Dye Branch II
Stream Restoration
Annual Monitoring Report
Monitoring Year 5
NCDMS Project Number: 92255
Monitoring Contract Number: 004523

Submitted to
North Carolina Division of Mitigation Services
North Carolina Department of Environmental Quality
November 2015

1652 Mail Service Center
Raleigh, NC 27699

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Monitoring Firm

EQUINOX

balance through proper planning

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Dye Branch II Stream Restoration
2015 Monitoring Report (MY 5)

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Appendices

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.

Vegetation monitoring of the Dye Branch Stream Restoration Project includes annual monitoring of seven permanent vegetation plots and visual assessment of the easement as a whole. The site includes a diverse assemblage of 20 planted species of native trees and shrubs. Planted species range from 3 to 5 per plot with 6 to 11 species observed when volunteers are included. Based on the MY5 vegetation data, the average stem density for planted stems across all plots is approximately 249 stems per acre. This does not meet the year 5 success criteria of 260 planted stems per acre. However, when planted and natural stems are combined, the average stem density is 1,347 stems per acre, and all seven plots meet the year five success criteria. Regarding invasive-exotics, 28 patches of invasive plants have been identified, totaling 4.85 acres or 40% of the easement. A contractor was hired to treat the invasive-exotic vegetation in November 2015. Cut and stump spray, foliar spray and basal bark methods were implemented to treat Japanese honeysuckle (*Lonicera japonica*), Chinese privet (*Ligustrum sinense*), kudzu (*Pueraria lobata*),Japanese privet (*Lonicera japonica*), multiflora rose (*Rosa multiflora*) and mimosa (*Albizia julibrissin)* throughout the conservation easement. A follow up treatment is scheduled for spring 2016.

Morphologic monitoring of the Cemetery Branch Reach included three cross-sections, three pebble counts, and 989 feet of longitudinal profile (Appendix D). As expected, some channel adjustment was noticeable in cross-section data between MY0 and MY1; however, more recent years have remained stable. Stream longitudinal profiles within the Cemetery Branch reach have remained stable among monitoring years with the exception of a few isolated areas of scour and deposition. These are isolated areas and do not give any indication of reach-wide instability. Riffle substrates have been stable over the course of the monitoring period with D_{50} in the coarse gravel size class whereas pool substrate has become gradually finer over the monitoring period with the D_{50} falling in the sand size class during MY5.

Morphologic monitoring of the upstream reach of Dye Branch included four cross-sections, four pebble counts, and 1,473 feet of longitudinal profile. Cross-sections have remained stable with minimal adjustments from MY2 through MY5 (Table 11a). The upstream reach of Dye Branch has multiple areas of aggradation and degradation, as well as structures with compromised structural integrity. Areas of aggradation and degradation shown in the profile consist of mostly fine material, transported from contributing areas upstream of the watershed, shifting within the

channel. There are a total of four failed structures and three stressed structures, which are documented in the Current Condition Plan View (Figure 2). Substrate has remained in the fine gravel to sand size class throughout the monitoring period. Approximately 10% of the reach is actively eroding (Table 5).

Morphologic monitoring of the downstream reach of Dye Branch includes three cross-sections, three pebble counts, and 882 feet of longitudinal profile. The downstream reach of Dye Branch showed a significant downcutting between MY1 and MY2. Since then the reach has showed indications of instability between monitoring years. Aggradation, degradation, bank erosion, and compromised structures persist throughout the reach. The most severely affected area is between stations 18+77 and 20+74 as well as between stations 21+20 and 23+16, where multiple structures have failed, resulting in loss of grade control and significant shifts in bedform. A total of seven structures have either failed or are stressed. Substrate has remained relatively fine with D_{50} falling in the sand size class throughout the monitoring period.

A water level logger was installed in December of 2010 and has since recorded a total of 14 bankfull events. An equipment malfunction led to the loss of pressure transducer data between June and November of 2015. One bankfull event was documented through wrack lines between June and November of 2015. Bankfull events may be underrepresented during this monitoring year.

With the exception of Cemetery Branch, the Dye Branch Stream Restoration project is not performing as expected and is currently not meeting the goals and objectives stated above. In particular, the mainstem of Dye Branch has shown extensive adjustment and instability in both the upstream and downstream reaches and is not currently meeting the stable channel success criterion. The stream performance criteria in the restoration plan states that instability in C-type streams will be judged based on width/depth ratios exceeding 18. In the case of the upstream reach of Dye Branch, width/depth ratios have exceeded this criterion since MY0. Regarding the downstream reach of Dye Branch, although the width-depth ratio has remained relatively stable over the monitoring period, the longitudinal profile and visual assessment of the channel have documented the unstable nature of the channel. In addition, with extensive invasive exotics documented throughout the project reach and many vegetation plots failing, success of the riparian vegetation community objective is suspect.

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 NCDMS' website. All raw data supporting tables and figures in the appendices are available from NCDMS upon request.

2.0 Methodology

The stream monitoring methodologies utilized in MY5 replicate those employed during the previous monitoring years and are based on standard guidance and procedures documents (Rosgen 1996; USACE 2003).

Geomorphic measurements were taken during low flow conditions using a Nikon NPR 332 Total Station. Three-dimensional coordinates associated with cross-sections were collected in the field and geo-referenced (NAD83 North Carolina State Plane feet FIPS 3200). Geomorphic data included 10 cross-sections and 3,311 feet of longitudinal profile. Survey data was imported into CAD, ArcGIS®, and Microsoft Excel® for data processing and analysis. Channel substrate was characterized using a Wolman Pebble Count outlined in the Harrelson et al. (1994) and processed using Microsoft Excel.

Vegetation success is being monitored using 7 permanent monitoring plots. Vegetation monitoring follows the CVS-EEP Level 2 Protocol for Recording Vegetation, Version 4.2 (Lee et al. 2008) and includes analysis of composition and density of planted species. Data is processed using the CVS data entry tool. In the field, the four corners of each plot were permanently marked with rebar and photos of each plot taken from the origin each monitoring year.

Flow data and bankfull events were documented with a Global Water pressure transducer. Data from the transducer was downloaded bi-annually and processed using Microsoft Excel.

3.0 References

Harrelson, Cheryl, C. Rawlins and J. Potyondy. 1994. Stream Channel Reference Sites: An Illustrated Guide to Field Technique. Gen. Tech. Rep. RM-245. Rocky Mountain Forest and Range Experiment Station. USDA Forest Service. Fort Collins, Colorado

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

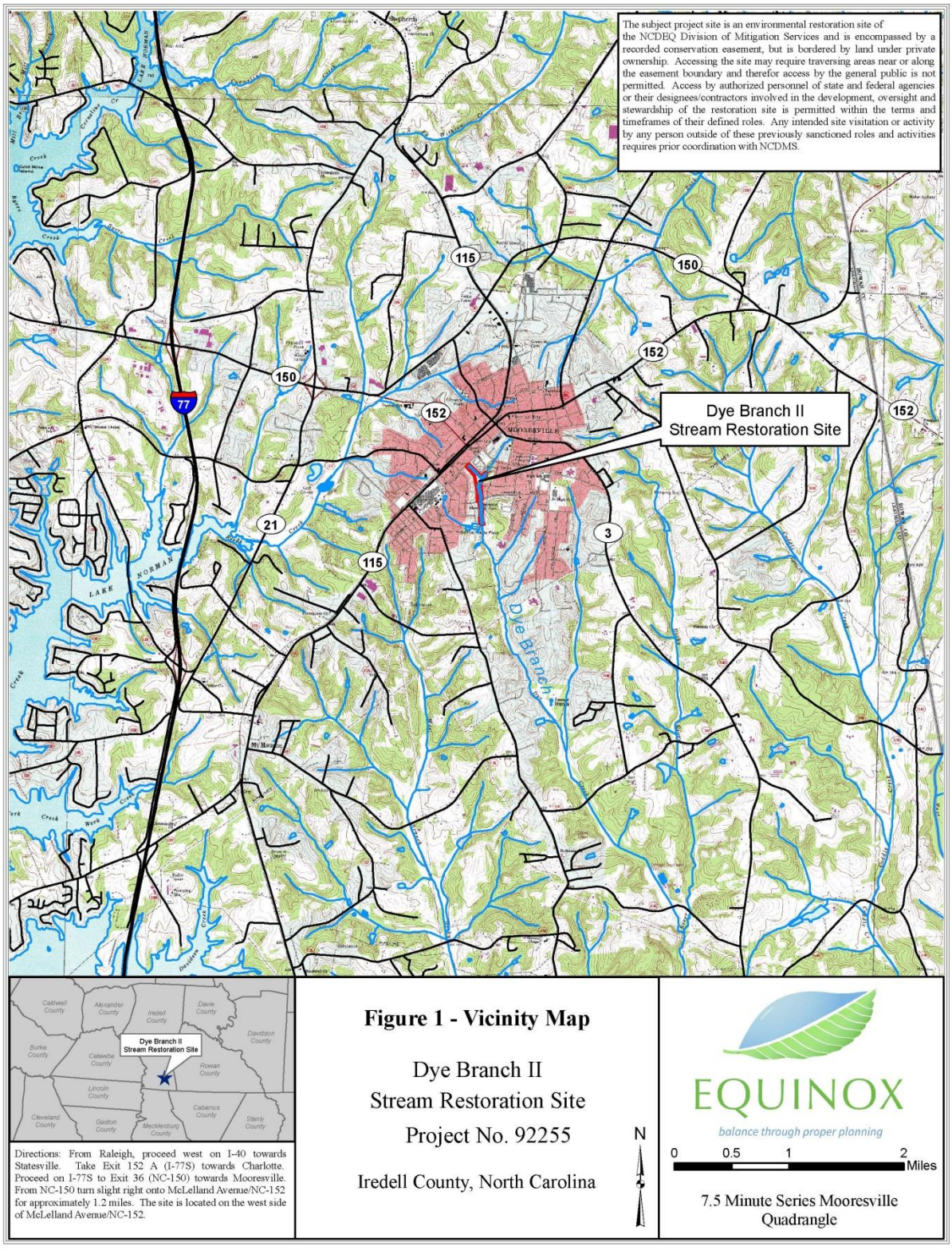
The subject project site is an environmental restoration site of the NCDEQ Division of Mitigation Services and is encompassed by a recorded conservation easement, but is bordered by land under private ownership. Accessing the site may require traversing areas near or along the easement boundary and therefor 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 NCDMS.
Dye Branch II Stream Restoration Site
77
115
150
152
21
3
Dye Branch
LAKE NORMAN
MOORESVILLE
Dye Branch II Stream Restoration Site
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.
Figure 1 - Vicinity Map
Dye Branch II
Stream Restoration Site
Project No. 92255
Iredell County, North Carolina
N
EQUINOX
balance through proper planning
0 0.5 1 2 Miles
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**	**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	Nov 2013	Dec 2013
Year 4 Monitoring	Dec 2014	Dec 2014
Year 5 Monitoring	Nov 2015	Nov 2015
Invasive-Exotic Vegetation Treatment	-	Nov 2015

- Information unavailable.

N/A - Item does not apply.

Table 3. Project Contacts Dye Branch II / Project No. 92255	
Designer Primary Project Design POC	Mulkey Engineers & Consultants 6750 Tryon Road Cary NC, 27518 Emmett Perdue (919) 858-1874
Construction Contractor Construction Contractor POC	Fluvial Solutions P.O. Box 28749 Raleigh, NC 27611 Peter Jelenevsky (919) 605-6134
Planting Contractor Planting Contractor POC	Fluvial Solutions P.O. Box 28749 Raleigh, NC 27611 Peter Jelenevsky (919) 605-6134
Seeding Contractor Seeding Contractor POC	Fluvial Solutions P.O. Box 28749 Raleigh, NC 27611 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 (MY0) - 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 (MY1) - 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 (MY2) - 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 (MY3) - 2013	Equinox Environmental Consultation & Design, Inc. 37 Haywood Street, Suite 100 Asheville, North Carolina 28801
Stream Monitoring POC	Hunter Terrell (828) 253-6856
Vegetation Monitoring POC	Hunter Terrell (828) 253-6856
Monitoring Performers (MY4) - 2014	Equinox Environmental Consultation & Design, Inc. 37 Haywood Street, Suite 100 Asheville, North Carolina 28801
Stream Monitoring POC	Hunter Terrell (828) 253-6856
Vegetation Monitoring POC	Hunter Terrell (828) 253-6856
Monitoring Performers (MY5) - 2015	Equinox Environmental Consultation & Design, Inc. 37 Haywood Street, Suite 100 Asheville, North Carolina 28801
Stream Monitoring POC	Hunter Terrell (828) 253-6856
Vegetation Monitoring POC	Hunter Terrell (828) 253-6856

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		
Series	Chewacla / Cecil / Colfax	
Depth	-	-
Clay%	-	-
K	-	-
T	-	-

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N/A - Item does not apply.

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Appendix B
Visual Assessment Data

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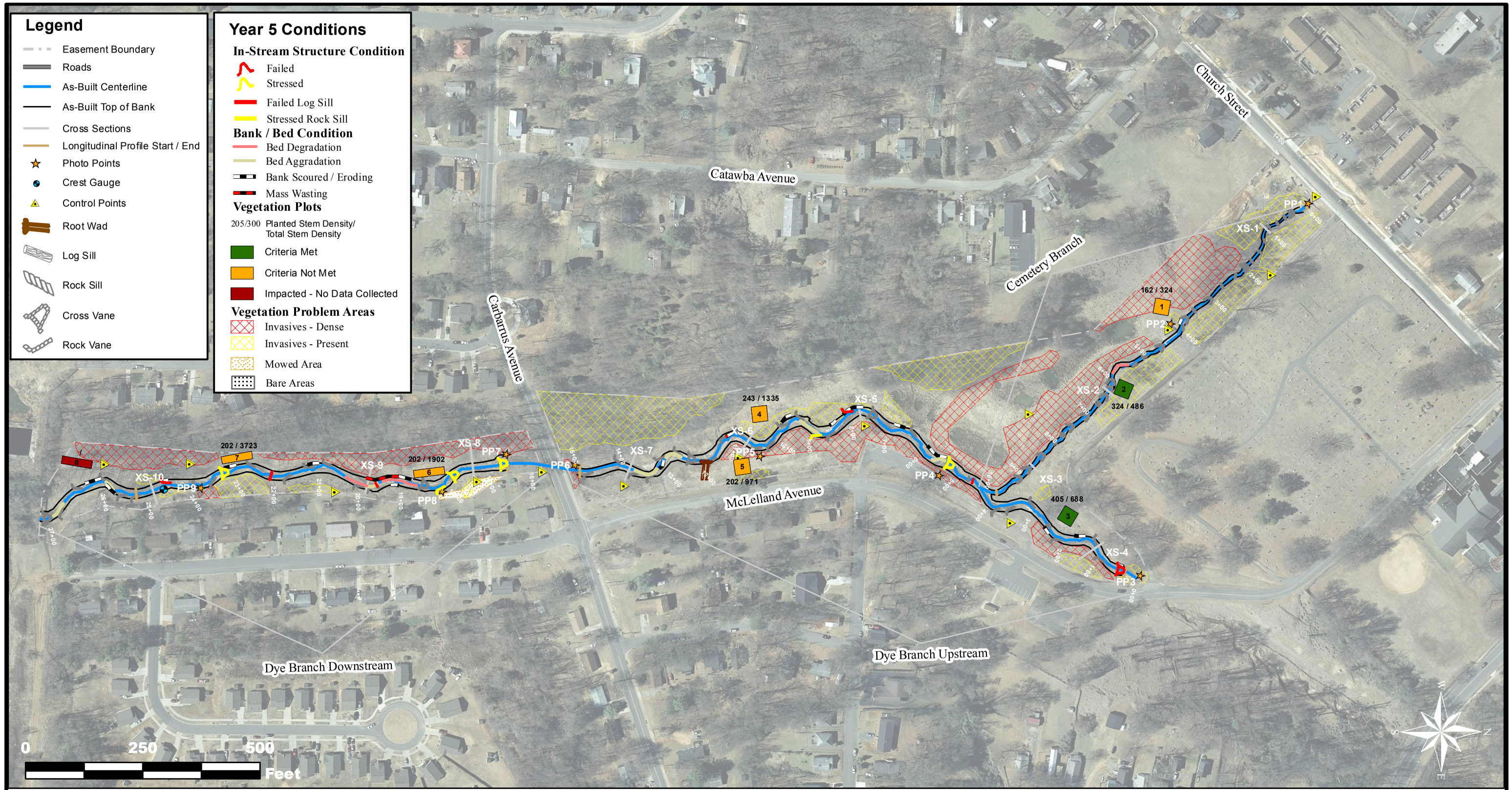
Figure 2. Integrated Current Condition Plan View



Prepared for	**Project:** Dye Branch Stream Restoration Monitoring Year 5 - Integrated Current Condition Plan View Iredell County, North Carolina	Notes: 1) Base Map Data Provided by Mulkey Engineers & Consultants 2) NC OneMap 2010 Aerial Photo 3) Dominant Invasive Species Include Ligustrum sp., Lonicera japonica, Pueraria montana var. lobata, and Lespedeza cuneata.	Prepared by
NCDMS	Sheet 1 of 1		EQUINOX
	November 2015	Project Number	
		NCEEP # 92255	

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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. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars).			0	0	100%			
		2. Degradation - Evidence of downcutting.			1	43	96%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate.	14	14			100%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6).	11	15			73%			
		2. Length 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.			1	12	99%	N/A	N/A	N/A
	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.			0	0	100%	N/A	N/A	N/A
				Totals	1	12	99%	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 NOT exceed 15%.	4	4			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth Ratio ≥ 1.6. Rootwads/logs providing some cover at base-flow.	13	13			100%			

N/A - Item does not apply.

Table 5 cont'd. 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. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars).			4	171	89%			
		2. Degradation - Evidence of downcutting.			0	0	100%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate.	15	17			88%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6).	20	20			100%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream riffle).	16	20			80%			
	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.			9	252	92%	5	50	93%
	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.			1	5	100%	2	0	100%
				Totals	10	257	91%	7	50	93%
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	25	30			83%			
	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.	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 ≥ 1.6. Rootwads/logs providing some cover at base-flow.	3	5			60%			

N/A - Item does not apply.

