

**Dye Branch II
Stream Restoration
NCEEP Project Number: 92255
Monitoring Year 2
Monitoring Contract Number: 004523
2012 Final Report**

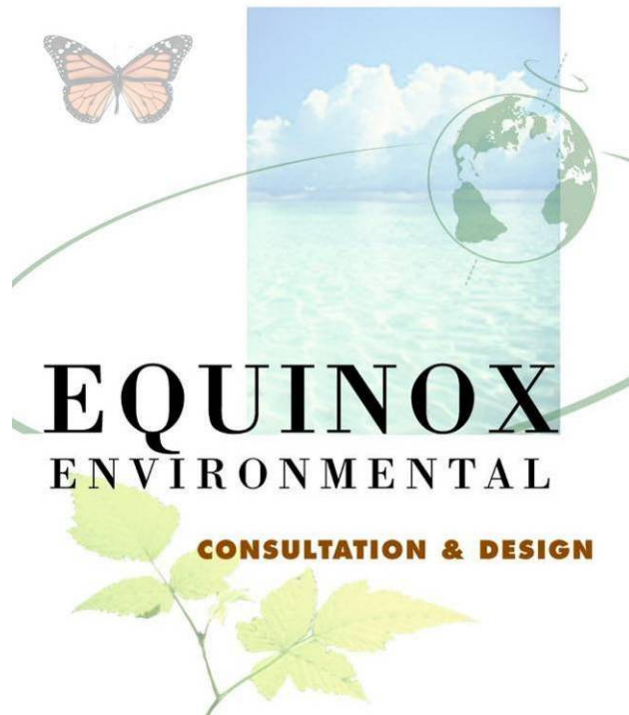


**Submitted to
North Carolina Ecosystem Enhancement Program
North Carolina Department of Environment and Natural Resources
November 2012**



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Raleigh, NC 27699**

Monitoring Firm



EQUINOX
ENVIRONMENTAL

CONSULTATION & DESIGN

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Dye Branch II Stream Restoration 2012 Monitoring Report (MY 2)

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1.0 EXECUTIVE SUMMARY / PROJECT ABSTRACT

The goals and objectives stated in the Dye Branch Stream Restoration Plan (NCEEP 2005) are as follows:

- Provide a stable system of stream channels that neither aggrade nor degrade while maintaining dimension, pattern, and profile with the capacity to transport the watershed's water and sediment load;
- Improve the overall water quality and aquatic habitat by reducing sediment and waste inputs into the stream caused by bank erosion, mass-wasting, and stormwater runoff through stabilization of the stream channel and creation of a stormwater wetland; and
- Improve the overall viability of the riparian vegetative communities through establishment of native species and elimination of invasive exotic species.

The site includes a diverse assemblage of 21 planted species of native trees and shrubs. Planted species range from 3 to 6 per plot with 4 to 10 species observed when volunteers are included. Between the baseline and year 1 (MY1) monitoring vegetation data collection efforts, two monitoring plots were impacted by repairs made to the stream channel in summer 2011. A significant number of planted stems were damaged in VP7 and all plants in VP8 were destroyed. Based on the MY2 vegetation data from plots 1 through 7 the project is not on track to meet the 320 planted stems per acre criterion that must be achieved by the end of the year three monitoring period. Average stem density for planted stems in MY2 is approximately 266 stems per acre. Of the seven remaining plots, six plots (~86%) will not meet the year three interim success criteria numbers per acre. These include VP 1, 3, 4, 5, 6, and 7; which had 202, 283, 283, 202, 202, and 283 stems per acre, respectively. However, when planted and natural stems are combined, the average stem density is 885 stems per acre, which is above the minimum established criterion. Six of the seven plots meet the year three interim success criteria when planted and natural stems are combined. There are also approximately 32 isolated patches of high threat invasive plants that are distributed throughout the project area.

Stream longitudinal profiles within the Cemetery Branch reach have remained stable among monitoring years with the exception of a few isolated areas of bed degradation and aggradation. The primary stream issues observed during MY2 along Dye Branch include structure degradation, bank erosion, bed degradation, and bed aggradation. Significant portions of the downstream reach on Dye Branch appear to have downcut between monitoring years. A water level logger was installed in December of 2010 and has since recorded a total of six bankfull events including three during the MY2 monitoring period.

Summary information/data related to the occurrence of items such as beaver or easement 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 tables and figures in the appendices are available from EEP upon request.

2.0 Methodology

The stream monitoring methodologies utilized in MY2 replicate those employed during the previous monitoring years and are based on standard guidance and procedures documents (Rosgen 1996; USACE 2003). Vegetation monitoring data were collected following the standard CVS-EEP Protocol for Recording Vegetation, Level II, Version 4.2 (Lee et al. 2008).

3.0 References

Lee, M.T., R.K. Peet, S.D. Roberts, and T.R. Wentworth. 2008. CVS-EEP Protocol for Recording Vegetation. Version 4.2. The University of North Carolina at Chapel Hill, Department of Biology.

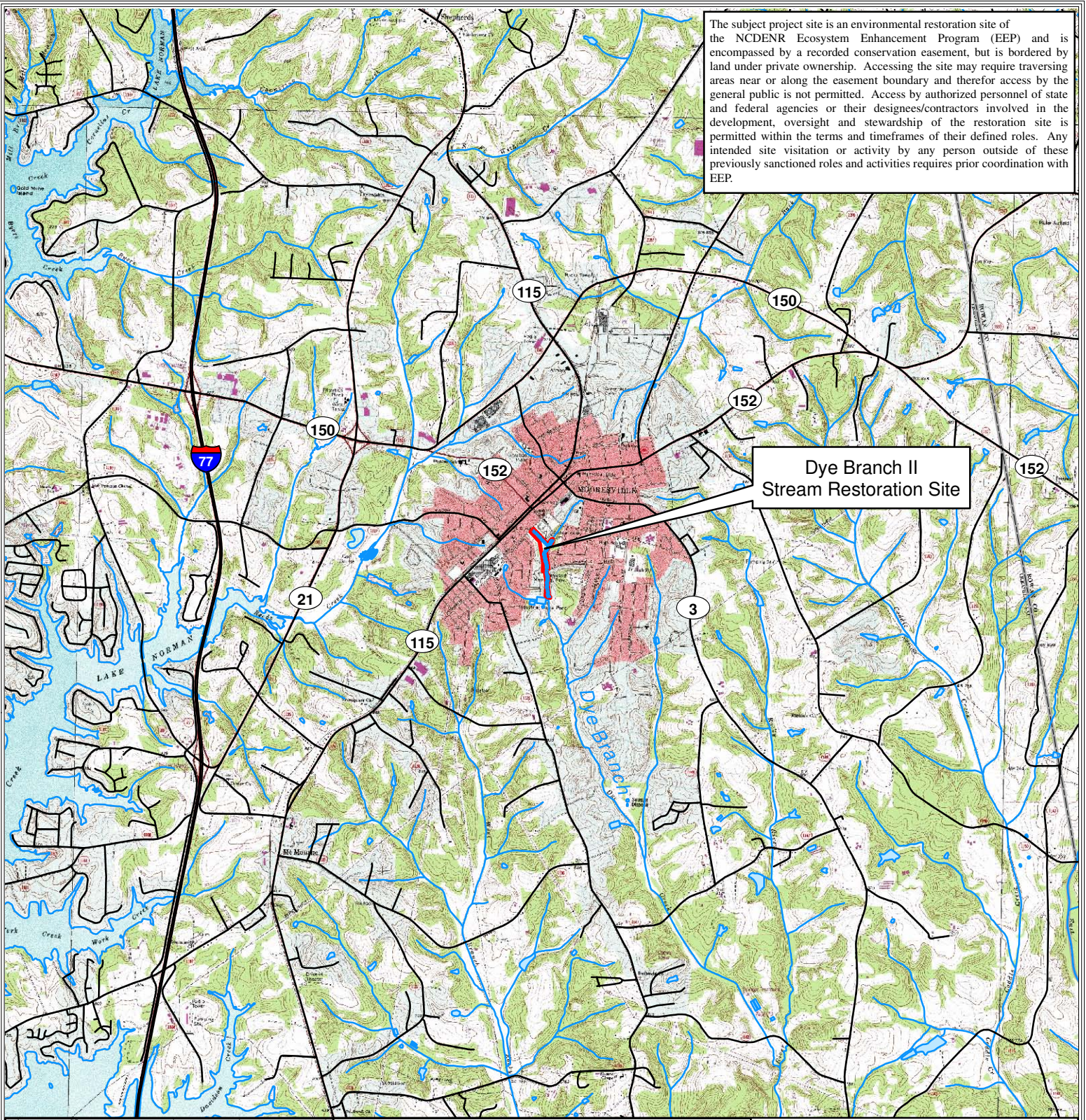
NCEEP (North Carolina Ecosystem Enhancement Program). 2005. Dye Branch Stream Restoration Plan. Raleigh.

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

USACE (U.S. Army Corps of Engineers). 2003. Stream Mitigation Guidelines. U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, North Carolina Wildlife Resources Commission, North Carolina Department of Environment and Natural Resources-Division of Water Quality. Wilmington District.

Appendix A
Project Vicinity Map and Background Tables

The subject project site is an environmental restoration site of the NCDENR Ecosystem Enhancement Program (EEP) and is encompassed by a recorded conservation easement, but is bordered by land under private ownership. Accessing the site may require traversing areas near or along the easement boundary and therefore access by the general public is not permitted. Access by authorized personnel of state and federal agencies or their designees/contractors involved in the development, oversight and stewardship of the restoration site is permitted within the terms and timeframes of their defined roles. Any intended site visitation or activity by any person outside of these previously sanctioned roles and activities requires prior coordination with EEP.



Dye Branch II Stream Restoration Site



Figure 1 - Vicinity Map

Dye Branch II Stream Restoration Site
Project No. 92255

Iredell County, North Carolina

Directions: From Raleigh, proceed west on I-40 towards Statesville. Take Exit 152 A (I-77S) towards Charlotte. Proceed on I-77S to Exit 36 (NC-150) towards Mooresville. From NC-150 turn slight right onto McLelland Avenue/NC-152 for approximately 1.2 miles. The site is located on the west side of McLelland Avenue/NC-152.



7.5 Minute Series Mooresville Quadrangle

Table 1a. Project Components Dye Branch II / Project No. 92255								
Project Component or Reach ID	Existing Feet/Acres	Restoration Level	Approach	Footage or Acreage	Stationing	Buffer Acres	BMP Elements	Comment
Cemetery Branch	968 lf	R	P3	1,014 lf	0+00 - 10+14		Stormwater wetlands	
Dye Branch Upstream	1,772 lf	R	P2	1,500 lf	0+00 - 15+00		Stormwater wetlands	
Dye Branch Downstream	1,232 lf	R	P2	1,171 lf	16+00 - 27+71			

- Information unavailable

=Non-Applicable

Table 1b. Component Summations Dye Branch II / Project No. 92255							
Restoration Level	Stream (lf)	Riparian Wetland (ac)		Non-Riparian (ac)	Upland (ac)	Buffer (ac)	BMP
		Riverine	Non-Riverine				
Restoration	3,685	0.0	0.0				
Enhancement		0.0	0.0				
Enhancement I	0						
Enhancement II	0						
Creation		0.0	0.0				
Preservation	0	0.0	0.0				
HQ Preservation	0	0.0	0.0				
		0.0	0.0				
Totals	3,685	0	0	0	0	0	3

=Non-applicable

Table 2. Project Activity & Reporting History Dye Branch II / Project No. 92255		
Activity or Report	Data Collection Complete	Actual Completion or Delivery
Restoration Plan	-	Oct 2005
Final Design - Construction Plans	-	April 2006
Final Design - Repair Plans	N/A	July 2010
Construction Repairs	N/A	Dec 2010
Temporary S&E mix applied	N/A	Summer 2010
Permanent seed mix applied	N/A	Summer 2010
Planting	N/A	Feb 2011
Mitigation Plan / As-built (Year 0 Monitoring - Baseline)	March 2011	Aug 2011
Year 1 Monitoring	Nov 2011	Jan 2012
Year 2 Monitoring	Dec 2012	Jan 2013
Year 3 Monitoring		
Year 4 Monitoring		
Year 5 Monitoring		

- Information unavailable.

N/A - Item does not apply.

Table 3. Project Contacts Dye Branch II / Project No. 92255	
Designer	Mulkey Engineers & Consultants 6750 Tryon Road Cary NC, 27518
Primary Project Design POC	Emmett Perdue (919) 858-1874
Construction Contractor	Fluvial Solutions P.O. Box 28749 Raleigh, NC 27611
Construction Contractor POC	Peter Jelenevsky (919) 605-6134
Planting Contractor	Fluvial Solutions P.O. Box 28749 Raleigh, NC 27611
Planting Contractor POC	Peter Jelenevsky (919) 605-6134
Seeding Contractor	Fluvial Solutions P.O. Box 28749 Raleigh, NC 27611
Seeding Contractor POC	Peter Jelenevsky (919) 605-6134
Seed Mix Sources	Hanes Geo Components Winston-Salem, NC 27101
Nursery Stock Suppliers	North Carolina Forest Service Goldsboro, NC 27530
Monitoring Performers (Y0) - 2010	Equinox Environmental Consultation & Design, Inc. 37 Haywood Street, Suite 100 Asheville, North Carolina 28801
Stream Monitoring POC	Win Taylor (828) 253-6856
Vegetation Monitoring POC	Win Taylor (828) 253-6856
Monitoring Performers (Y1) - 2011	Equinox Environmental Consultation & Design, Inc. 37 Haywood Street, Suite 100 Asheville, North Carolina 28801
Stream Monitoring POC	Win Taylor (828) 253-6856
Vegetation Monitoring POC	Win Taylor (828) 253-6856
Monitoring Performers (Y2) - 2012	Equinox Environmental Consultation & Design, Inc. 37 Haywood Street, Suite 100 Asheville, North Carolina 28801
Stream Monitoring POC	Kevin Mitchell (828) 253-6856
Vegetation Monitoring POC	Kevin Mitchell (828) 253-6856
Monitoring Performers (Y3) - 2013	
Stream Monitoring POC	
Vegetation Monitoring POC	
Monitoring Performers (Y4) - 2014	
Stream Monitoring POC	
Vegetation Monitoring POC	
Monitoring Performers (Y5) - 2015	
Stream Monitoring POC	
Vegetation Monitoring POC	

Table 4. Project Attributes		
Dye Branch II / Project No. 92255		
Project County	Iredell	
Physiographic Region	Piedmont	
Ecoregion	Southern Outer Piedmont	
River Basin	Yadkin - Pee Dee	
USGS HUC	03040105010010	
NCDWQ Sub-Basin	03-07-11	
Within Extent of EEP Watershed Plan	Upper Rocky River Local Watershed Plan	
WRC Class	Warm	
% of Project Easement Fenced or Demarcated	100%	
Beaver Activity Observed During Design Phase	No	
Restoration Component Attributes		
	Dye Branch	Cemetery Branch
Drainage Area (sq.mi.)	0.60	0.06
Stream Order	First / Second	First
Restored Length (feet)	2,671	1,014
Perennial or Intermittent	Perennial	Perennial
Watershed Type	Urban	
Watershed LULC Distribution		
	Urban	85%
	Other	15%
Watershed Impervious Cover	-	
NCDWQ AU/Index Number	13-17-2	
NCDWQ Classification	C	
303d Listed	Yes	
Upstream of 303d Listed Segment	Yes	
Reasons for 303d Listing or Stressor	Poor Bioclassification	
Total Acreage of Easement	12.0	
Total Vegetated Acreage within Easement	12.0	
Total Planted Acreage as Part of Restoration	8.9	
Rosgen Classification of Pre-Existing	E4 / G4c	E4
Rosgen Classification of As-Built	C	C
Valley Type	-	-
Valley Slope	0.0097 / 0.0125	0.0217
Valley Side Slope Range	-	-
Valley Toe Slope Range	-	-
Cowardin Classification	N/A	N/A
Trout Waters Designation	No	No
Species of Concern, Endangered, Etc.	None	
Dominant Soil Series and Characteristics	Chewacla / Cecil / Colfax	
	Series	
	Depth	-
	Clay%	-
	K	-
	T	-

- Information unavailable.

N/A - Item does not apply.

Appendix B

Visual Assessment Data

Figure 2. Integrated Current Condition Plan View - Final





Prepared for	Project: Dye Branch Stream Restoration	Notes: 1) Base Map Data Provided by Mulkey Engineers & Consultants	Prepared by
	Monitoring Year 2 - Integrated Current Condition Plan View Final Iredell County, North Carolina	2) 2010 Aerial Photo 3) Dominant Invasive Species Include Ligustrum sp., Lonicera japonica, Pueraria montana var. lobata, and Lespedeza cuneata.	
Sheet 1 of 1		Project Number	
Date		NCEEP # 92255	
December 2012			

Table 5. Visual Stream Morphology Stability Assessment Dye Branch II / Project No. 92255 - Cemetery Branch Assessed Length 1,014 feet										
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	Adjusted % for Stabilizing Woody Vegetation
1. Bed	1. Vertical Stability (Riffle and Run Units)	1. <u>Aggradation</u> - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars).			0	0	100%			
		2. <u>Degradation</u> - Evidence of downcutting.			0	0	100%			
	2. Riffle Condition	1. <u>Texture/Substrate</u> - Riffle maintains coarser substrate.	14	14			100%			
		3. Meander Pool Condition	1. <u>Depth</u> Sufficient (Max Pool Depth : Mean Bankfull Depth \geq 1.6).	14	15					
	2. <u>Length</u> appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream riffle).		15	15			100%			
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run).	15	15			100%			
		2. Thalweg centering at downstream of meander bend (Glide).	14	14			100%			
2. Bank	1. Scoured / Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion.			0	0	100%	N/A	N/A	N/A
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does <u>NOT</u> include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	N/A	N/A	N/A
	3. Mass Wasting	Bank slumping, calving, or collapse.			0	0	100%	N/A	N/A	N/A
Totals					0	0	100%	N/A	N/A	N/A
3. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	32	32			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	28	28			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	27	28			96%			
	3. Bank Protection	Bank erosion within the structures extent of influence does <u>NOT</u> exceed 15%.	4	4			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth Ratio \geq 1.6. Rootwads/logs providing some cover at base-flow.	13	13			100%			

N/A - Item does not apply.

Table 5. Visual Stream Morphology Stability Assessment Dye Branch II / Project No. 92255 - Dye Branch - Upstream Assessed Length 1,500 feet										
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	Adjusted % for Stabilizing Woody Vegetation
1. Bed	1. Vertical Stability (Riffle and Run Units)	1. <u>Aggradation</u> - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars).			4	227	85%			
		2. <u>Degradation</u> - Evidence of downcutting.			2	83	94%			
	2. Riffle Condition	1. <u>Texture/Substrate</u> - Riffle maintains coarser substrate.	15	17			88%			
		3. Meander Pool Condition	1. <u>Depth</u> Sufficient (Max Pool Depth : Mean Bankfull Depth \geq 1.6).	18	20					
	2. <u>Length</u> appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream riffle).		18	20			90%			
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run).	14	17			82%			
		2. Thalweg centering at downstream of meander bend (Glide).	14	16			88%			
	2. Bank	1. Scoured / Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion.			5	167			
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%	N/A	N/A	N/A
3. Mass Wasting		Bank slumping, calving, or collapse.			2	62	98%	2	0	98%
Totals					7	229	92%	7	50	94%
3. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	26	30			87%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	8	8			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	6	8			75%			
	3. Bank Protection	Bank erosion within the structures extent of influence does NOT exceed 15%.	18	23			78%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth Ratio \geq 1.6. Rootwads/logs providing some cover at base-flow.	4	5			80%			

N/A - Item does not apply.

Table 5. Visual Stream Morphology Stability Assessment Dye Branch II / Project No. 92255 - Dye Branch - Downstream Assessed Length 1,171 feet										
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	Adjusted % for Stabilizing Woody Vegetation
1. Bed	1. Vertical Stability (Riffle and Run Units)	1. <u>Aggradation</u> - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars).			2	55	95%			
		2. <u>Degradation</u> - Evidence of downcutting.			3	184	84%			
	2. Riffle Condition	1. <u>Texture/Substrate</u> - Riffle maintains coarser substrate.	11	11			100%			
		3. Meander Pool Condition	1. <u>Depth</u> Sufficient (Max Pool Depth : Mean Bankfull Depth \geq 1.6).	10	10					
	2. <u>Length</u> appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream riffle).		10	10			100%			
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run).	8	10			80%			
		2. Thalweg centering at downstream of meander bend (Glide).	9	10			90%			
2. Bank	1. Scoured / Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion.			2	63	97%	2	30	99%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does <u>NOT</u> include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	N/A	N/A	N/A
	3. Mass Wasting	Bank slumping, calving, or collapse.			2	117	95%	1	22	96%
Totals					4	180	92%	1	22	93%
3. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	16	22			73%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	6	8			75%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	4	8			50%			
	3. Bank Protection	Bank erosion within the structures extent of influence does <u>NOT</u> exceed 15%.	12	14			86%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth Ratio \geq 1.6. Rootwads/logs providing some cover at base-flow.	5	5			100%			

N/A - Item does not apply.

Table 6. Vegetation Condition Assessment Dye Branch II / Project No. 92255 Planted Acreage 9.0					
Vegetation Category	Definitions	CCPV Depiction	Number of Polygons	Combined Acreage	% of Planted Acreage
1. Bare Areas	Very limited cover of both woody and herbaceous material.	Stipple Black Dots White Background	1	0.01	<1%
2. Low Stem Density Areas	Woody stem densities clearly below target levels based on MY3, 4, or 5 stem count criteria.	N/A	0	0.00	0%
Totals			1	0.01	<1%
3. Areas of Poor Growth Rates or Vigor	Areas with woody stems of a size class that are obviously small given the monitoring year.	N/A	0	0.00	0%
Cumulative Totals			1	0.01	<1%
Easement Acreage 12.01					
Vegetation Category	Definitions	CCPV Depiction	Number of Polygons	Combined Acreage	% of Easement Acreage
4. Invasive Areas of Concern	Areas or points (if too small to render as polygons at map scale).	Cross Hatch (Red - Dense/Yellow - Present)	33	2.60	22%
5. Easement Encroachment Areas	Areas or points (if too small to render as polygons at map scale).	Stipple Orange Dots White Background	1	0.06	0.5%

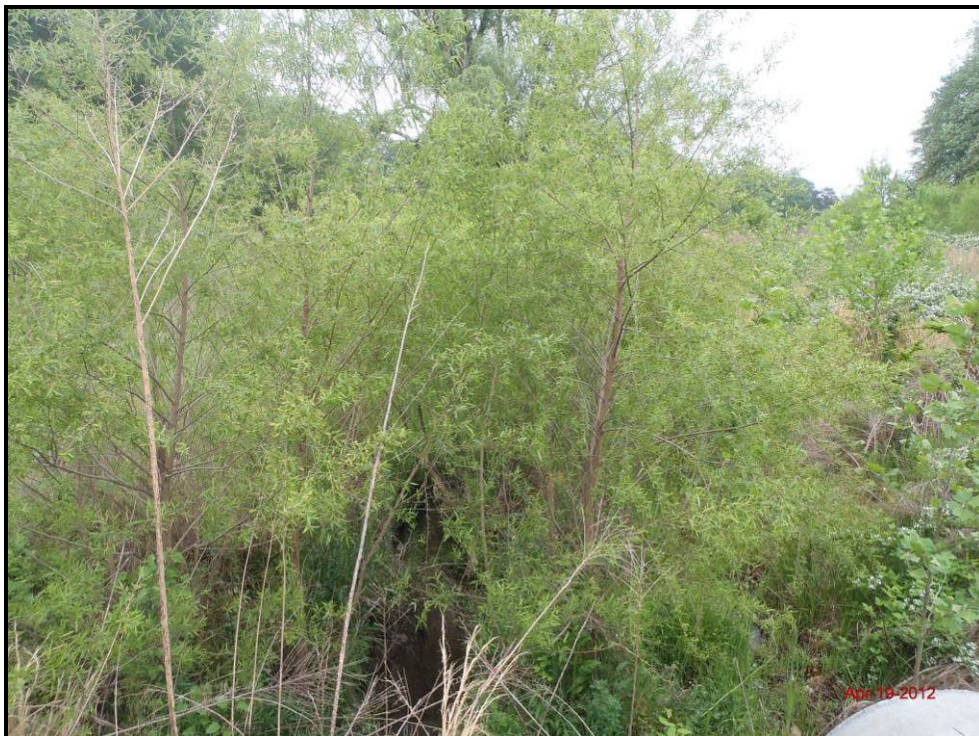
N/A - Item does not apply.



