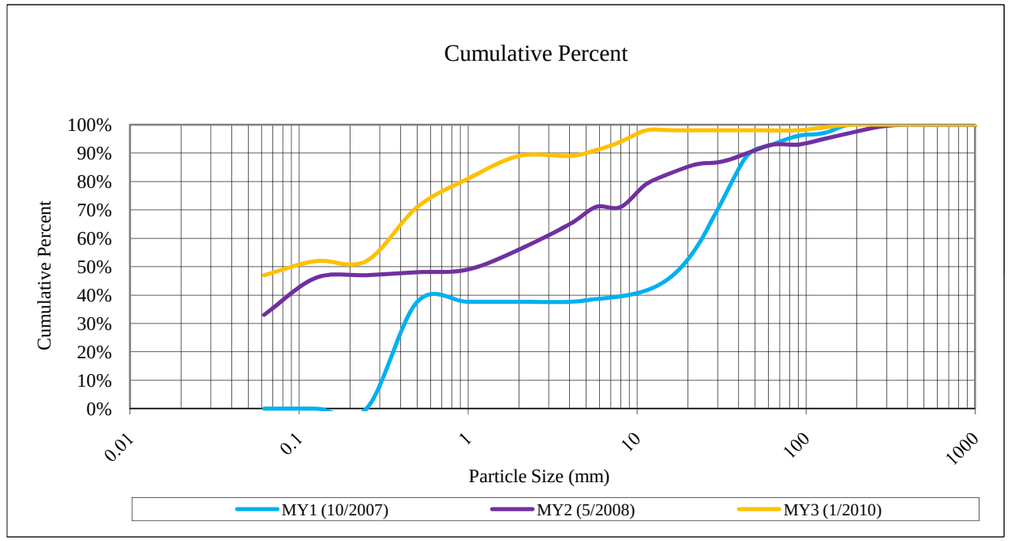


Figure 4.3f - Pebble Count Plots with Annual Overlays

Project Name: Camp Branch-Main Channel					
Cross-Section: 6					
Feature: Pool					
			MY3-1/2010		
Description	**Material**	**Size (mm)**	**Total #**	**Item %**	**Cum %**
Silt/Clay	silt/clay	0.062	47	47%	47%
Sand	very fine sand	0.125	5	5%	5%
	fine sand	0.250	0	0%	0%
	medium sand	0.50	19	19%	19%
	coarse sand	1.00	10	10%	10%
	very coarse sand	2.0	8	8%	8%
Gravel	very fine gravel	4.0	0	0%	0%
	fine gravel	5.7	2	2%	2%
	fine gravel	8.0	3	3%	3%
	medium gravel	11.3	4	4%	4%
	medium gravel	16.0	0	0%	0%
	course gravel	22.3	0	0%	0%
	course gravel	32.0	0	0%	0%
	very coarse gravel	45	0	0%	0%
	very coarse gravel	64	0	0%	0%
Cobble	small cobble	90	0	0%	0%
	medium cobble	128	1	1%	1%
	large cobble	180	1	1%	1%
	very large cobble	256	0	0%	0%
Boulder	small boulder	362	0	0%	0%
	small boulder	512	0	0%	0%
	medium boulder	1024	0	0%	0%
	large boulder	2048	0	0%	0%
Bedrock	bedrock	40096	0	0%	0%
TOTAL % of whole count			100	100%	100%