Table 5 cont'd. 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. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars).			3	78	93%			
		2. Degradation - Evidence of downcutting.			2	124	89%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate.	10	11			91%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6).	10	10			100%			
		2. Length 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.			7	175	93%	2	30	94%
	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.			1	72	97%	1	22	98%
				Totals	8	247	89%	1	22	90%
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	15	22			68%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	5	8			63%			
	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 NOT exceed 15%.	12	14			86%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth Ratio ≥ 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	0	0.00	<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	0	0.00	<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	0	0.00	<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)	28	4.85	40%
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

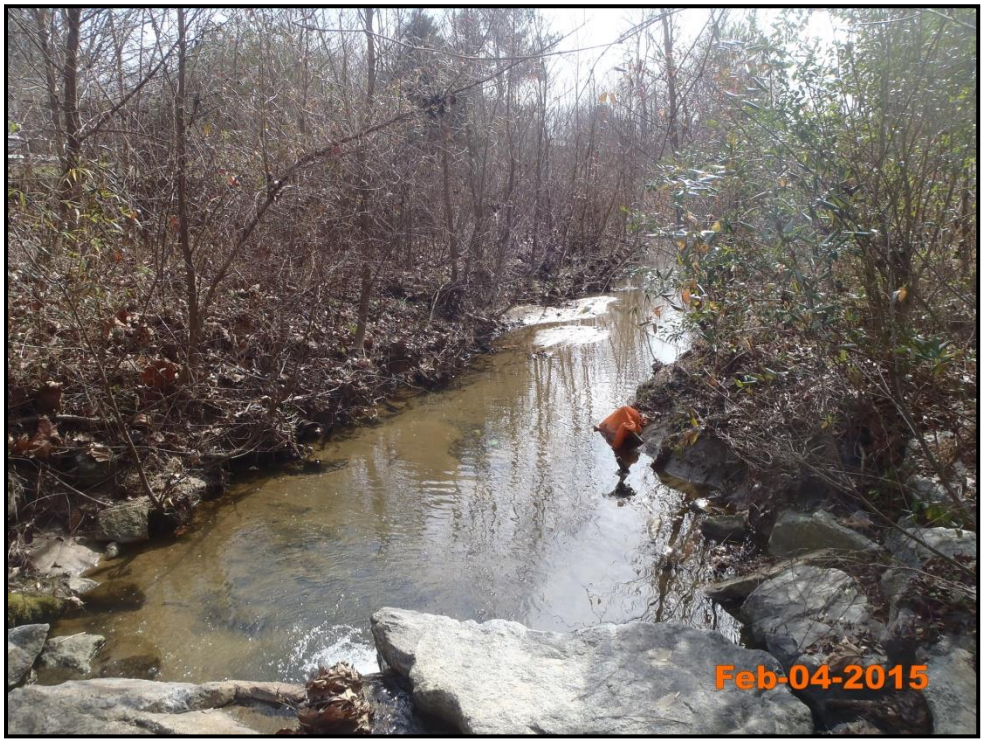
Cemetery Branch – Permanent Photo Station 2
Downstream

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

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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	29%
2	Yes	
3	Yes	
4	No	
5	No	
6	No	
7	No	

Vegetation Monitoring Plot 1
Monitoring Year 5 – August 10, 2015

Vegetation Monitoring Plot 2
Monitoring Year 5 – August 10, 2015

Vegetation Monitoring Plot 3
Monitoring Year 5 – August 10, 2015

Vegetation Monitoring Plot 4
Monitoring Year 5 – August 10, 2015

Vegetation Monitoring Plot 5
Monitoring Year 5 – August 10, 2015

Vegetation Monitoring Plot 6
Monitoring Year 5 – August 10, 2015

Vegetation Monitoring Plot 7
Monitoring Year 5 – August 10, 2015

Table 8. CVS Vegetation Plot Metadata Dye Branch II / Project No. 92255	
Report Prepared By	Drew Alderman
Date Prepared	8/12/2015 11:10
Database name	Equinox-2015-A-DyeBranch_MY5.mdb
Database location	Z:\ES\NRI&M\EEP Monitoring\Dye Branch\DB-MY5-2015\Data\Veg
Computer name	FIELD-PC
File size	45289472
DESCRIPTION OF WORKSHEETS IN THIS DOCUMENT	
Metadata	Description of database file, the report worksheets, and a summary of project(s) and project data.
Proj, planted	Each project is listed with its PLANTED stems per acre, for each year. This excludes live stakes.
Proj, total stems	Each project is listed with its TOTAL stems per acre, for each year. This includes live stakes, all planted stems, and all natural/volunteer
Plots	List of plots surveyed with location and summary data (live stems, dead stems, missing, etc.).
Vigor	Frequency distribution of vigor classes for stems for all plots.
Vigor by Spp	Frequency distribution of vigor classes listed by species.
Damage	List of most frequent damage classes with number of occurrences and percent of total stems impacted by each.
Damage by Spp	Damage values tallied by type for each species.
Damage by Plot	Damage values tallied by type for each plot.
Planted Stems by Plot and Spp	A matrix of the count of PLANTED living stems of each species for each plot; dead and missing stems are excluded.
ALL Stems by Plot and spp	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

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Table 9. Planted Stems and Total Stem Counts (Species by Plot)
Dye Branch / Project No. 92255

			Current Plot Data (MY5 2015)																				
			Plot 1			Plot 2			Plot 3			Plot 4			Plot 5			Plot 6			Plot 7		
Scientific Name	Common Name	Species Type	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T
Acer negundo	Boxelder	Tree									1			4			4			4			
Acer negundo var. negun	Boxelder	Tree																					
Acer rubrum	Red maple	Tree									3						1						
Acer rubrum var. rubrum	Red maple	Tree																					
Albizia julibrissin	Silktree	Exotic																					
Betula nigra	River birch	Tree				1	1	1												1			
Carya	Hickory	Tree															3			4			
Carya alba	Mockernut hickory	Tree																					
Carya ovata	Shagbark hickory	Tree																					
Cercis canadensis	Eastern redbud	Tree										1	1	1	1	1	1				2	2	2
Cornus amomum	Silky dogwood	Shrub																					
Cornus florida	Flowering dogwood	Tree																					4
Cornus kousa	Kousa dogwood																						6
Crataegus	Hawthorn	Tree																					
Diospyros virginiana	Common persimmon	Tree			1				1	1	2	1	1	1									
Fagus grandifolia var. gra	American beech	Tree																					
Fraxinus pennsylvanica	Green ash	Tree			1	3	3	3	1	1	1						1						2
Hibiscus	Rosemallow	Shrub																					
Juglans nigra	Black walnut	Tree	1	1	1									1									
Juniperus virginiana var. v	Eastern redcedar	Tree										1	1	1	2	2	2						
Liquidambar styraciflua	Sweetgum	Tree												10			3			18			20
Liriodendron	Tuliptree																						42
Liriodendron tulipifera	Tuliptree	Tree												2			5			6			
Liriodendron tulipifera va	Tulip-tree, Yellow Po	Tree				2	2	2										1	1	1			
Nyssa sylvatica	Blackgum	Tree																					
Pinus virginiana	Virginia pine	Tree	2	2	2							1	1	1	2	2	2						
Platanus occidentalis	American sycamore	Tree															1			5			3
Platanus occidentalis var.	Sycamore, Plane-tree	Tree				1	1	1			2												
Populus deltoides	Eastern cottonwood	Tree																					
Prunus	Plum	Shrub or Tree																					
Prunus serotina	Black cherry	Tree																					
Prunus serotina var. serot	Black cherry	Tree																					
Prunus serrulata	Japanese flowering cherry				2									4									
Pyrus calleryana	Callery pear	Exotic																					
Quercus	Oak	Tree																					
Quercus alba	White oak	Tree																					
Quercus falcata	Southern red oak	Tree																					
Quercus nigra	Water oak	Tree										2	2	8			1	1	1	1			2
Quercus pagoda	Cherrybark oak	Tree																					
Quercus phellos	Willow oak	Tree				1	1	1	7	7	7							3	3	7	2	2	8
Quercus rubra	Northern red oak	Tree																					
Quercus velutina	Black oak	Tree	1	1	1				1	1	1										1	1	1
Salix caroliniana	Coastal plain willow	Tree						4															2
Sambucus canadensis	Common Elderberry	Shrub																					
Unknown		Shrub or Tree																					
Stem count			4	4	8	8	8	12	10	10	17	6	6	33	5	5	24	5	5	47	5	5	92
size (ares)			1			1			1			1			1			1			1		
size (ACRES)			0.02			0.02			0.02			0.02			0.02			0.02			0.02		
Species count			3	3	6	5	5	6	4	4	7	5	5	10	3	3	11	3	3	9	3	3	11
Stems per ACRE			162	162	324	324	324	486	405	405	688	243	243	1335	202	202	971	202	202	1902	202	202	3723

[1]PnoLS: No livestakes included in tally; P-all: All planted stems included in tally; T: Total stems including recruitment.

Color Key

Exceeds requirements by 10%
Exceeds requirements, but by less than 10%
Fails to meet requirements, by less than 10%
Fails to meet requirements by more than 10%
Recruit Stems

Table 9 Con't. Planted Stems and Total Stem Counts (Annual Means)
Dye Branch / Project No. 92255

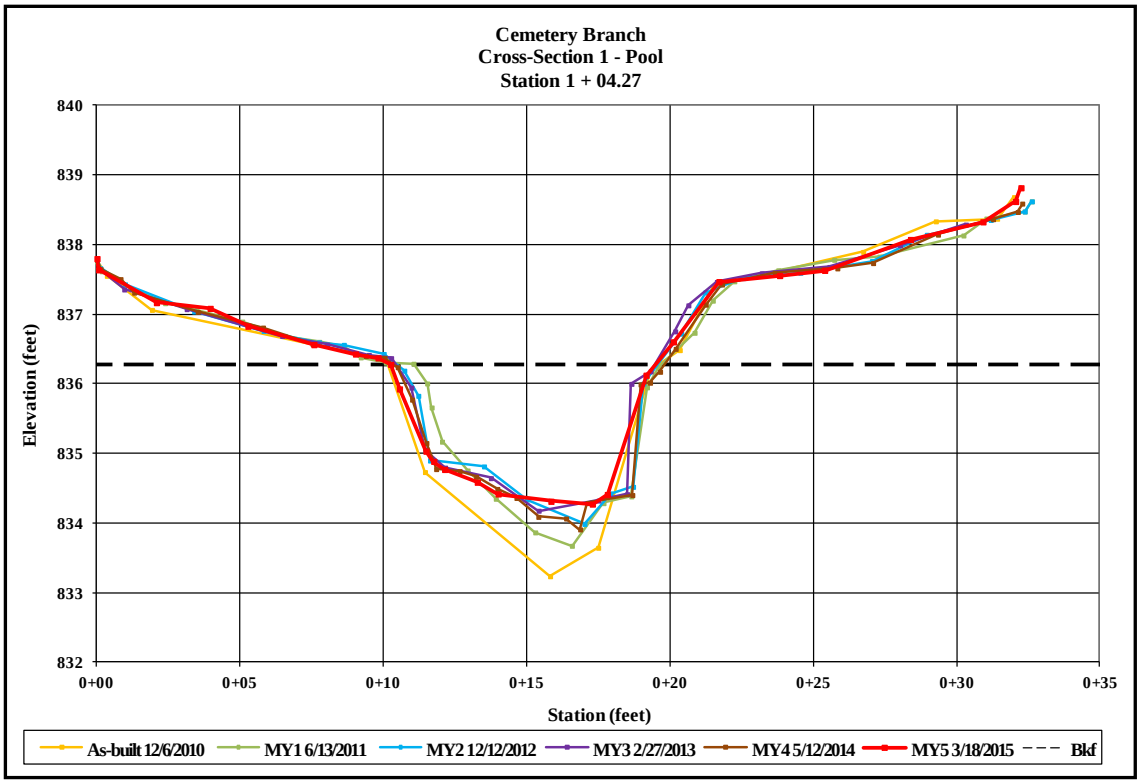
			Annual Means																	
			MY5 (2015)			MY4 (2014)			MY3 (2013)			MY2 (2012)			MY1 (2011)			MY0 (2011)		
Scientific Name	Common Name	Species Type	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T
Acer negundo	Boxelder	Tree			13									1						
Acer negundo var. negundo	Boxelder	Tree						7			7									
Acer rubrum	Red maple	Tree			4									2						
Acer rubrum var. rubrum	Red maple	Tree						5			5									
Albizia julibrissin	Silktree	Exotic									2									
Betula nigra	River birch	Tree	1	1	2	1	1	2	1	1	2	1	1	1	1	1	1			
Carya	Hickory	Tree			7			9			4			5						
Carya alba	Mockernut hickory	Tree																1	1	1
Carya ovata	Shagbark hickory	Tree															1			
Cercis canadensis	Eastern redbud	Tree	4	4	4	4	4	4	4	4	4	4	4	4	2	2	2	2	2	2
Cornus amomum	Silky dogwood	Shrub						3												
Cornus florida	Flowering dogwood	Tree			4															
Cornus kousa	Kousa dogwood				6															
Crataegus	Hawthorn	Tree						1												
Diospyros virginiana	Common persimmon	Tree	2	2	4	1	1	4	1	1	5	1	1	1			1			
Fagus grandifolia var. grandifolia	American beech	Tree						1												
Fraxinus pennsylvanica	Green ash	Tree	4	4	8	5	5	9	5	5	5	4	4	4	4	4	4	4	4	4
Hibiscus	Rosemallow	Shrub						1												
Juglans nigra	Black walnut	Tree	1	1	2	1	1	1	1	1	1	2	2	2	2	2	2	1	1	1
Juniperus virginiana var. virginiana	Eastern redcedar	Tree	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	9	9	9
Liquidambar styraciflua	Sweetgum	Tree			51			44			43			14			17			
Liriodendron	Tuliptree				42															
Liriodendron tulipifera	Tuliptree	Tree			13															
Liriodendron tulipifera var. tulipifera	Tulip-tree, Yellow Poplar, Whitewood	Tree	3	3	3	2	2	54	3	3	95	3	3	50	4	4	30	8	8	8
Nyssa sylvatica	Blackgum	Tree						1												
Pinus virginiana	Virginia pine	Tree	5	5	5	6	6	6	7	7	7	10	10	10	11	11	11	14	14	14
Platanus occidentalis	American sycamore	Tree			9						1			6						
Platanus occidentalis var. occidentalis	Sycamore, Plane-tree	Tree	1	1	3	1	1	8	1	1	3						1	1	1	1
Populus deltoides	Eastern cottonwood	Tree												1						
Prunus	Plum	Shrub or Tree															5			
Prunus serotina	Black cherry	Tree												8						
Prunus serotina var. serotina	Black cherry	Tree						12			6									
Prunus serrulata	Japanese flowering cherry				6															
Pyrus calleryana	Callery pear	Exotic						1									2			
Quercus	Oak	Tree						5			1	1	1	1	9	9	13	19	19	19
Quercus alba	White oak	Tree						3												
Quercus falcata	Southern red oak	Tree							1	1	1	1	1	1	2	2	2	2	2	2
Quercus nigra	Water oak	Tree	3	3	12	3	3	9	3	3	3	8	8	9	2	2	2	2	2	2
Quercus pagoda	Cherrybark oak	Tree						1												
Quercus phellos	Willow oak	Tree	13	13	23	13	13	18	13	13	13	8	8	26	4	4	7	4	4	4
Quercus rubra	Northern red oak	Tree												4						
Quercus velutina	Black oak	Tree	3	3	3	3	3	3	4	4	15									
Salix caroliniana	Coastal plain willow	Tree			6			3												
Sambucus canadensis	Common Elderberry	Shrub									8									
Unknown		Shrub or Tree													3	3	3	9	9	9
Stem count			43	43	233	43	43	218	47	47	234	46	46	153	47	47	107	76	76	76
size (ares)			7			7			7			7			7			7		
size (ACRES)			0.17			0.17			0.17			0.17			0.17			0.17		
Species count			12	12	23	12	12	27	13	13	22	12	12	20	12	12	18	13	13	13
Stems per ACRE			249	249	1347	249	249	1260	272	272	1353	266	266	885	272	272	619	439	439	439

[1]PnoLS: No livestakes included in tally; P-all: All planted stems included in tally; T: Total stems including recruitment.

Color Key

Exceeds requirements by 10%
Exceeds requirements, but by less than 10%
Fails to meet requirements, by less than 10%
Fails to meet requirements by more than 10%
Recruit Stems