Cemetery Branch – Permanent Photo Station 1
Downstream



Cemetery Branch – Permanent Photo Station 2
Upstream



Cemetery Branch – Permanent Photo Station 2
Downstream



Dye Branch – Permanent Photo Station 3
Downstream



Dye Branch – Permanent Photo Station 4
Upstream



Dye Branch – Permanent Photo Station 5
Upstream



Dye Branch – Permanent Photo Station 6
Upstream



Dye Branch – Permanent Photo Station 7
Downstream



Dye Branch – Permanent Photo Station 8
Upstream



Dye Branch – Permanent Photo Station 9
Upstream

Appendix C

Vegetation Plot Data

Table 7. Vegetation Plot Criteria Attainment Dye Branch II / Project No. 92255		
Vegetation Plot ID	Vegetation Survival Threshold Met?	Tract Mean
1	No	14%
2	Yes	
3	No	
4	No	
5	No	
6	No	
7	No	



Vegetation Monitoring Plot 1
Monitoring Year 2 – June 11, 2012



Vegetation Monitoring Plot 2
Monitoring Year 2 – June 11, 2012



Vegetation Monitoring Plot 3
Monitoring Year 2 – June 11, 2012



Vegetation Monitoring Plot 4
Monitoring Year 2 – June 11, 2012



Vegetation Monitoring Plot 5
Monitoring Year 2 – June 11, 2012



Vegetation Monitoring Plot 6
Monitoring Year 2 – June 11, 2012



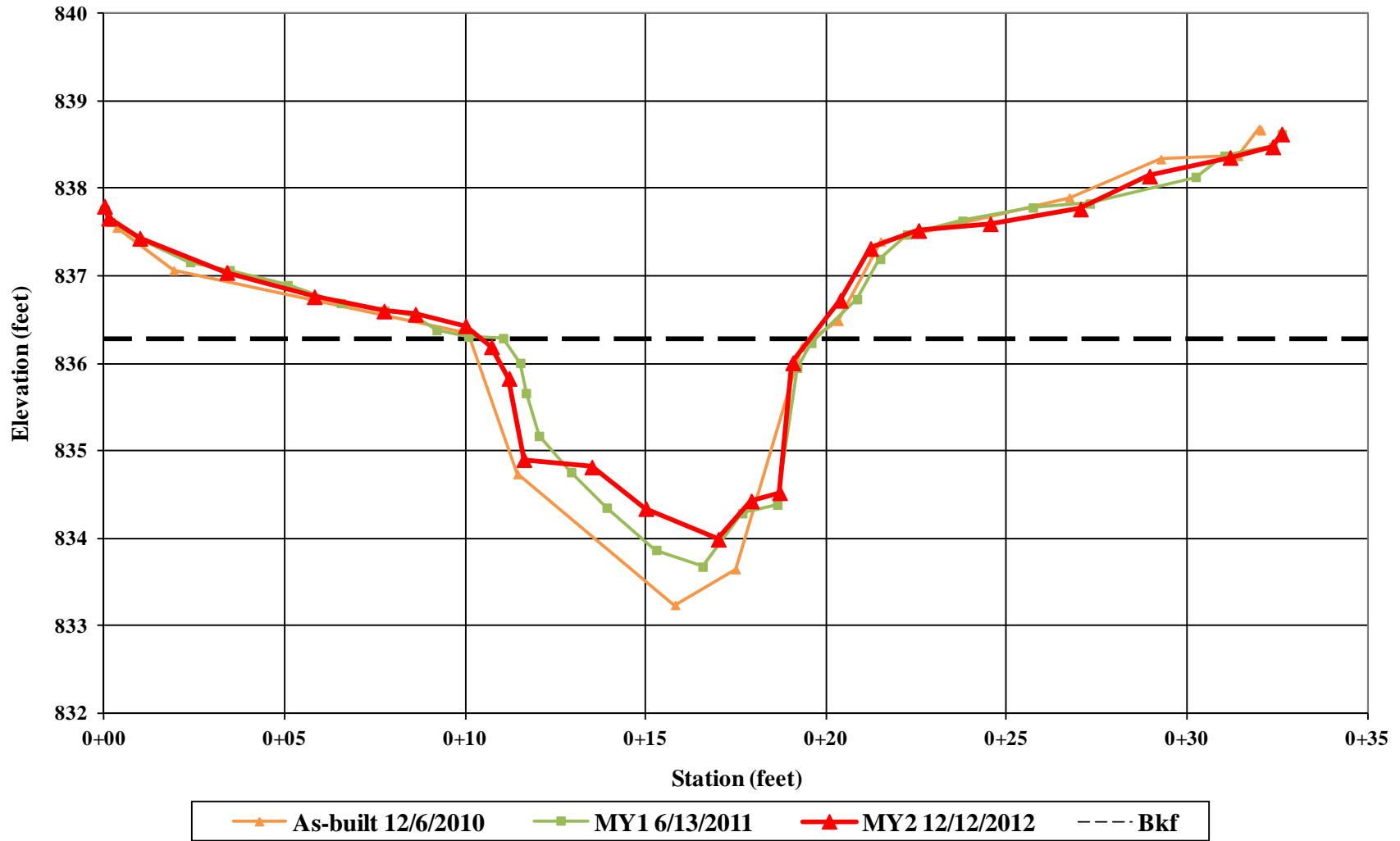
Vegetation Monitoring Plot 7
Monitoring Year 2 – June 11, 2012

Table 8. CVS Vegetation Plot Metadata Dye Branch II / Project No. 92255	
Report Prepared By	William Carson
Date Prepared	8/9/2012 14:55
Database Name	Equinox-2012-A-DyeBranch_MY2.mdb
Database Location	Z:\ES\NRI&M\EEP Monitoring\Dye Branch\DB-MY2-2012\Data\Veg
Computer Name	D16TNK71
File Size	51560448
DESCRIPTION OF WORKSHEETS IN THIS DOCUMENT	
Metadata	Description of database file, the report worksheets, and a summary of project(s) and project data.
Project Planted	Each project is listed with its PLANTED stems per acre, for each year. This excludes live stakes.
Project 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 Species	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 Species	Damage values tallied by type for each species.
Damage by Plot	Damage values tallied by type for each plot.
Planted Stems by Plot and Species	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 Species	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	92255
Project Name	Dye Branch
Description	
River Basin	Yadkin-Pee Dee
Length(ft)	
Stream-to-Edge Width (ft)	
Area (sq m)	
Required Plots (calculated)	
Sampled Plots	7

Appendix D

Stream Survey Data

**Cemetery Branch
Cross-Section 1 - Pool
Station 1 + 04.27**





Cemetery Branch – Cross-Section 1 – Pool
Left Bank Descending
Monitoring Year 2 – December 12, 2012



Cemetery Branch – Cross-Section 1 – Pool
Right Bank Descending
Monitoring Year 2 – December 12, 2012

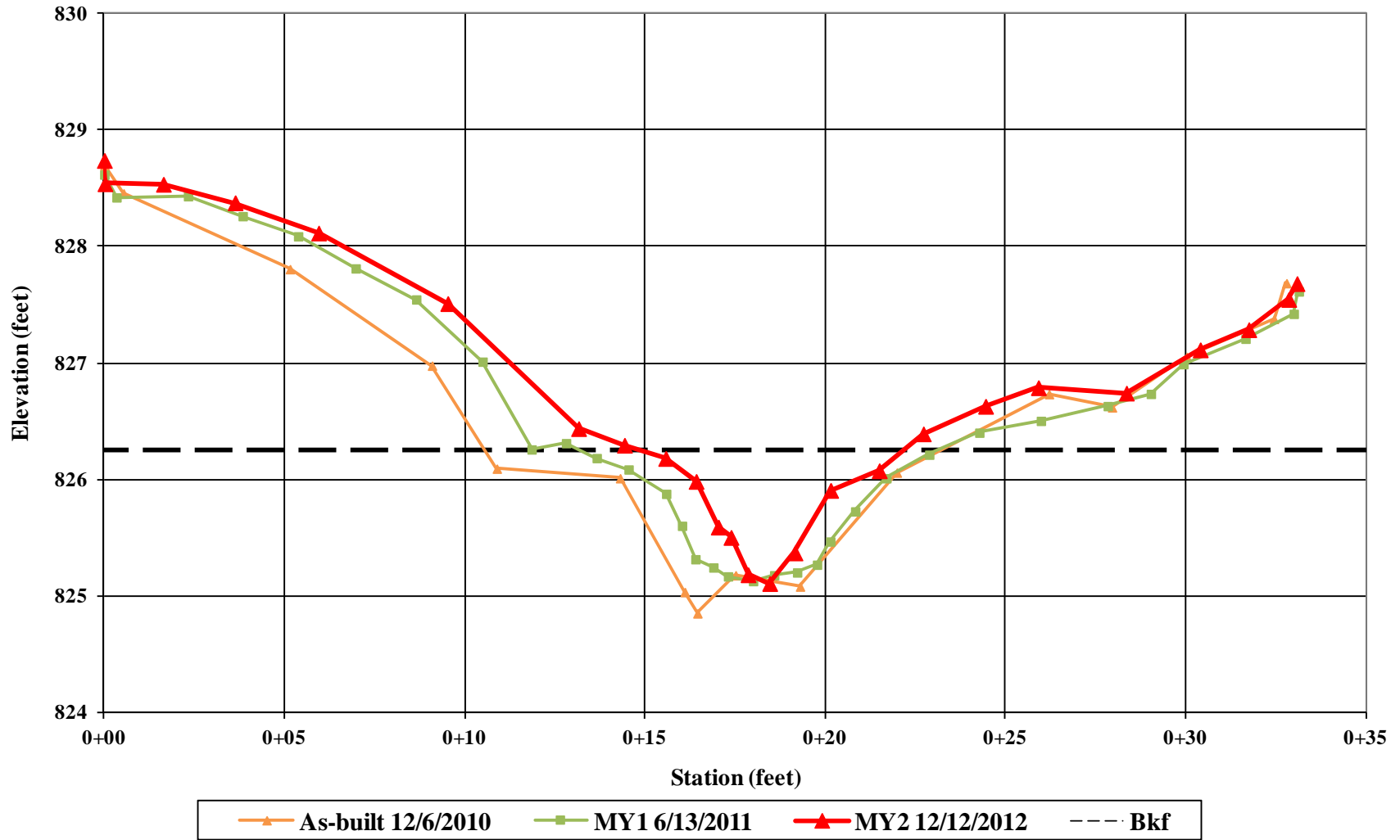


Cemetery Branch – Cross-Section 1 – Pool
Downstream
Monitoring Year 2 – December 12, 2012



Cemetery Branch – Cross-Section 1 – Pool
Upstream
Monitoring Year 2 – December 12, 2012

**Cemetery Branch
Cross-Section 2 - Riffle
Station 6 + 40.40**





Cemetery Branch – Cross-Section 2 – Riffle
Left Bank Descending
Monitoring Year 2 – December 12, 2012



Cemetery Branch – Cross-Section 2 – Riffle
Right Bank Descending
Monitoring Year 2 – December 12, 2012

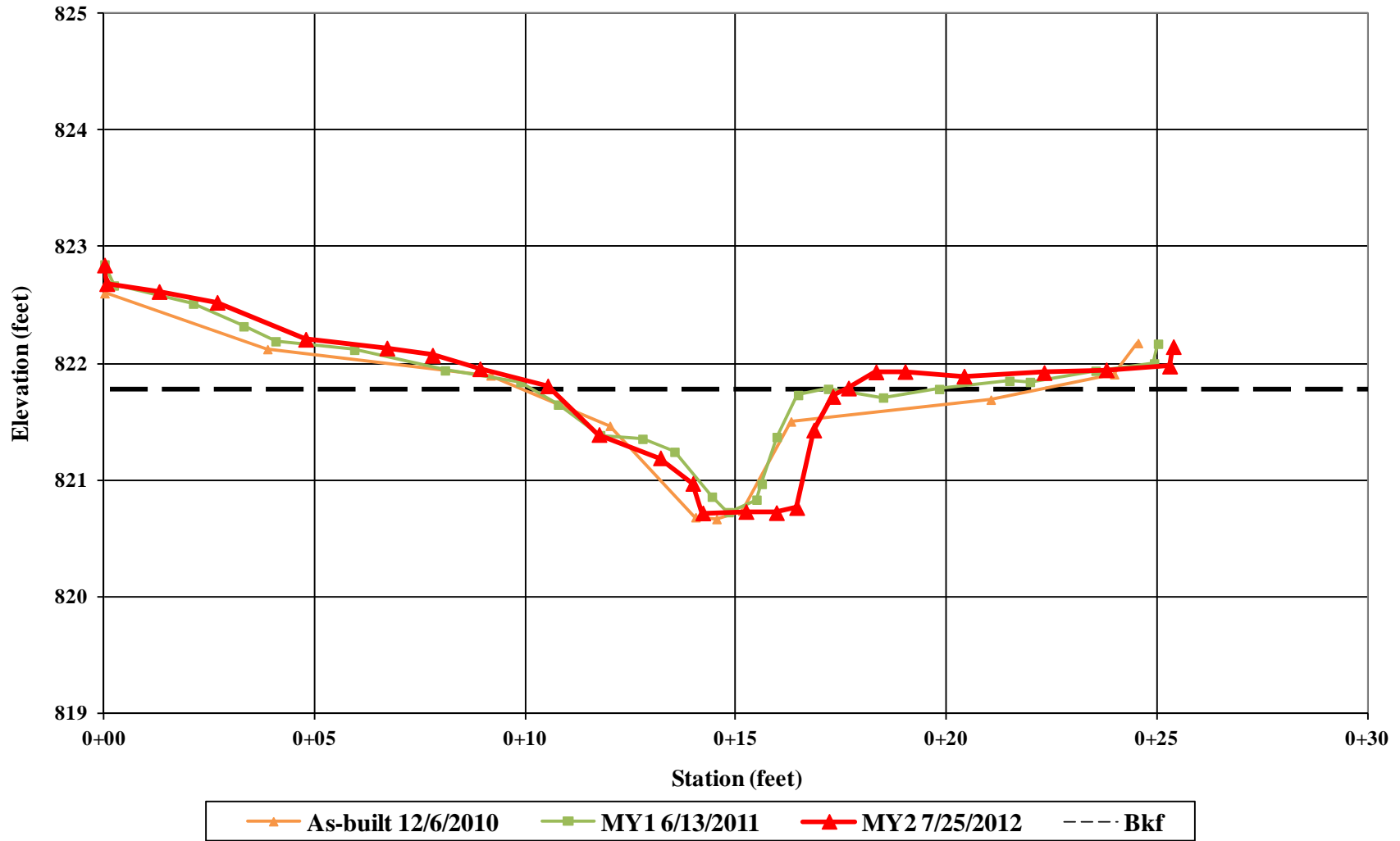


Cemetery Branch – Cross-Section 2 – Riffle
Downstream
Monitoring Year 2 – December 12, 2012



Cemetery Branch – Cross-Section 2 – Riffle
Upstream
Monitoring Year 2 – December 12, 2012

**Cemetery Branch
Cross-Section 3 - Riffle
Station 8 + 77.10**





Cemetery Branch – Cross-Section 3 – Riffle
Left Bank Descending
Monitoring Year 2 – July 25, 2012



Cemetery Branch – Cross-Section 3 – Riffle
Right Bank Descending
Monitoring Year 2 – July 25, 2012

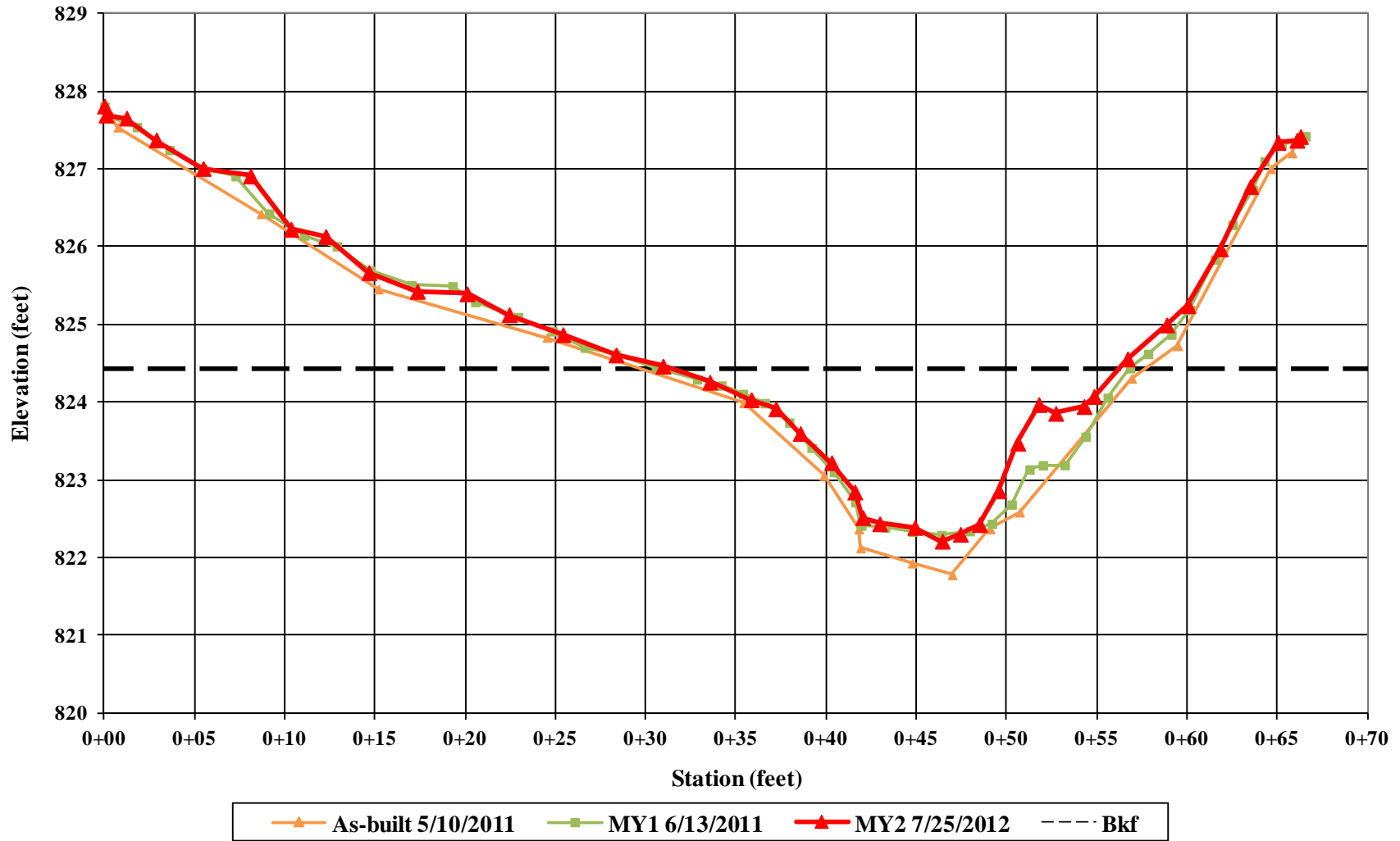


Cemetery Branch – Cross-Section 3 – Riffle
Downstream
Monitoring Year 2 – July 25, 2012



Cemetery Branch – Cross-Section 3 – Riffle
Upstream
Monitoring Year 2 – July 25, 2012

**Dye Branch - Upstream
Cross-Section 4 - Riffle
Station 1 + 15.75**





Dye Branch Upstream Reach – Cross-Section 4 – Riffle
Left Bank Descending
Monitoring Year 2 – July 25, 2012



Dye Branch Upstream Reach – Cross-Section 4 – Riffle
Right Bank Descending
Monitoring Year 2 – July 25, 2012

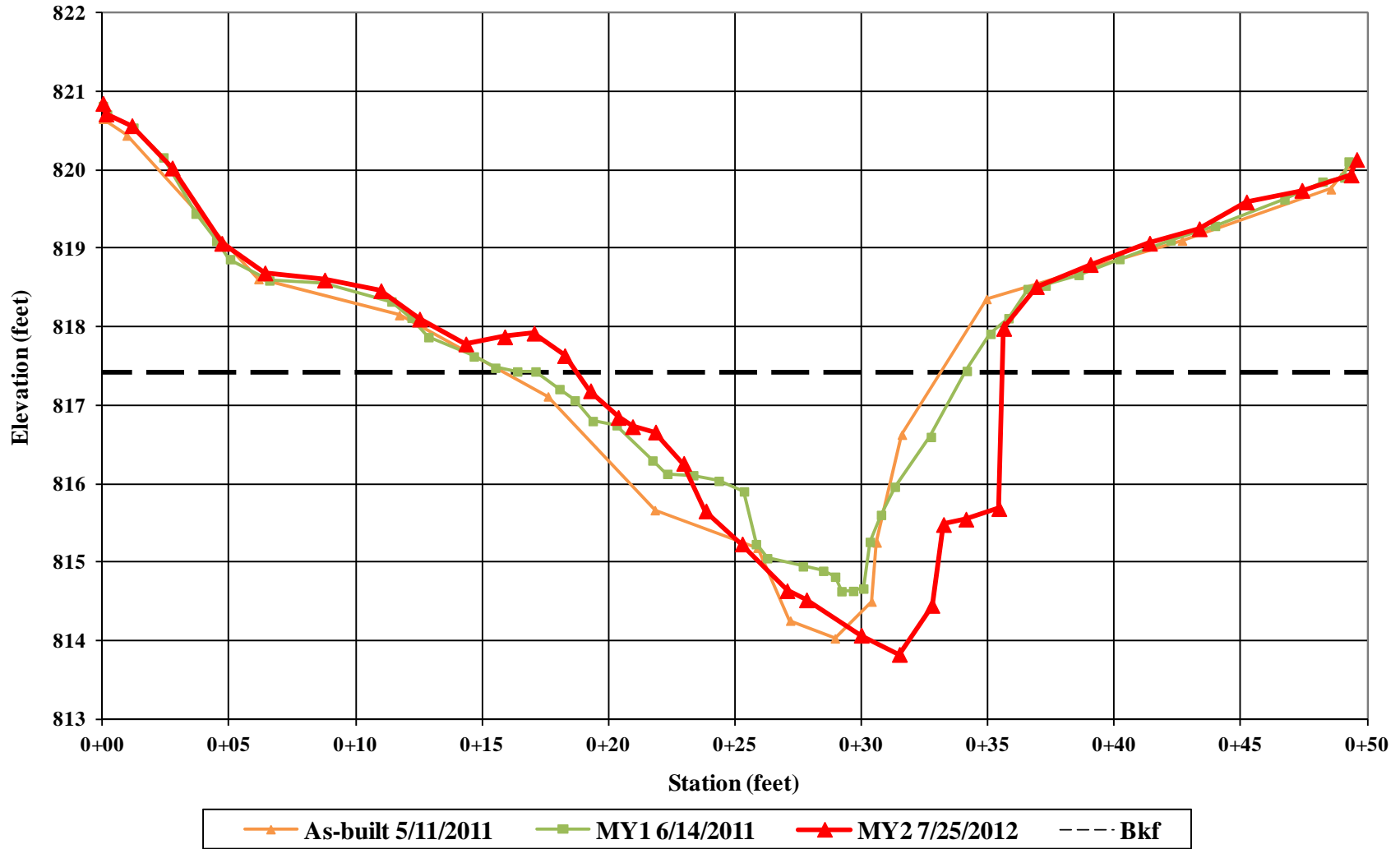


Dye Branch Upstream Reach – Cross-Section 4 – Riffle
Downstream
Monitoring Year 2 – July 25, 2012



Dye Branch Upstream Reach – Cross-Section 4 – Riffle
Upstream
Monitoring Year 2 – July 25, 2012

**Dye Branch - Upstream
Cross-Section 5 - Pool
Station 7 + 74.58**





Dye Branch Upstream Reach – Cross-Section 5 – Pool
Left Bank Descending
Monitoring Year 2 – July 25, 2012



Dye Branch Upstream Reach – Cross-Section 5 – Pool
Right Bank Descending
Monitoring Year 2 – July 25, 2012

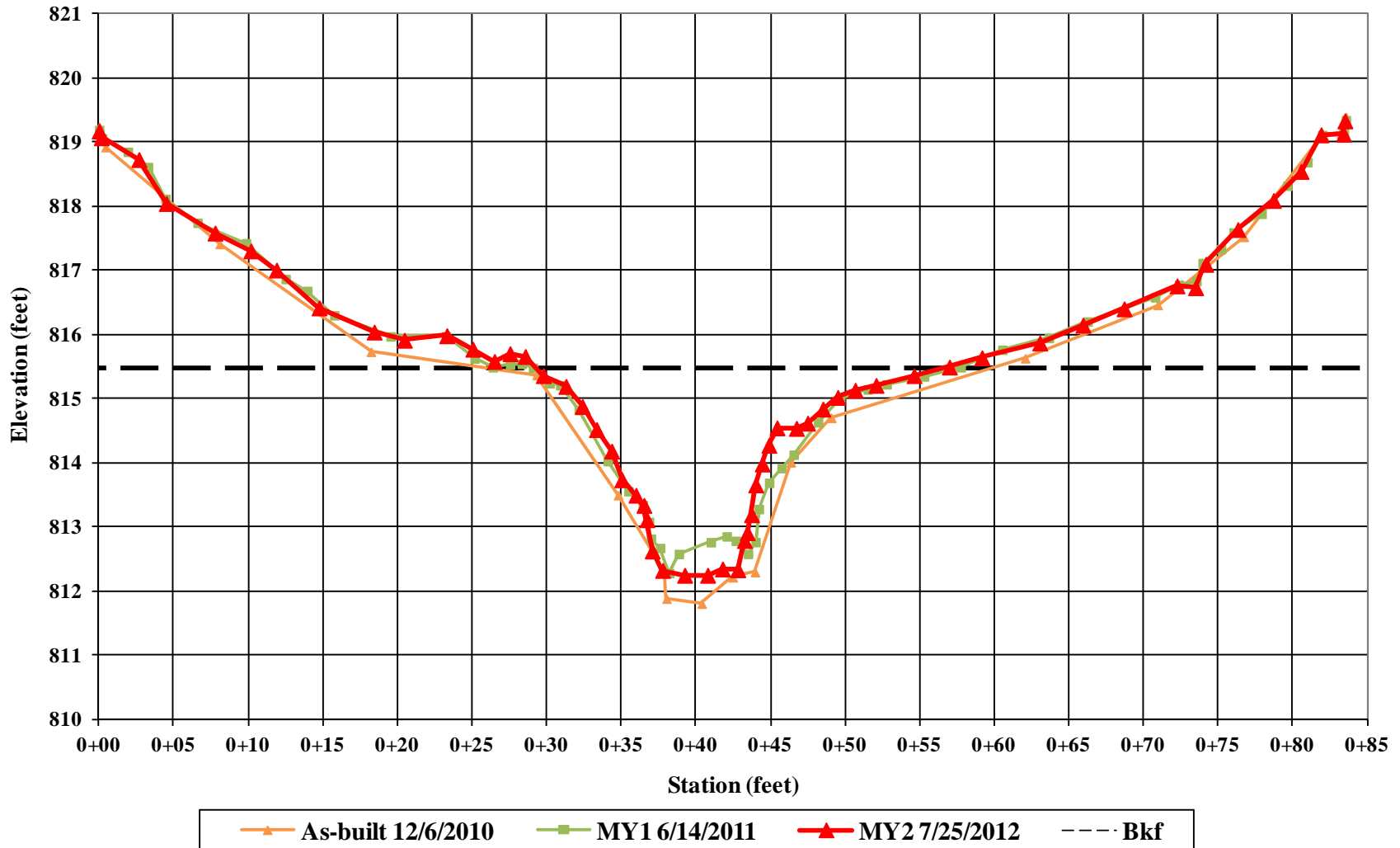


Dye Branch Upstream Reach – Cross-Section 5 – Pool
Downstream
Monitoring Year 2 – July 25, 2012