Summary Data	
D50	0.1
D84	1.38
D95	8.83



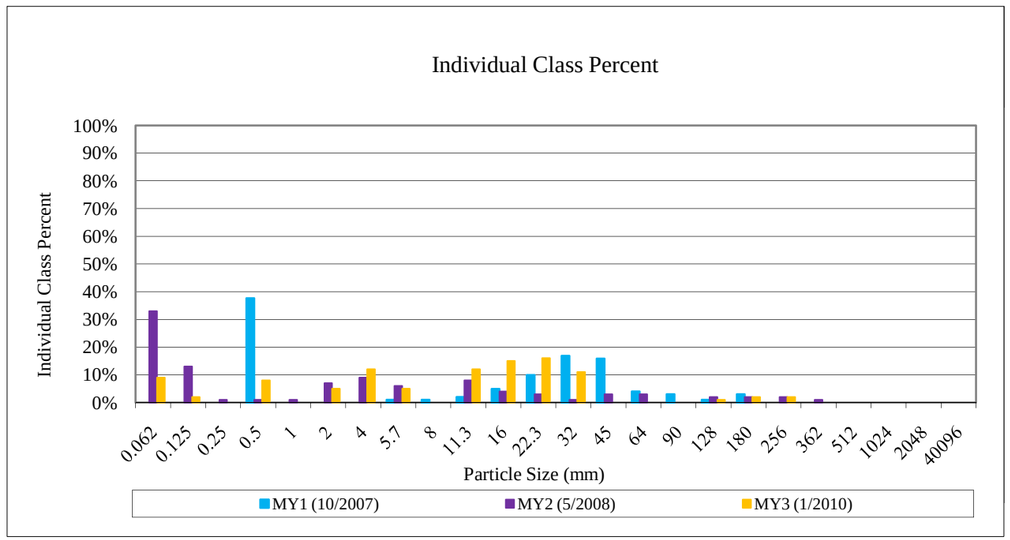
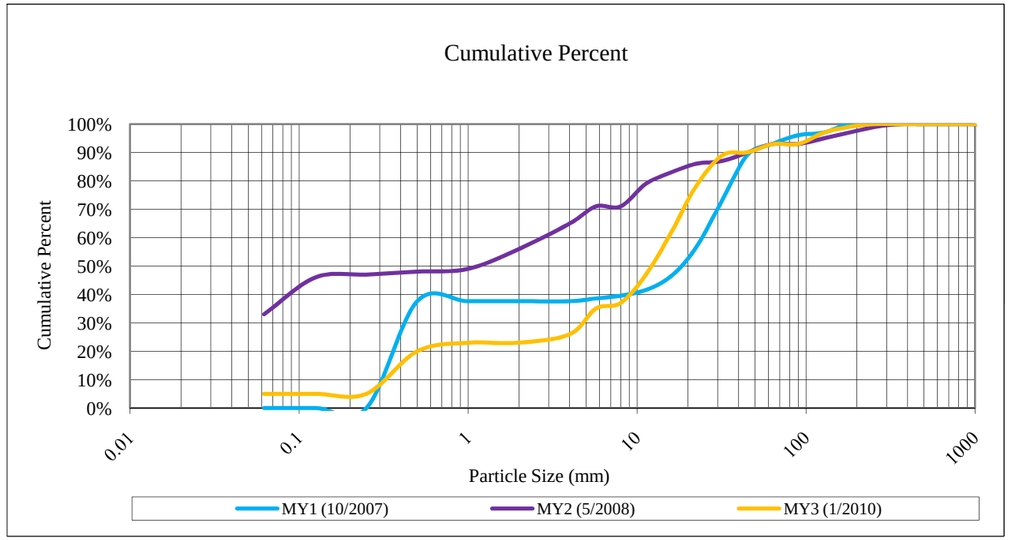


Figure 4.3g - Pebble Count Plots with Annual Overlays

Project Name: Camp Branch-Main Channel					
Cross-Section: 7					
Feature: Riffle					
			MY3-1/2010		
Description	**Material**	**Size (mm)**	**Total #**	**Item %**	**Cum %**
Silt/Clay	silt/clay	0.062	5	5%	5%
Sand	very fine sand	0.125	0	0%	0%
	fine sand	0.250	0	0%	0%
	medium sand	0.50	15	15%	15%
	coarse sand	1.00	3	3%	3%
	very coarse sand	2.0	0	0%	0%
Gravel	very fine gravel	4.0	3	3%	3%
	fine gravel	5.7	9	9%	9%
	fine gravel	8.0	2	2%	2%
	medium gravel	11.3	10	10%	10%
	medium gravel	16.0	15	15%	15%
	course gravel	22.3	16	16%	16%
	course gravel	32.0	11	11%	11%
	very coarse gravel	45	1	1%	1%
	very coarse gravel	64	3	3%	3%
Cobble	small cobble	90	0	0%	0%
	medium cobble	128	4	4%	4%
	large cobble	180	2	2%	2%
	very large cobble	256	1	1%	1%
Boulder	small boulder	362	0	0%	0%
	small boulder	512	0	0%	0%
	medium boulder	1024	0	0%	0%
	large boulder	2048	0	0%	0%
Bedrock	bedrock	40096	0	0%	0%
TOTAL % of whole count			100	100%	100%