Appendix D
Stream Survey Data

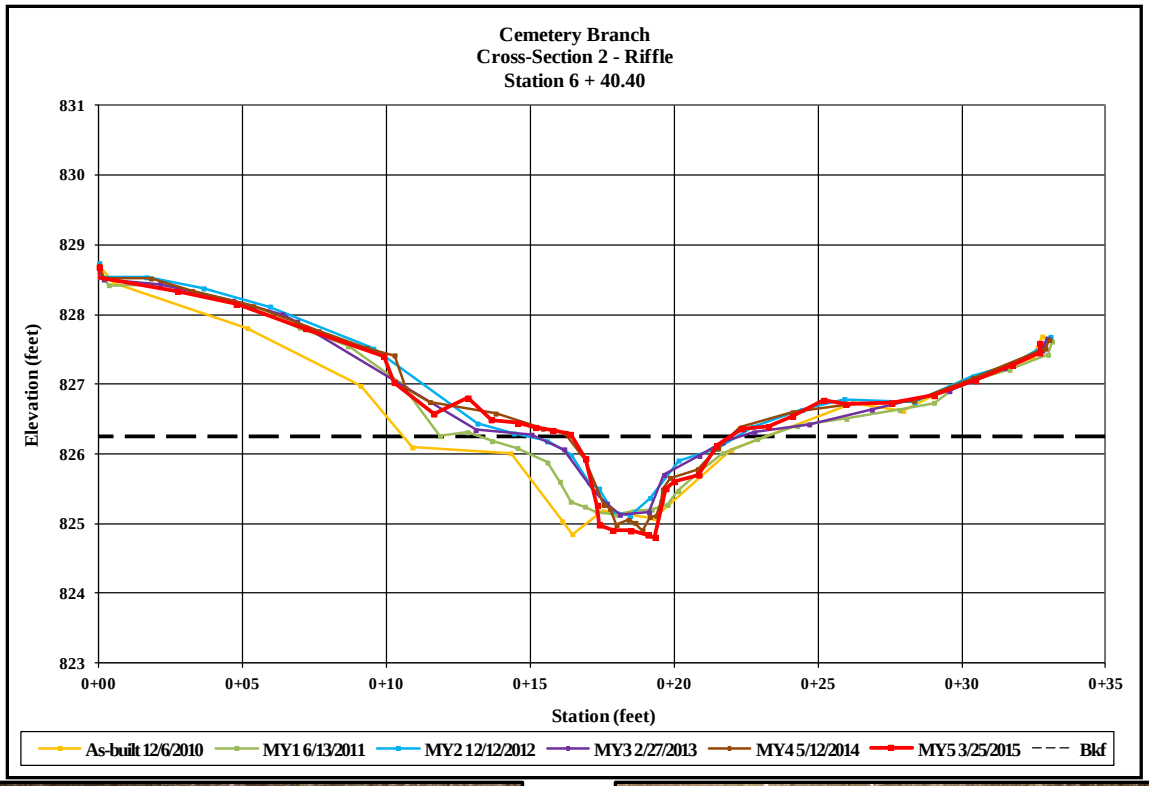


Left Descending Bank

Right Descending Bank

Upstream

Downstream

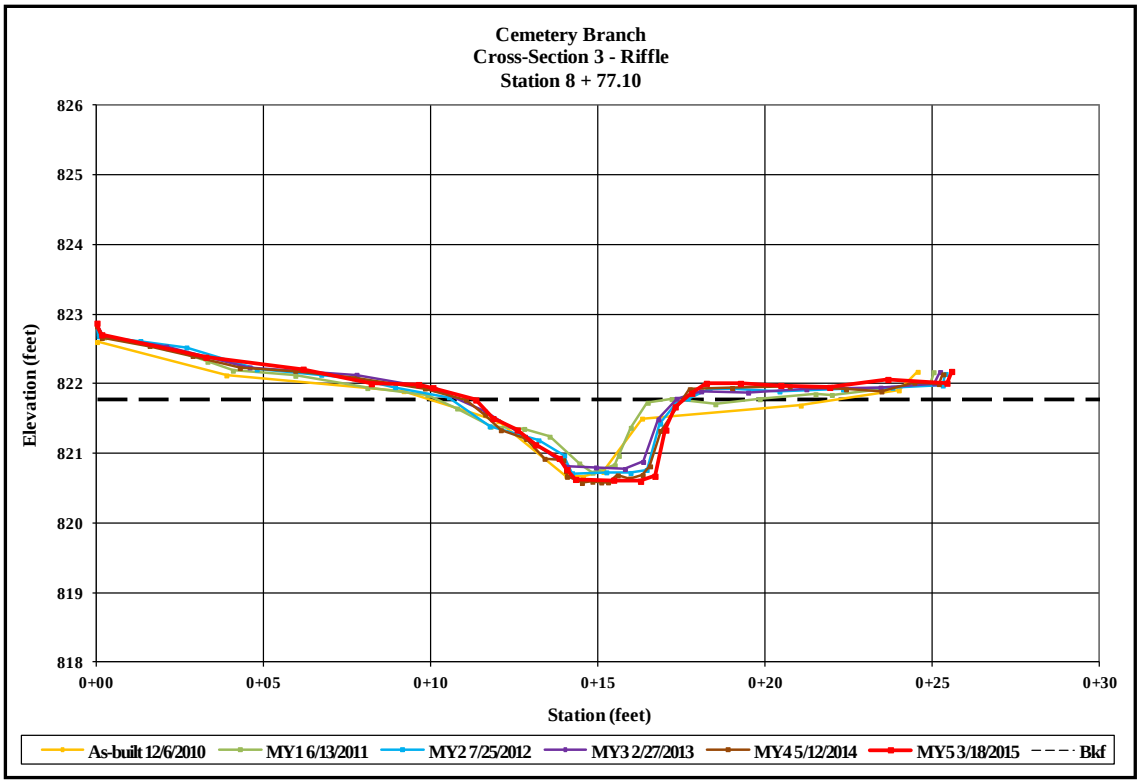


Left Descending Bank

Right Descending Bank

Upstream

Downstream

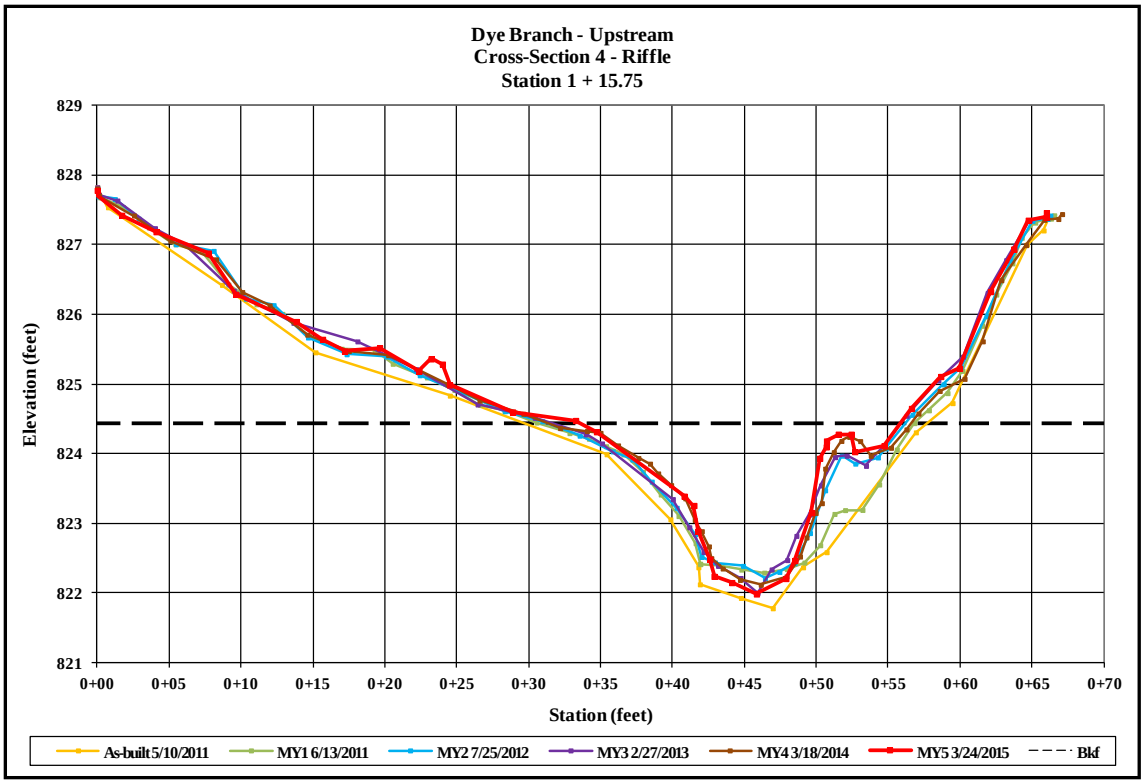


Left Descending Bank

Right Descending Bank

Upstream

Downstream

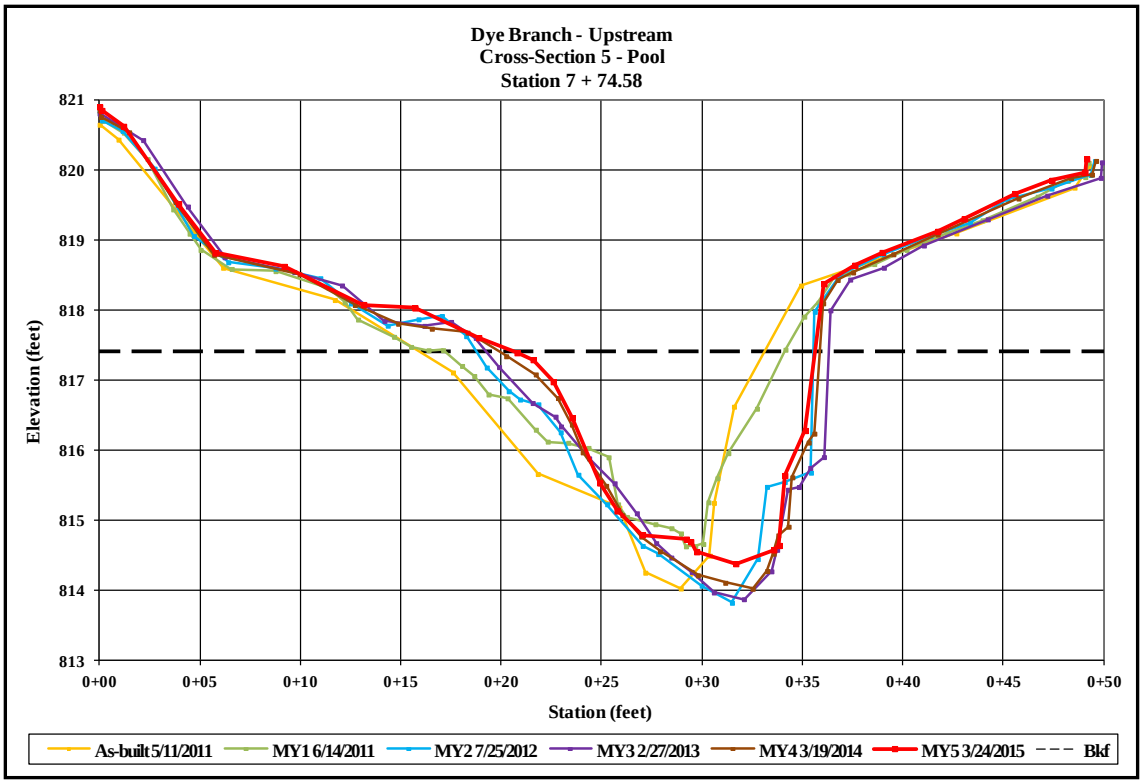


Left Descending Bank

Right Descending Bank

Upstream

Downstream

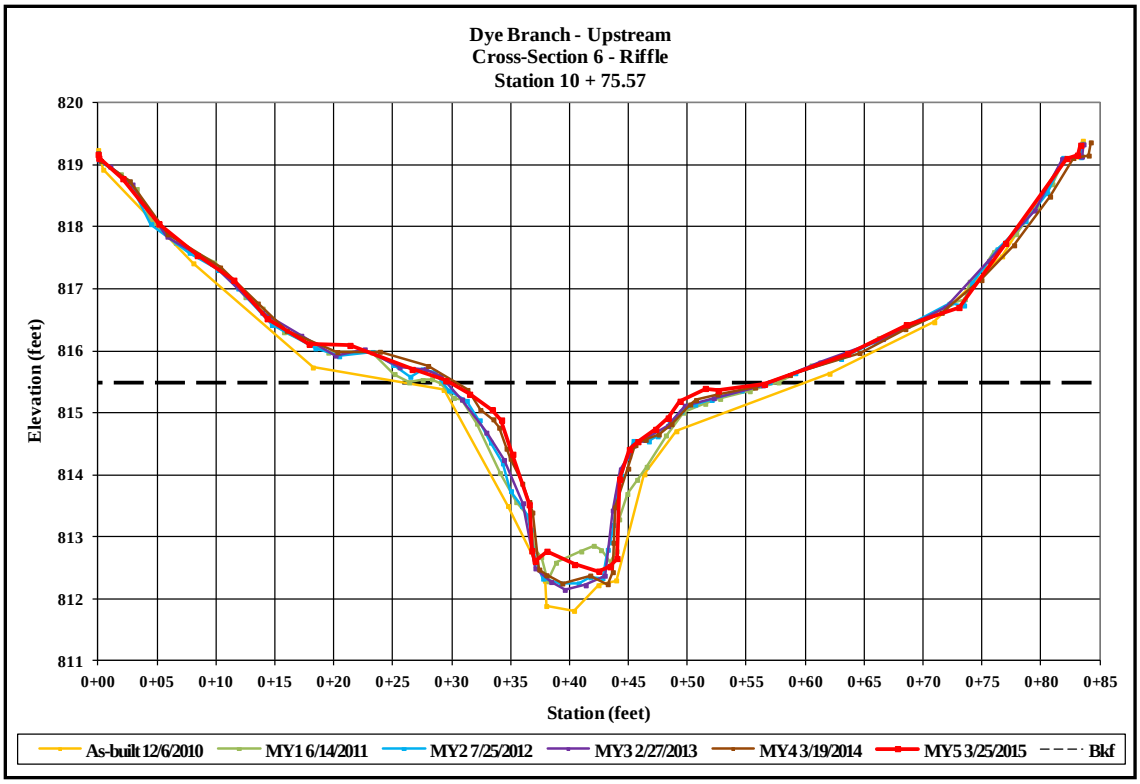


Left Descending Bank

Right Descending Bank

Upstream

Downstream

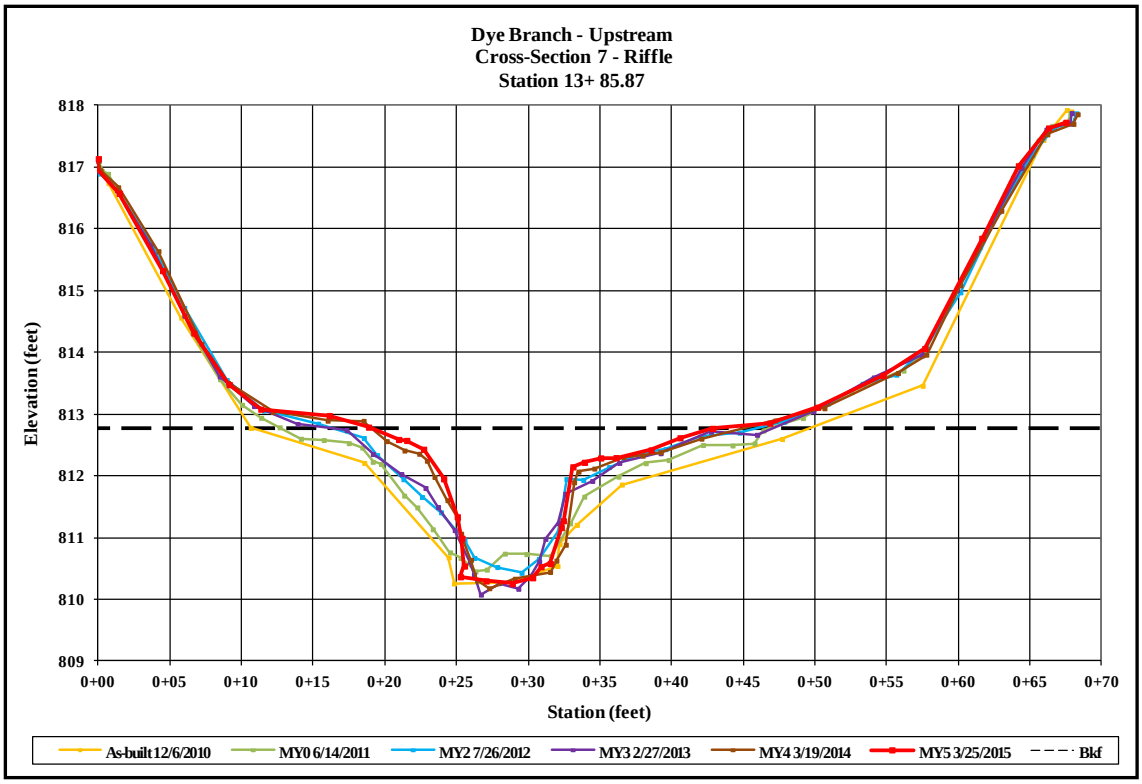


Left Descending Bank

Right Descending Bank

Upstream

Downstream

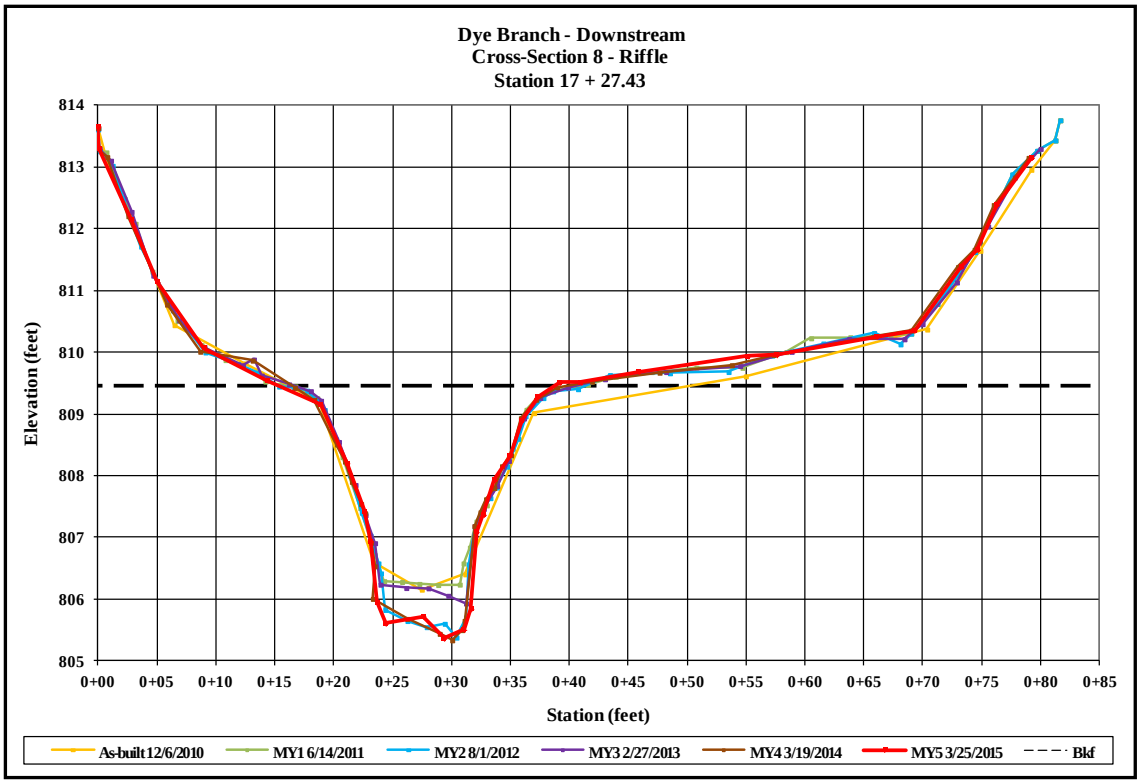


Left Descending Bank

Right Descending Bank

Upstream

Downstream

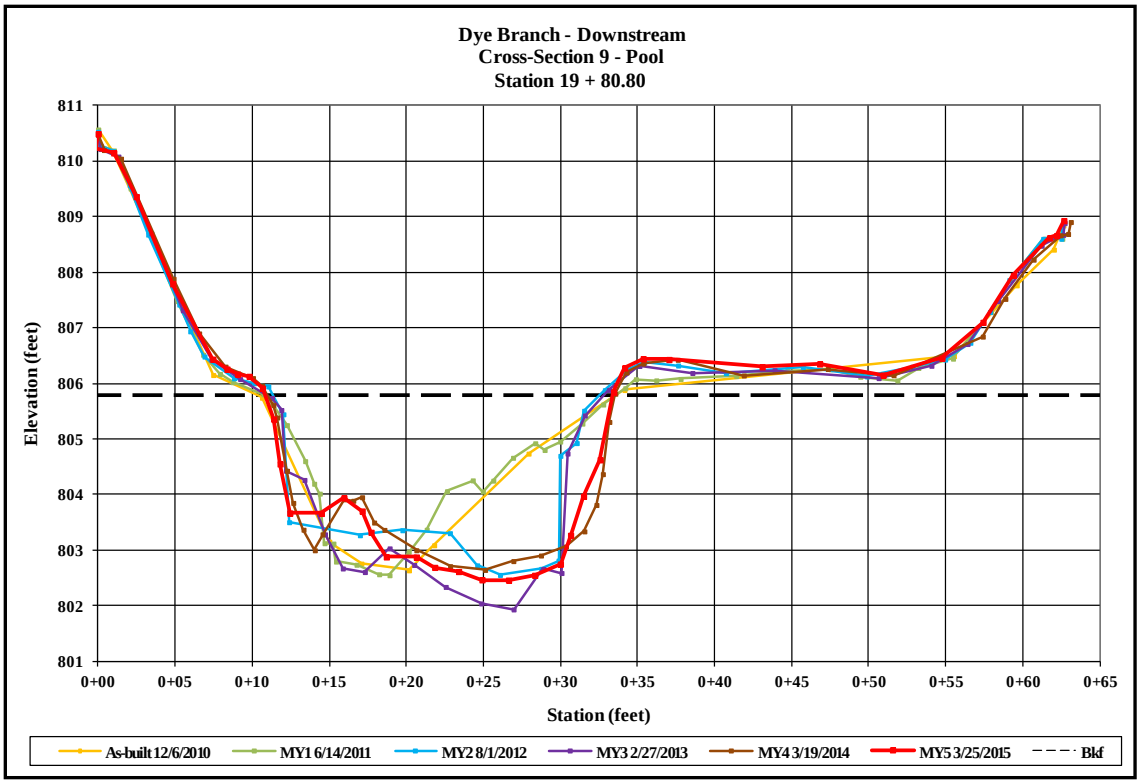


Left Descending Bank

Right Descending Bank

Upstream

Downstream

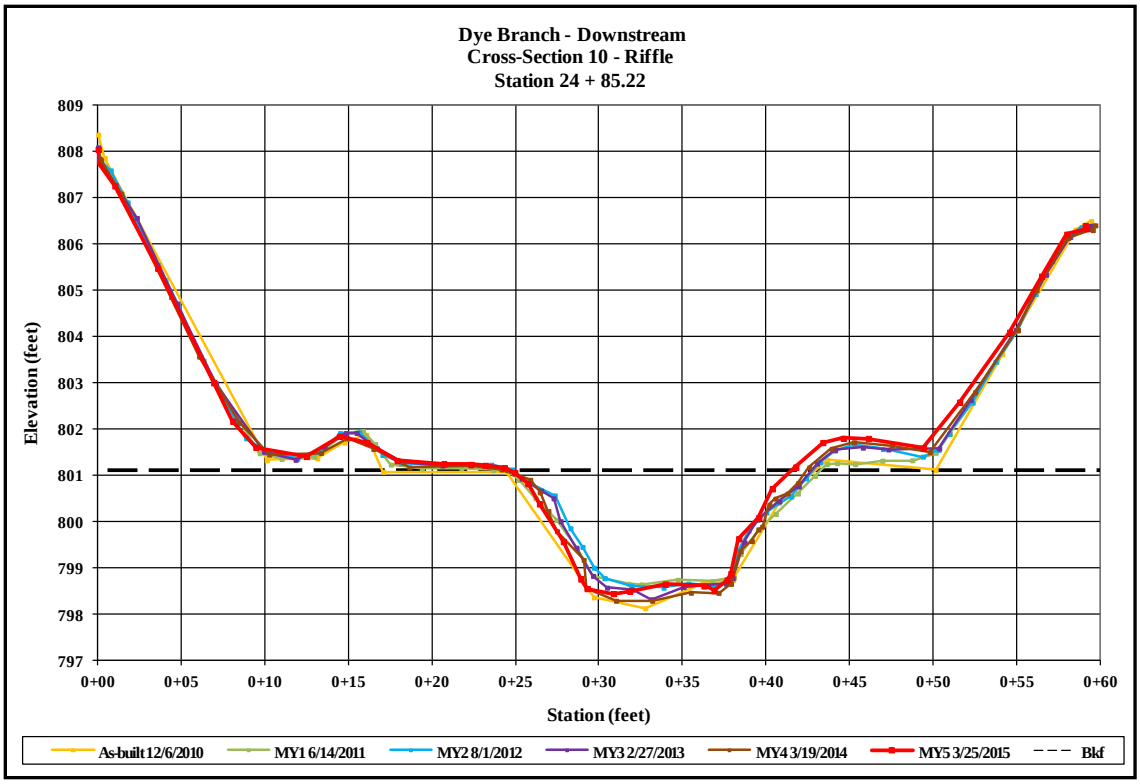


Left Descending Bank

Right Descending Bank

Upstream

Downstream



Left Descending Bank

Right Descending Bank

Upstream

Downstream