Dye Branch Upstream Reach – Cross-Section 5 – Pool
Upstream
Monitoring Year 2 – July 25, 2012

**Dye Branch - Upstream
Cross-Section 6 - Riffle
Station 10 + 75.57**





Dye Branch Upstream Reach – Cross-Section 6 – Riffle
Left Bank Descending
Monitoring Year 2 – July 25, 2012



Dye Branch Upstream Reach – Cross-Section 6 – Riffle
Right Bank Descending
Monitoring Year 2 – July 25, 2012

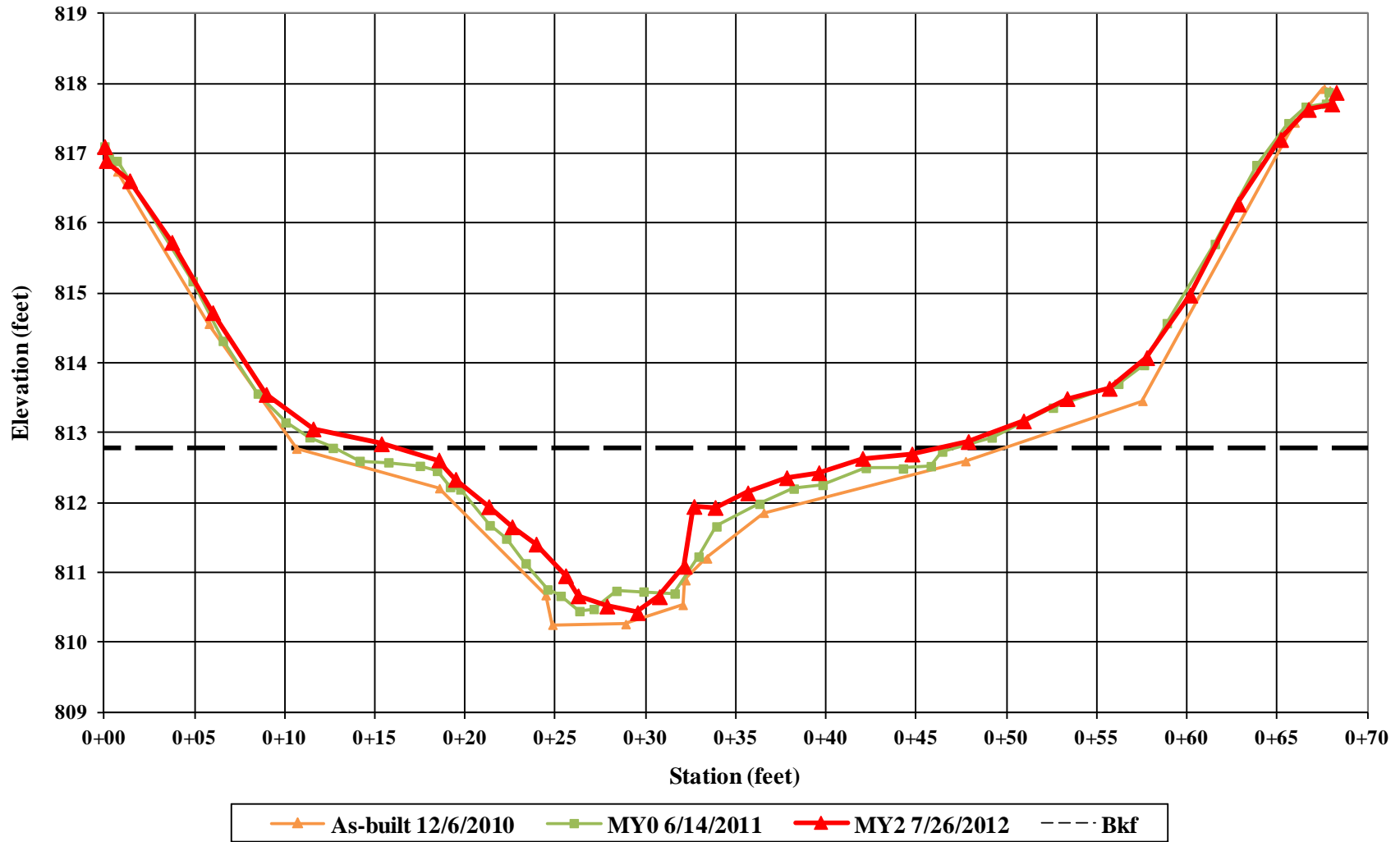


Dye Branch Upstream Reach – Cross-Section 6 – Riffle
Downstream
Monitoring Year 2 – July 25, 2012



Dye Branch Upstream Reach – Cross-Section 6 – Riffle
Upstream
Monitoring Year 2 – July 25, 2012

**Dye Branch - Upstream
Cross-Section 7 - Riffle
Station 13+ 85.87**





Dye Branch Upstream Reach – Cross-Section 7 – Riffle
Left Bank Descending
Monitoring Year 2 – July 25, 2012



Dye Branch Upstream Reach – Cross-Section 7 – Riffle
Right Bank Descending
Monitoring Year 2 – July 25, 2012

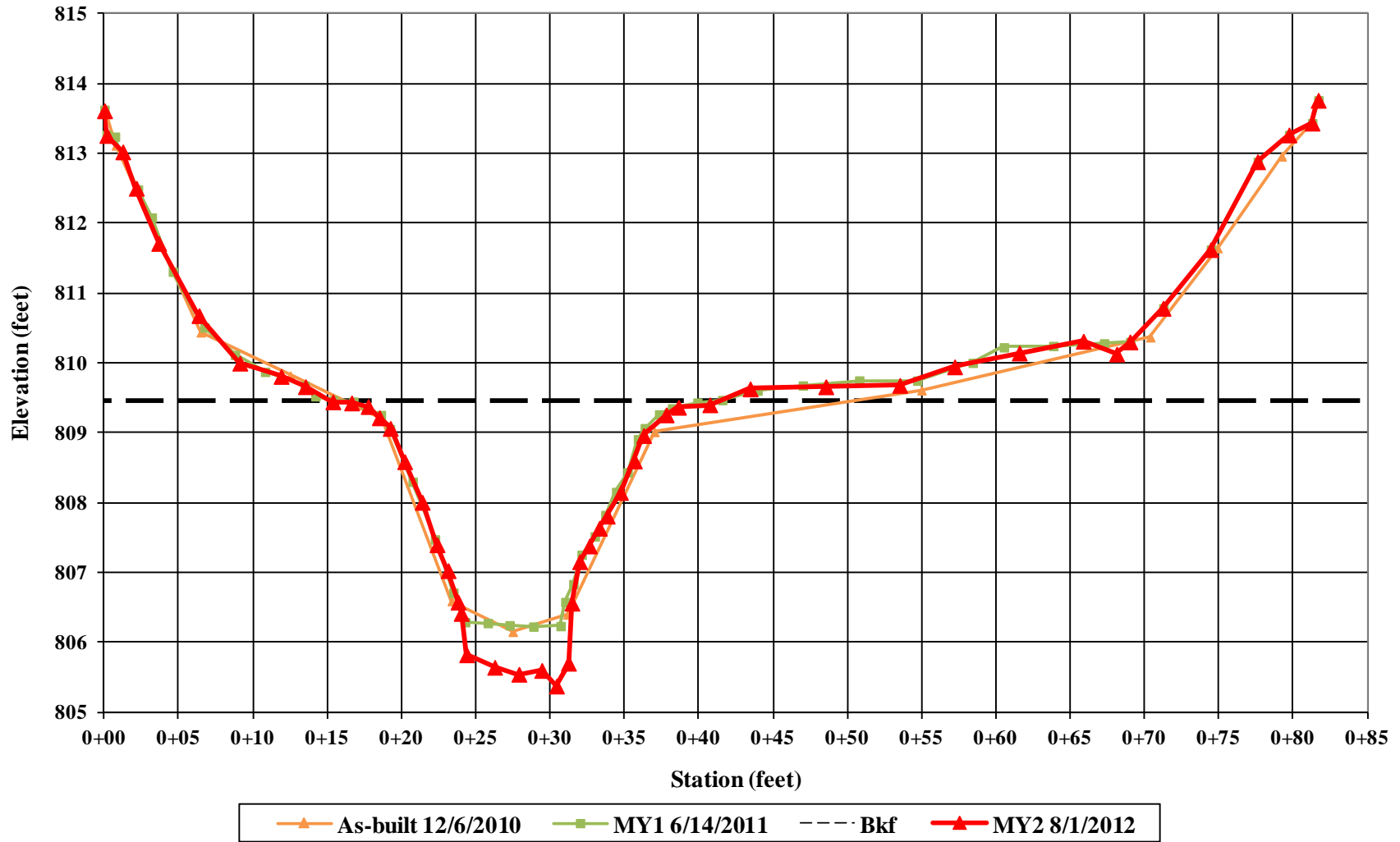


Dye Branch Upstream Reach – Cross-Section 7 – Riffle
Downstream
Monitoring Year 2 – July 25, 2012



Dye Branch Upstream Reach – Cross-Section 7 – Riffle
Upstream
Monitoring Year 2 – July 25, 2012

**Dye Branch - Downstream
Cross-Section 8 - Riffle
Station 17 + 27.43**





Dye Branch Downstream Reach – Cross-Section 8 – Riffle
Left Bank Descending
Monitoring Year 2 – August 1, 2012



Dye Branch Downstream Reach – Cross-Section 8 – Riffle
Right Bank Descending
Monitoring Year 2 – August 1, 2012

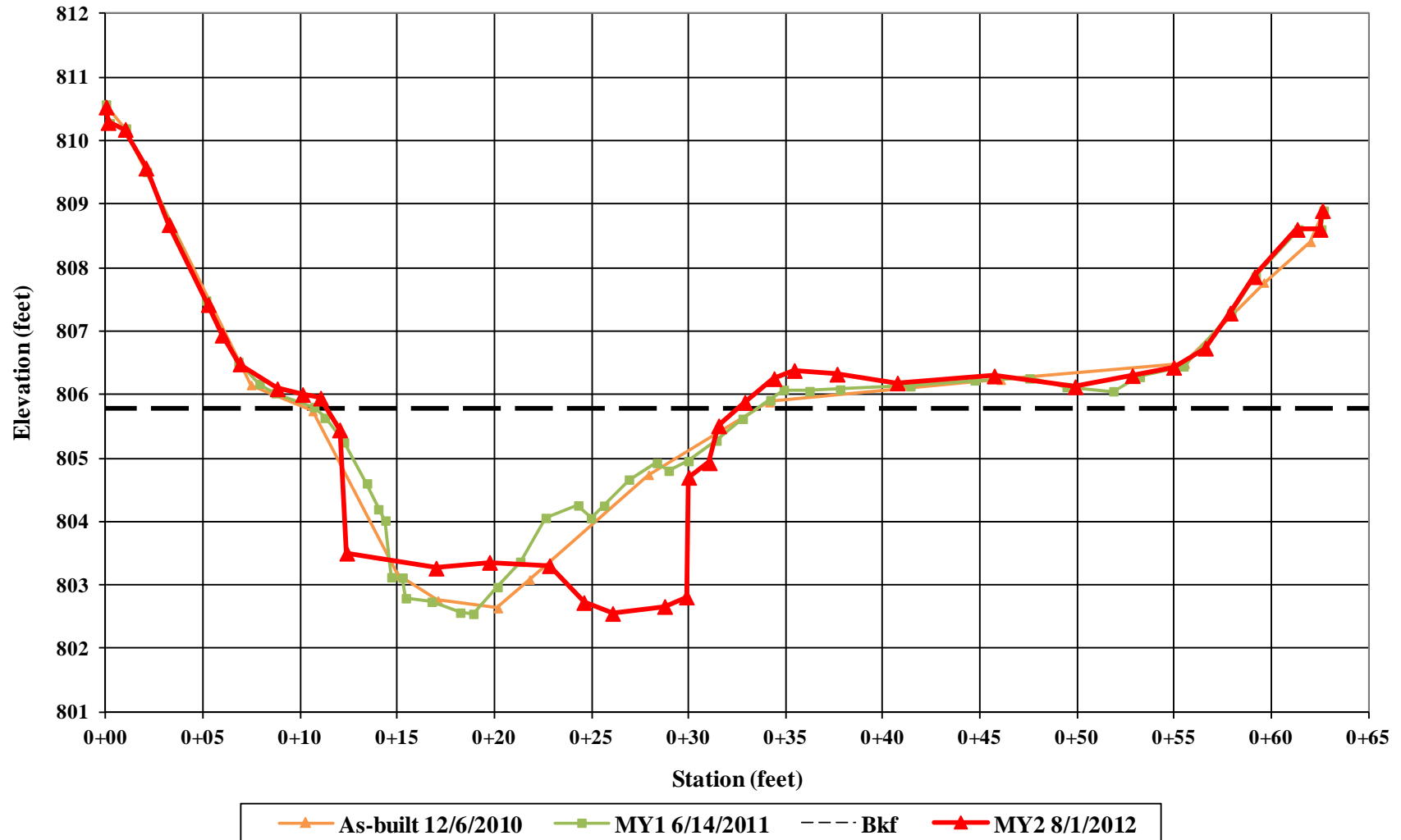


Dye Branch Downstream Reach – Cross-Section 8 – Riffle
Downstream
Monitoring Year 2 – August 1, 2012



Dye Branch Downstream Reach – Cross-Section 8 – Riffle
Upstream
Monitoring Year 2 – August 1, 2012

**Dye Branch - Downstream
Cross-Section 9 - Pool
Station 19 + 80.80**





Dye Branch Downstream Reach – Cross-Section 9 – Pool
Left Bank Descending
Monitoring Year 2 – August 1, 2012



Dye Branch Downstream Reach – Cross-Section 9 – Pool
Right Bank Descending
Monitoring Year 2 – August 1, 2012

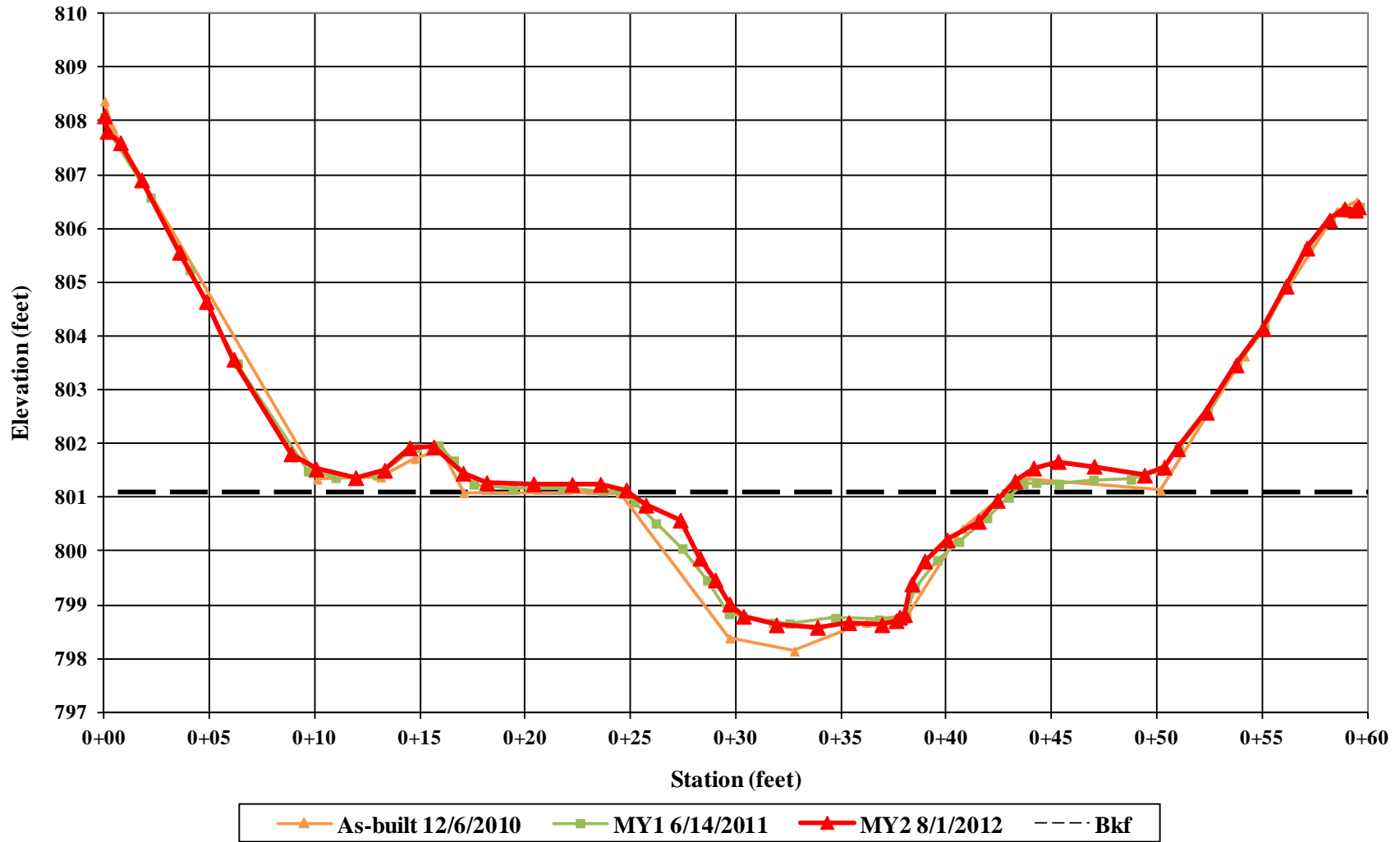


Dye Branch Downstream Reach – Cross-Section 9 – Pool
Downstream
Monitoring Year 2 – August 1, 2012



Dye Branch Downstream Reach – Cross-Section 9 – Pool
Upstream
Monitoring Year 2 – August 1, 2012

**Dye Branch - Downstream
Cross-Section 10 - Riffle
Station 24 + 85.22**





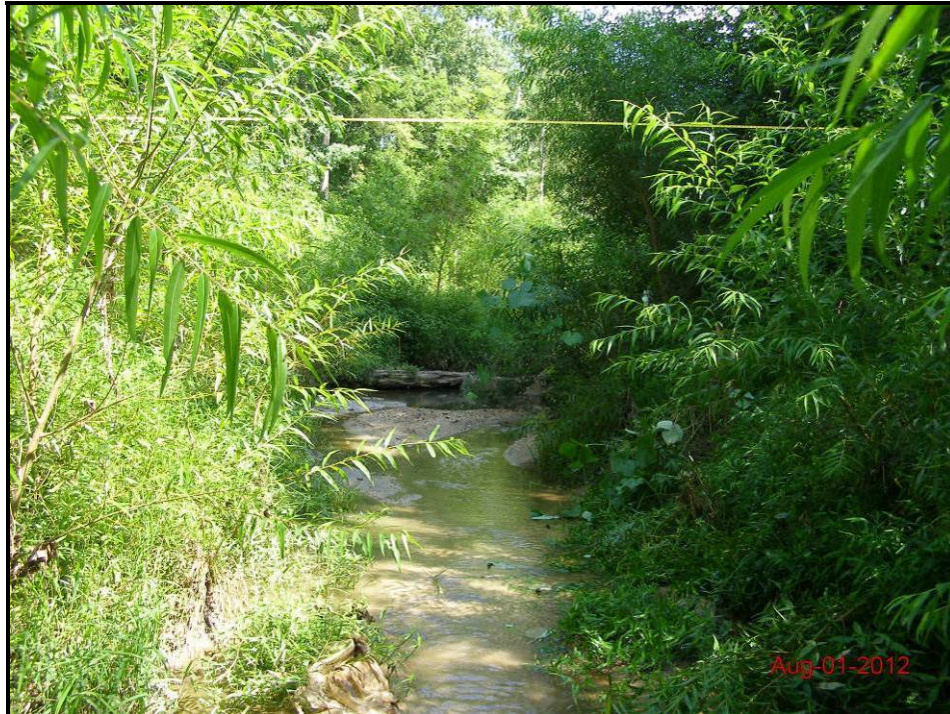
Dye Branch Downstream Reach – Cross-Section 10 – Riffle
Left Bank Descending
Monitoring Year 2 – August 1, 2012



Dye Branch Downstream Reach – Cross-Section 10 – Riffle
Right Bank Descending
Monitoring Year 2 – August 1, 2012



Dye Branch Downstream Reach – Cross-Section 10 – Riffle
Downstream
Monitoring Year 2 – August 1, 2012



Dye Branch Downstream Reach – Cross-Section 10 – Riffle
Upstream
Monitoring Year 2 – August 1, 2012

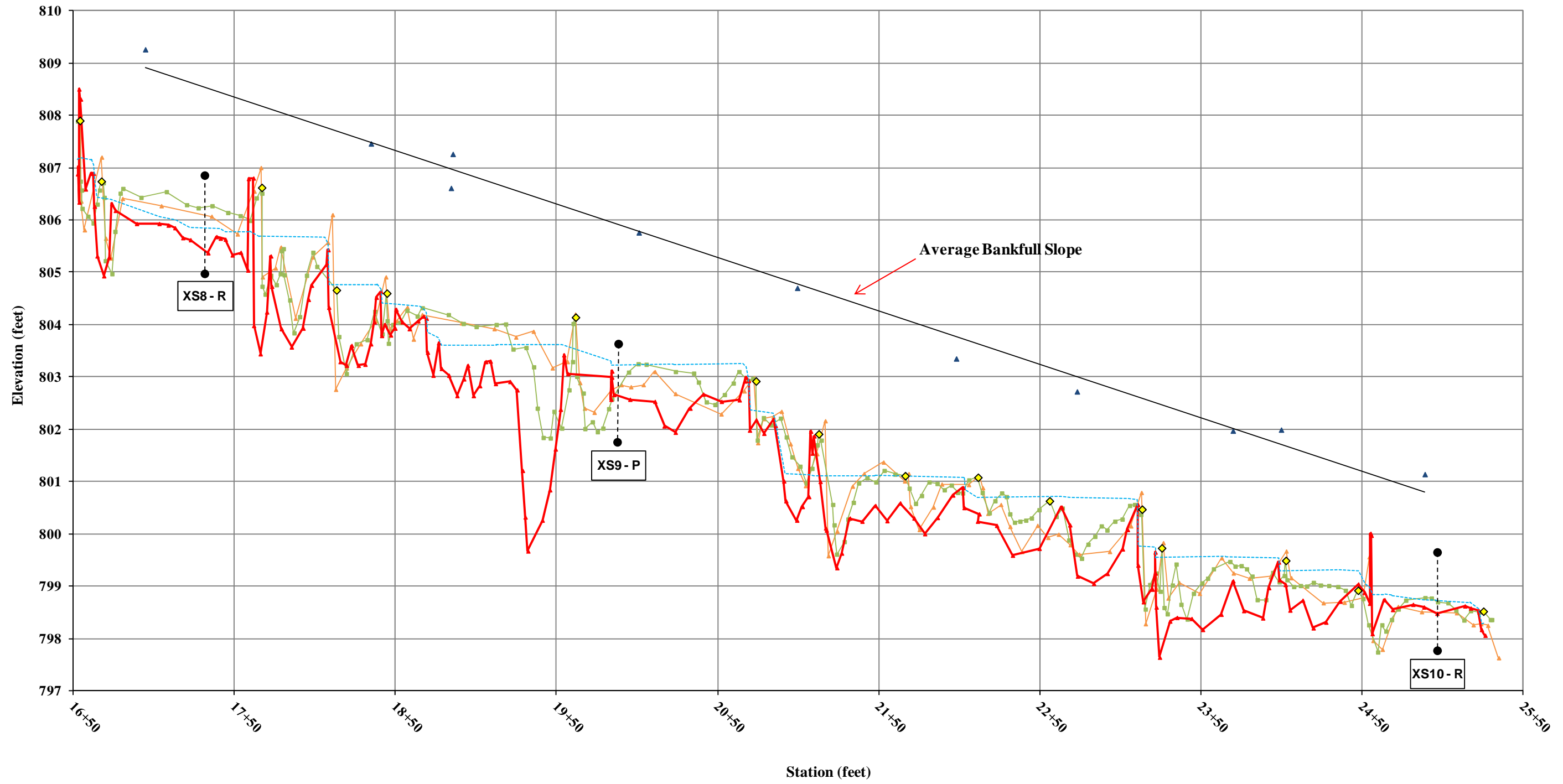
**Cemetery Branch
Longitudinal Profile
0+00 to 9+89.93**