Summary Data	
D50	12.24
D84	27.73
D95	109



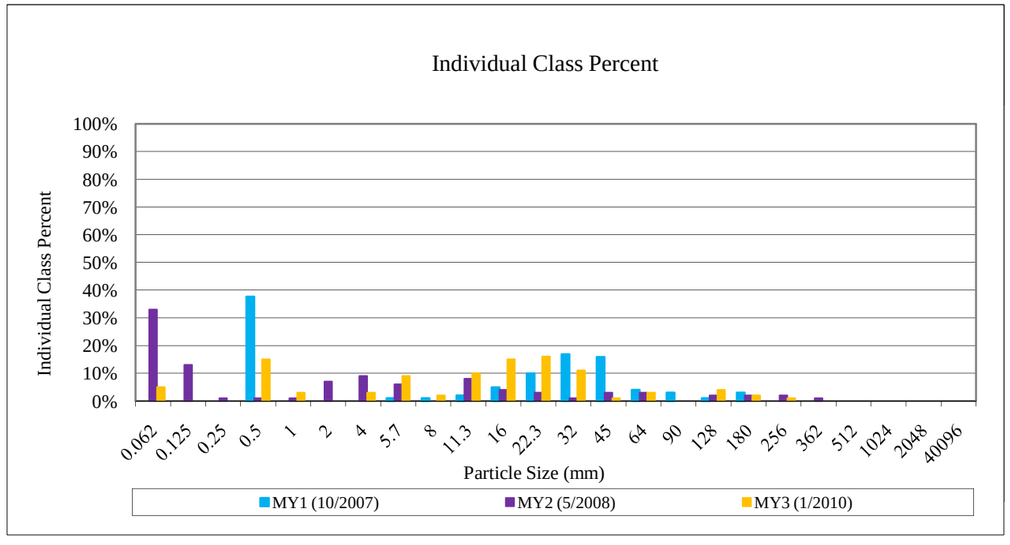


Figure 4.3h - Pebble Count Plots with Annual Overlays

Project Name: Camp Branch-Main Channel					
Cross-Section: 8					
Feature: Pool					
			MY3-1/2010		
Description	**Material**	**Size (mm)**	**Total #**	**Item %**	**Cum %**
Silt/Clay	silt/clay	0.062	55	55%	55%
Sand	very fine sand	0.125	8	8%	8%
	fine sand	0.250	2	2%	2%
	medium sand	0.50	17	17%	17%
	coarse sand	1.00	9	9%	9%
	very coarse sand	2.0	4	4%	4%
Gravel	very fine gravel	4.0	0	0%	0%
	fine gravel	5.7	2	2%	2%
	fine gravel	8.0	3	3%	3%
	medium gravel	11.3	0	0%	0%
	medium gravel	16.0	0	0%	0%
	course gravel	22.3	0	0%	0%
	course gravel	32.0	0	0%	0%
	very coarse gravel	45	0	0%	0%
	very coarse gravel	64	0	0%	0%
Cobble	small cobble	90	0	0%	0%
	medium cobble	128	0	0%	0%
	large cobble	180	0	0%	0%
	very large cobble	256	0	0%	0%
Boulder	small boulder	362	0	0%	0%
	small boulder	512	0	0%	0%
	medium boulder	1024	0	0%	0%
	large boulder	2048	0	0%	0%
Bedrock	bedrock	40096	0	0%	0%
TOTAL % of whole count			100	100%	100%

Summary Data	
D50	0.06
D84	0.61
D95	2