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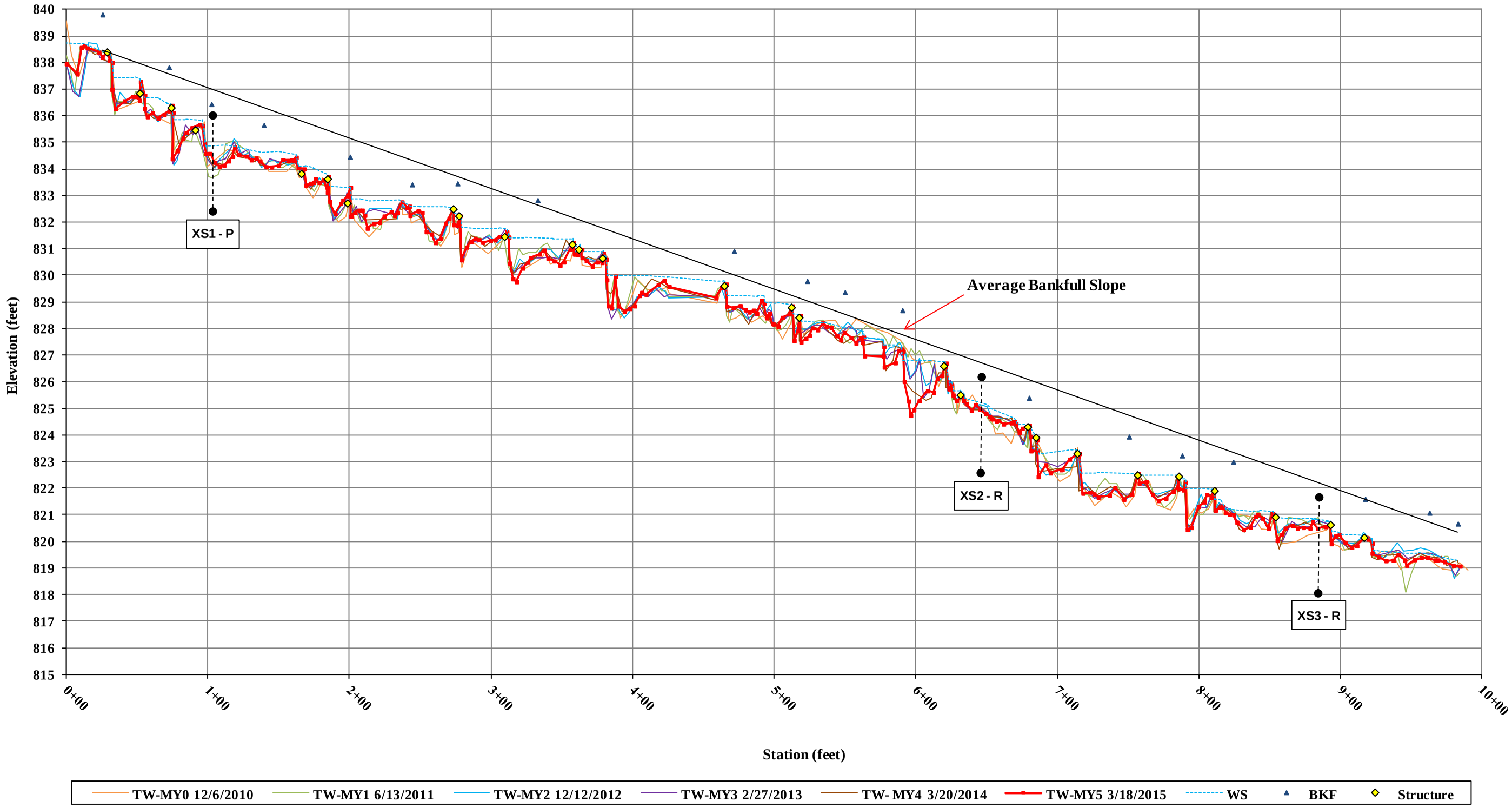
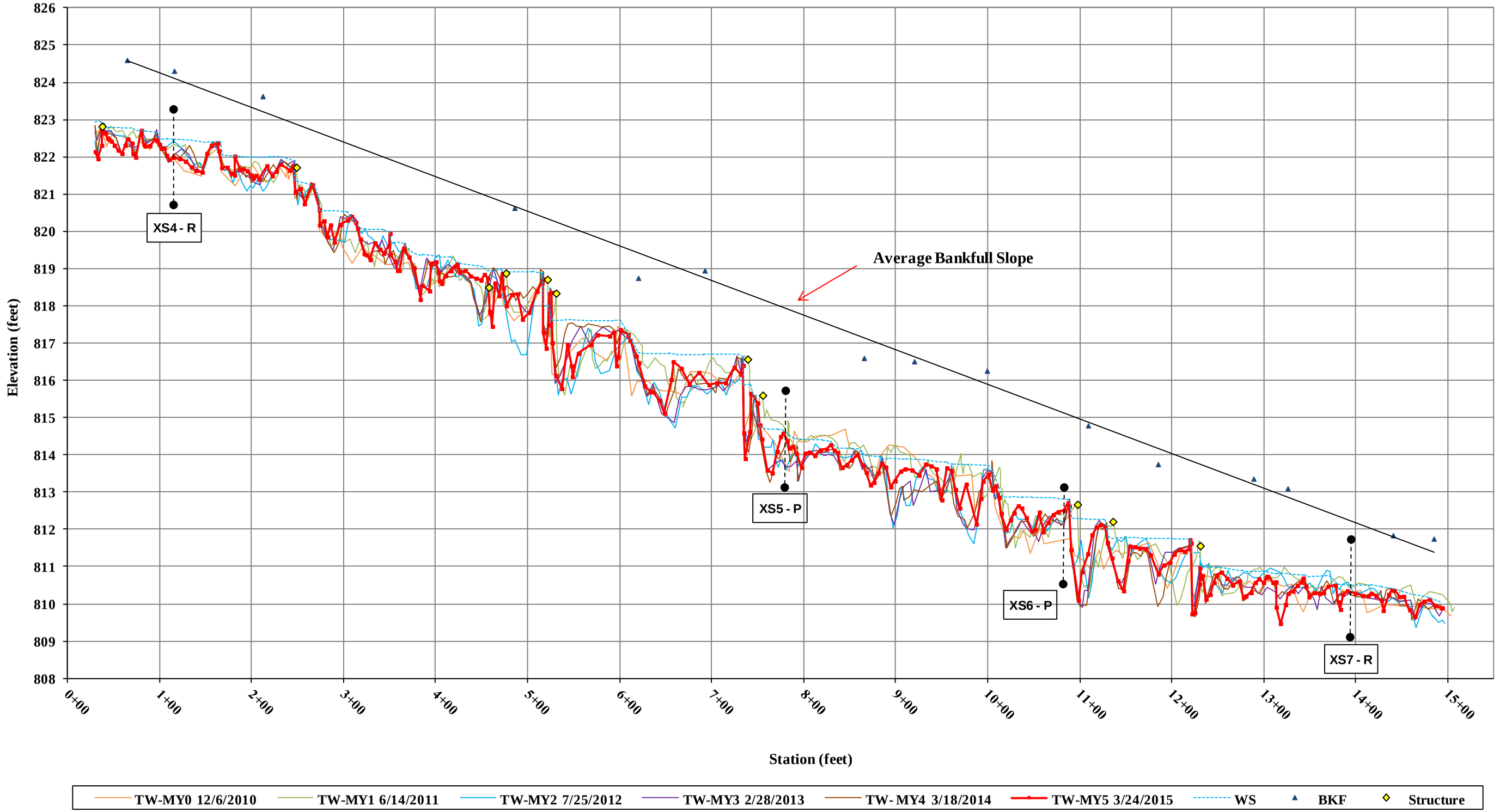
Cemetary Branch
Longitudinal Profile
0+00 to 9+89.93



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



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

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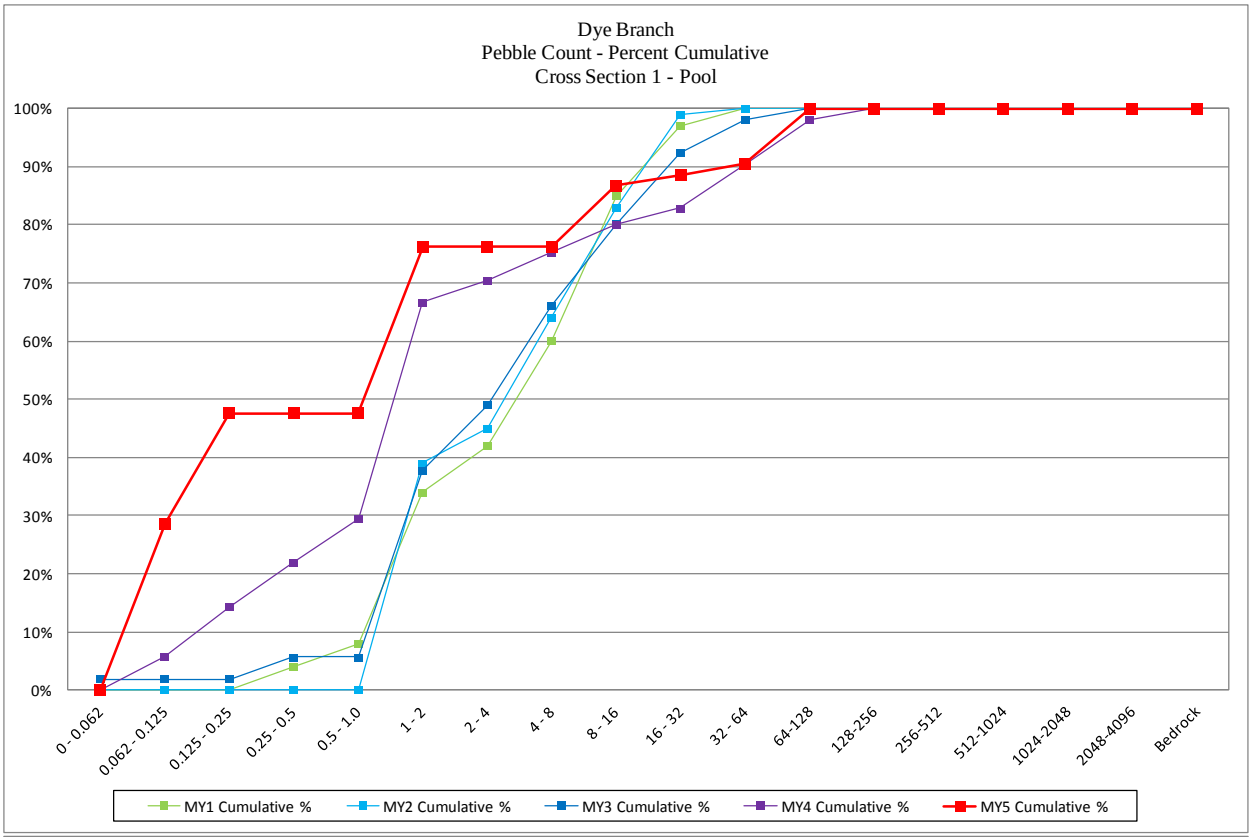
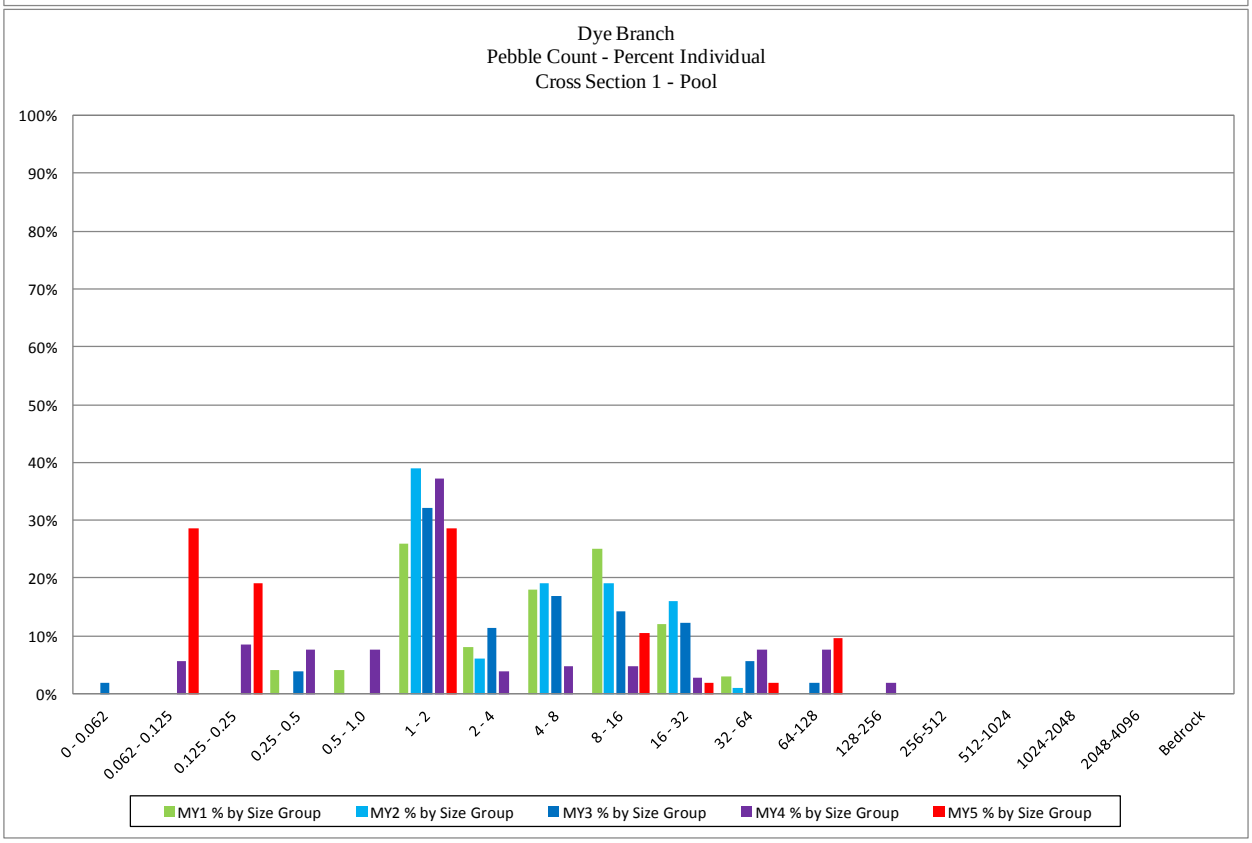
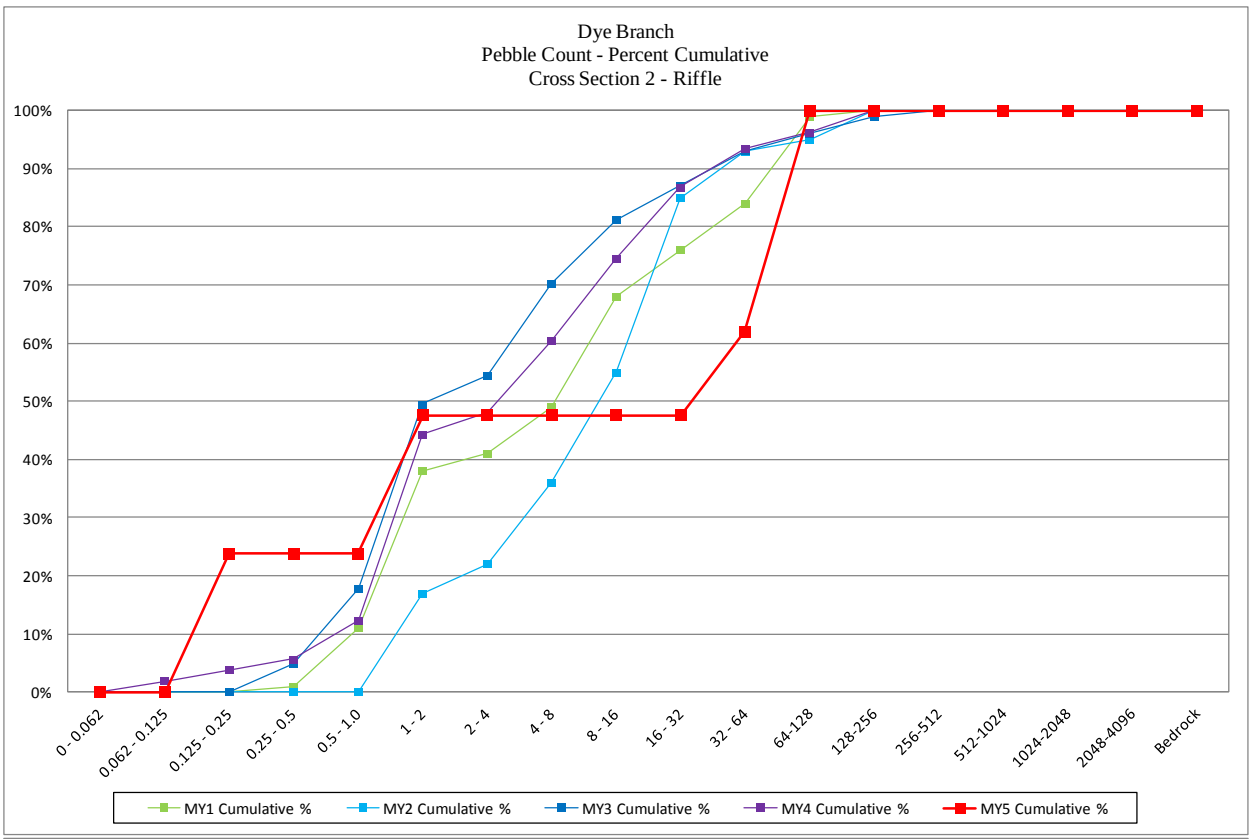
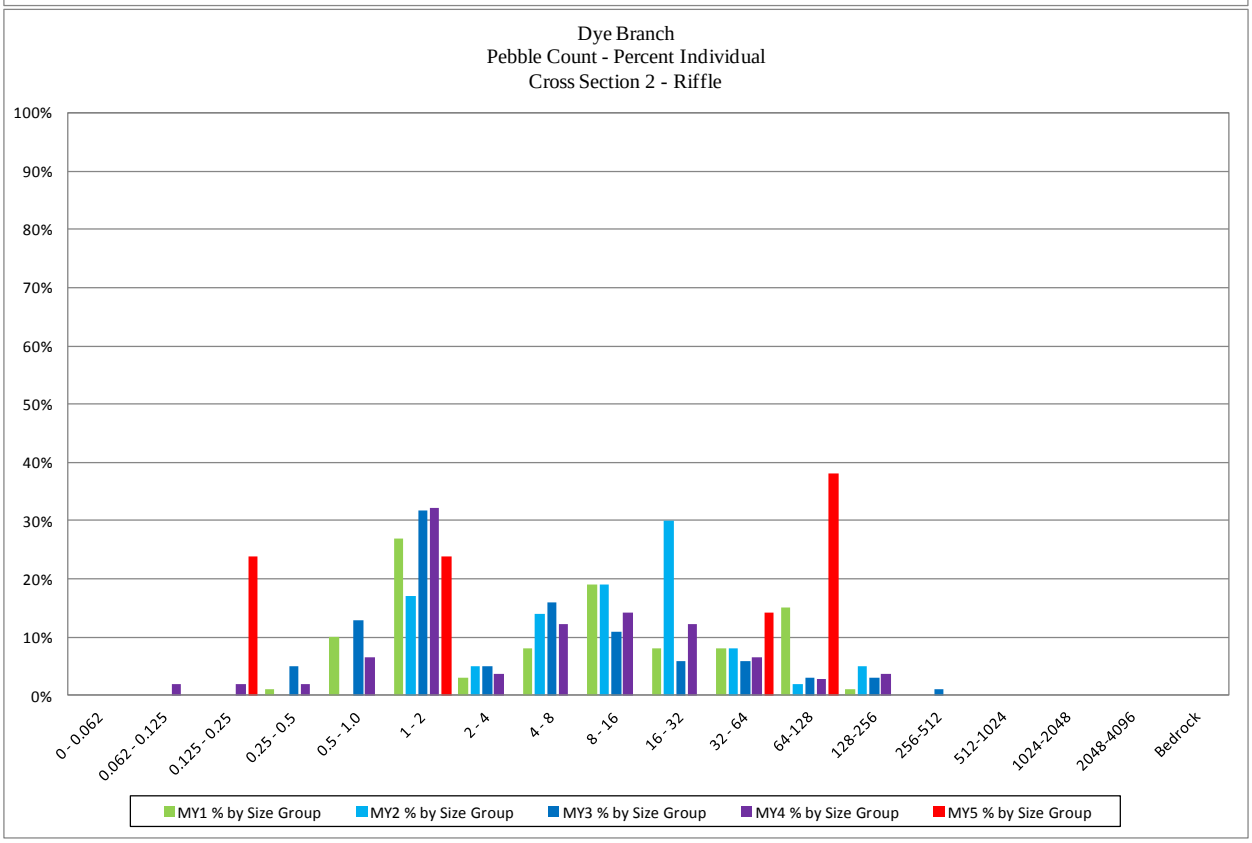
Dye Branch			
Cross Section 1 - Pool			
Monitoring Year - 2015; MY5			
Bed Surface Material Particle Size Class (mm)	**Number**	**% Individual**	**% Cumulative**
0 - 0.062	0	0.0%	0%
0.062 - 0.125	30	28.6%	29%
0.125 - 0.25	20	19.0%	48%
0.25 - 0.5	0	0.0%	48%
0.5 - 1.0	0	0.0%	48%
1 - 2	30	28.6%	76%
2 - 4	0	0.0%	76%
4 - 8	0	0.0%	76%
8 - 16	11	10.5%	87%
16 - 32	2	1.9%	89%
32 - 64	2	1.9%	90%
64-128	10	9.5%	100%
128-256	0	0.0%	100%
256-512	0	0.0%	100%
512-1024	0	0.0%	100%
1024-2048	0	0.0%	100%
2048-4096	0	0.0%	100%
Bedrock	0	0.0%	100%
Total	**105**	**100%**	**100%**
		Summary Data	
		D50	**1.1**
		D84	**13**
		D95	**100**