Dye Branch - Upstream Longitudinal Profile 0+30.36 to 15+03.3

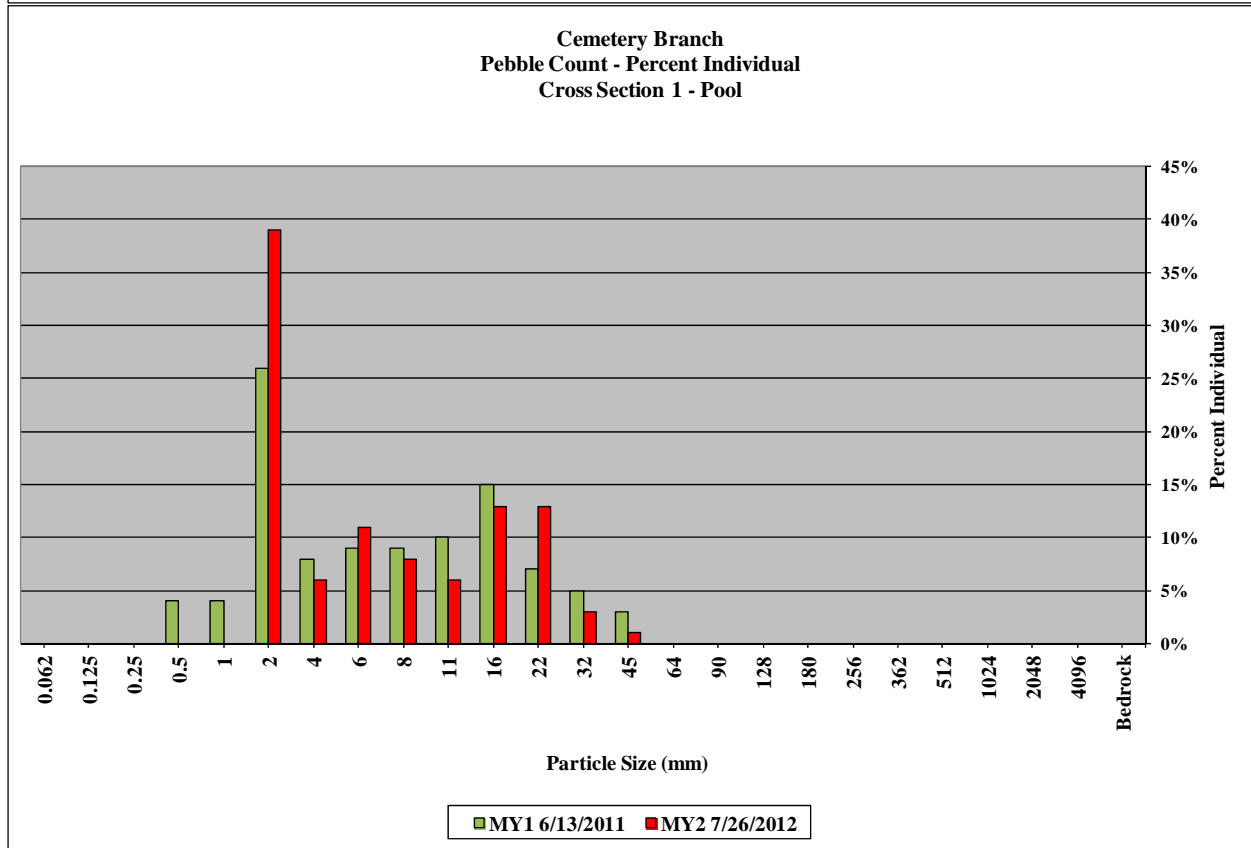
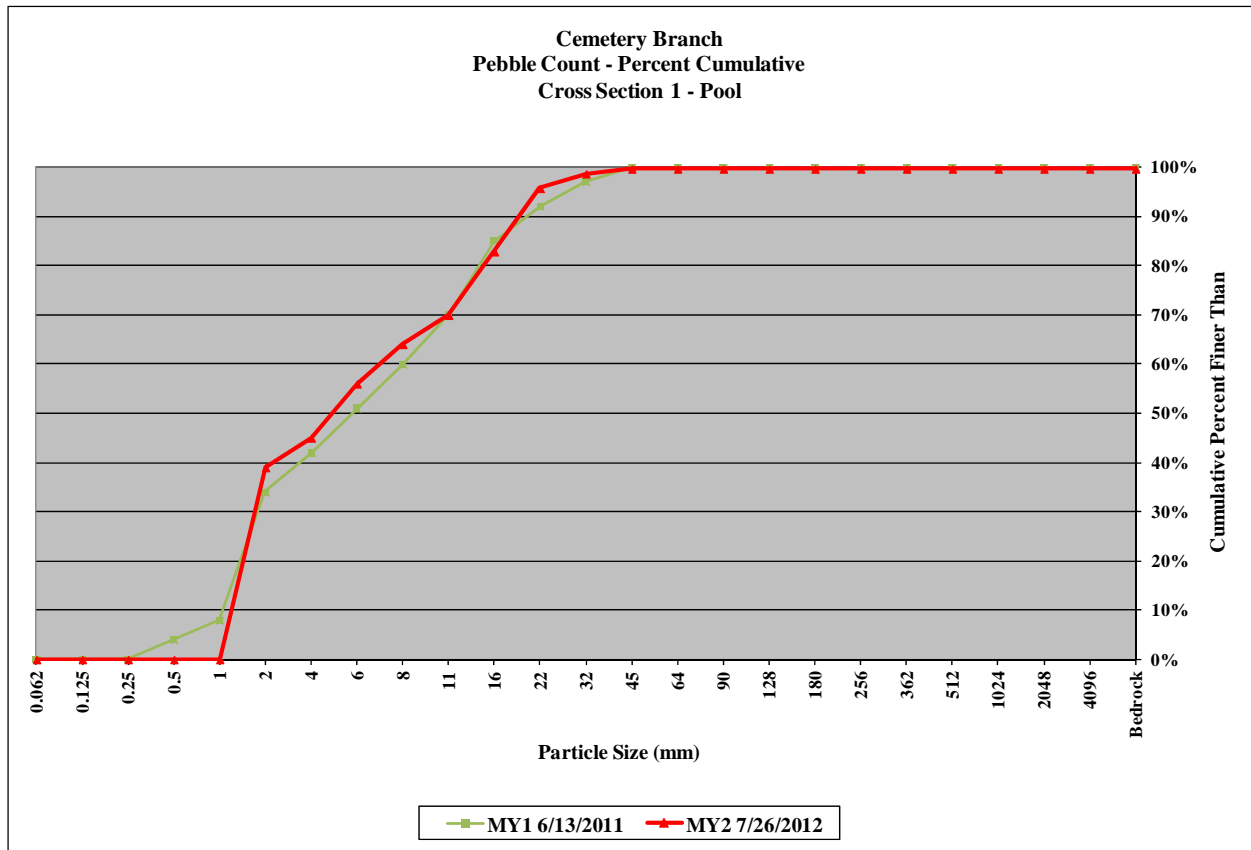


**Dye Branch - Downstream
Longitudinal Profile
16+52.72 to 25+34.71**



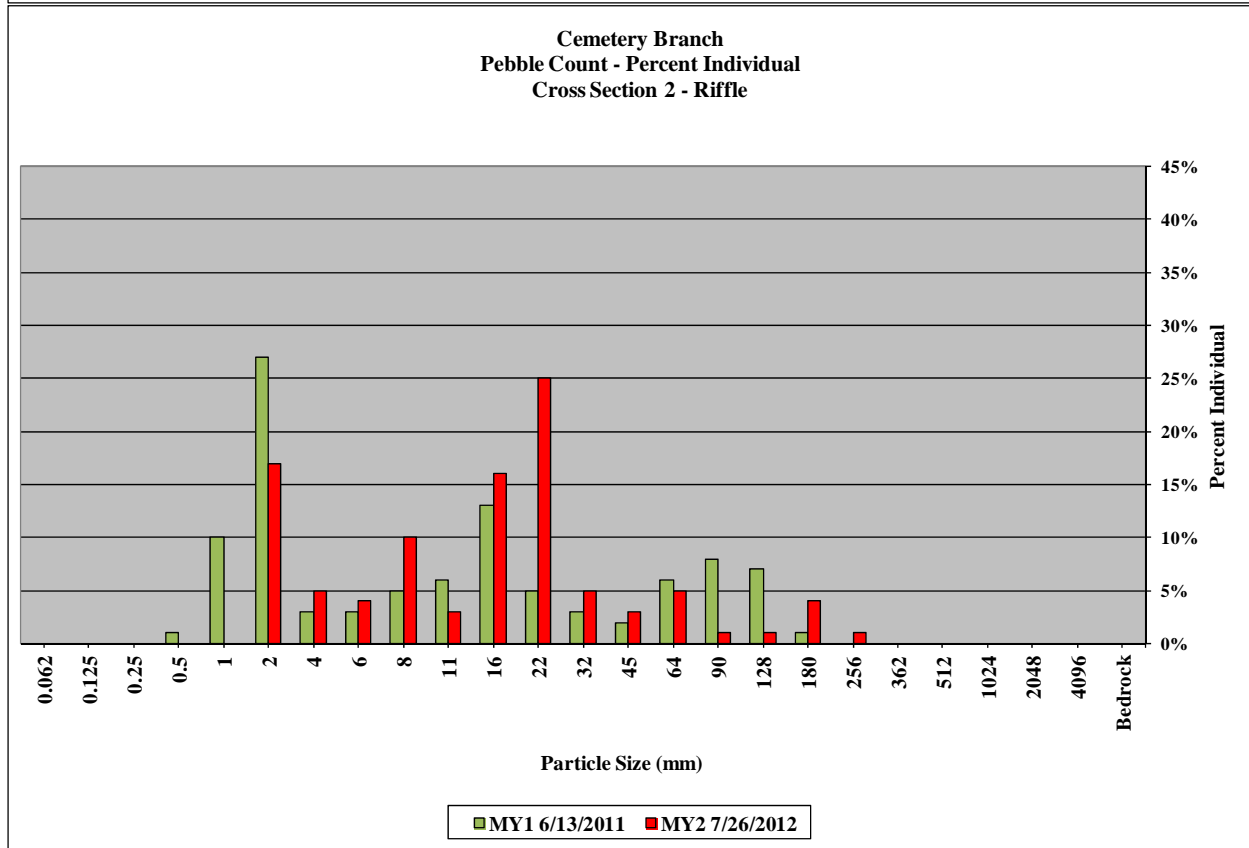
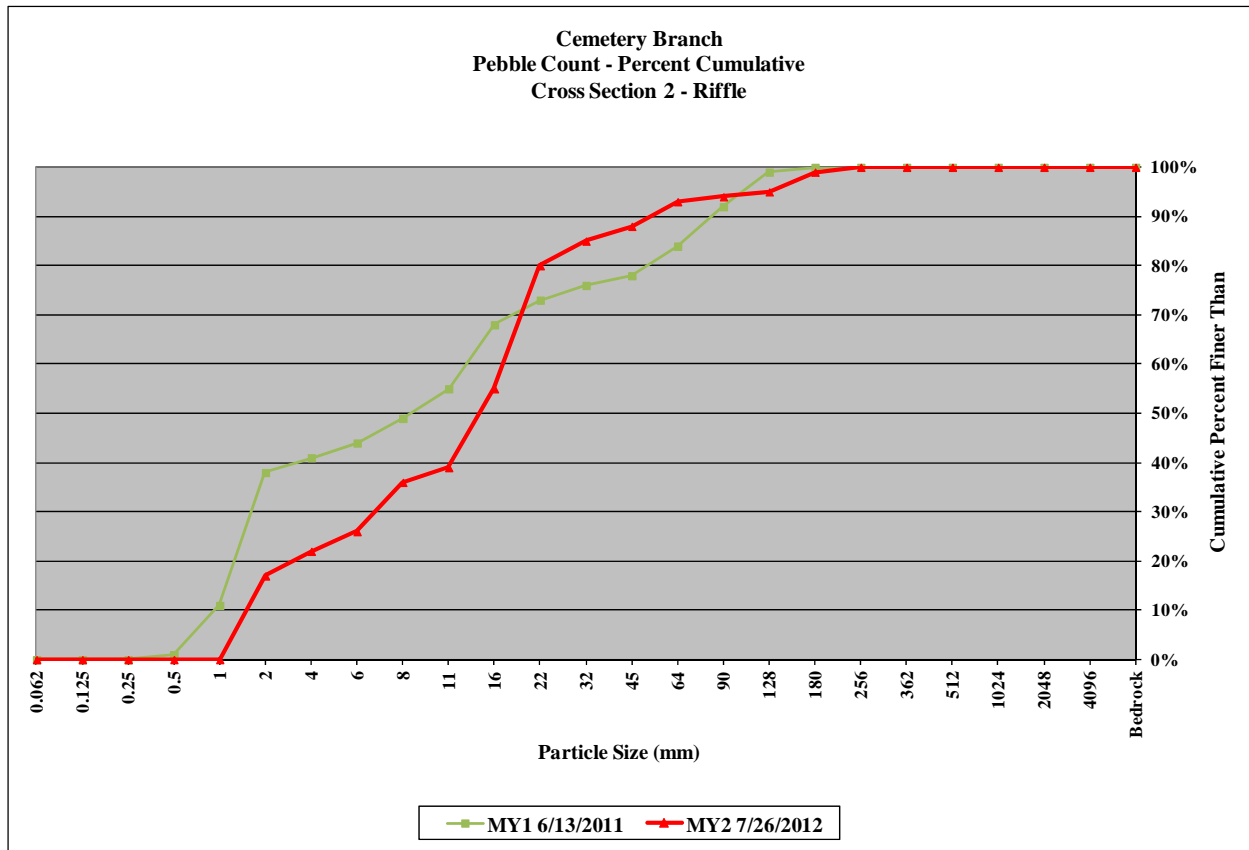
Dye Branch II / Project No. 92255					
Cemetery Branch - Cross-Section 1 - Pool					
Pebble Count Summary					
			Monitoring Year 2		
Description	Material	Size (mm)	Total #	Item %	Cum %
Silt/Clay	silt/clay	0.062	0	0%	0%
Sand	very fine sand	0.125	0	0%	0%
	fine sand	0.25	0	0%	0%
	medium sand	0.50	0	0%	0%
	coarse sand	1.00	0	0%	0%
	very coarse sand	2.00	39	39%	39%
Gravel	very fine gravel	4.0	6	6%	45%
	fine gravel	5.7	11	11%	56%
	fine gravel	8.0	8	8%	64%
	medium gravel	11.3	6	6%	70%
	medium gravel	16.0	13	13%	83%
	coarse gravel	22.3	13	13%	96%
	coarse gravel	32	3	3%	99%
	very coarse gravel	45	1	1%	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%
	very large boulder	4096	0	0%	100%
Bedrock	bedrock	>4096	0	0%	100%
TOTALS			100	100%	100%

Summary Data	
D50	4.8
D84	16
D95	21



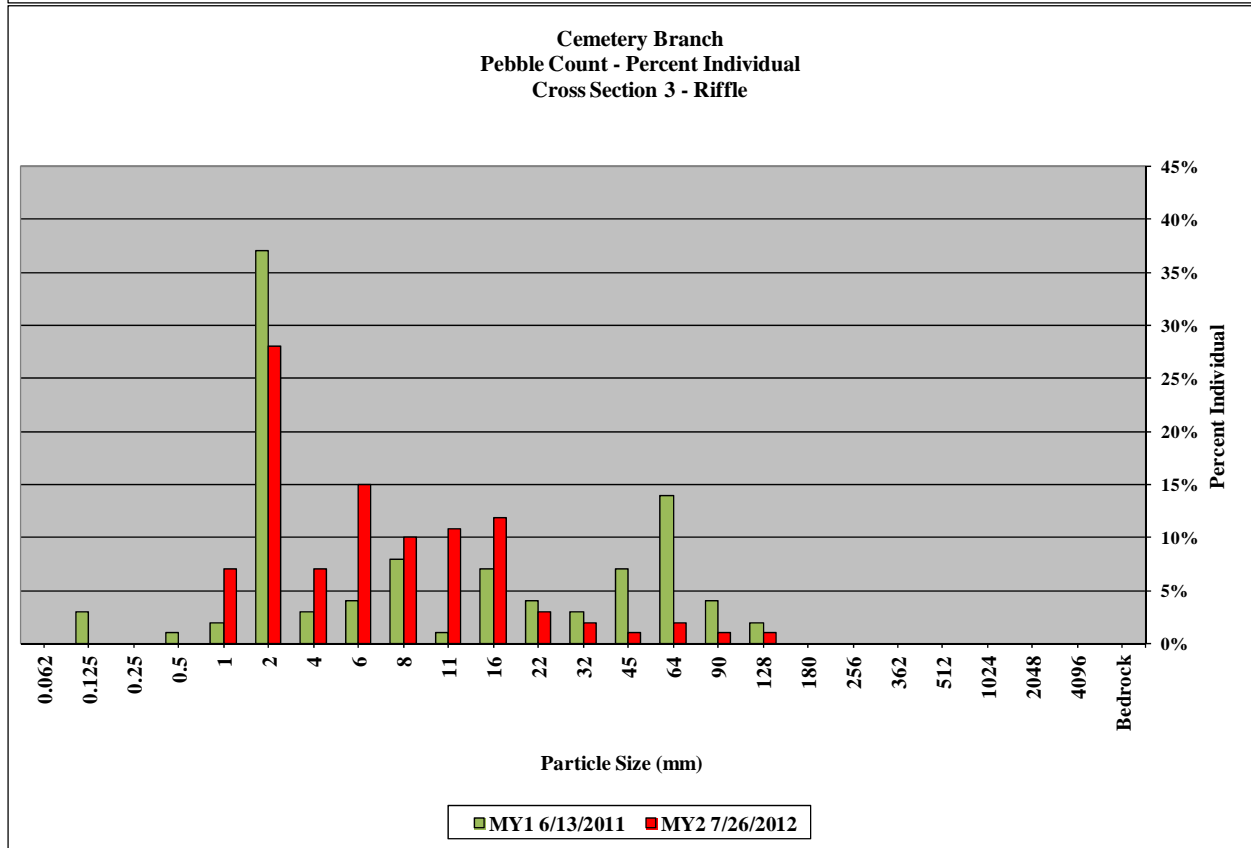
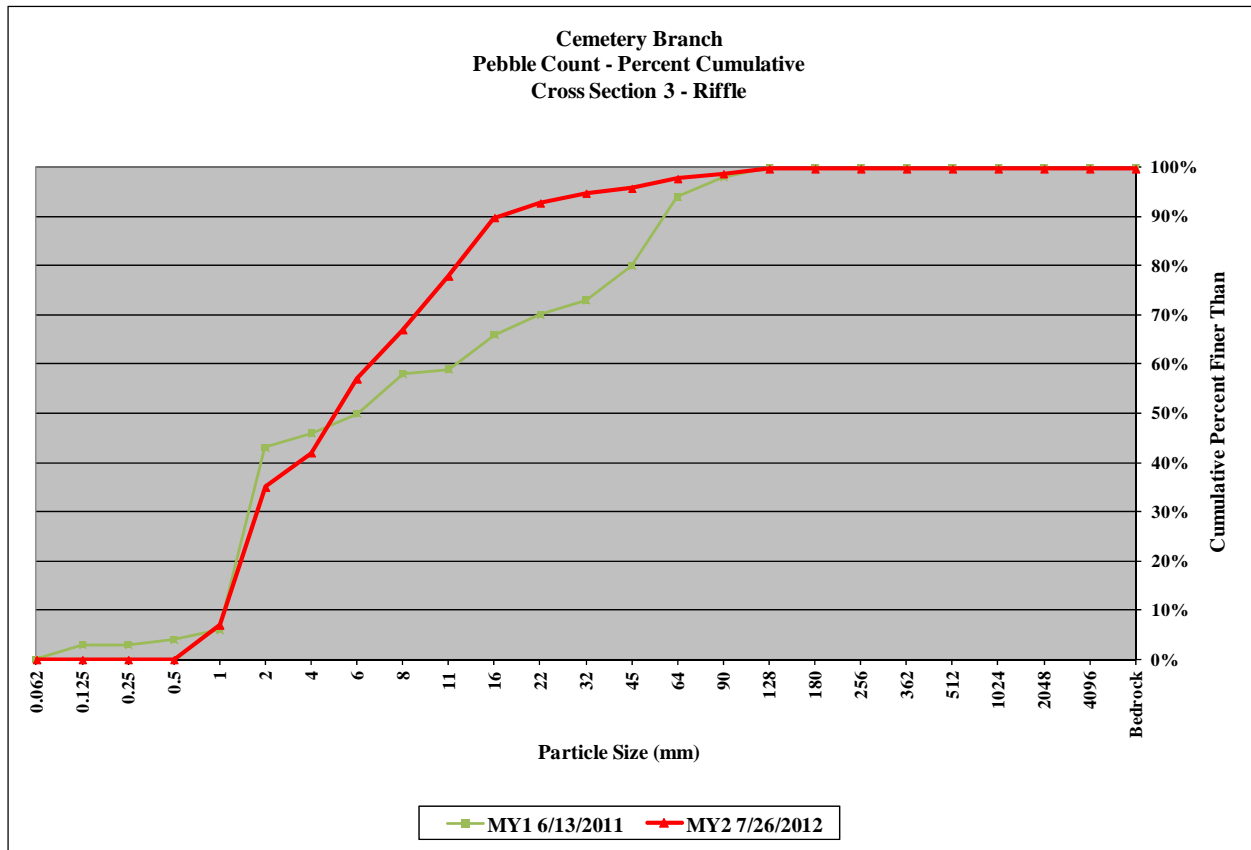
Dye Branch II / Project No. 92255					
Cemetery Branch - Cross-Section 2 - Riffle					
Pebble Count Summary					
			Monitoring Year 2		
Description	Material	Size (mm)	Total #	Item %	Cum %
Silt/Clay	silt/clay	0.062	0	0%	0%
Sand	very fine sand	0.125	0	0%	0%
	fine sand	0.25	0	0%	0%
	medium sand	0.50	0	0%	0%
	coarse sand	1.00	0	0%	0%
	very coarse sand	2.00	17	17%	17%
Gravel	very fine gravel	4.0	5	5%	22%
	fine gravel	5.7	4	4%	26%
	fine gravel	8.0	10	10%	36%
	medium gravel	11.3	3	3%	39%
	medium gravel	16.0	16	16%	55%
	coarse gravel	22.3	25	25%	80%
	coarse gravel	32	5	5%	85%
	very coarse gravel	45	3	3%	88%
	very coarse gravel	64	5	5%	93%
Cobble	small cobble	90	1	1%	94%
	medium cobble	128	1	1%	95%
	large cobble	180	4	4%	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%
	very large boulder	4096	0	0%	100%
Bedrock	bedrock	>4096	0	0%	100%
TOTALS			100	100%	100%

Summary Data	
D50	14
D84	30
D95	130



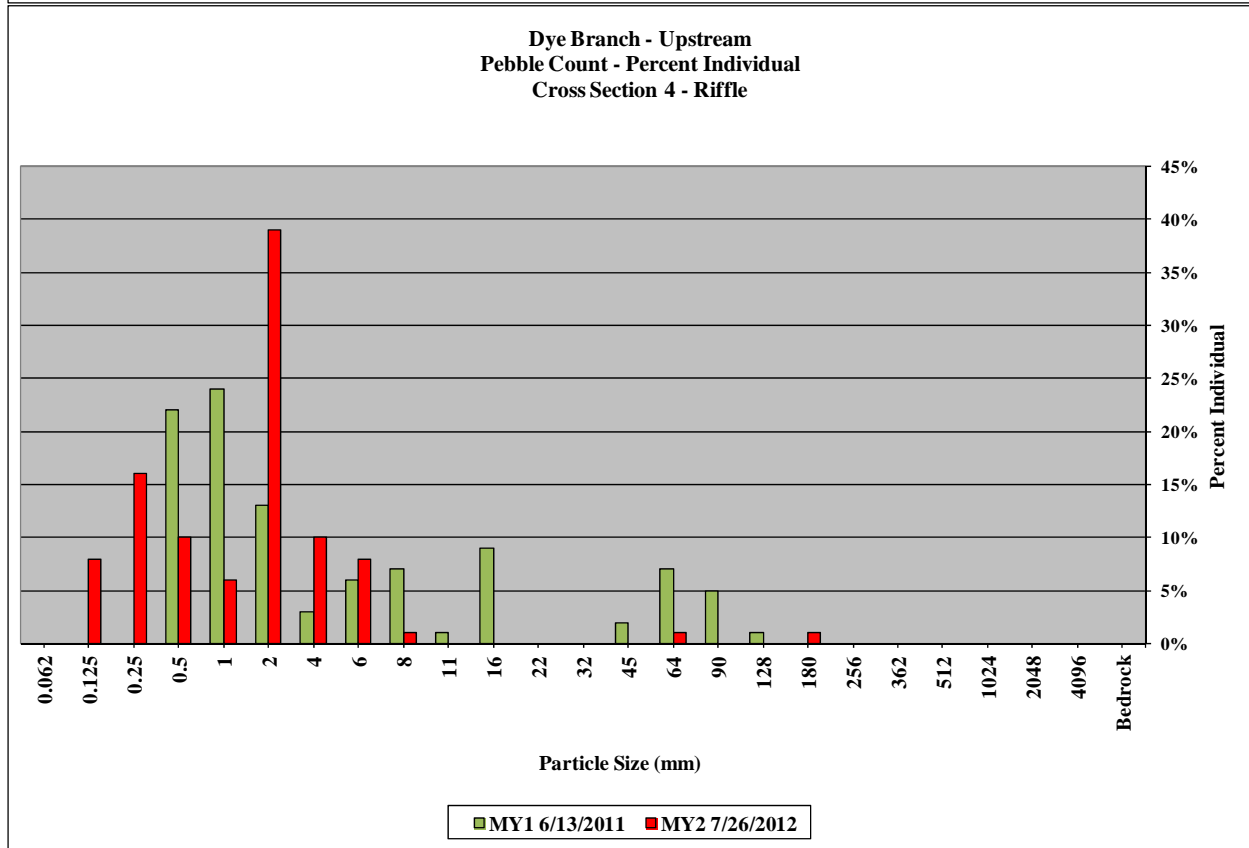
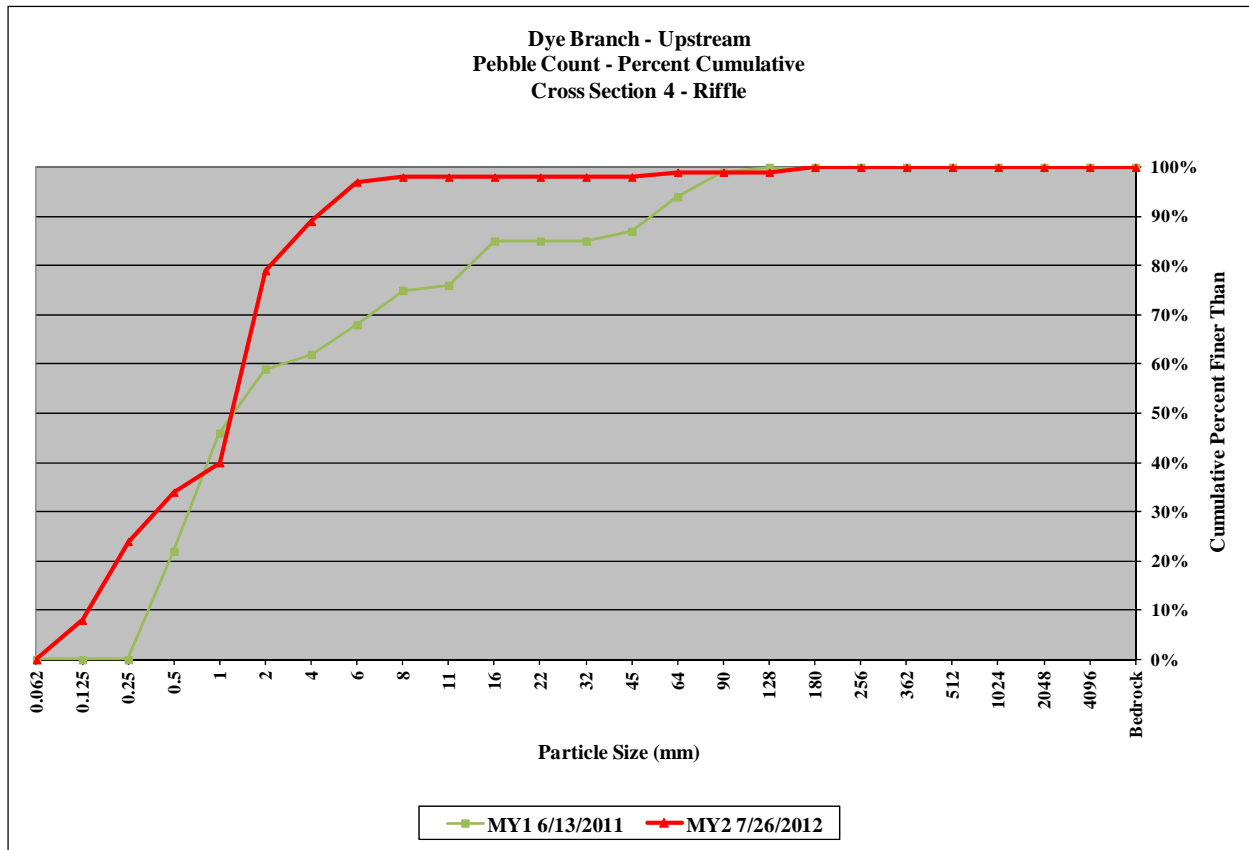
Dye Branch II / Project No. 92255					
Cemetery Branch - Cross-Section 3 - Riffle					
Pebble Count Summary					
			Monitoring Year 2		
Description	Material	Size (mm)	Total #	Item %	Cum %
Silt/Clay	silt/clay	0.062	0	0%	0%
Sand	very fine sand	0.125	0	0%	0%
	fine sand	0.25	0	0%	0%
	medium sand	0.50	0	0%	0%
	coarse sand	1.00	7	7%	7%
	very coarse sand	2.00	28	28%	35%
Gravel	very fine gravel	4.0	7	7%	42%
	fine gravel	5.7	15	15%	57%
	fine gravel	8.0	10	10%	67%
	medium gravel	11.3	11	11%	78%
	medium gravel	16.0	12	12%	90%
	coarse gravel	22.3	3	3%	93%
	coarse gravel	32	2	2%	95%
	very coarse gravel	45	1	1%	96%
	very coarse gravel	64	2	2%	98%
Cobble	small cobble	90	1	1%	99%
	medium cobble	128	1	1%	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%
	very large boulder	4096	0	0%	100%
Bedrock	bedrock	>4096	0	0%	100%
TOTALS			100	100%	100%

Summary Data	
D50	5
D84	13
D95	32



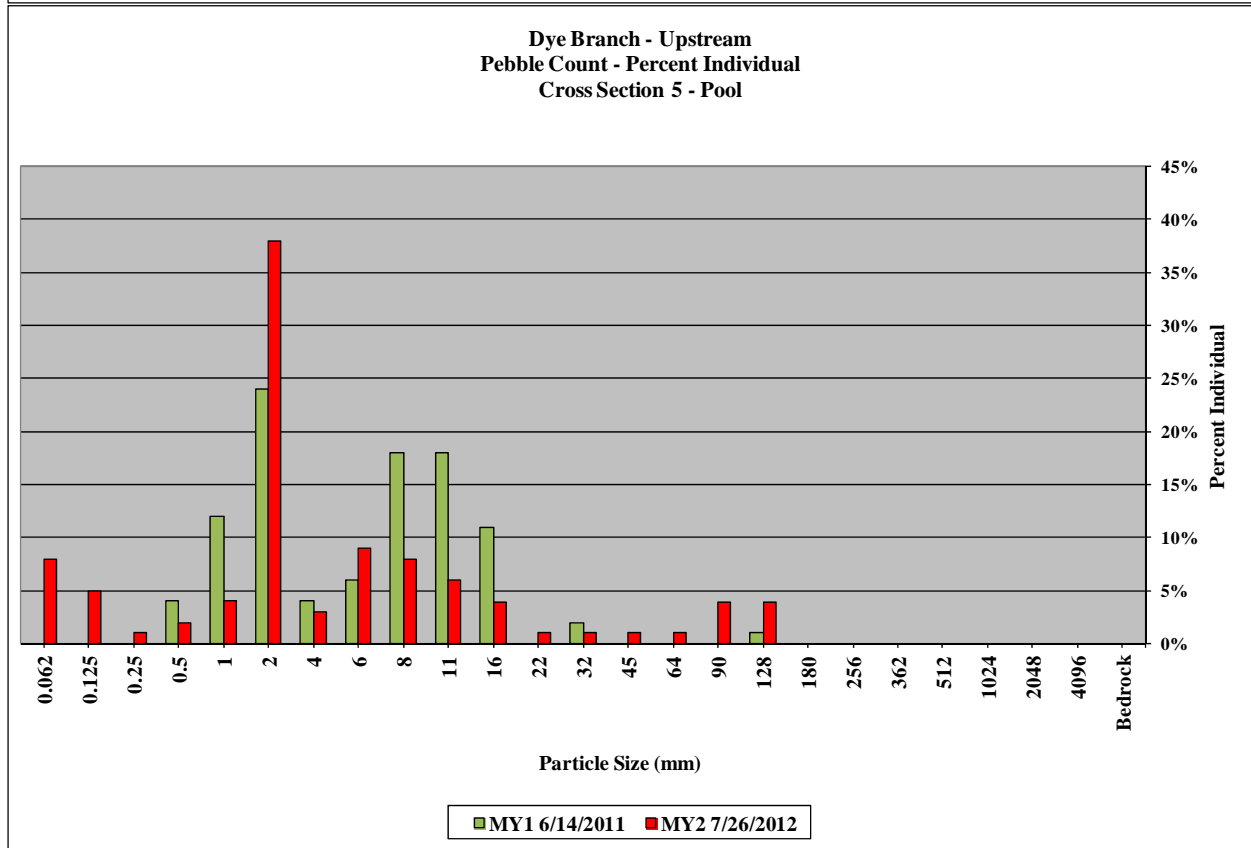
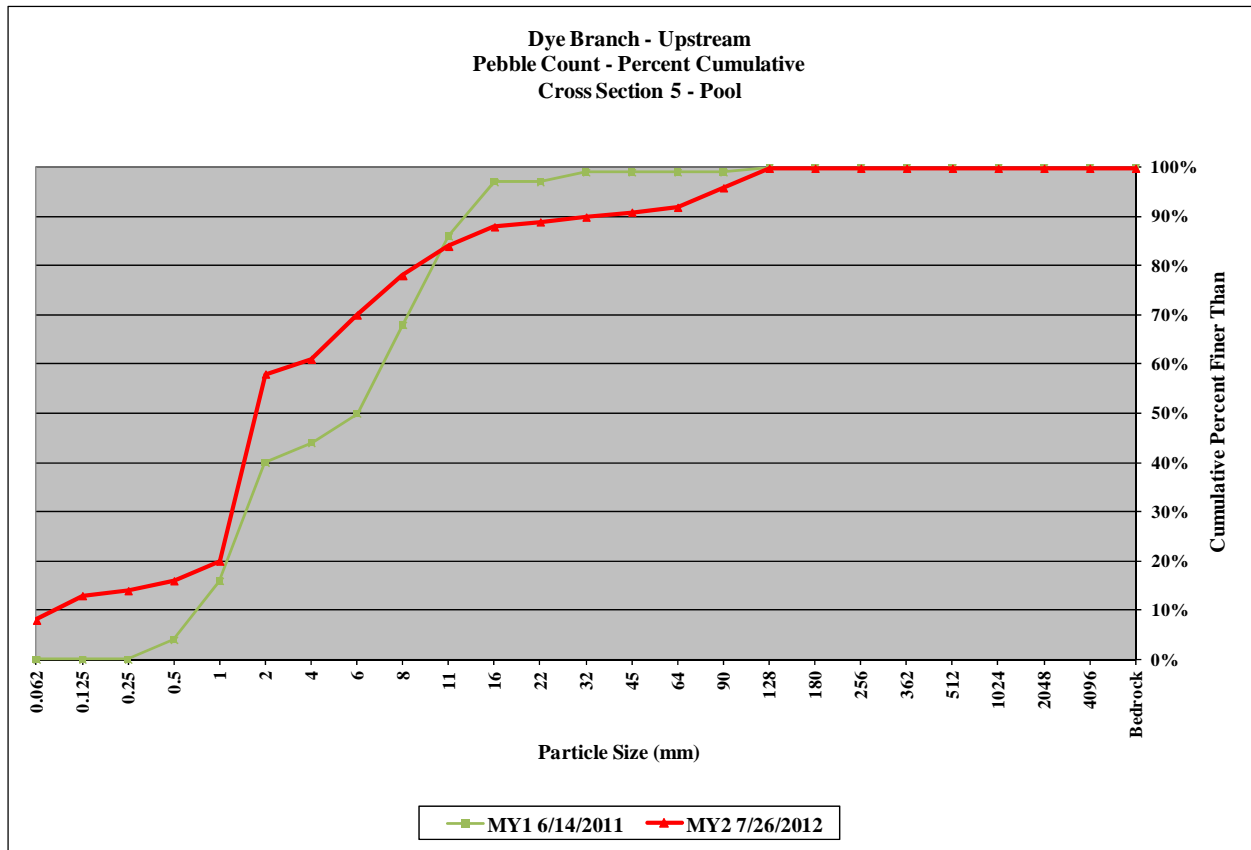
Dye Branch II / Project No. 92255					
Dye Branch - Upstream - Cross-Section 4 - Riffle					
Pebble Count Summary					
			Monitoring Year 1		
Description	Material	Size (mm)	Total #	Item %	Cum %
Silt/Clay	silt/clay	0.062	0	0%	0%
Sand	very fine sand	0.125	8	8%	8%
	fine sand	0.25	16	16%	24%
	medium sand	0.50	10	10%	34%
	coarse sand	1.00	6	6%	40%
	very coarse sand	2.00	39	39%	79%
Gravel	very fine gravel	4.0	10	10%	89%
	fine gravel	5.7	8	8%	97%
	fine gravel	8.0	1	1%	98%
	medium gravel	11.3	0	0%	98%
	medium gravel	16.0	0	0%	98%
	coarse gravel	22.3	0	0%	98%
	coarse gravel	32	0	0%	98%
	very coarse gravel	45	0	0%	98%
	very coarse gravel	64	1	1%	99%
Cobble	small cobble	90	0	0%	99%
	medium cobble	128	0	0%	99%
	large cobble	180	1	1%	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%
	very large boulder	4096	0	0%	100%
Bedrock	bedrock	>4096	0	0%	100%
TOTALS			100	100%	100%

Summary Data	
D50	1.2
D84	2.8
D95	5.4



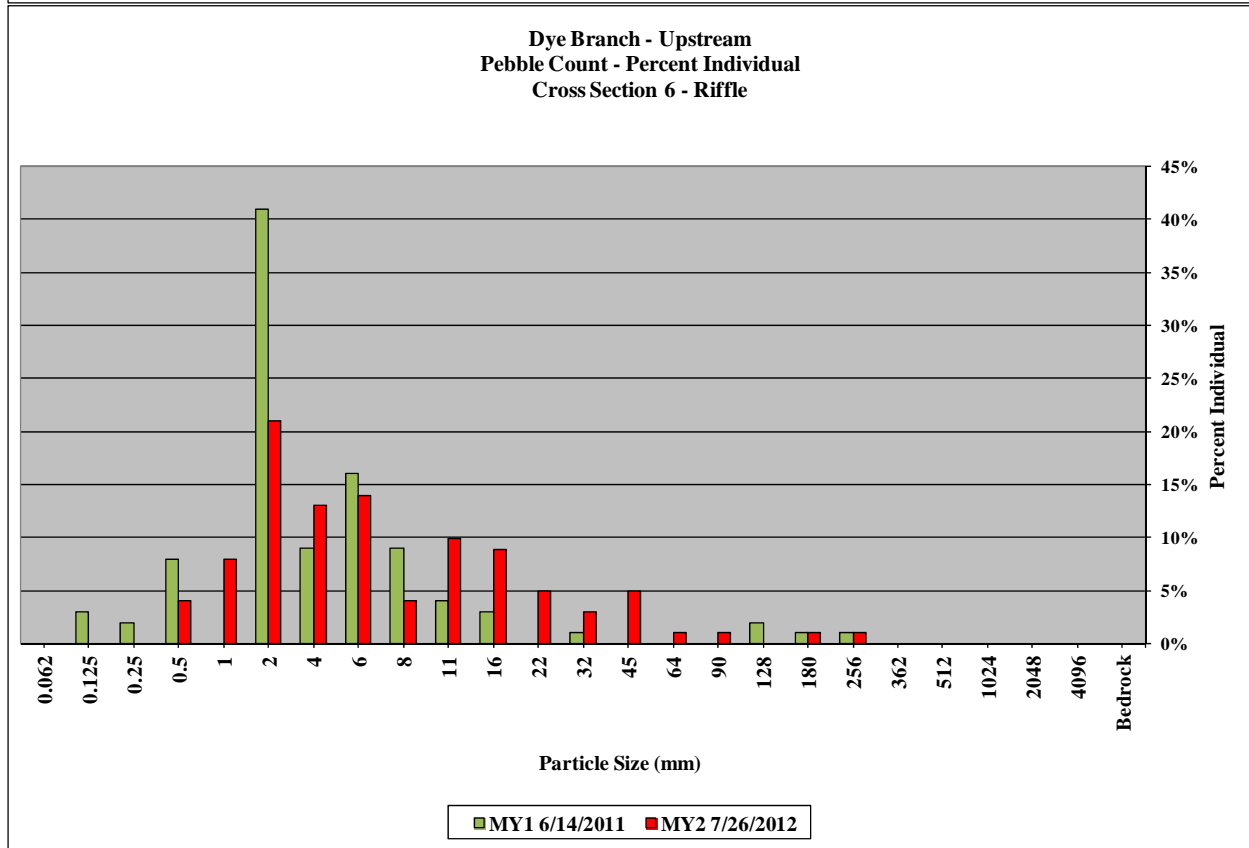
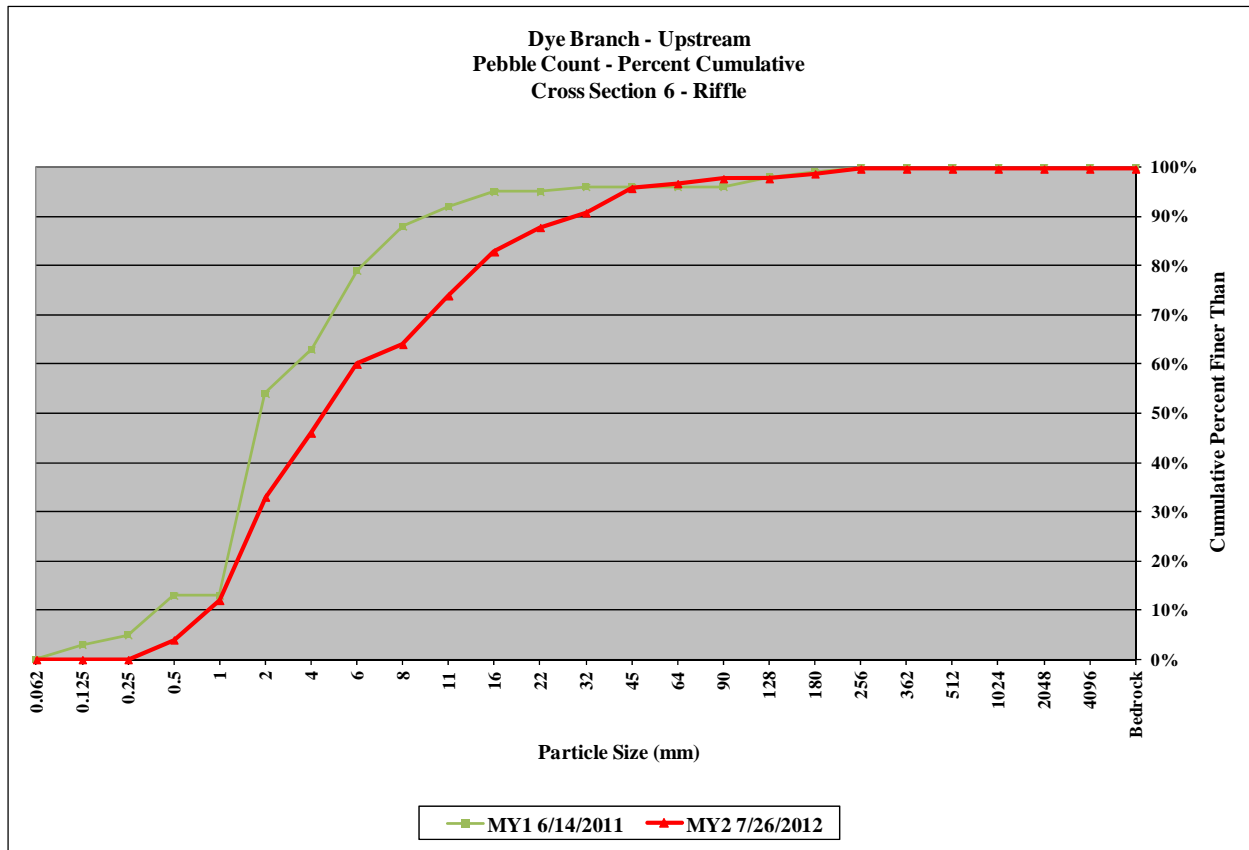
Dye Branch II / Project No. 92255					
Dye Branch - Upstream - Cross-Section 5 - Pool					
Pebble Count Summary					
			Monitoring Year 2		
Description	Material	Size (mm)	Total #	Item %	Cum %
Silt/Clay	silt/clay	0.062	8	8%	8%
Sand	very fine sand	0.125	5	5%	13%
	fine sand	0.25	1	1%	14%
	medium sand	0.50	2	2%	16%
	coarse sand	1.00	4	4%	20%
	very coarse sand	2.00	38	38%	58%
Gravel	very fine gravel	4.0	3	3%	61%
	fine gravel	5.7	9	9%	70%
	fine gravel	8.0	8	8%	78%
	medium gravel	11.3	6	6%	84%
	medium gravel	16.0	4	4%	88%
	coarse gravel	22.3	1	1%	89%
	coarse gravel	32	1	1%	90%
	very coarse gravel	45	1	1%	91%
	very coarse gravel	64	1	1%	92%
Cobble	small cobble	90	4	4%	96%
	medium cobble	128	4	4%	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%
	very large boulder	4096	0	0%	100%
Bedrock	bedrock	>4096	0	0%	100%
TOTALS			100	100%	100%