Dye Branch
Pebble Count - Percent Cumulative
Cross Section 1 - Pool
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0 - 0.062
0.062 - 0.125
0.125 - 0.25
0.25 - 0.5
0.5 - 1.0
1 - 2
2 - 4
4 - 8
8 - 16
16 - 32
32 - 64
64-128
128-256
256-512
512-1024
1024-2048
2048-4096
Bedrock
MY1 Cumulative %
MY2 Cumulative %
MY3 Cumulative %
MY4 Cumulative %
MY5 Cumulative %

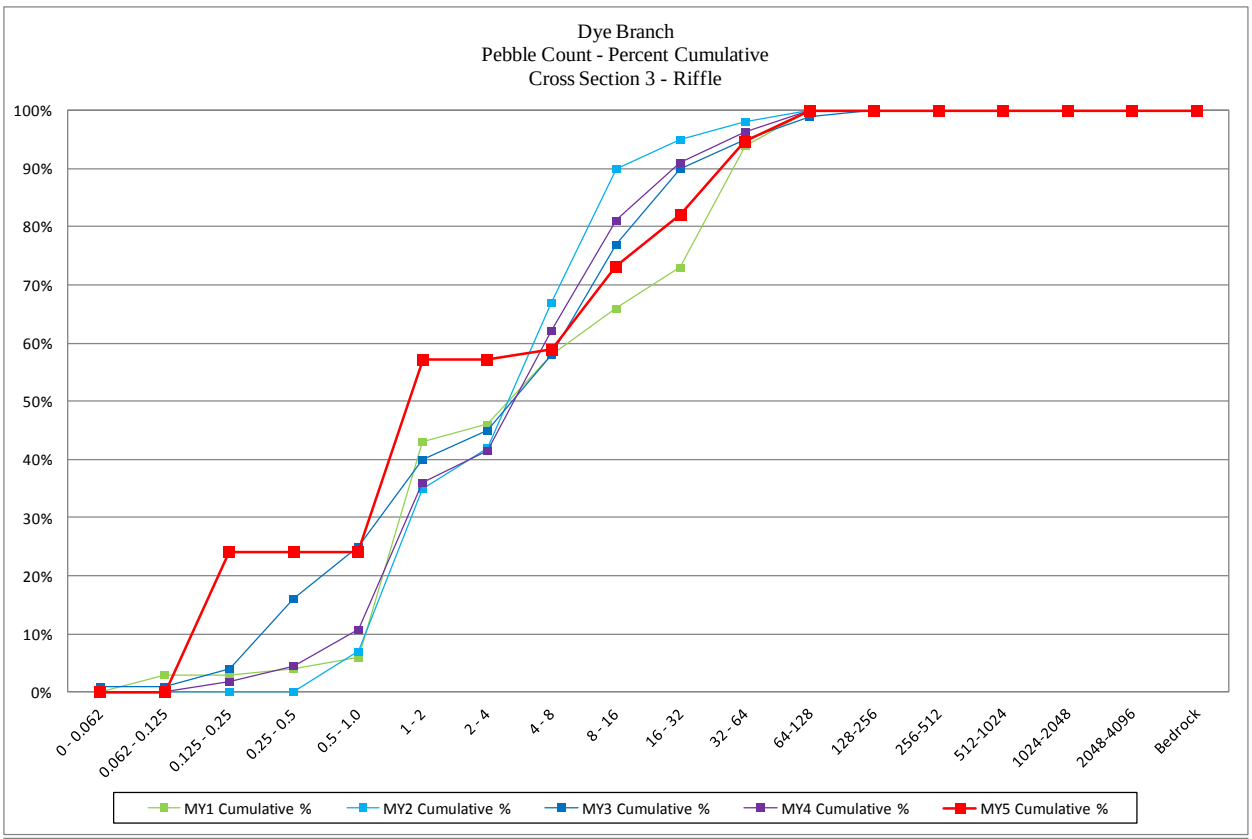

Dye Branch
Pebble Count - Percent Individual
Cross Section 1 - Pool
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0 - 0.062
0.062 - 0.125
0.125 - 0.25
0.25 - 0.5
0.5 - 1.0
1 - 2
2 - 4
4 - 8
8 - 16
16 - 32
32 - 64
64-128
128-256
256-512
512-1024
1024-2048
2048-4096
Bedrock
MY1 % by Size Group
MY2 % by Size Group
MY3 % by Size Group
MY4 % by Size Group
MY5 % by Size Group

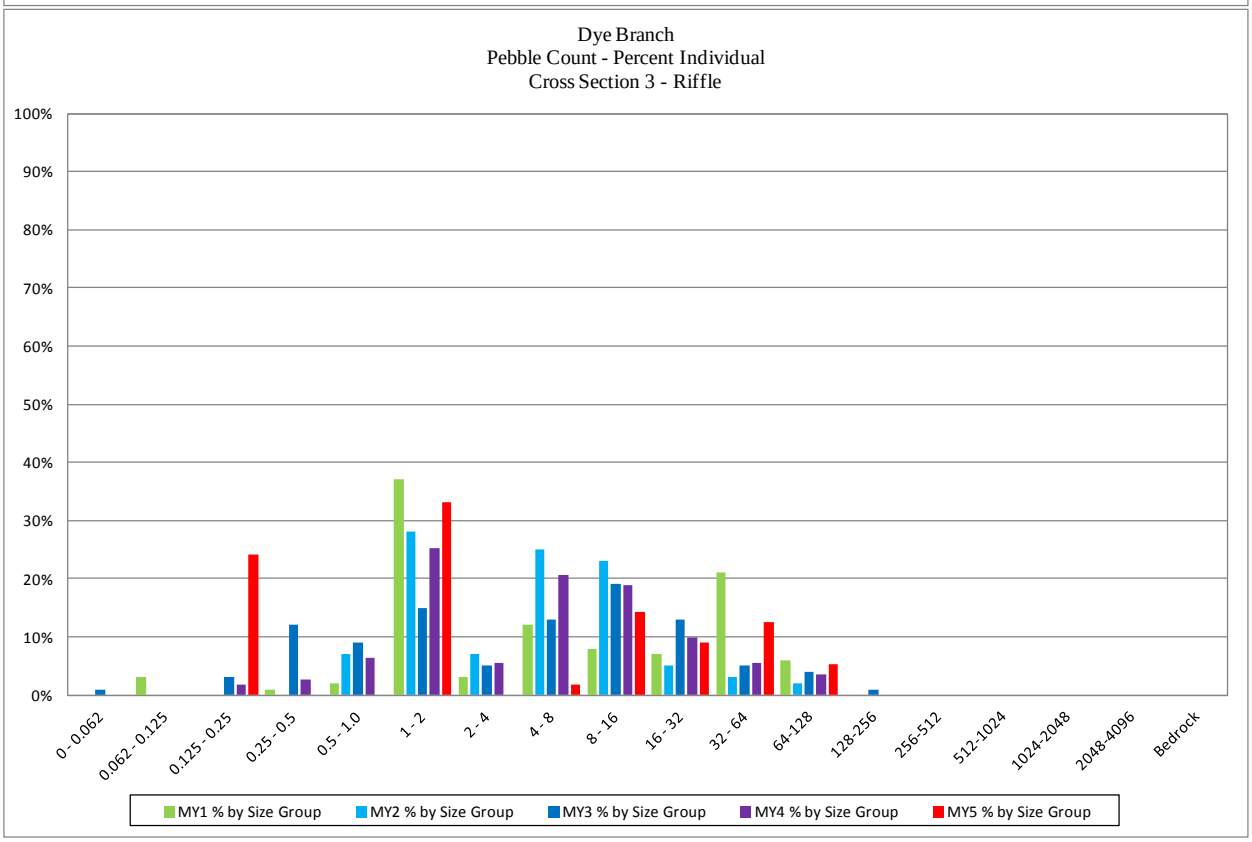
Dye Branch			
Cross Section 2 - Riffle			
Monitoring Year - 2015; MY5			
Bed Surface Material Particle Size Class (mm)	**Number**	**% Individual**	**% Cumulative**
0 - 0.062	0	0.0%	0%
0.062 - 0.125	0	0.0%	0%
0.125 - 0.25	25	23.8%	24%
0.25 - 0.5	0	0.0%	24%
0.5 - 1.0	0	0.0%	24%
1 - 2	25	23.8%	48%
2 - 4	0	0.0%	48%
4 - 8	0	0.0%	48%
8 - 16	0	0.0%	48%
16 - 32	0	0.0%	48%
32 - 64	15	14.3%	62%
64-128	40	38.1%	100%
128-256	0	0.0%	100%
256-512	0	0.0%	100%
512-1024	0	0.0%	100%
1024-2048	0	0.0%	100%
2048-4096	0	0.0%	100%
Bedrock	0	0.0%	100%
Total	**105**	**100%**	**100%**
		Summary Data	
		D50	**48**
		D84	**95**
		D95	**120**


Dye Branch
Pebble Count - Percent Cumulative
Cross Section 2 - Riffle
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0 - 0.062
0.062 - 0.125
0.125 - 0.25
0.25 - 0.5
0.5 - 1.0
1 - 2
2 - 4
4 - 8
8 - 16
16 - 32
32 - 64
64-128
128-256
256-512
512-1024
1024-2048
2048-4096
Bedrock
MY1 Cumulative %
MY2 Cumulative %
MY3 Cumulative %
MY4 Cumulative %
MY5 Cumulative %

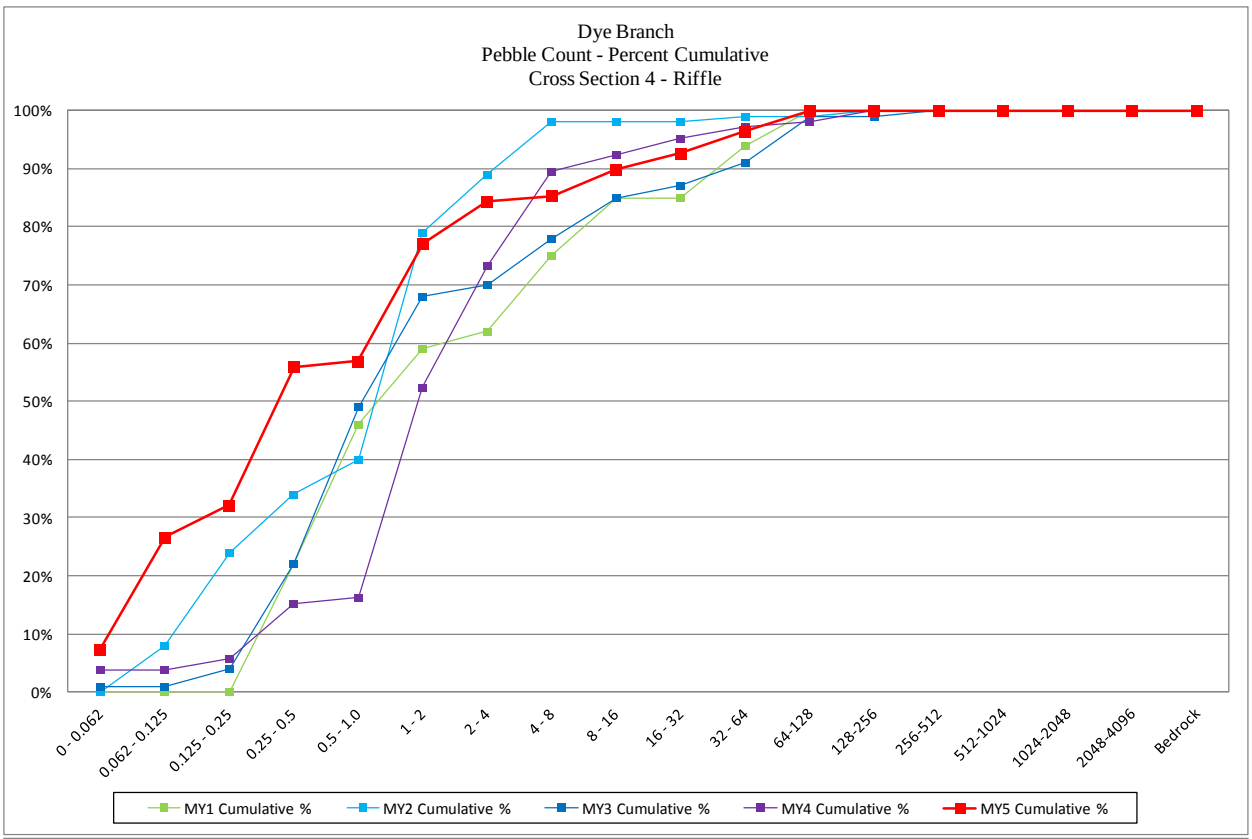

Dye Branch
Pebble Count - Percent Individual
Cross Section 2 - Riffle
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0 - 0.062
0.062 - 0.125
0.125 - 0.25
0.25 - 0.5
0.5 - 1.0
1 - 2
2 - 4
4 - 8
8 - 16
16 - 32
32 - 64
64-128
128-256
256-512
512-1024
1024-2048
2048-4096
Bedrock
MY1 % by Size Group
MY2 % by Size Group
MY3 % by Size Group
MY4 % by Size Group
MY5 % by Size Group

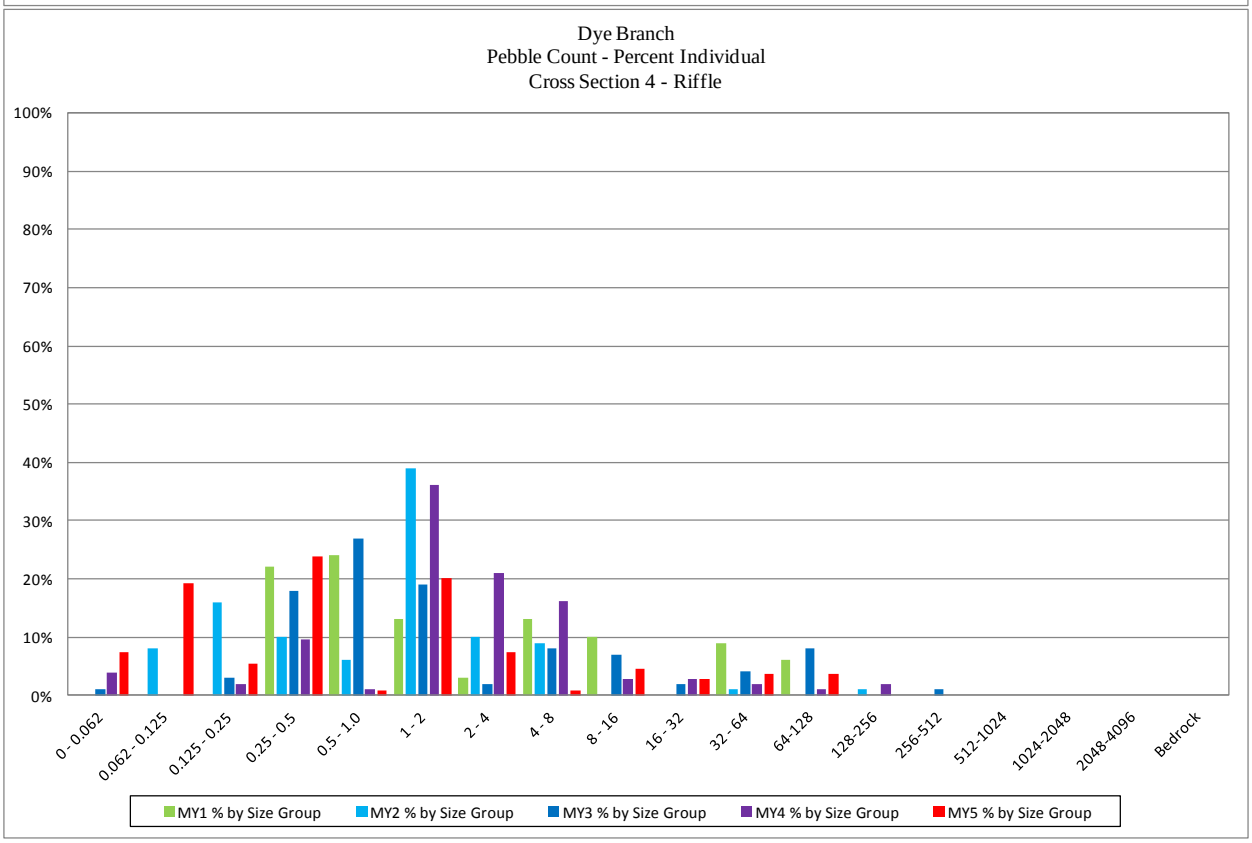
Dye Branch			
Cross Section 3 - Riffle			
Monitoring Year - 2015; MY5			
Bed Surface Material Particle Size Class (mm)	**Number**	**% Individual**	**% Cumulative**
0 - 0.062	0	0.0%	0%
0.062 - 0.125	0	0.0%	0%
0.125 - 0.25	27	24.1%	24%
0.25 - 0.5	0	0.0%	24%
0.5 - 1.0	0	0.0%	24%
1 - 2	37	33.0%	57%
2 - 4	0	0.0%	57%
4 - 8	2	1.8%	59%
8 - 16	16	14.3%	73%
16 - 32	10	8.9%	82%
32 - 64	14	12.5%	95%
64-128	6	5.4%	100%
128-256	0	0.0%	100%
256-512	0	0.0%	100%
512-1024	0	0.0%	100%
1024-2048	0	0.0%	100%
2048-4096	0	0.0%	100%
Bedrock	0	0.0%	100%
Total	**112**	**100%**	**100%**
		Summary Data	
		D50	**1.7**
		D84	**35**
		D95	**66**