Summary Data	
D50	1.7
D84	11
D95	83



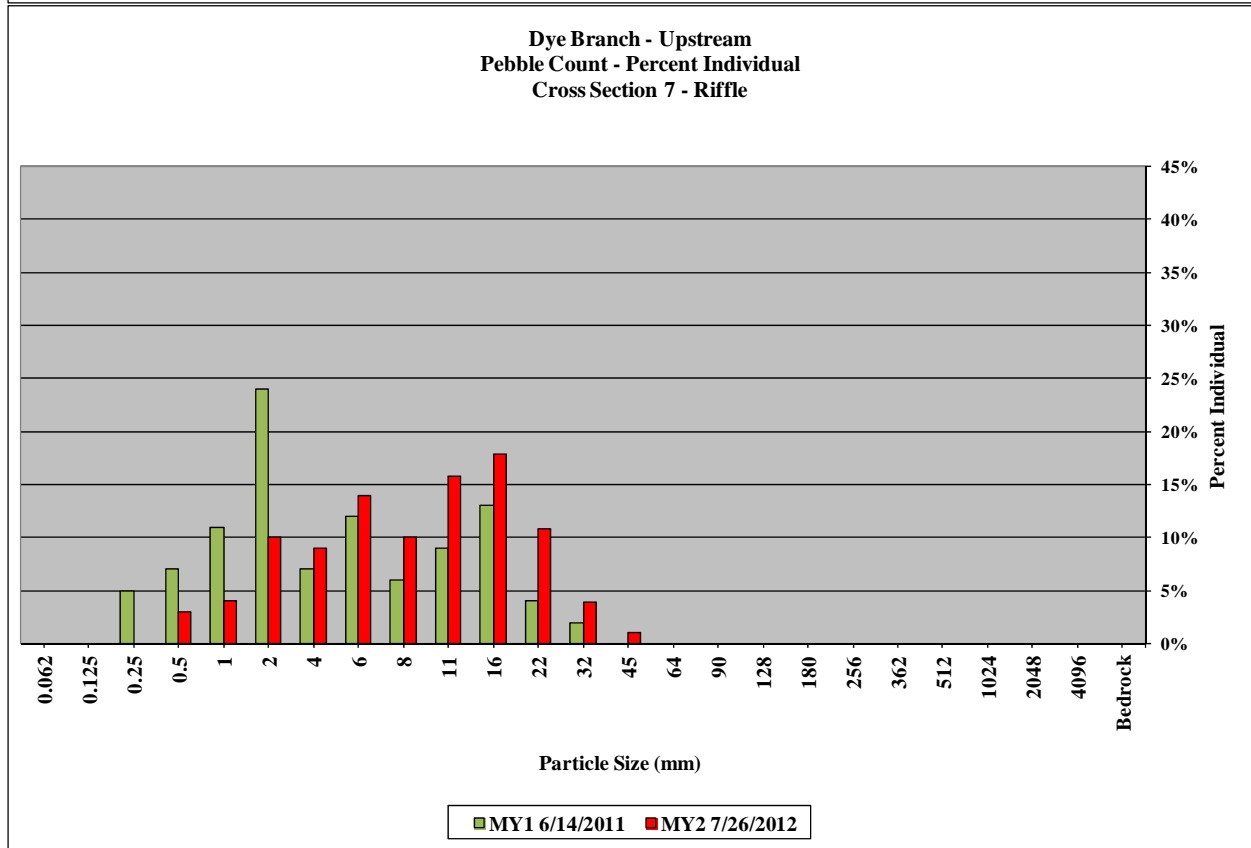
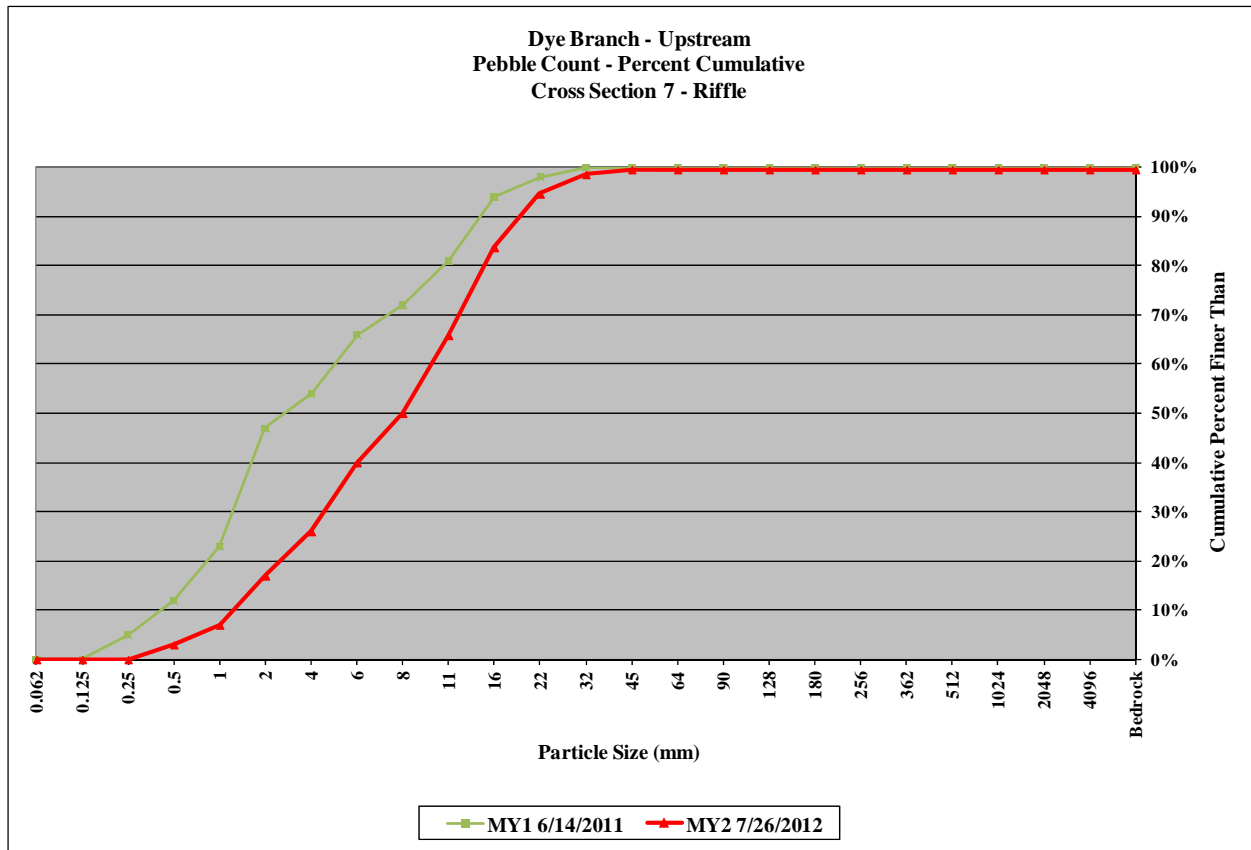
Dye Branch II / Project No. 92255					
Dye Branch - Upstream - Cross-Section 6 - Riffle					
Pebble Count Summary					
			Monitoring Year 2		
Description	Material	Size (mm)	Total #	Item %	Cum %
Silt/Clay	silt/clay	0.062	0	0%	0%
Sand	very fine sand	0.125	0	0%	0%
	fine sand	0.25	0	0%	0%
	medium sand	0.50	4	4%	4%
	coarse sand	1.00	8	8%	12%
	very coarse sand	2.00	21	21%	33%
Gravel	very fine gravel	4.0	13	13%	46%
	fine gravel	5.7	14	14%	60%
	fine gravel	8.0	4	4%	64%
	medium gravel	11.3	10	10%	74%
	medium gravel	16.0	9	9%	83%
	coarse gravel	22.3	5	5%	88%
	coarse gravel	32	3	3%	91%
	very coarse gravel	45	5	5%	96%
	very coarse gravel	64	1	1%	97%
Cobble	small cobble	90	1	1%	98%
	medium cobble	128	0	0%	98%
	large cobble	180	1	1%	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%
	very large boulder	4096	0	0%	100%
Bedrock	bedrock	>4096	0	0%	100%
TOTALS			100	100%	100%

Summary Data	
D50	4.5
D84	17
D95	42



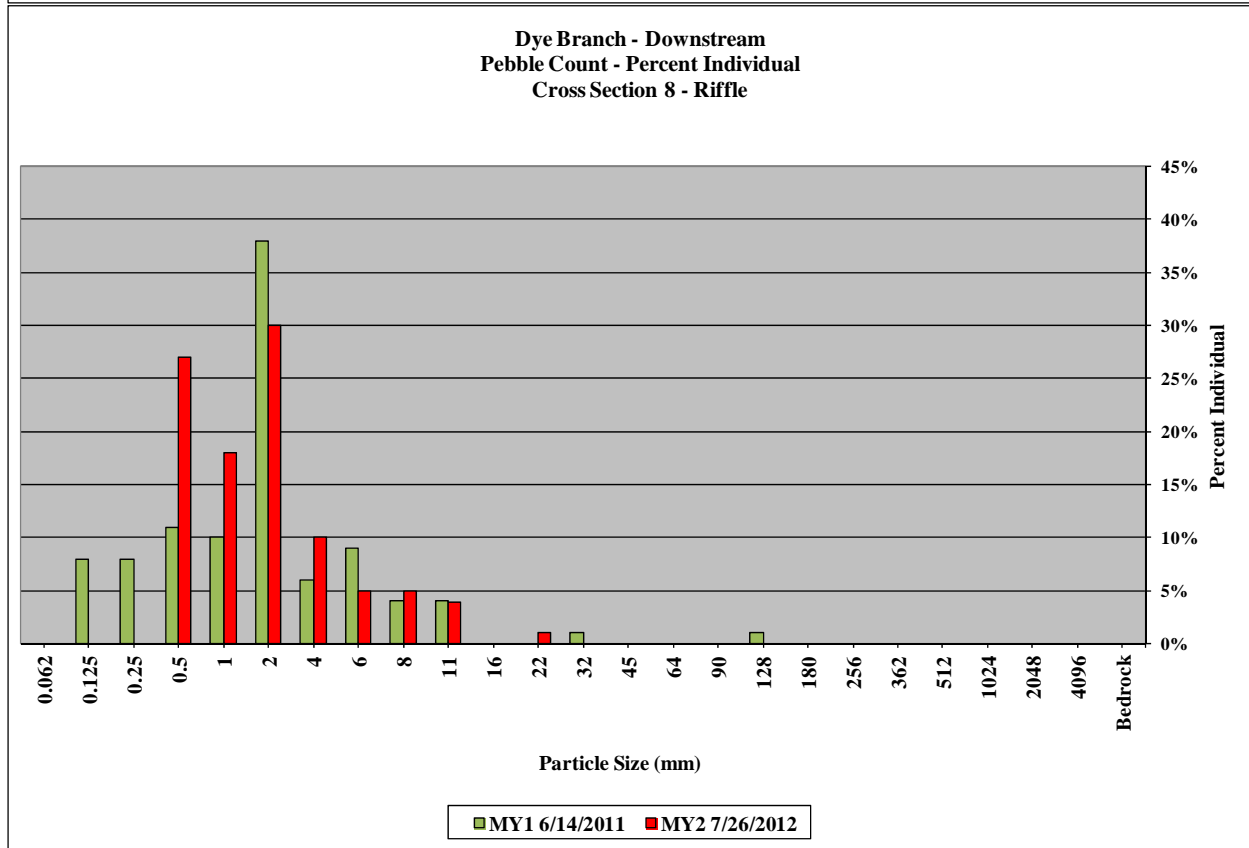
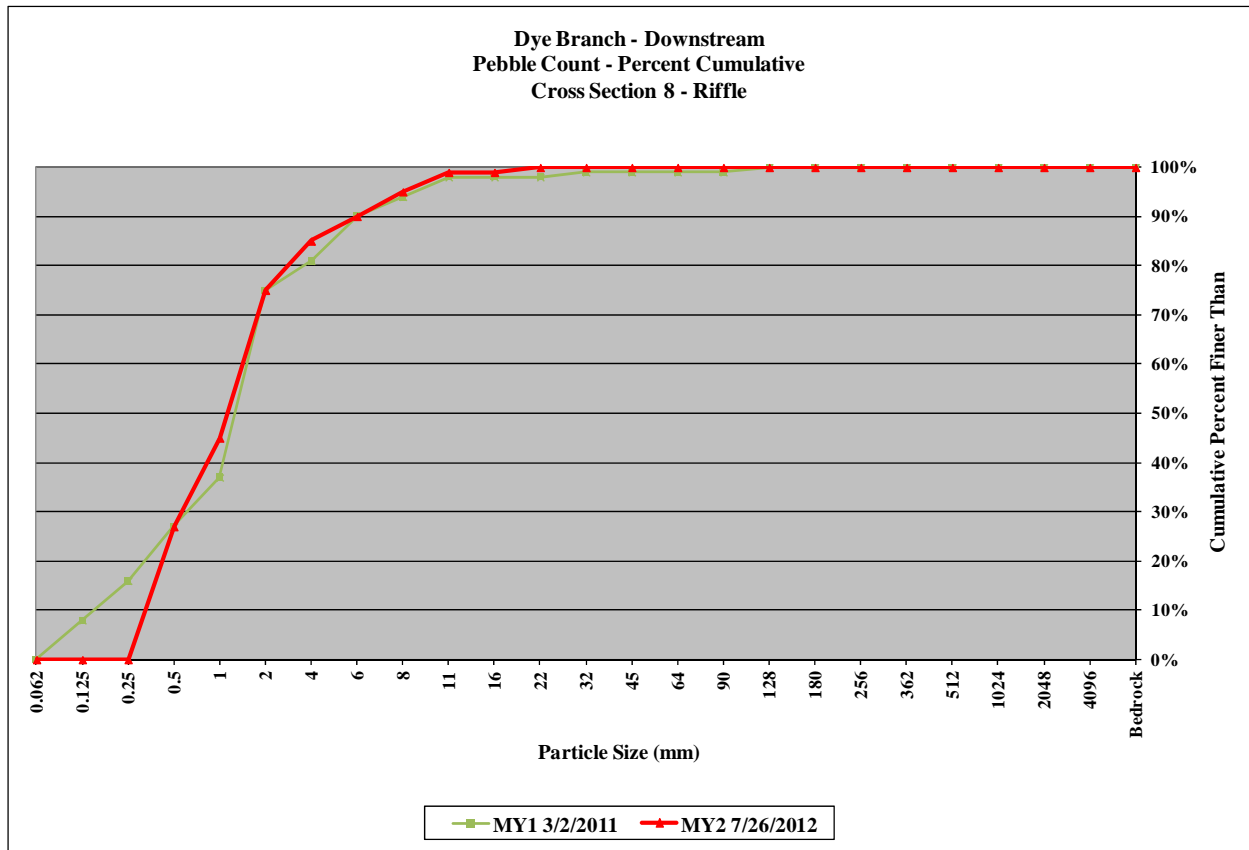
Dye Branch II / Project No. 92255					
Dye Branch - Upstream - Cross-Section 7 - Riffle					
Pebble Count Summary					
			Monitoring Year 2		
Description	Material	Size (mm)	Total #	Item %	Cum %
Silt/Clay	silt/clay	0.062	0	0%	0%
Sand	very fine sand	0.125	0	0%	0%
	fine sand	0.25	0	0%	0%
	medium sand	0.50	3	3%	3%
	coarse sand	1.00	4	4%	7%
	very coarse sand	2.00	10	10%	17%
Gravel	very fine gravel	4.0	9	9%	26%
	fine gravel	5.7	14	14%	40%
	fine gravel	8.0	10	10%	50%
	medium gravel	11.3	16	16%	66%
	medium gravel	16.0	18	18%	84%
	coarse gravel	22.3	11	11%	95%
	coarse gravel	32	4	4%	99%
	very coarse gravel	45	1	1%	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%
	very large boulder	4096	0	0%	100%
Bedrock	bedrock	>4096	0	0%	100%
TOTALS			100	100%	100%

Summary Data	
D50	8
D84	16
D95	22



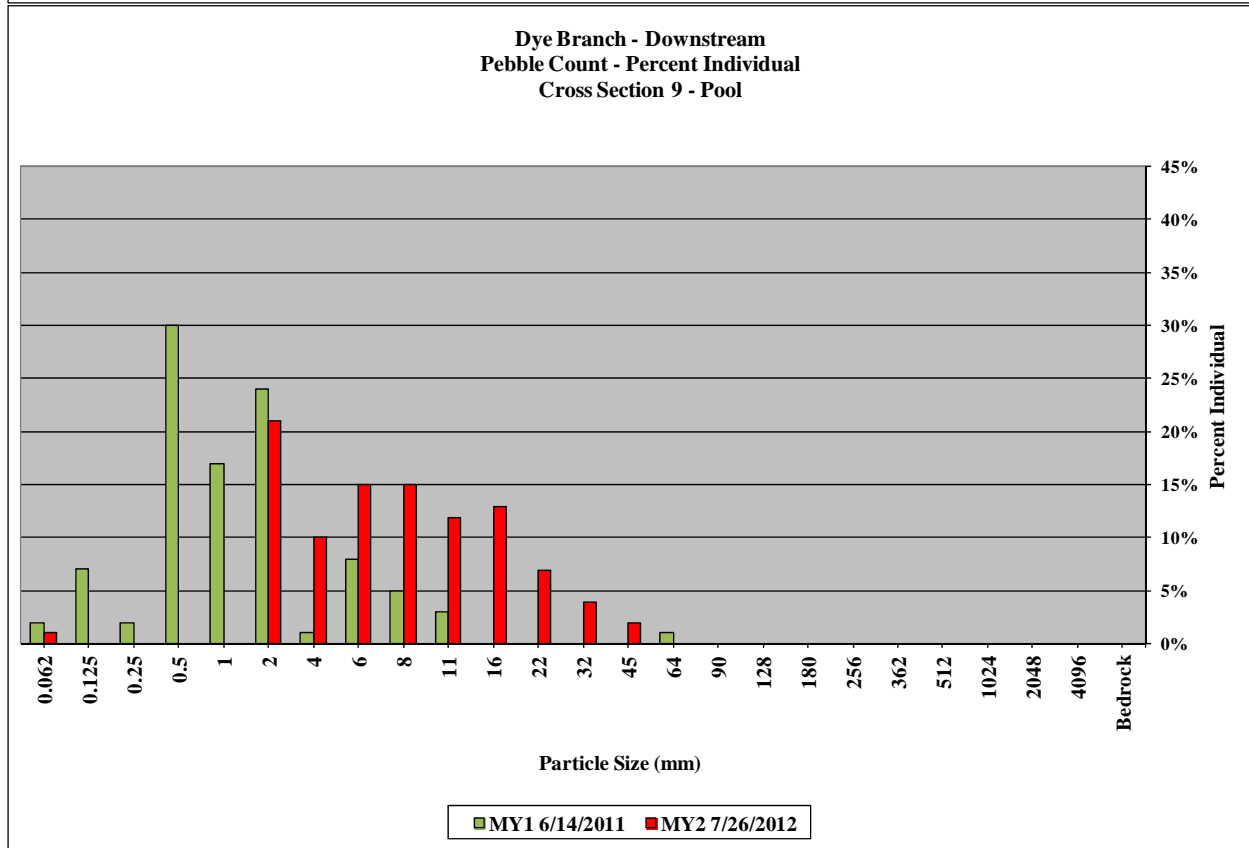
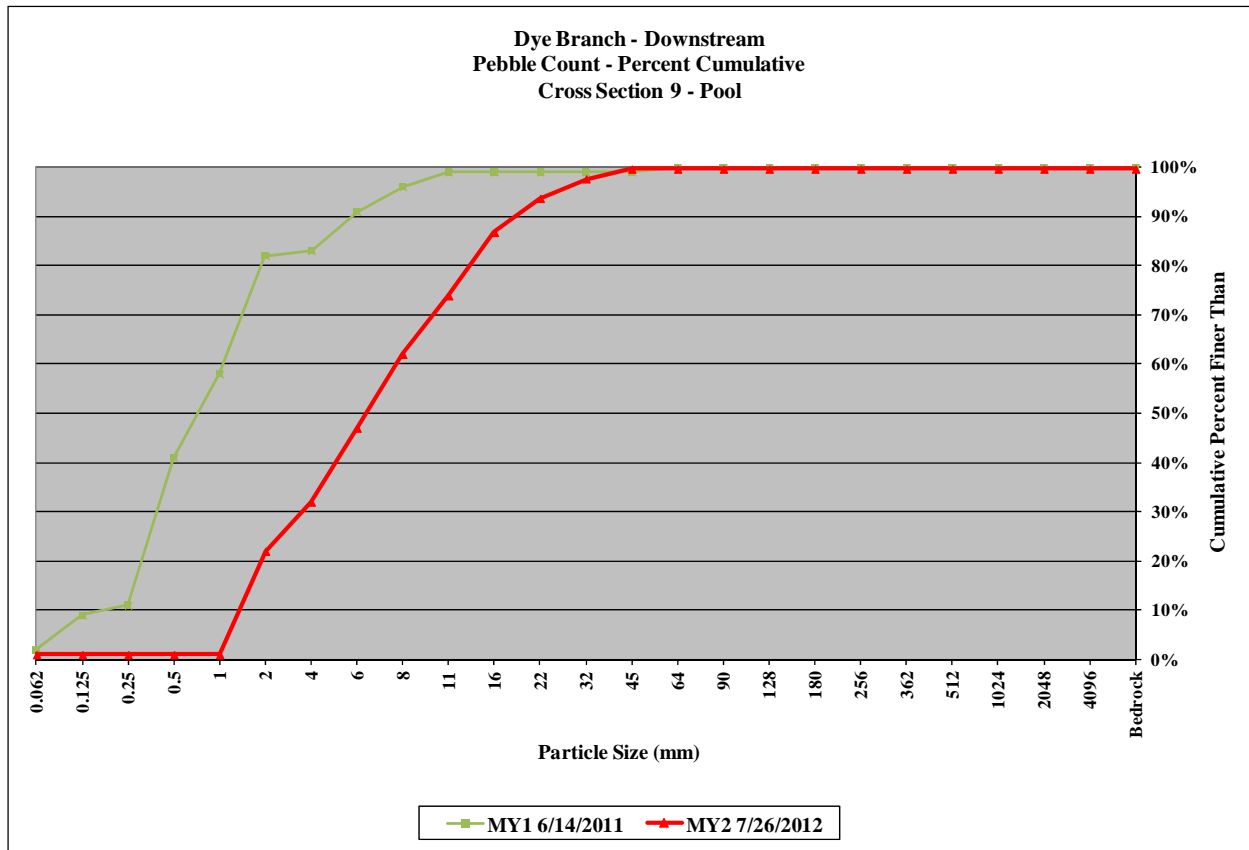
Dye Branch II / Project No. 92255					
Dye Branch - Downstream - Cross-Section 8 - Riffle					
Pebble Count Summary					
			Monitoring Year 2		
Description	Material	Size (mm)	Total #	Item %	Cum %
Silt/Clay	silt/clay	0.062	0	0%	0%
Sand	very fine sand	0.125	0	0%	0%
	fine sand	0.25	0	0%	0%
	medium sand	0.50	27	27%	27%
	coarse sand	1.00	18	18%	45%
	very coarse sand	2.00	30	30%	75%
Gravel	very fine gravel	4.0	10	10%	85%
	fine gravel	5.7	5	5%	90%
	fine gravel	8.0	5	5%	95%
	medium gravel	11.3	4	4%	99%
	medium gravel	16.0	0	0%	99%
	coarse gravel	22.3	1	1%	100%
	coarse gravel	32	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%
	very large boulder	4096	0	0%	100%
Bedrock	bedrock	>4096	0	0%	100%
TOTALS			100	100%	100%

Summary Data	
D50	1.1
D84	3.7
D95	8



Dye Branch II / Project No. 92255					
Dye Branch - Downstream - Cross-Section 9 - Pool					
Pebble Count Summary					
			Monitoring Year 2		
Description	Material	Size (mm)	Total #	Item %	Cum %
Silt/Clay	silt/clay	0.062	1	1%	1%
Sand	very fine sand	0.125	0	0%	1%
	fine sand	0.25	0	0%	1%
	medium sand	0.50	0	0%	1%
	coarse sand	1.00	0	0%	1%
	very coarse sand	2.00	21	21%	22%
Gravel	very fine gravel	4.0	10	10%	32%
	fine gravel	5.7	15	15%	47%
	fine gravel	8.0	15	15%	62%
	medium gravel	11.3	12	12%	74%
	medium gravel	16.0	13	13%	87%
	coarse gravel	22.3	7	7%	94%
	coarse gravel	32	4	4%	98%
	very coarse gravel	45	2	2%	100%
Cobble	very coarse gravel	64	0	0%	100%
	small cobble	90	0	0%	100%
	medium cobble	128	0	0%	100%
	large cobble	180	0	0%	100%
Boulder	very large cobble	256	0	0%	100%
	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	very large boulder	4096	0	0%	100%
	bedrock	>4096	0	0%	100%
TOTALS			100	100%	100%

Summary Data	
D50	6.4
D84	15
D95	24



Dye Branch II / Project No. 92255					
Dye Branch - Downstream - Cross-Section 10 - Riffle					
Pebble Count Summary					
			Monitoring Year 2		
Description	Material	Size (mm)	Total #	Item %	Cum %
Silt/Clay	silt/clay	0.062	8	8%	8%
Sand	very fine sand	0.125	9	9%	17%
	fine sand	0.25	4	4%	21%
	medium sand	0.50	16	16%	37%
	coarse sand	1.00	16	16%	53%
	very coarse sand	2.00	35	35%	88%
Gravel	very fine gravel	4.0	4	4%	92%
	fine gravel	5.7	2	2%	94%
	fine gravel	8.0	2	2%	96%
	medium gravel	11.3	2	2%	98%
	medium gravel	16.0	1	1%	99%
	coarse gravel	22.3	1	1%	100%
	coarse gravel	32	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%
	very large boulder	4096	0	0%	100%
Bedrock	bedrock	>4096	0	0%	100%
TOTALS			100	100%	100%