Dye Branch
Pebble Count - Percent Cumulative
Cross Section 3 - Riffle
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0 - 0.062
0.062 - 0.125
0.125 - 0.25
0.25 - 0.5
0.5 - 1.0
1 - 2
2 - 4
4 - 8
8 - 16
16 - 32
32 - 64
64-128
128-256
256-512
512-1024
1024-2048
2048-4096
Bedrock
MY1 Cumulative %
MY2 Cumulative %
MY3 Cumulative %
MY4 Cumulative %
MY5 Cumulative %

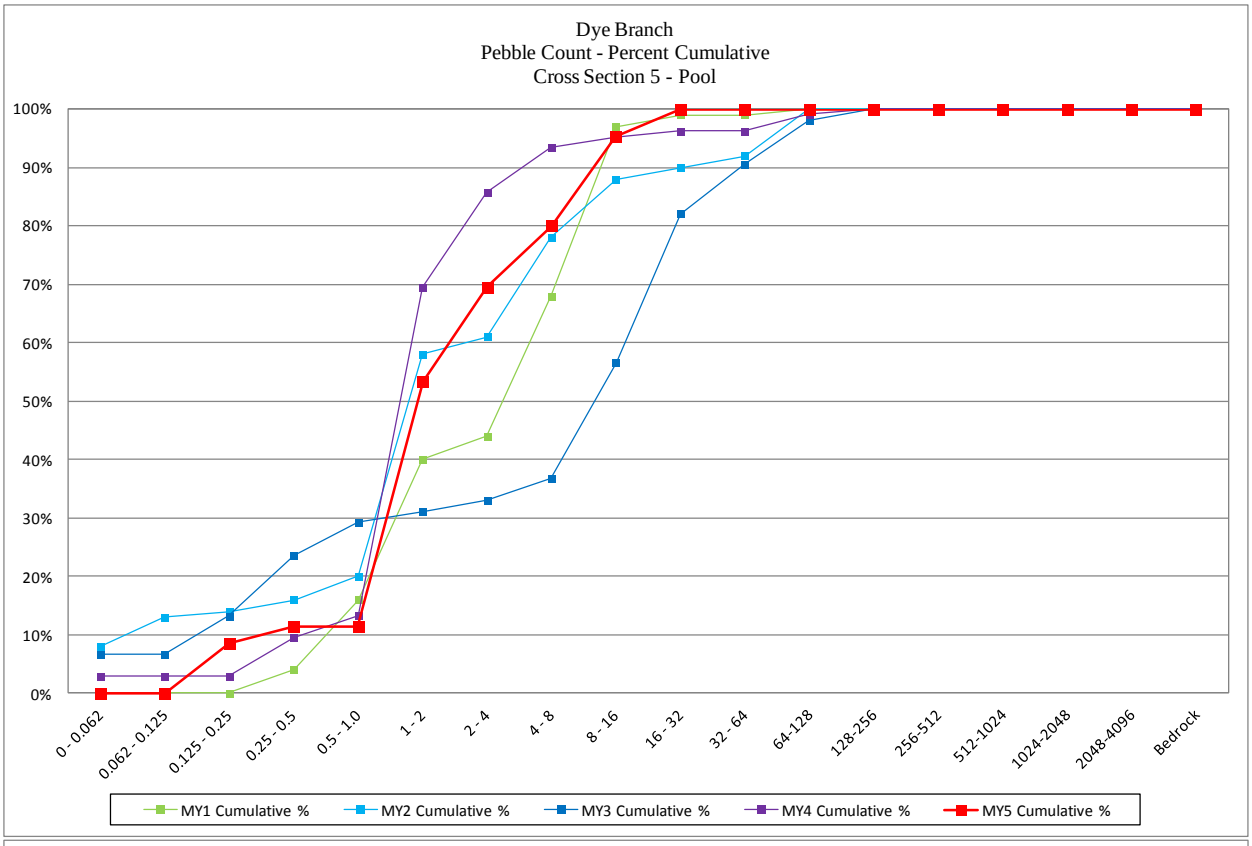

Dye Branch
Pebble Count - Percent Individual
Cross Section 3 - Riffle
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0 - 0.062
0.062 - 0.125
0.125 - 0.25
0.25 - 0.5
0.5 - 1.0
1 - 2
2 - 4
4 - 8
8 - 16
16 - 32
32 - 64
64-128
128-256
256-512
512-1024
1024-2048
2048-4096
Bedrock
MY1 % by Size Group
MY2 % by Size Group
MY3 % by Size Group
MY4 % by Size Group
MY5 % by Size Group

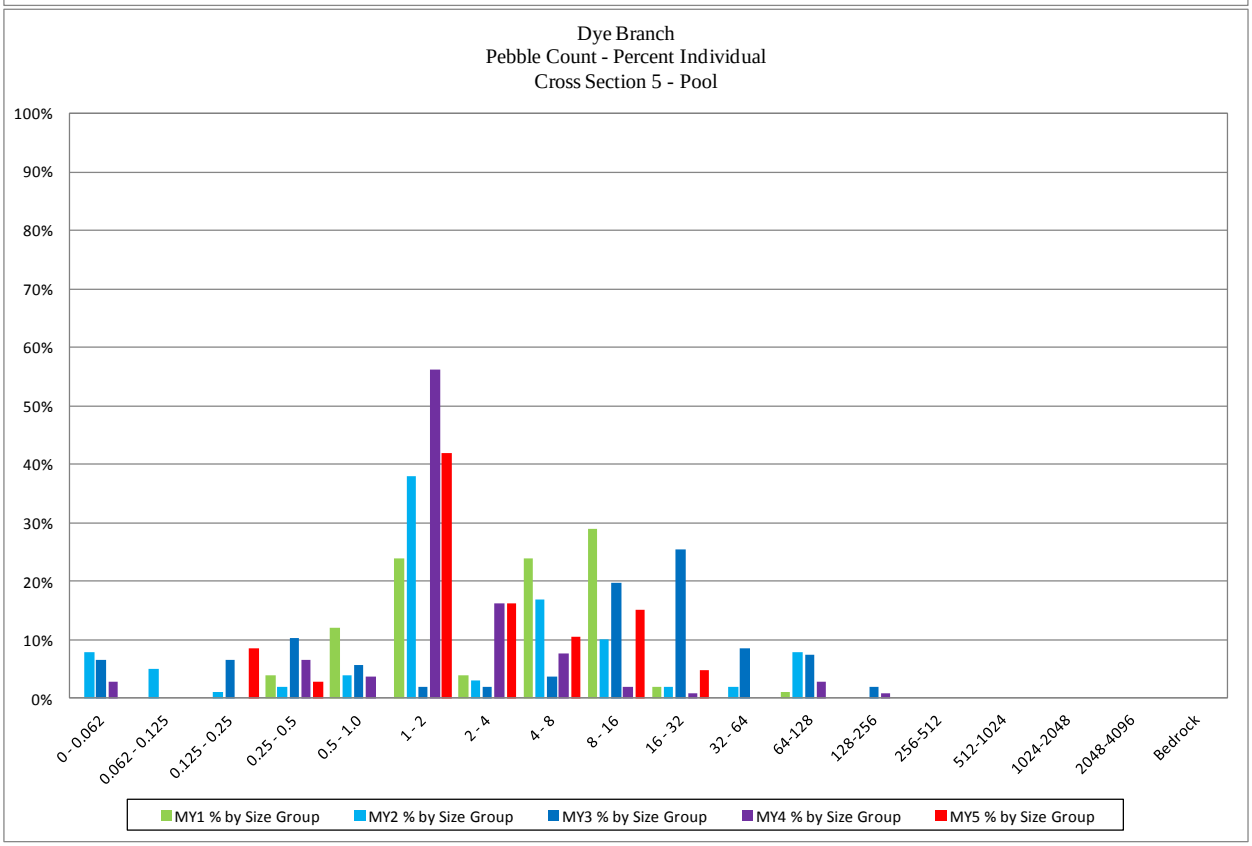
Dye Branch			
Cross Section 4 - Riffle			
Monitoring Year - 2015; MY5			
Bed Surface Material Particle Size Class (mm)	**Number**	**% Individual**	**% Cumulative**
0 - 0.062	8	7.3%	7%
0.062 - 0.125	21	19.3%	27%
0.125 - 0.25	6	5.5%	32%
0.25 - 0.5	26	23.9%	56%
0.5 - 1.0	1	0.9%	57%
1 - 2	22	20.2%	77%
2 - 4	8	7.3%	84%
4 - 8	1	0.9%	85%
8 - 16	5	4.6%	90%
16 - 32	3	2.8%	93%
32 - 64	4	3.7%	96%
64-128	4	3.7%	100%
128-256	0	0.0%	100%
256-512	0	0.0%	100%
512-1024	0	0.0%	100%
1024-2048	0	0.0%	100%
2048-4096	0	0.0%	100%
Bedrock	0	0.0%	100%
Total	**109**	**100%**	**100%**
		Summary Data	
		D50	**0.42**
		D84	**3.9**
		D95	**56**


Dye Branch
Pebble Count - Percent Cumulative
Cross Section 4 - Riffle
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0 - 0.062
0.062 - 0.125
0.125 - 0.25
0.25 - 0.5
0.5 - 1.0
1 - 2
2 - 4
4 - 8
8 - 16
16 - 32
32 - 64
64-128
128-256
256-512
512-1024
1024-2048
2048-4096
Bedrock
MY1 Cumulative %
MY2 Cumulative %
MY3 Cumulative %
MY4 Cumulative %
MY5 Cumulative %

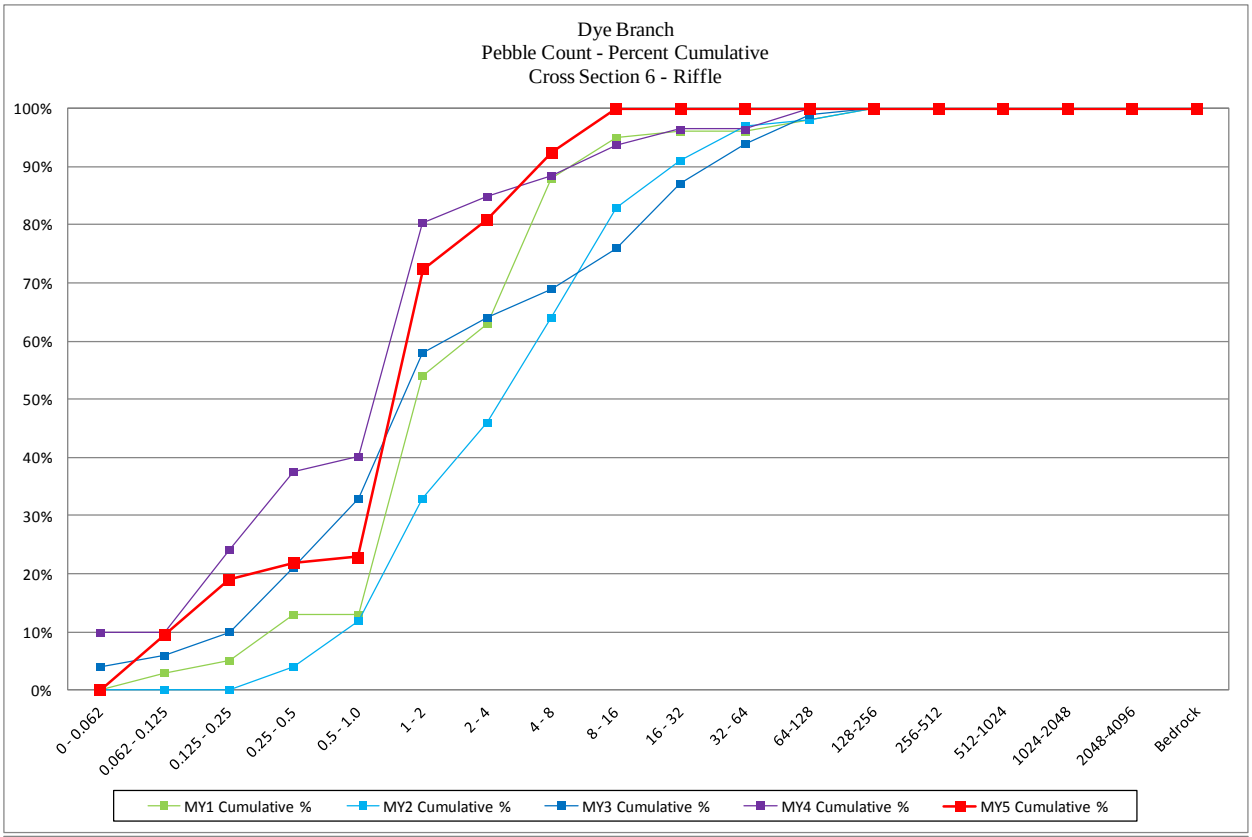

Dye Branch
Pebble Count - Percent Individual
Cross Section 4 - Riffle
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0 - 0.062
0.062 - 0.125
0.125 - 0.25
0.25 - 0.5
0.5 - 1.0
1 - 2
2 - 4
4 - 8
8 - 16
16 - 32
32 - 64
64-128
128-256
256-512
512-1024
1024-2048
2048-4096
Bedrock
MY1 % by Size Group
MY2 % by Size Group
MY3 % by Size Group
MY4 % by Size Group
MY5 % by Size Group

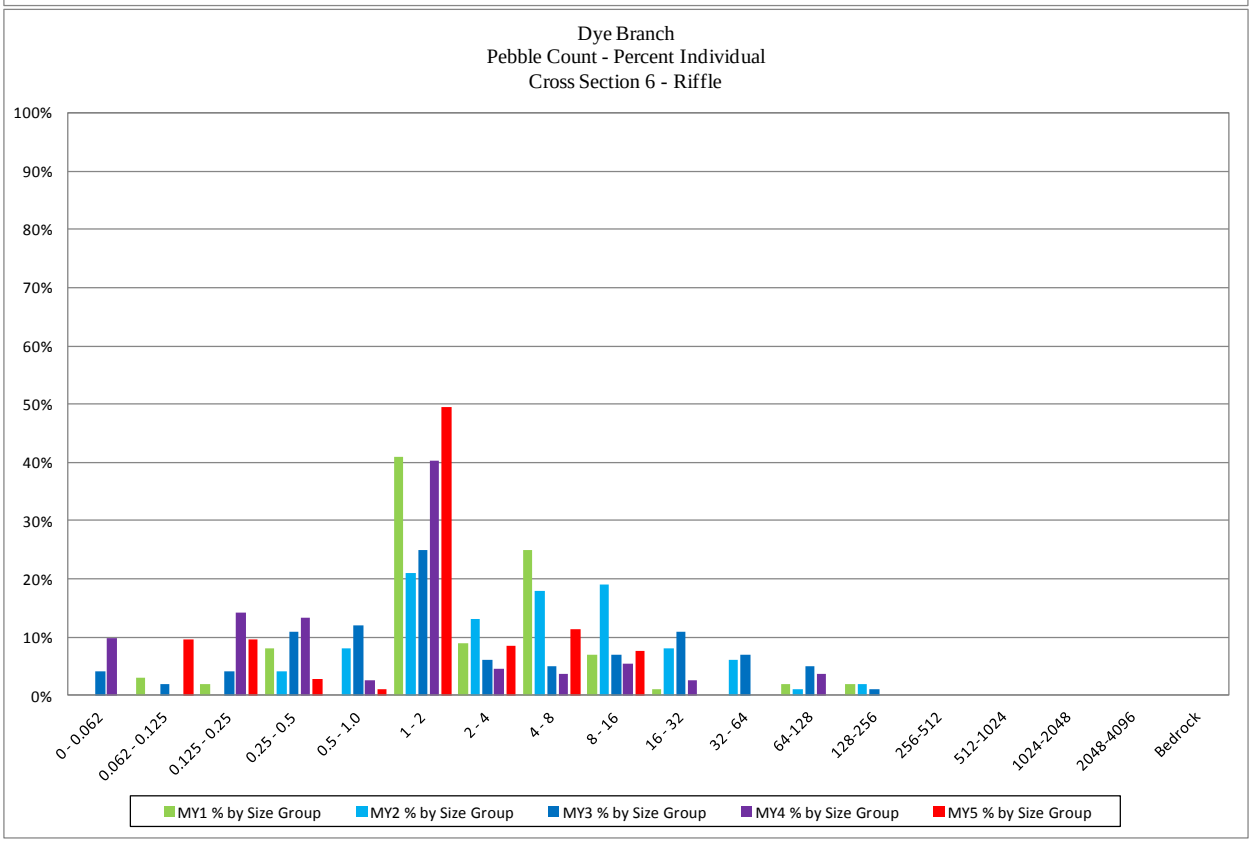
Dye Branch			
Cross Section 5 - Pool			
Monitoring Year - 2015; MY5			
Bed Surface Material Particle Size Class (mm)	**Number**	**% Individual**	**% Cumulative**
0 - 0.062	0	0.0%	0%
0.062 - 0.125	0	0.0%	0%
0.125 - 0.25	9	8.6%	9%
0.25 - 0.5	3	2.9%	11%
0.5 - 1.0	0	0.0%	11%
1 - 2	44	41.9%	53%
2 - 4	17	16.2%	70%
4 - 8	11	10.5%	80%
8 - 16	16	15.2%	95%
16 - 32	5	4.8%	100%
32 - 64	0	0.0%	100%
64-128	0	0.0%	100%
128-256	0	0.0%	100%
256-512	0	0.0%	100%
512-1024	0	0.0%	100%
1024-2048	0	0.0%	100%
2048-4096	0	0.0%	100%
Bedrock	0	0.0%	100%
Total	**105**	**100%**	**100%**
		Summary Data	
		D50	**1.9**
		D84	**9.5**
		D95	**16**


Dye Branch
Pebble Count - Percent Cumulative
Cross Section 5 - Pool
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0 - 0.062
0.062 - 0.125
0.125 - 0.25
0.25 - 0.5
0.5 - 1.0
1 - 2
2 - 4
4 - 8
8 - 16
16 - 32
32 - 64
64-128
128-256
256-512
512-1024
1024-2048
2048-4096
Bedrock
MY1 Cumulative %
MY2 Cumulative %
MY3 Cumulative %
MY4 Cumulative %
MY5 Cumulative %

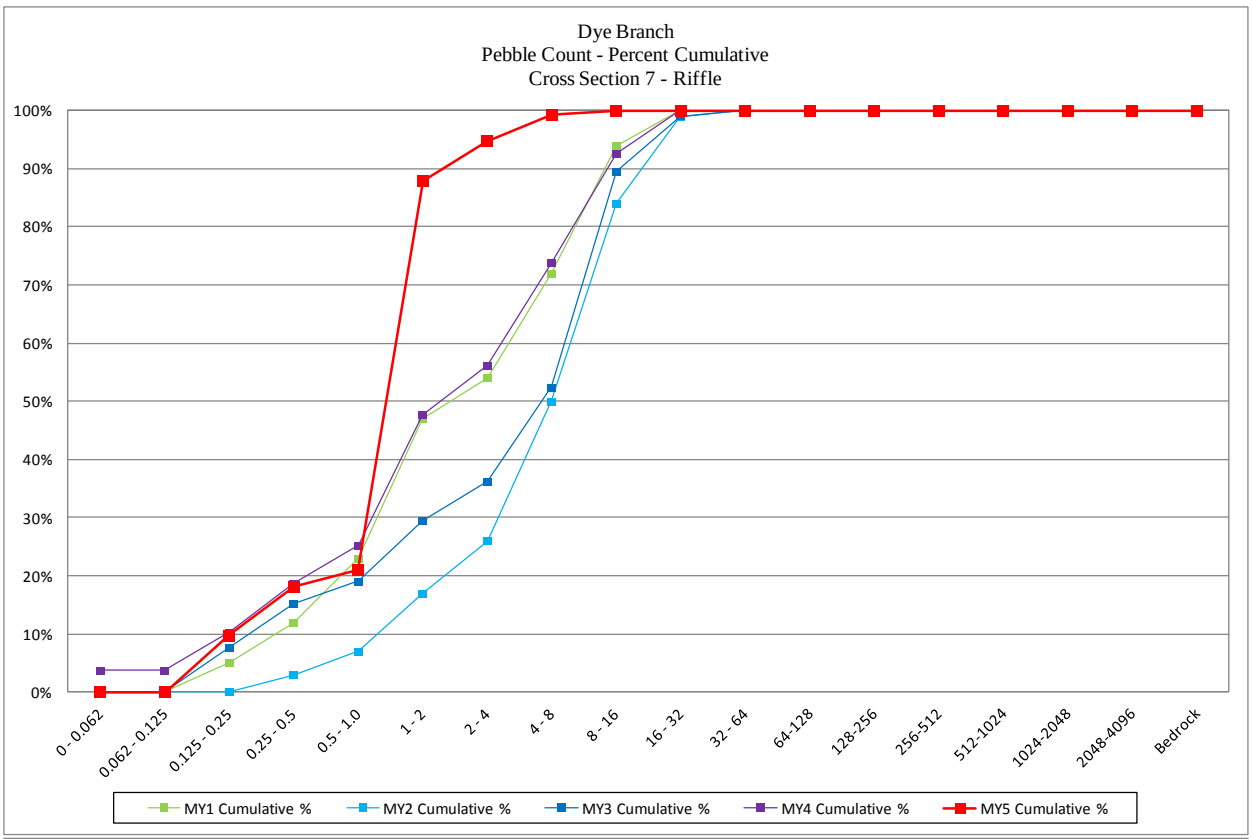

Dye Branch
Pebble Count - Percent Individual
Cross Section 5 - Pool
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0 - 0.062
0.062 - 0.125
0.125 - 0.25
0.25 - 0.5
0.5 - 1.0
1 - 2
2 - 4
4 - 8
8 - 16
16 - 32
32 - 64
64-128
128-256
256-512
512-1024
1024-2048
2048-4096
Bedrock
MY1 % by Size Group
MY2 % by Size Group
MY3 % by Size Group
MY4 % by Size Group
MY5 % by Size Group