Summary Data	
D50	0.88
D84	1.8
D95	6.9

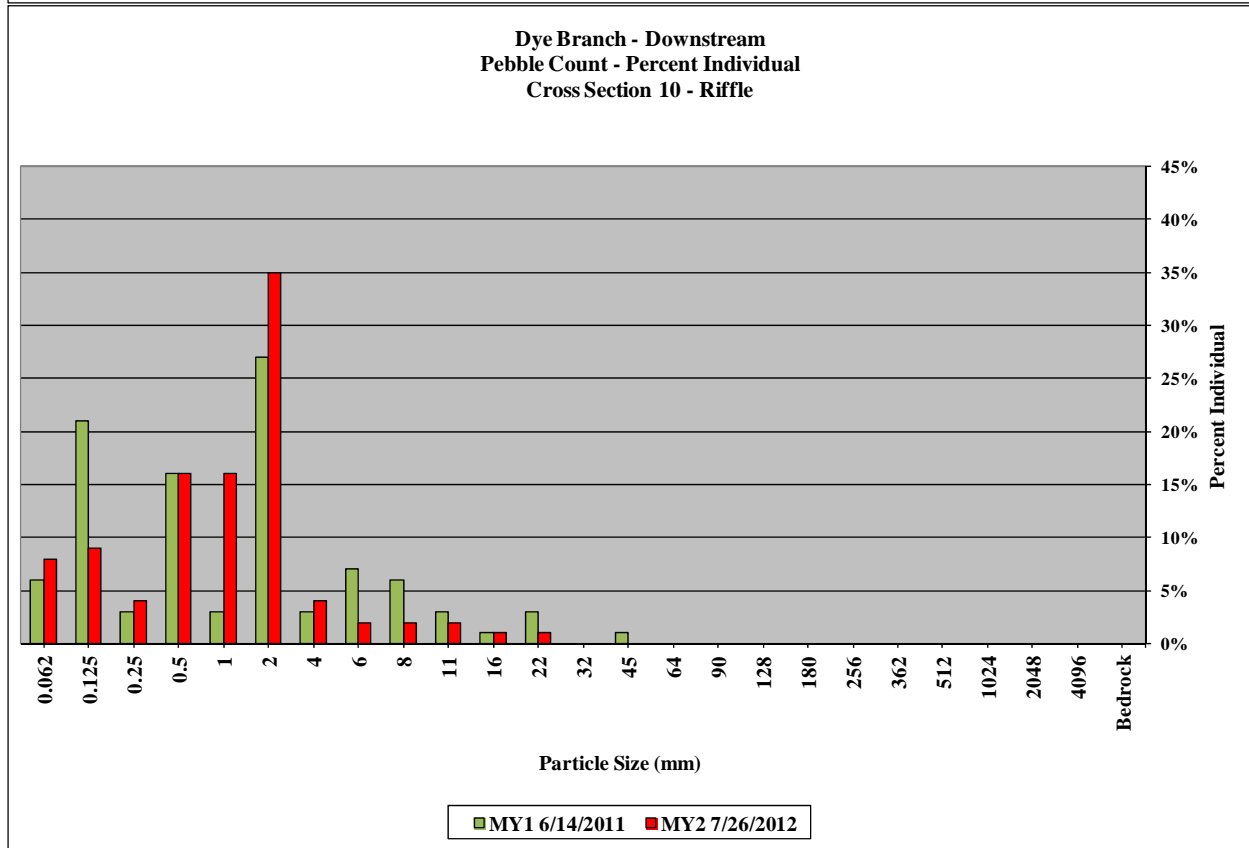
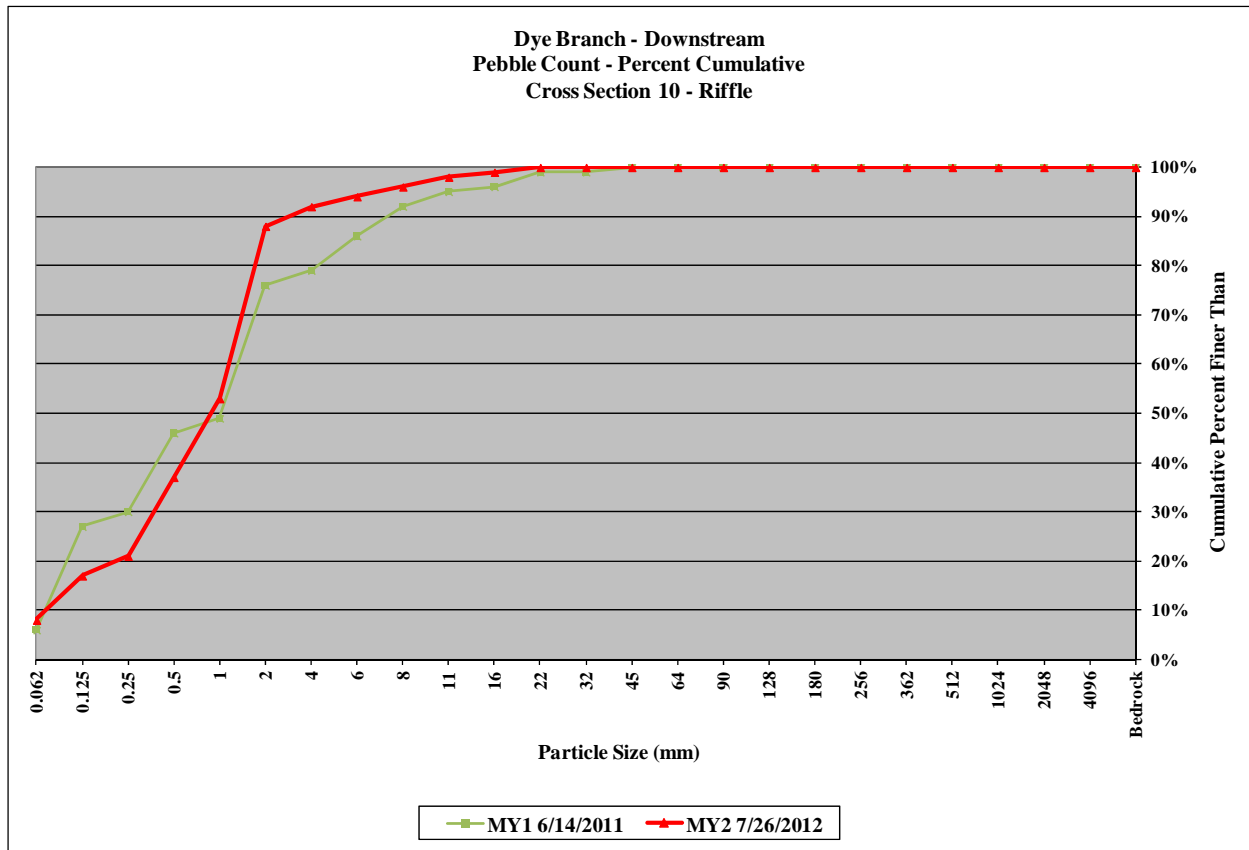


Table 10a. Baseline Stream Data Summary Dye Branch II / Project No. 92255 - Cemetery Branch (977 feet)																								
Parameter	Regional Curve			Pre-Existing Condition					Reference Reach Data					Design			Monitoring Baseline							
	LL	UL	Eq.	Min	Mean	Med	Max	SD	N	Min	Mean	Med	Max	SD	N	Min	Mean	Max	Min	Mean	Med	Max	SD	N
Dimension & Substrate - Riffle																								
Bankfull Width (ft)	-	-	-	7.0	7.0	7.0	7.0	N/A	1	8.9	11.1	11.3	14.1	1.8	7	-	10.0	-	5.5	7.2	7.2	8.9	N/A	2
Floodprone Width (ft)				14.2	14.2	14.2	14.2	N/A	1	19.0	54.0	36.0	100.0	38.1	5	-	28.0	-	>30	>30	>30	>30	N/A	2
Bankfull Mean Depth (ft)	-	-	-	1.0	1.0	1.0	1.0	N/A	1	0.7	0.9	0.8	1.6	0.3	7	-	0.7	-	0.5	0.7	0.7	0.8	N/A	2
Bankfull Max Depth (ft)				1.5	1.5	1.5	1.5	N/A	1	1.0	1.5	1.3	2.4	0.5	7	0.8	1.1	1.6	1.0	1.2	1.2	1.4	N/A	2
Bankfull Cross Sectional Area (ft ²)				6.8	6.8	6.8	6.8	N/A	1	6.8	9.6	8.4	18.4	3.9	7	-	7.0	-	3.0	5.0	5.0	7.0	N/A	2
Width/Depth Ratio				7.2	7.2	7.2	7.2	N/A	1	6.9	11.2	11.7	15.0	NA	3	-	14.3	-	10.3	10.8	10.8	11.2	N/A	2
Entrenchment Ratio				2.0	2.0	2.0	2.0	N/A	1	3.8	6.8	7.7	8.9	NA	3	-	2.8	-	>3.4	>4.4	>4.4	>5.4	N/A	2
Bank Height Ratio				1.5	1.5	1.5	1.5	N/A	1	1.0	1.1	1.0	1.2	NA	3	1.0	1.0	1.0	1.0	1.0	1.0	1.0	N/A	2
Profile																								
Riffle Length (ft)				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.8	23.4	19.5	53.9	14.84	14
Riffle Slope (ft/ft)				0.012	0.034	-	0.088	-	-	0.006	0.027	0.026	0.052	0.016	6	-	0.048	-	0.004	0.023	0.022	0.049	0.01	14
Pool Length (ft)				4.7	8.2	-	11.9	-	-	3.5	19.3	19.6	32.8	11.5	6	13.8	20.7	27.6	5.8	16.2	16.9	39.1	7.17	24
Pool Max Depth (ft)				-	2.6	-	-	-	-	1.8	2.6	2.9	3.2	0.5	7	-	2.0	-	1.8	3.0	2.9	3.7	0.48	18
Pool Spacing (ft)				22.8	86.0	-	228.2	-	-	18.0	52.7	40.2	140.8	41.7	7	18.4	27.6	32.2	4.5	38.7	36.4	111.0	24.40	24
Pattern																								
Channel Belt Width (ft)				5.3	10.8	-	22.6	-	-	26.0	49.1	40.0	119.0	29.8	9	23.0	32.2	41.4	11.3	30.6	37.0	46.7	12.3	16
Radius of Curvature (ft)				3.9	19.6	-	37.0	-	-	5.0	23.8	22.0	48.0	14.6	9	18.4	27.6	36.8	8.3	13.7	12.0	29.9	5.7	16
Rc: Bankfull Width (ft/ft)				0.6	2.8	-	5.3	-	-	0.6	2.1	1.8	4.3	1.3	9	1.8	2.8	3.7	2.4	2.4	2.4	2.4	N/A	1
Meander Wavelength (ft)				13.6	42.0	-	71.0	-	-	26.0	72.9	69.0	155.0	47.6	9	46.0	55.2	64.4	38.8	77.4	79.1	167.0	36.1	11
Meander Width Ratio				0.8	1.5	-	3.2	-	-	2.5	4.7	3.6	10.1	2.7	7	2.3	3.2	4.1	4.9	6.6	6.6	8.2	N/A	2
Transport Parameters																								
Reach Shear Stress (Competency) lb/ft ²																								
Max Part Size (mm) Mobilized at Bankfull							45 - 180																	
Stream Power (Transport Capacity) W/m ²																								
Additional Reach Parameters																								
Rosgen Classification							E4					E4 / C4 / C5					C4						C	
Bankfull Velocity (fps)							6.6 - 7.8					4.1 - 7.0					5.5 - 6.7							
Bankfull Discharge (cfs)							44.3 - 52.8					35.0 - 128.1					38.4 - 46.6							
Valley Length (ft)							-					-					-							
Channel Thalweg Length (ft)							-					-					-						977	
Sinuosity							1.14					1.15 - 2.22					1.14						1.08	
Water Surface Slope (ft/ft)							0.0190					0.0057 - 0.0130					0.0190						-	
Bankfull Slope (ft/ft)							-					-					-						0.0191	
Bankfull Floodplain Area (acres)							-					-					-						-	
% of Reach with Eroding Banks							-					-					-						-	
Channel Stability or Habitat Metric							-					-					-						-	
Biological or Other							-					-					-						-	

- Information unavailable.
 N/A - Item does not apply.
 Non-Applicable.

Table 10a. Baseline Stream Data Summary																								
Dye Branch II / Project No. 92255 - Dye Branch-Upstream (1,465 feet)																								
Parameter	Regional Curve			Pre-Existing Condition					Reference Reach Data UT to Ostin Creek						Design			Monitoring Baseline						
	LL	UL	Eq.	Min	Mean	Med	Max	SD	N	Min	Mean	Med	Max	SD	N	Min	Mean	Max	Min	Mean	Med	Max	SD	N
Dimension & Substrate - Riffle																								
Bankfull Width (ft)	-	-	-	-	11.2	-	-	-	-	16.0	18.5	-	20.6	-	-	20.1	-	25.7	28.4	26.9	32.7	N/A	3	
Floodprone Width (ft)	-	-	-	-	89.5	-	-	-	-	67.2	70.2	-	72.8	-	-	70.9	76.9	88.8	54.4	64.9	58.6	81.8	N/A	3
Bankfull Mean Depth (ft)	-	-	-	-	1.6	-	-	-	-	1.6	1.6	-	1.7	-	-	1.5	-	1.1	1.3	1.3	1.4	N/A	3	
Bankfull Max Depth (ft)	-	-	-	-	2.8	-	-	-	-	1.5	1.9	-	2.4	-	-	1.5	1.8	2.2	2.2	2.8	2.5	3.6	N/A	3
Bankfull Cross Sectional Area (ft ²)	-			18.1	20.2	19.7	22.9	NA	3	27.4	30.3	-	33.4	-	-	31.0	-	29.5	36.3	32.5	46.9	N/A	3	
Width/Depth Ratio	-	-	-	6.2	7.0	7.0	7.9	NA	3	9.3	11.4	-	12.7	-	-	13.0	-	20.3	22.6	22.8	24.6	N/A	3	
Entrenchment Ratio	-	-	-	>3.2	>4.4	>5.0	>5.0	NA	3	3.5	3.8	-	4.4	-	-	3.5	3.8	4.4	2.0	2.3	2.3	2.5	N/A	3
Bank Height Ratio	-	-	-	-	1.0	-	-	-	-	1.0	1.2	-	1.4	-	-	1.0	1.0	1.0	1.0	1.0	1.0	1.0	N/A	3
Profile																								
Riffle Length (ft)	-	-	-	-	-	-	-	-	-	6.1	17.6	-	30.2	-	-	6.6	19.1	32.7	20.1	51.6	47.1	97	29.5	8
Riffle Slope (ft/ft)	-	-	-	0.002	0.014	-	0.042	-	-	0.006	0.028	-	0.066	-	-	0.007	0.030	0.070	0.002	0.006	0.005	0.016	0.005	8
Pool Length (ft)	-	-	-	-	-	-	-	-	-	18.3	35.1	-	62.9	-	-	19.9	38.1	68.1	8.76	24.6	22.4	66.4	13	20
Pool Max Depth (ft)	-	-	-	-	-	-	-	-	-	2.2	2.9	-	3.3	-	-	2.1	2.7	3.1	2.1	3.44	3.61	4.48	0.67	20
Pool Spacing (ft)	-	-	-	-	-	-	-	-	-	50.3	78.9	-	105.8	-	-	54.5	85.5	114.7	24.1	66.8	65.3	125	28.6	19
Pattern																								
Channel Belt Width (ft)	-	-	-	6.6	24.3	-	56.9	-	-	36.0	67.0	-	150.0	-	-	39.0	72.6	162.6	28.5	45.0	48.4	54.1	8.34	17
Radius of Curvature (ft)	-	-	-	14.5	52.4	-	148.8	-	-	19.0	49.0	-	115.0	-	-	20.6	53.1	124.6	23.6	31.3	31.2	39.6	4.75	14
Rc: Bankfull Width (ft/ft)	-	-	-	1.3	4.7	-	13.3	-	-	1.0	2.7	-	6.2	-	-	1.0	2.7	6.2	2.3	2.3	2.3	2.3	N/A	1
Meander Wavelength (ft)	-	-	-	40.1	79.7	-	172.7	-	-	33.0	94.0	-	155.0	-	-	35.8	102	168.0	100.5	130.0	138.2	153.3	18.2	12
Meander Width Ratio	-	-	-	0.6	2.2	-	5.1	-	-	1.9	3.6	-	8.1	-	-	1.9	3.6	8.1	1.7	1.9	1.9	2.1	0.21	3
Transport Parameters																								
Reach Shear Stress (Competency) lb/ft ²				-																				
Max Part Size (mm) Mobilized at Bankfull				30 - 100																				
Stream Power (Transport Capacity) W/m ²				-																				
Additional Reach Parameters																								
Rosgen Classification				E4					C4						C5			C						
Bankfull Velocity (fps)	-			6.2 - 6.9					4.2						3.5									
Bankfull Discharge (cfs)	-			112.2 - 124.8					128						110									
Valley Length (ft)				-																				
Channel Thalweg Length (ft)				2,086					1,034						2,405			2,455						
Sinuosity				1.04					1.20						1.20			1.21						
Water Surface Slope (Channel) (ft/ft)				0.0090					0.0088						0.0080			0.0080						
Bankfull Slope (ft/ft)				-					-						-			0.0083						
Bankfull Floodplain Area (acres)				-					-						-									
% of Reach with Eroding Banks				-					-						-									
Channel Stability or Habitat Metric				-					-						-									
Channel Stability or Habitat Metric				-					-						-									
Biological or Other				-					-						-									

- Information unavailable.
 N/A - Item does not apply.
 Non-Applicable.

Table 10a. Baseline Stream Data Summary																								
Dye Branch II / Project No. 92255 - Dye Branch-Downstream (870 feet)																								
Parameter	Regional Curve			Pre-Existing Condition						Reference Reach Data UT to Ostin Creek						Design			Monitoring Baseline					
	LL	UL	Eq.	Min	Mean	Med	Max	SD	N	Min	Mean	Med	Max	SD	N	Min	Mean	Max	Min	Mean	Med	Max	SD	N
Dimension & Substrate - Riffle																								
Bankfull Width (ft)	-	-	-	14.8	14.8	14.8	14.8	NA	1	16.0	18.5	-	20.6	-	-	-	20.1	-	18.4	18.6	18.6	18.8	N/A	3
Floodprone Width (ft)				22.0	22.0	22.0	22.0	NA	1	67.2	70.2	-	72.8	-	-	70.9	76.9	88.8	48.7	61.8	61.8	74.8	N/A	3
Bankfull Mean Depth (ft)	-	-	-	1.2	1.2	1.2	1.2	NA	1	1.6	1.6	-	1.7	-	-	1.5			1.9	2.0	2.0	2.0	N/A	3
Bankfull Max Depth (ft)				2.4	2.4	2.4	2.4	NA	1	1.5	1.9	-	2.4	-	-	1.5	1.8	2.2	2.9	3.0	3.0	3.1	N/A	3
Bankfull Cross Sectional Area (ft ²)				17.4	17.4	17.4	2.4	NA	1	27.4	30.3	-	33.4	-	-	31.0			34.0	36.1	36.1	38.1	N/A	3
Width/Depth Ratio				12.5	12.5	12.5	2.4	NA	1	9.3	11.4	-	12.7	-	-	13.0			9.3	9.6	9.6	9.9	N/A	3
Entrenchment Ratio				1.5	1.5	1.5	2.4	NA	1	3.5	3.8	-	4.4	-	-	3.5	3.8	4.4	2.7	3.4	3.4	4.0	N/A	3
Bank Height Ratio				4.9	4.9	4.9	2.4	NA	1	1.0	1.2	-	1.4	-	-	1.0	1.0	1.0	1.0	1.0	1.0	1.0	N/A	3
Profile																								
Riffle Length (ft)				-	-	-	-	-	-	6.1	17.6	-	30.2	-	-	6.6	19.1	32.7	15.7	50.3	55.7	79.3	20.2	7
Riffle Slope (ft/ft)				0.003	0.021	-	0.121	-	-	0.006	0.028	-	0.066	-	-	0.007	0.030	0.070	0.001	0.006	0.006	0.014	0.004	7
Pool Length (ft)				2.9	24.8	-	120	-	-	18.3	35.1	-	62.9	-	-	19.9	38.1	68.1	10.1	19.9	15.9	39.6	8.91	14
Pool Max Depth (ft)				-	3.1	-	-	-	-	2.2	2.9	-	3.3	-	-	2.1	2.7	3.1	3.3	3.91	3.77	5.05	0.59	12
Pool Spacing (ft)				79.0	162.0	-	261.0	-	-	50.3	78.9	-	105.8	-	-	54.5	85.5	114.7	15.3	57.5	38.8	130	41.5	14
Pattern																								
Channel Belt Width (ft)				15.6	30.6	-	67.7	-	-	36.0	67.0	-	150.0	-	-	39.0	72.6	162.6	28.3	49.2	57.5	65.4	15.4	9
Radius of Curvature (ft)				11.0	42.1	-	81.9	-	-	19.0	49.0	-	115.0	-	-	20.6	53.1	124.6	32.7	40.7	42.2	50.1	5.6	7
Rc: Bankfull Width (ft/ft)				0.7	2.9	-	5.6	-	-	1.0	2.7	-	6.2	-	-	1.0	2.7	6.2	1.7	1.7	1.7	1.7	N/A	1
Meander Wavelength (ft)				62.0	103.0	-	157	-	-	33.0	94.0	-	155.0	-	-	35.8	102	168.0	138.9	162.2	157.3	210.5	27.2	6
Meander Width Ratio				1.1	2.1	-	4.6	-	-	1.9	3.6	-	8.1	-	-	1.9	3.6	8.1	2.4	2.8	2.8	3.1	0.51	2
Transport Parameters																								
Reach Shear Stress (Competency) lb/ft ²																								
Max Part Size (mm) Mobilized at Bankfull							30 - 100																	
Stream Power (Transport Capacity) W/m ²																								
Additional Reach Parameters																								
Rosgen Classification							G4c						C4					C5					C	
Bankfull Velocity (fps)							6.1 - 7.2						4.2					3.5						
Bankfull Discharge (cfs)							105.4 - 126.0						128					110						
Valley Length (ft)																								
Channel Thalweg Length (ft)																								870
Sinuosity							1.14						1.46					1.09						1.10
Water Surface Slope (ft/ft)							0.0110						0.0090					0.0095						-
Bankfull Slope (ft/ft)																								0.0106
Bankfull Floodplain Area (acres)																								
% of Reach with Eroding Banks																								
Channel Stability or Habitat Metric																								
Biological or Other																								

- Information unavailable.
 N/A - Item does not apply.
 Non-Applicable.

Table 10b. Baseline Stream Data Summary (Substrate, Bed, Bank, and Hydrologic Containment Parameter Distributions) Dye Branch II / Project No. 92255 - Cemetery Branch (977 feet)																											
Parameter	Pre-Existing Condition						Reference Reach Data						Design						Monitoring Baseline								
Ri% / Ru% / P% / G% / S%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	35%	4%	42%	13%	7%
SC% / Sa% / G% / C% / B% / Be%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-					
d16 / D35 / d50 / d84 / d95 / di ^p / di ^w (mm)	0.9	1.2	2.0	8.0	10.1	88.9	-	0.21	0.5	3.5	13.9	26.6	45.0	-													
Entrenchment Class	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-					
<1.5 / 1.5 - 1.99 / 2 - 4.9 / 5.0 - 9.9 / >10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-					
Incision Class	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-					
<1.2 / 1.2 - 1.49 / 1.5 - 1.99 / >2.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-					

- Information unavailable.
N/A - Item does not apply.
Non-Applicable.

Table 10b. Baseline Stream Data Summary (Substrate, Bed, Bank, and Hydrologic Containment Parameter Distributions) Dye Branch II / Project No. 92255 - Dye Branch-Upstream (1,465 feet)																											
Parameter	Pre-Existing Condition						Reference Reach Data						Design						Monitoring Baseline								
Ri% / Ru% / P% / G% / S%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	28%	15%	34%	20%	3%
SC% / Sa% / G% / C% / B% / Be%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-					
d16 / D35 / d50 / d84 / d95 / di ^p / di ^w (mm)	0.15	0.4	3.3	10.3	13.7	45.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-					
Entrenchment Class	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-					
<1.5 / 1.5 - 1.99 / 2 - 4.9 / 5.0 - 9.9 / >10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-					
Incision Class	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-					
<1.2 / 1.2 - 1.49 / 1.5 - 1.99 / >2.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-					

- Information unavailable.
Non-Applicable.

Table 10b. Baseline Stream Data Summary (Substrate, Bed, Bank, and Hydrologic Containment Parameter Distributions) Dye Branch II / Project No. 92255 - Dye Branch-Downstream (870 feet)																											
Parameter	Pre-Existing Condition						Reference Reach Data						Design						Monitoring Baseline								
Ri% / Ru% / P% / G% / S%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	43%	6%	34%	13%	3%
SC% / Sa% / G% / C% / B% / Be%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-					
d16 / D35 / d50 / d84 / d95 / di ^p / di ^w (mm)	0.15	0.28	0.56	10.7	13.0	45.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-					
Entrenchment Class	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-					
<1.5 / 1.5 - 1.99 / 2 - 4.9 / 5.0 - 9.9 / >10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-					
Incision Class	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-					
<1.2 / 1.2 - 1.49 / 1.5 - 1.99 / >2.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-					

- Information unavailable.
N/A - Item does not apply.
Non-Applicable.

Table 11a. Baseline Morphology & Hydraulic Monitoring Summary Dye Branch II / Project No. 92255 - Cemetery Branch (971 Feet)																		
Parameter	Cross Section 1 Pool						Cross Section 2 Riffle						Cross Section 3 Riffle					
	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5
Record Elevation (datum) Used	836.3	836.3	836.3				826.3	826.3	826.3				821.7	821.7	821.7			
Bankfull Width (ft)	9.7	10.2	9.4				8.9	10.6	8.0				5.5	6.0	6.5			
Floodprone Width (ft)	>50	>50	>50				>30	>30	>30				>30	>30	>30			
Bankfull Mean Depth (ft)	1.9	1.5	1.5				0.8	0.6	0.5				0.5	0.5	0.6			
Bankfull Max Depth (ft)	3.1	2.7	2.4				1.4	1.2	1.2				1.0	1.0	1.0			
Bankfull Cross Sectional Area (ft ²)	18.9	15.2	14.3				7.0	6.3	3.9				3.0	2.8	4.0			
Bankfull Width/Depth Ratio	5.0	6.8	6.2				11.2	18.1	16.4				10.3	12.7	10.6			
Bankfull Entrenchment Ratio	>5.1	>4.9	>5.3				>3.4	>2.8	>3.8				>5.4	>5.0	>4.6			
Bankfull Bank Height Ratio	1.0	1.0	1.0				1.0	1.0	1.0				1.0	1.0	1.0			
Cross Sectional Area between End Pins (ft ²)	18.9	15.2	14.3				7.0	6.3	3.9				3.0	2.8	4.0			
d50 (mm)	N/A	5.7	4.8				N/A	8.4	14.0				N/A	6.0	5.0			

N/A - Item does not apply.