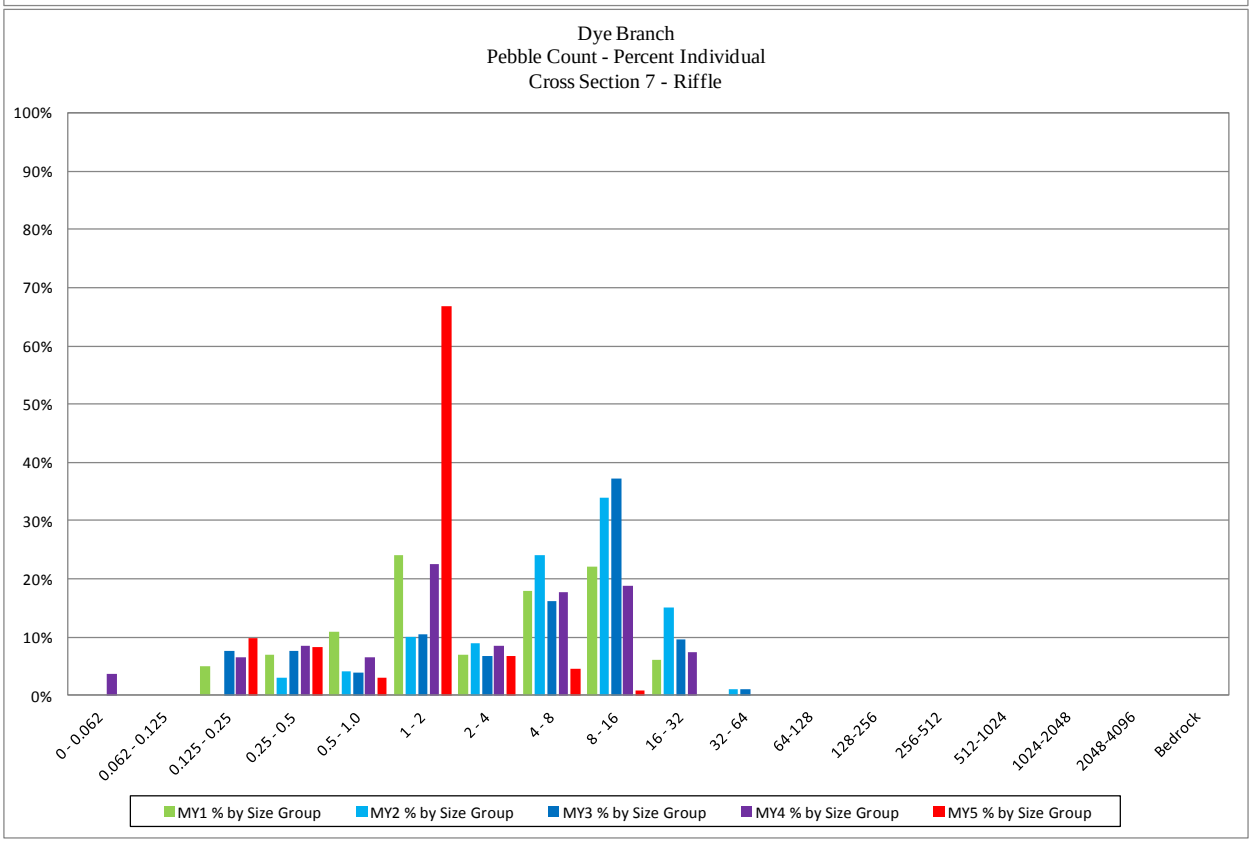
Dye Branch			
Cross Section 6 - Riffle			
Monitoring Year - 2015; MY5			
Bed Surface Material Particle Size Class (mm)	**Number**	**% Individual**	**% Cumulative**
0 - 0.062	0	0.0%	0%
0.062 - 0.125	10	9.5%	10%
0.125 - 0.25	10	9.5%	19%
0.25 - 0.5	3	2.9%	22%
0.5 - 1.0	1	1.0%	23%
1 - 2	52	49.5%	72%
2 - 4	9	8.6%	81%
4 - 8	12	11.4%	92%
8 - 16	8	7.6%	100%
16 - 32	0	0.0%	100%
32 - 64	0	0.0%	100%
64-128	0	0.0%	100%
128-256	0	0.0%	100%
256-512	0	0.0%	100%
512-1024	0	0.0%	100%
1024-2048	0	0.0%	100%
2048-4096	0	0.0%	100%
Bedrock	0	0.0%	100%
Total	**105**	**100%**	**100%**
		Summary Data	
		D50	**1.5**
		D84	**4.6**
		D95	**11**


Dye Branch
Pebble Count - Percent Cumulative
Cross Section 6 - Riffle
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0 - 0.062
0.062 - 0.125
0.125 - 0.25
0.25 - 0.5
0.5 - 1.0
1 - 2
2 - 4
4 - 8
8 - 16
16 - 32
32 - 64
64-128
128-256
256-512
512-1024
1024-2048
2048-4096
Bedrock
MY1 Cumulative %
MY2 Cumulative %
MY3 Cumulative %
MY4 Cumulative %
MY5 Cumulative %

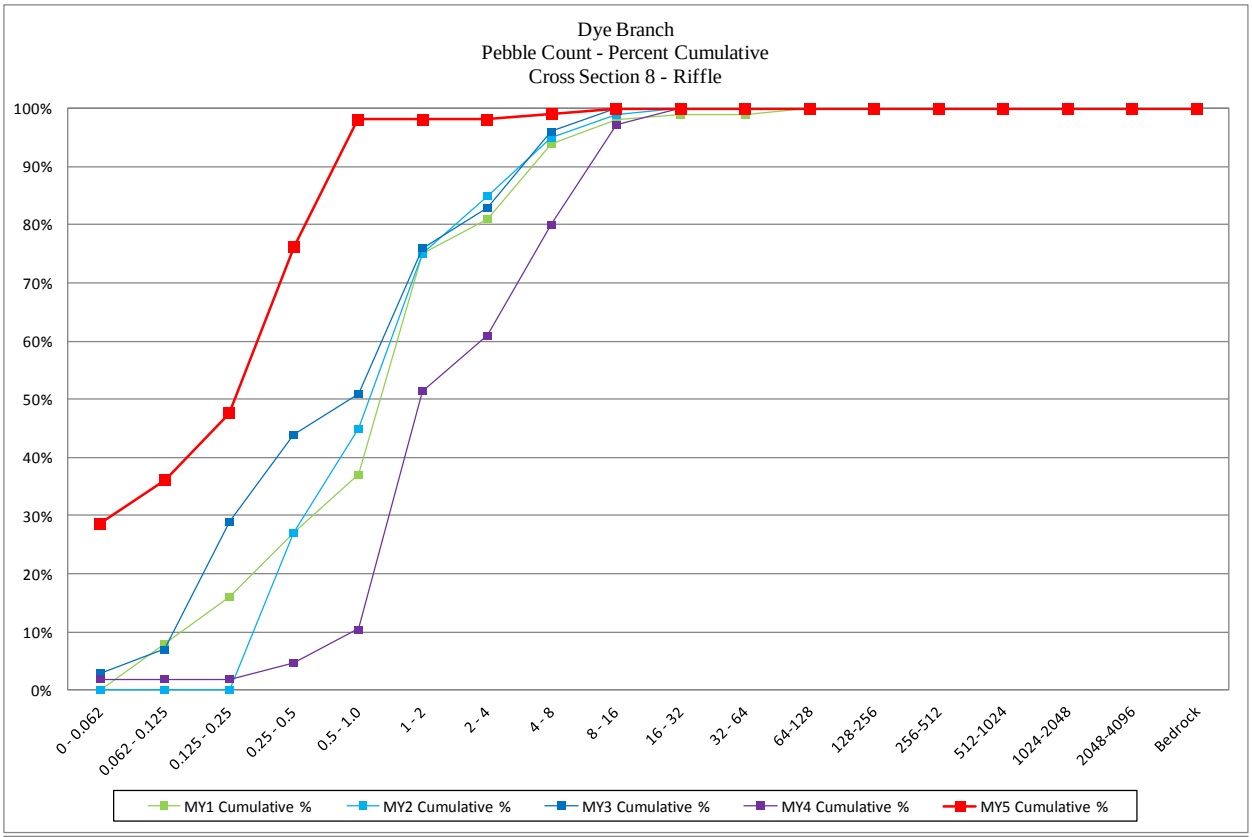

Dye Branch
Pebble Count - Percent Individual
Cross Section 6 - Riffle
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0 - 0.062
0.062 - 0.125
0.125 - 0.25
0.25 - 0.5
0.5 - 1.0
1 - 2
2 - 4
4 - 8
8 - 16
16 - 32
32 - 64
64-128
128-256
256-512
512-1024
1024-2048
2048-4096
Bedrock
MY1 % by Size Group
MY2 % by Size Group
MY3 % by Size Group
MY4 % by Size Group
MY5 % by Size Group

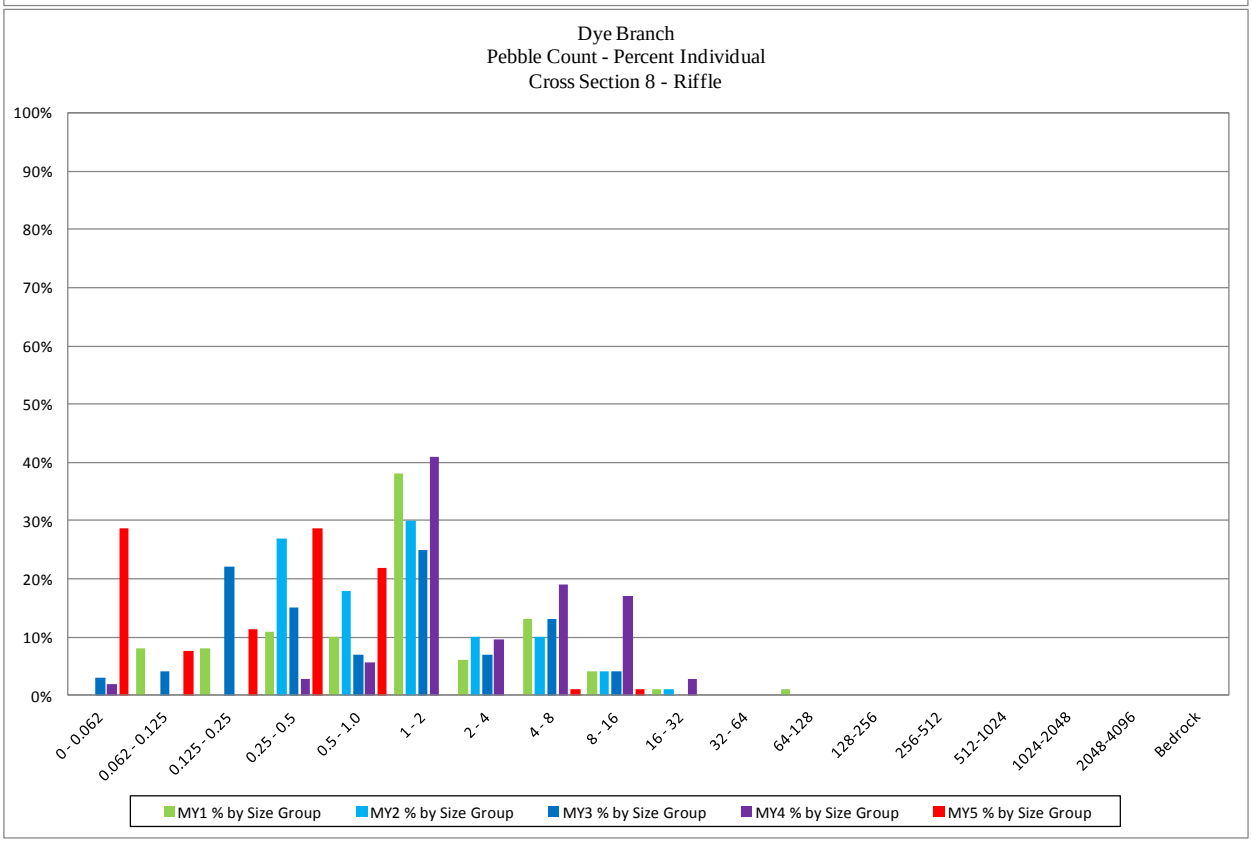
Dye Branch			
Cross Section 7 - Riffle			
Monitoring Year - 2015; MY5			
Bed Surface Material Particle Size Class (mm)	**Number**	**% Individual**	**% Cumulative**
0 - 0.062	0	0.0%	0%
0.062 - 0.125	0	0.0%	0%
0.125 - 0.25	13	9.8%	10%
0.25 - 0.5	11	8.3%	18%
0.5 - 1.0	4	3.0%	21%
1 - 2	89	66.9%	88%
2 - 4	9	6.8%	95%
4 - 8	6	4.5%	99%
8 - 16	1	0.8%	100%
16 - 32	0	0.0%	100%
32 - 64	0	0.0%	100%
64-128	0	0.0%	100%
128-256	0	0.0%	100%
256-512	0	0.0%	100%
512-1024	0	0.0%	100%
1024-2048	0	0.0%	100%
2048-4096	0	0.0%	100%
Bedrock	0	0.0%	100%
Total	**133**	**100%**	**100%**
		Summary Data	
		D50	**1.3**
		D84	**1.9**
		D95	**4.1**


Dye Branch
Pebble Count - Percent Cumulative
Cross Section 7 - Riffle
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0 - 0.062
0.062 - 0.125
0.125 - 0.25
0.25 - 0.5
0.5 - 1.0
1 - 2
2 - 4
4 - 8
8 - 16
16 - 32
32 - 64
64-128
128-256
256-512
512-1024
1024-2048
2048-4096
Bedrock
MY1 Cumulative %
MY2 Cumulative %
MY3 Cumulative %
MY4 Cumulative %
MY5 Cumulative %

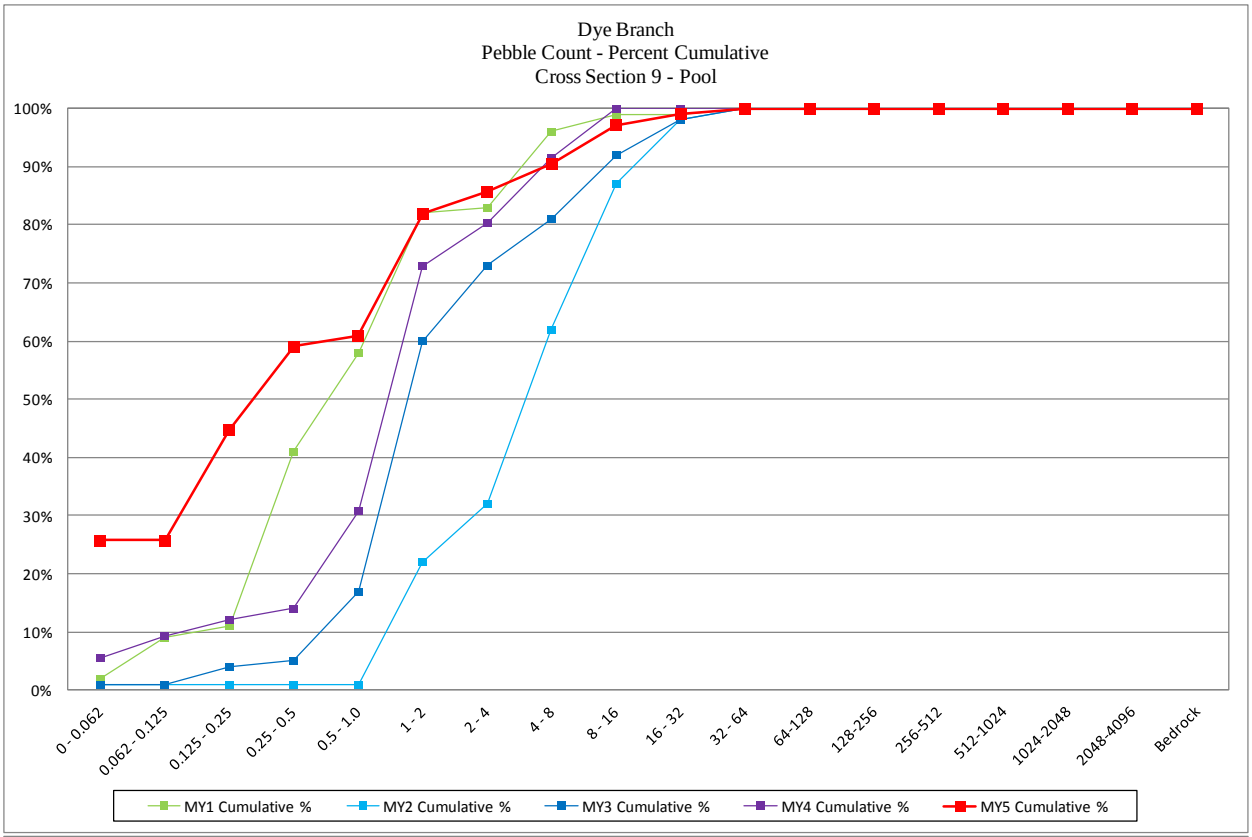

Dye Branch
Pebble Count - Percent Individual
Cross Section 7 - Riffle
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0 - 0.062
0.062 - 0.125
0.125 - 0.25
0.25 - 0.5
0.5 - 1.0
1 - 2
2 - 4
4 - 8
8 - 16
16 - 32
32 - 64
64-128
128-256
256-512
512-1024
1024-2048
2048-4096
Bedrock
MY1 % by Size Group
MY2 % by Size Group
MY3 % by Size Group
MY4 % by Size Group
MY5 % by Size Group