Table 11a. Baseline Morphology & Hydraulic Monitoring Summary Dye Branch II / Project No. 92255 - Dye Branch-Upstream (1,471 Feet)																								
Parameter	Cross Section 4 Riffle						Cross Section 5 Pool						Cross Section 6 Riffle						Cross Section 7 Riffle					
	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5
Record Elevation (datum) Used	824.3	824.3	824.3				817.4	817.4	817.4				815.5	815.5	815.5				812.5	812.5	812.5			
Bankfull Width (ft)	25.7	23.8	22.9				17.1	17.0	16.8				32.7	28.7	27.7				26.9	24.1	21.3			
Floodprone Width (ft)	58.6	52.8	52.8				50	47.1	47.1				81.8	78.2	78.2				54.4	52.6	52.6			
Bankfull Mean Depth (ft)	1.3	1.1	1.0				1.7	1.4	2.1				1.4	1.3	1.3				1.1	1.0	0.9			
Bankfull Max Depth (ft)	2.5	2.0	2.1				3.4	2.8	3.6				3.6	3.2	3.2				2.2	2.0	2.1			
Bankfull Cross Sectional Area (ft ²)	32.5	27.1	23.1				28.8	23.7	35.0				46.9	37.5	36.2				29.5	24.2	19.9			
Bankfull Width/Depth Ratio	20.3	20.9	22.6				10.2	12.2	8.1				22.8	22.0	21.2				24.6	24.0	22.9			
Bankfull Entrenchment Ratio	2.3	2.2	2.3				2.9	2.8	2.8				2.5	2.7	2.8				2.0	2.2	2.5			
Bankfull Bank Height Ratio	1.0	1.0	1.0				1.0	1.0	1.0				1.0	1.0	1.0				1.0	1.0	1.0			
Cross Sectional Area between End Pins (ft ²)	32.5	27.1	23.1				28.8	23.7	35.0				46.9	37.5	36.2				29.5	24.2	19.9			
d50 (mm)	N/A	1.2	1.2				N/A	6.0	1.7				N/A	1.9	4.5				N/A	2.7	8.0			

N/A - Item does not apply.

Table 11a. Baseline Morphology & Hydraulic Monitoring Summary Dye Branch II / Project No. 92255 - Dye Branch-Downstream (869 Feet)																		
Parameter	Cross Section 8 Rifle						Cross Section 9 Pool						Cross Section 10 Rifle					
	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5
Record Elevation (datum) Used	809.3	809.3	809.3				806.1	806.1	806.1				801.1	801.1	801.1			
Bankfull Width (ft)	18.8	18.8	19.6				26.3	26.3	24.3				18.4	18.5	17.7			
Floodprone Width (ft)	74.8	73.5	73.5				>70	>70	>70				48.7	47.6	47.6			
Bankfull Mean Depth (ft)	2.0	1.9	2.1				1.8	1.7	2.3				1.9	1.6	1.6			
Bankfull Max Depth (ft)	3.1	3.0	3.9				3.5	3.5	3.5				2.9	2.4	2.5			
Bankfull Cross Sectional Area (ft ²)	38.1	35.9	41.0				48.4	43.6	55.3				34.0	29.5	27.8			
Bankfull Width/Depth Ratio	9.3	9.9	9.3				14.3	15.9	10.7				9.9	11.7	11.3			
Bankfull Entrenchment Ratio	4.0	3.9	3.8				>2.7	>2.7	2.9				2.7	2.6	2.7			
Bankfull Bank Height Ratio	1.0	1.0	1.0				1.0	1.0	1.0				1.0	1.0	1.0			
Cross Sectional Area between End Pins (ft ²)	38.1	35.9	41.0				48.4	43.6	55.3				34.0	29.5	27.8			
d50 (mm)	N/A	1.3	1.1				N/A	0.72	6.4				N/A	1.0	0.9			

N/A - Item does not apply.

Table 11b. Monitoring Data - Stream Reach Data Summary																																							
Dye Branch II / Project No. 92255 - Cemetery Branch (971 feet)																																							
Parameter	Baseline					MY - 1					MY - 2					MY - 3					MY - 4					MY - 5													
	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n			
Dimension & Substrate - Riffle																																							
Bankfull Width (ft)	5.5	7.2	7.2	8.9	N/A	2	6.0	8.3	8.3	10.6	N/A	2	6.5	7.3	7.3	8.0	N/A	2																					
Floodprone Width (ft)	>30	>30	>30	>30	N/A	2	>30	>30	>30	>30	N/A	2	>30	>30	>30	>30	N/A	2																					
Bankfull Mean Depth (ft)	0.5	0.7	0.7	0.8	N/A	2	0.5	0.6	0.6	0.6	N/A	2	0.5	0.6	0.6	0.6	N/A	2																					
Bankfull Max Depth (ft)	1.0	1.2	1.2	1.4	N/A	2	1.0	1.1	1.1	1.2	N/A	2	1.0	1.1	1.1	1.2	N/A	2																					
Bankfull Cross-Sectional Area (ft ²)	3.0	5.0	5.0	7.0	N/A	2	2.8	4.6	4.6	6.3	N/A	2	3.9	4.0	4.0	4.0	N/A	2																					
Width/Depth Ratio	10.3	10.8	10.8	11.2	N/A	2	12.7	15.4	15.4	18.1	N/A	2	10.6	13.5	13.5	16.4	N/A	2																					
Entrenchment Ratio	>3.4	>4.4	>4.4	>5.4	N/A	2	>2.8	>3.9	>3.9	>5.0	N/A	2	>3.8	>4.2	>4.2	>4.6	N/A	2																					
Bank Height Ratio	1.0	1.0	1.0	1.0	N/A	2	1.0	1.0	1.0	1.0	N/A	2	1.0	1.0	1.0	1.0	N/A	2																					
Profile																																							
Riffle Length (ft)	6.8	23.4	19.5	53.9	14.8	14	6.9	22.9	22.7	50.3	13.3	17	6.4	24.3	15.2	53.7	17.0	13																					
Riffle Slope (ft/ft)	0.004	0.023	0.022	0.049	0.013	14	0.002	0.020	0.018	0.052	0.015	17	0.002	0.027	0.022	0.064	0.020	13																					
Pool Length (ft)	5.8	16.2	16.9	39.1	7.2	24	4.9	13.0	12.5	38.9	6.8	25	8.4	16.5	14.8	39.0	6.9	26																					
Pool Max Depth (ft)	1.8	3.0	2.9	3.7	0.5	18	1.0	2.8	2.9	3.4	0.6	19	1.0	2.5	2.5	3.6	0.8	24																					
Pool Spacing (ft)	4.5	38.7	36.4	111.0	24.4	24	12.0	39.1	33.3	110.2	24.0	24	12.0	36.9	30.1	86.7	20.6	25																					
Pattern																																							
Channel Belt Width (ft)	11.3	30.6	37.0	46.7	12.26	16																																	
Radius of Curvature (ft)	8.3	13.7	12.0	29.9	5.70	16																																	
Rc: Bankfull Width (ft/ft)	2.4	2.4	2.4	2.4	N/A	1																																	
Meander Wavelength (ft)	38.8	77.4	79.1	167.0	36.08	11																																	
Meander Width Ratio	4.2	5.4	5.4	6.7	N/A	2																																	
Additional Reach Parameters																																							
Rosgen Classification	C					C4					C4																												
Channel Thalweg Length (ft)	977					971					970																												
Sinuosity (ft)	1.08					1.08					1.08																												
Water Surface Slope (Channel) (ft/ft)	-					0.0200					0.0203																												
Bankfull Slope (ft/ft)	0.0191					0.0195					0.0198																												
R% / Ru% / P% / G% / S%	35%	4%	42%	13%	7%	42%	6%	34%	13%	6%	34%	4%	46%	11%	6%																								
SC% / SA% / G% / C% / B% / Be%*						0%	38%	54%	7%	0%	0%	0%	30%	67%	3%	0%	0%																						
d16 / d35 / d50 / d84 / d95 (mm)																																							
% of Reach with Eroding Banks	0%					0%					0%																												
Channel Stability or Habitat Metric	N/A					N/A					N/A																												
Biological or Other	N/A					N/A					N/A																												

N/A - Information does not apply.
 Ri = Riffle / Ru = Run / P = Pool / G = Glide / S = Step
 SC = Silt-Clay / SA = Sand / G = Gravel / C = Cobble / B = Boulder / Be = Bedrock
 *Percentages based on riffle and pool pebble counts.

Table 11b. Monitoring Data - Stream Reach Data Summary																																		
Dye Branch II / Project No. 92255 - Dye Branch-Upstream (1,471 feet)																																		
Parameter	Baseline					MY - 1					MY - 2					MY - 3					MY - 4					MY - 5								
	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n				
Dimension & Substrate - Riffle																																		
Bankfull Width (ft)	25.7	28.4	26.9	32.7	N/A	3	23.8	25.5	24.1	28.7	N/A	3	21.3	24.0	22.9	27.7	N/A	3																
Floodprone Width (ft)	54.4	64.9	58.6	81.8	N/A	3	52.6	61.2	52.8	78.2	N/A	3	52.6	61.2	52.8	78.2	N/A	3																
Bankfull Mean Depth (ft)	1.1	1.3	1.3	1.4	N/A	3	1.0	1.1	1.1	1.3	N/A	3	0.9	1.1	1.0	1.3	N/A	3																
Bankfull Max Depth (ft)	2.2	2.8	2.5	3.6	N/A	3	2.0	2.4	2.0	3.2	N/A	3	2.1	2.5	2.1	3.2	N/A	3																
Bankfull Cross-Sectional Area (ft ²)	29.5	36.3	32.5	46.9	N/A	3	24.2	29.6	27.1	37.5	N/A	3	19.9	26.4	23.1	36.2	N/A	3																
Width/Depth Ratio	20.3	22.6	22.8	24.6	N/A	3	20.9	22.3	22.0	24.0	N/A	3	21.2	22.2	22.6	22.9	N/A	3																
Entrenchment Ratio	2.0	2.3	2.3	2.5	N/A	3	2.2	2.4	2.2	2.7	N/A	3	2.3	2.5	2.5	2.8	N/A	3																
Bank Height Ratio	1.0	1.0	1.0	1.0	N/A	3	1.0	1.0	1.0	1.0	N/A	3	1.0	1.0	1.0	1.0	N/A	3																
Profile																																		
Riffle Length (ft)	20.1	51.6	47.1	97.0	29.5	8	17.5	40.6	33.3	75.1	19.0	11	15.5	37.5	34.6	58.6	14.4	9																
Riffle Slope (ft/ft)	0.002	0.006	0.005	0.016	0.005	8	0.002	0.007	0.005	0.019	0.005	11	0.001	0.007	0.004	0.016	0.005	9																
Pool Length (ft)	8.8	24.6	22.4	66.4	13.0	20	10.7	29.8	27.3	75.6	15.9	20	8.8	29.5	23.2	76.3	18.7	20																
Pool Max Depth (ft)	2.1	3.4	3.6	4.5	0.7	20	1.8	3.3	3.4	4.7	0.8	20	2.2	3.7	3.8	5.0	0.8	20																
Pool Spacing (ft)	24.1	66.8	65.3	124.9	28.6	19	31.7	67.7	69.0	128.2	27.5	19	20.7	62.1	55.7	127.6	29.6	19																
Pattern																																		
Channel Belt Width (ft)	28.5	45.0	48.4	54.1	8.3	17																												
Radius of Curvature (ft)	23.6	31.3	31.2	39.6	4.7	14																												
Rc: Bankfull Width (ft/ft)	2.0	2.0	2.0	2.0	N/A	1																												
Meander Wavelength (ft)	100.5	130.0	138.2	153.3	18.2	12																												
Meander Width Ratio	1.5	1.7	1.8	1.9	N/A	3																												
Additional Reach Parameters																																		
Rosgen Classification	C					C5					C4																							
Channel Thalweg Length (ft)	1,465					1,471					1,465																							
Sinuosity (ft)	1.15					1.16					1.15																							
Water Surface Slope (Channel) (ft/ft)	-					0.0092					0.0091																							
Bankfull Slope (ft/ft)	0.0091					0.0094					0.0095																							
R% / Ru% / P% / G% / S%	28%	15%	34%	20%	3%		31%	10%	41%	15%	4%		23%	14%	40%	19%	3%																	
SC% / SA% / G% / C% / B% / Be%*							0%	50%	47%	3%	0%	0%	2%	45%	50%	3%	0%	0%																
d16 / d35 / d50 / d84 / d95 (mm)																																		
% of Reach with Eroding Banks	0%					0%					7%																							
Channel Stability or Habitat Metric	N/A					N/A					N/A																							
Biological or Other	N/A					N/A					N/A																							

N/A - Information does not apply.
 Ri = Riffle / Ru = Run / P = Pool / G = Glide / S = Step
 SC = Silt-Clay / SA = Sand / G = Gravel / C = Cobble / B = Boulder / Be = Bedrock
 *Percentages based on riffle and pool pebble counts.

Table 11b. Monitoring Data - Stream Reach Data Summary																																				
Dye Branch II / Project No. 92255 - Dye Branch-Downstream (869 feet)																																				
Parameter	Baseline					MY - 1					MY - 2					MY - 3					MY - 4					MY - 5										
	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n
Dimension & Substrate - Riffle																																				
Bankfull Width (ft)	18.4	18.6	18.6	18.8	N/A	2	18.5	18.7	18.7	18.8	N/A	2	17.7	18.7	18.7	19.6	N/A	2																		
Floodprone Width (ft)	48.7	61.8	61.8	74.8	N/A	2	47.6	60.6	60.6	73.5	N/A	2	47.6	60.6	60.6	73.5	N/A	2																		
Bankfull Mean Depth (ft)	1.9	2.0	2.0	2.0	N/A	2	1.6	1.8	1.8	1.9	N/A	2	1.6	1.9	1.9	2.1	N/A	2																		
Bankfull Max Depth (ft)	2.9	3.0	3.0	3.1	N/A	2	2.4	2.7	2.7	3.0	N/A	2	2.5	3.2	3.2	3.9	N/A	2																		
Bankfull Cross-Sectional Area (ft ²)	34.0	36.1	36.1	38.1	N/A	2	29.5	32.7	32.7	35.9	N/A	2	27.8	34.4	34.4	41.0	N/A	2																		
Width/Depth Ratio	9.3	9.6	9.6	9.9	N/A	2	9.9	10.8	10.8	11.7	N/A	2	9.3	10.3	10.3	11.3	N/A	2																		
Entrenchment Ratio	2.7	3.4	3.4	4.0	N/A	2	2.6	3.3	3.3	3.9	N/A	2	2.7	3.3	3.3	3.8	N/A	2																		
Bank Height Ratio	1.0	1.0	1.0	1.0	N/A	2	1.0	1.0	1.0	1.0	N/A	2	1.0	1.0	1.0	1.0	N/A	2																		
Profile																																				
Riffle Length (ft)	15.7	50.3	55.7	79.3	20.2	7	14.4	48.7	43.0	87.0	24.1	7	14.7	37.3	39.9	54.7	18.2	4																		
Riffle Slope (ft/ft)	0.001	0.006	0.006	0.014	0.004	7	0.001	0.003	0.003	0.006	0.002	7	0.003	0.007	0.007	0.010	0.004	4																		
Pool Length (ft)	10.1	19.9	15.9	39.6	8.9	14	9.7	17.6	17.5	26.1	5.8	15	7.6	26.2	31.4	44.2	13.0	14																		
Pool Max Depth (ft)	3.3	3.9	3.8	5.1	0.6	12	3.2	3.9	4.0	4.9	0.5	13	3.0	4.2	3.8	6.7	1.0	13																		
Pool Spacing (ft)	15.3	57.5	38.8	130.2	41.5	14	10.8	56.8	40.6	129.1	40.4	14	10.0	60.6	61.6	109.9	34.9	13																		
Pattern																																				
Channel Belt Width (ft)	28.3	49.2	57.5	65.4	15.4	9																														
Radius of Curvature (ft)	32.7	40.7	42.2	50.1	5.6	7																														
Rc: Bankfull Width (ft/ft)	1.6	1.6	1.6	1.6	N/A	1																														
Meander Wavelength (ft)	138.9	162.2	157.3	210.5	27.2	6																														
Meander Width Ratio	3.1	3.1	3.1	3.1	N/A	2																														
Additional Reach Parameters																																				
Rosgen Classification	C					C5					C5																									
Channel Thalweg Length (ft)	870					869					875																									
Sinuosity (ft)	1.10					1.09					1.10																									
Water Surface Slope (Channel) (ft/ft)	-					0.0099					0.0094																									
Bankfull Slope (ft/ft)	0.0106					0.0104					0.0101																									
Rt% / Ru% / P% / G% / S%	43%	6%	34%	13%	3%	39%	10%	31%	18%	2%	17%	19%	42%	19%	3%																					
SC% / SA% / G% / C% / B% / Be%*						3%	75%	22%	0%	0%	0	3%	59%	38%	0%	0%	0%																			
d16 / d35 / d50 / d84 / d95 (mm)																																				
% of Reach with Eroding Banks	0%					0%					8%																									
Channel Stability or Habitat Metric	N/A					N/A					N/A																									
Biological or Other	N/A					N/A					N/A																									

N/A - Information does not apply.
 Rt = Riffle / Ru = Run / P = Pool / G = Glide / S = Step
 SC = Silt-Clay / SA = Sand / G = Gravel / C = Cobble / B = Boulder / Be = Bedrock
 *Percentages based on riffle and pool pebble counts.

Appendix E

Hydrologic Data

Table 12. Verification of Bankfull Events Dye Branch II / Project No. 92255		
Date of Occurrence	Method	Feet Above Average Bankfull Elevation
7/8/2011	Water level logger	1.07
9/21/2011	Water level logger	1.14
9/24/2011	Water level logger	0.52
5/16/2012	Water level logger	1.63
7/11/2012	Water level logger	0.21
9/29/2012	Water level logger	0.22

Figure 3. Dye Branch Water Level Logger Chart

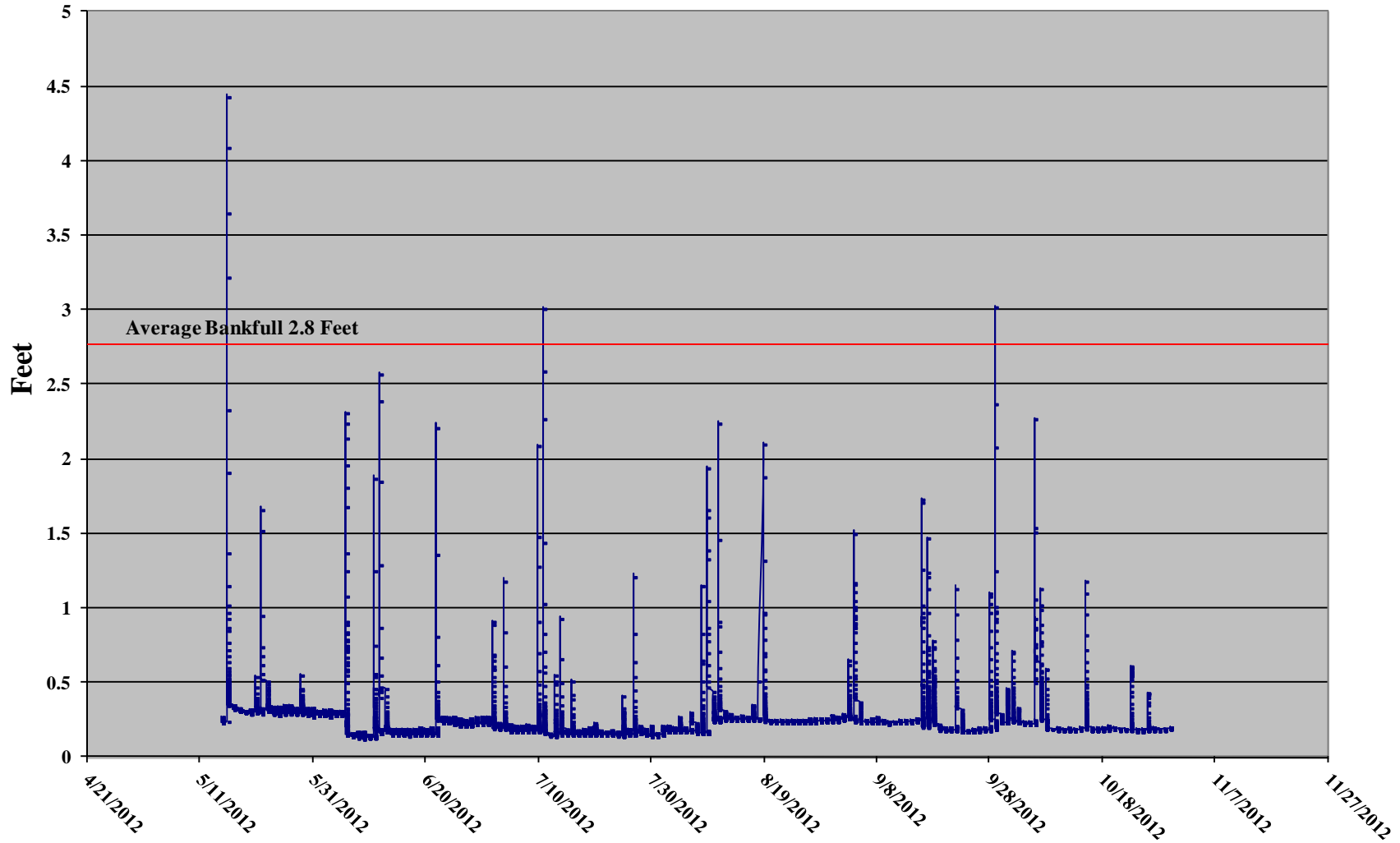
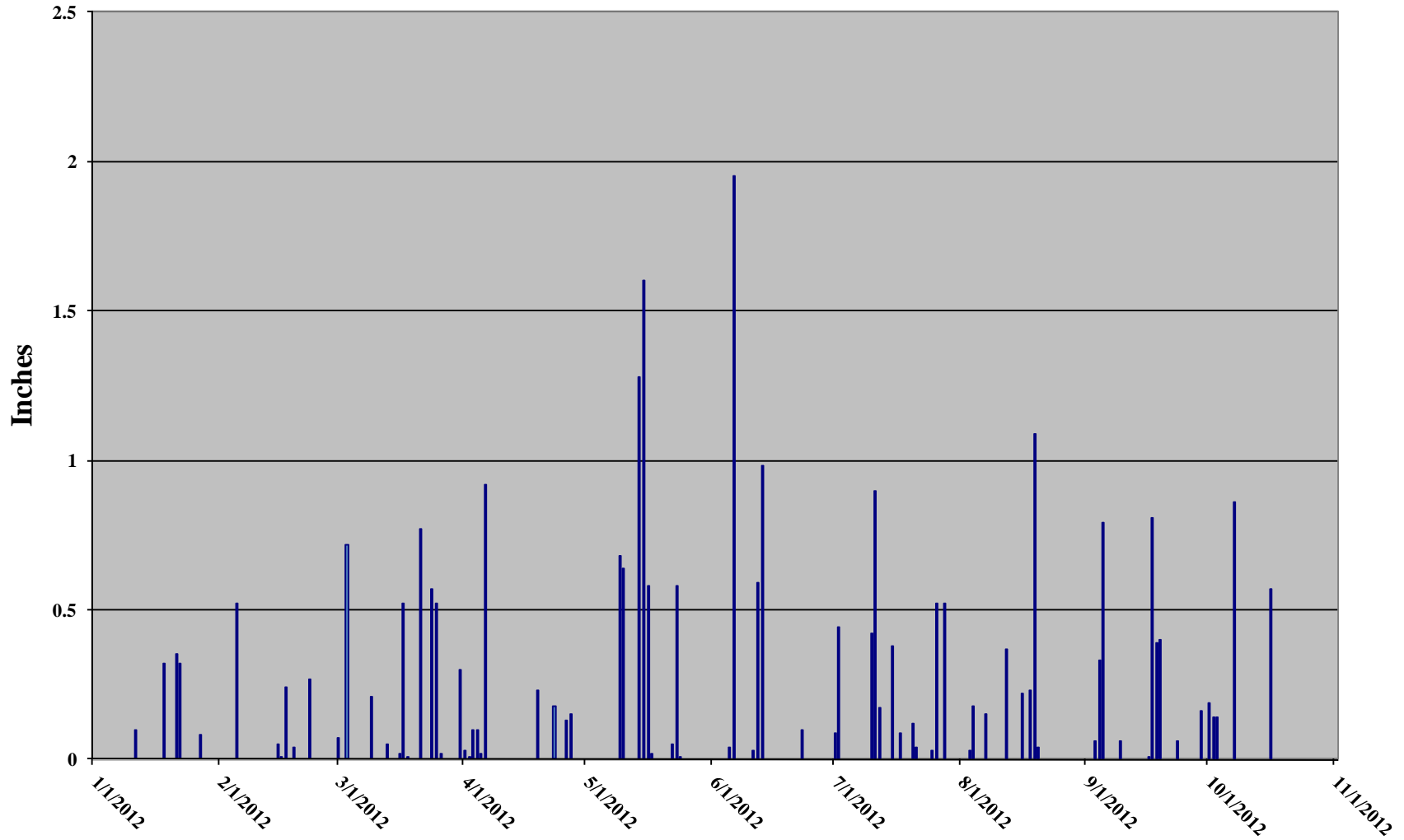


Figure 3. Precipitation for Mooresville, North Carolina



NC CRONOS (North Carolina Climate Retrieval and Observations Network of the Southeast Database). State Climate Office of North Carolina. Version 2.7.2. Mooresville 1.9 SSE (NC-IR-1). <http://www.nc-climate.ncsu.edu/cronos/> Accessed November 2012.