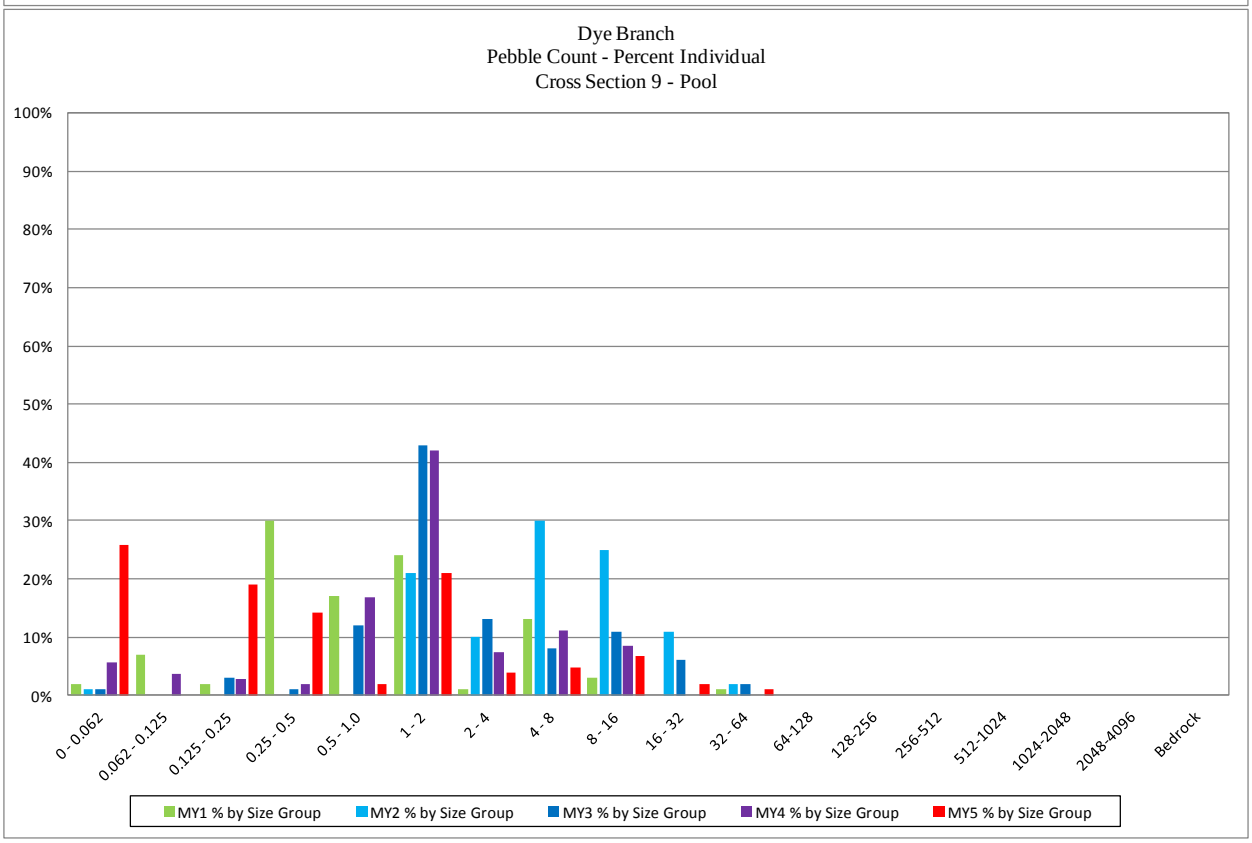
Dye Branch			
Cross Section 8 - Riffle			
Monitoring Year - 2015; MY5			
Bed Surface Material Particle Size Class (mm)	**Number**	**% Individual**	**% Cumulative**
0 - 0.062	30	28.6%	29%
0.062 - 0.125	8	7.6%	36%
0.125 - 0.25	12	11.4%	48%
0.25 - 0.5	30	28.6%	76%
0.5 - 1.0	23	21.9%	98%
1 - 2	0	0.0%	98%
2 - 4	0	0.0%	98%
4 - 8	1	1.0%	99%
8 - 16	1	1.0%	100%
16 - 32	0	0.0%	100%
32 - 64	0	0.0%	100%
64-128	0	0.0%	100%
128-256	0	0.0%	100%
256-512	0	0.0%	100%
512-1024	0	0.0%	100%
1024-2048	0	0.0%	100%
2048-4096	0	0.0%	100%
Bedrock	0	0.0%	100%
Total	**105**	**100%**	**100%**
		Summary Data	
		D50	**0.26**
		D84	**0.64**
		D95	**0.91**


Dye Branch
Pebble Count - Percent Cumulative
Cross Section 8 - Riffle
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0 - 0.062
0.062 - 0.125
0.125 - 0.25
0.25 - 0.5
0.5 - 1.0
1 - 2
2 - 4
4 - 8
8 - 16
16 - 32
32 - 64
64-128
128-256
256-512
512-1024
1024-2048
2048-4096
Bedrock
MY1 Cumulative %
MY2 Cumulative %
MY3 Cumulative %
MY4 Cumulative %
MY5 Cumulative %

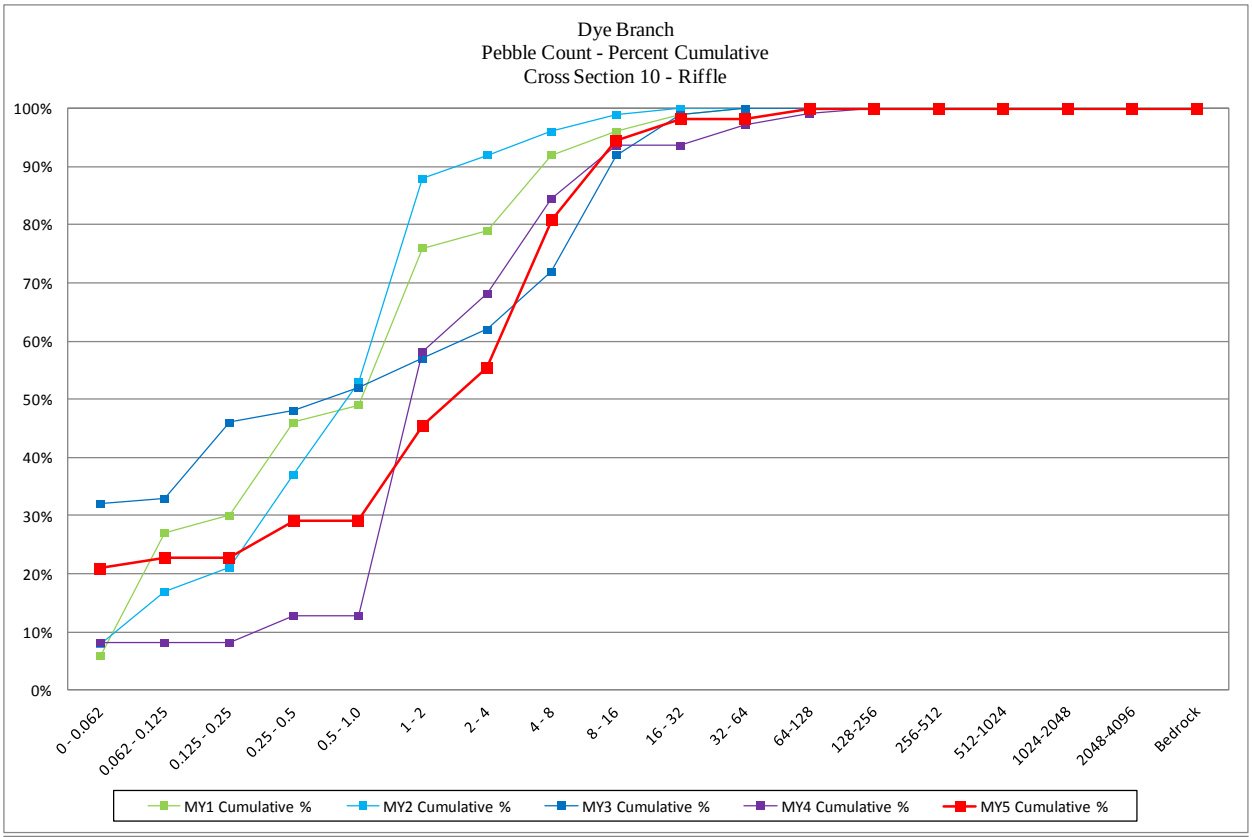

Dye Branch
Pebble Count - Percent Individual
Cross Section 8 - Riffle
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0 - 0.062
0.062 - 0.125
0.125 - 0.25
0.25 - 0.5
0.5 - 1.0
1 - 2
2 - 4
4 - 8
8 - 16
16 - 32
32 - 64
64-128
128-256
256-512
512-1024
1024-2048
2048-4096
Bedrock
MY1 % by Size Group
MY2 % by Size Group
MY3 % by Size Group
MY4 % by Size Group
MY5 % by Size Group

Dye Branch			
Cross Section 9 - Pool			
Monitoring Year - 2015; MY5			
Bed Surface Material Particle Size Class (mm)	**Number**	**% Individual**	**% Cumulative**
0 - 0.062	27	25.7%	26%
0.062 - 0.125	0	0.0%	26%
0.125 - 0.25	20	19.0%	45%
0.25 - 0.5	15	14.3%	59%
0.5 - 1.0	2	1.9%	61%
1 - 2	22	21.0%	82%
2 - 4	4	3.8%	86%
4 - 8	5	4.8%	90%
8 - 16	7	6.7%	97%
16 - 32	2	1.9%	99%
32 - 64	1	1.0%	100%
64-128	0	0.0%	100%
128-256	0	0.0%	100%
256-512	0	0.0%	100%
512-1024	0	0.0%	100%
1024-2048	0	0.0%	100%
2048-4096	0	0.0%	100%
Bedrock	0	0.0%	100%
Total	**105**	**100%**	**100%**
		Summary Data	
		D50	**0.32**
		D84	**2.9**
		D95	**12**


Dye Branch
Pebble Count - Percent Cumulative
Cross Section 9 - Pool
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0 - 0.062
0.062 - 0.125
0.125 - 0.25
0.25 - 0.5
0.5 - 1.0
1 - 2
2 - 4
4 - 8
8 - 16
16 - 32
32 - 64
64-128
128-256
256-512
512-1024
1024-2048
2048-4096
Bedrock
MY1 Cumulative %
MY2 Cumulative %
MY3 Cumulative %
MY4 Cumulative %
MY5 Cumulative %


Dye Branch
Pebble Count - Percent Individual
Cross Section 9 - Pool
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0 - 0.062
0.062 - 0.125
0.125 - 0.25
0.25 - 0.5
0.5 - 1.0
1 - 2
2 - 4
4 - 8
8 - 16
16 - 32
32 - 64
64-128
128-256
256-512
512-1024
1024-2048
2048-4096
Bedrock
MY1 % by Size Group
MY2 % by Size Group
MY3 % by Size Group
MY4 % by Size Group
MY5 % by Size Group

Dye Branch			
Cross Section 10 - Riffle			
Monitoring Year - 2015; MY5			
Bed Surface Material Particle Size Class (mm)	**Number**	**% Individual**	**% Cumulative**
0 - 0.062	23	20.9%	21%
0.062 - 0.125	2	1.8%	23%
0.125 - 0.25	0	0.0%	23%
0.25 - 0.5	7	6.4%	29%
0.5 - 1.0	0	0.0%	29%
1 - 2	18	16.4%	45%
2 - 4	11	10.0%	55%
4 - 8	28	25.5%	81%
8 - 16	15	13.6%	95%
16 - 32	4	3.6%	98%
32 - 64	0	0.0%	98%
64-128	2	1.8%	100%
128-256	0	0.0%	100%
256-512	0	0.0%	100%
512-1024	0	0.0%	100%
1024-2048	0	0.0%	100%
2048-4096	0	0.0%	100%
Bedrock	0	0.0%	100%
Total	**110**	**100%**	**100%**
		Summary Data	
		D50	**2.7**
		D84	**8.8**
		D95	**17**


Dye Branch
Pebble Count - Percent Cumulative
Cross Section 10 - Riffle
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0 - 0.062
0.062 - 0.125
0.125 - 0.25
0.25 - 0.5
0.5 - 1.0
1 - 2
2 - 4
4 - 8
8 - 16
16 - 32
32 - 64
64-128
128-256
256-512
512-1024
1024-2048
2048-4096
Bedrock
MY1 Cumulative %
MY2 Cumulative %
MY3 Cumulative %
MY4 Cumulative %
MY5 Cumulative %

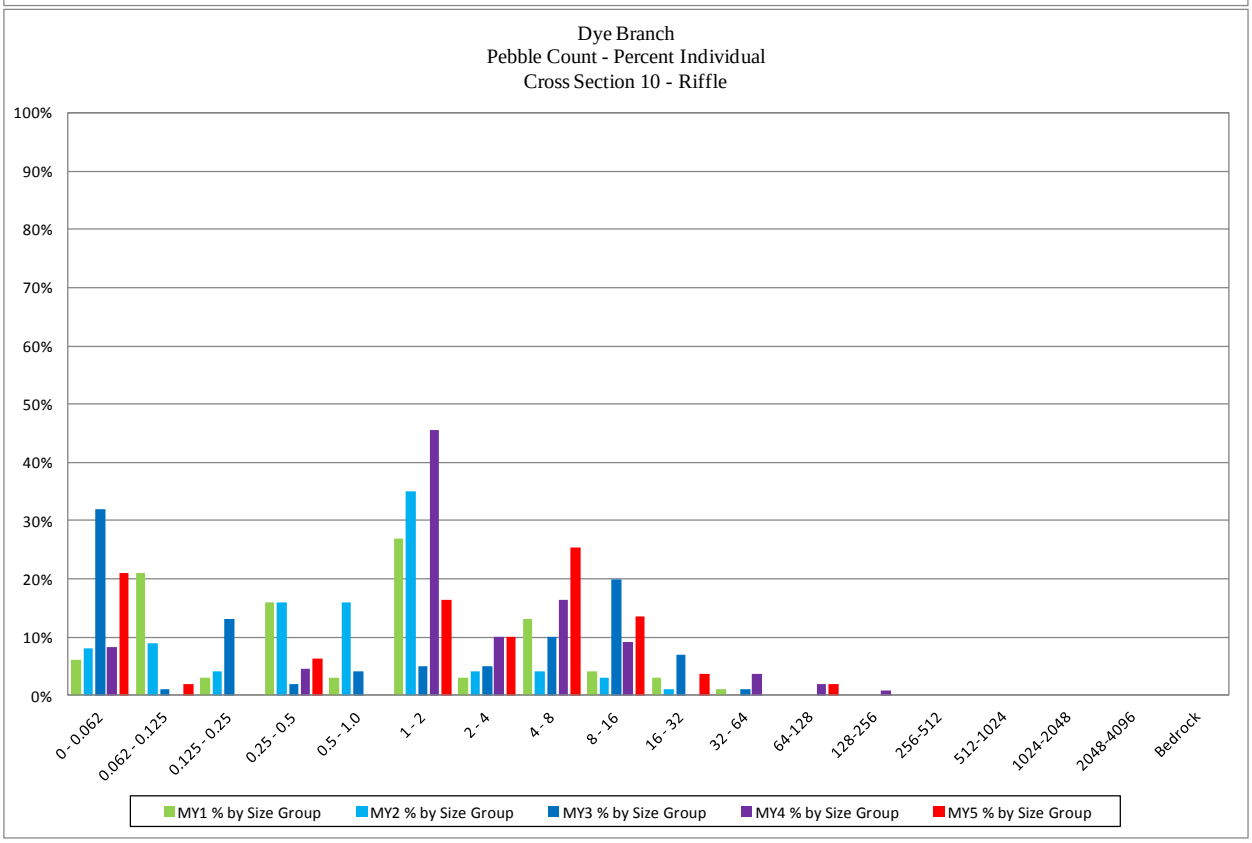

Dye Branch
Pebble Count - Percent Individual
Cross Section 10 - Riffle
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0 - 0.062
0.062 - 0.125
0.125 - 0.25
0.25 - 0.5
0.5 - 1.0
1 - 2
2 - 4
4 - 8
8 - 16
16 - 32
32 - 64
64-128
128-256
256-512
512-1024
1024-2048
2048-4096
Bedrock
MY1 % by Size Group
MY2 % by Size Group
MY3 % by Size Group
MY4 % by Size Group
MY5 % by Size Group

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					
Dimension & Substrate - Riffle	**LL**	**UL**	**Eq.**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**	**Min**	**Mean**	**Max**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**
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					
Dimension & Substrate - Riffle	**LL**	**UL**	**Eq.**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**	**Min**	**Mean**	**Max**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**
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					
Dimension & Substrate - Riffle	**LL**	**UL**	**Eq.**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**	**Min**	**Mean**	**Max**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**
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^{sp} (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^{sp} (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^{sp} (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**					
Dimension	**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	836.3	836.3	836.3	826.3	826.3	826.3	826.3	826.3	826.3	821.7	821.7	821.7	821.7	821.7	821.7
Bankfull Width (ft)	9.7	10.2	9.4	9.2	9.2	9.3	8.9	10.6	8.0	8.4	5.9	6.0	5.5	6.0	6.5	6.1	5.7	5.8
Floodprone Width (ft)	>50	>50	>50	>50	>50	>50	>30	>30	>30	>30	>30	>30	>30	>30	>30	>30	>30	>30
Bankfull Mean Depth (ft)	1.9	1.5	1.5	1.5	1.6	1.5	0.8	0.6	0.5	0.5	0.7	0.8	0.5	0.5	0.6	0.6	0.7	0.7
Bankfull Max Depth (ft)	3.1	2.7	2.4	2.2	2.4	2.1	1.4	1.2	1.2	1.2	1.4	1.5	1.0	1.0	1.0	0.9	1.1	1.1
Bankfull Cross Sectional Area (ft^2)	18.9	15.2	14.3	14.0	15.1	14.2	7.0	6.3	3.9	4.1	4.2	4.7	3.0	2.8	4.0	3.6	4.2	4.3
Bankfull Width/Depth Ratio	5.0	6.8	6.2	6.1	5.6	6.2	11.2	18.1	16.4	17.3	8.3	7.5	10.3	12.7	10.6	10.4	7.6	7.9
Bankfull Entrenchment Ratio	>5.1	>4.9	>5.3	>5.4	>5.5	>5.4	>3.4	>2.8	>3.8	>3.6	>5.1	>5.0	>5.4	>5.0	>4.6	>4.9	>5.3	>5.1
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	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	14.0	40.9	40.4	7.0	6.3	3.9	4.1	26.9	27.1	3.0	2.8	4.0	3.6	9.1	9.0
d50 (mm)	N/A	5.7	4.8	4.1	1.5	1.1	N/A	8.4	14.0	2.1	4.7	48.0	N/A	6.0	5.0	6.0	6.2	1.7

N/A - Item does not apply.

Cross Sectional Area between End Pins was miscalculated during MY1-MY3, correct values presented in MY4

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**					
Dimension	**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	824.3	824.3	824.3	817.4	817.4	817.4	817.4	817.4	817.4	815.5	815.5	815.5	815.5	815.5	815.5	812.5	812.5	812.5	812.5	812.5	812.5
Bankfull Width (ft)	25.7	23.8	22.9	20.8	21.5	20.7	17.1	17.0	16.8	16.4	15.6	15.1	32.7	28.7	27.7	26.9	26.7	27.2	26.9	24.1	21.3	20.1	19.9	17.1
Floodprone Width (ft)	>58.6	>52.8	>52.8	>52.8	>52.8	>52.8	>50	>47.1	>47.1	>47.1	>47.1	>47.1	>81.8	>78.2	.78.2	>78.2	>78.2	>78.2	>54.4	>52.6	>52.6	>52.6	>52.6	>52.6
Bankfull Mean Depth (ft)	1.3	1.1	1.0	1.1	1.0	1.0	1.7	1.4	2.1	2.1	2.1	2.0	1.4	1.3	1.3	1.3	1.3	1.2	1.1	1.0	0.9	1.1	1.0	1.0
Bankfull Max Depth (ft)	2.5	2.0	2.1	2.3	2.2	2.3	3.4	2.8	3.6	3.6	3.4	3.0	3.6	3.2	3.2	3.3	3.3	3.0	2.2	2.0	2.1	2.4	2.3	2.2
Bankfull Cross Sectional Area (ft^2)	32.5	27.1	23.1	22.4	21.1	21.0	28.8	23.7	35.0	35.1	33.1	29.7	46.9	37.5	36.2	36.0	34.2	31.3	29.5	24.2	19.9	21.3	19.4	17.9
Bankfull Width/Depth Ratio	20.3	20.9	22.6	19.3	21.9	20.4	10.2	12.2	8.1	7.7	7.4	7.7	22.8	22.0	21.2	20.0	20.8	23.6	24.6	24.0	22.9	18.9	20.4	16.3
Bankfull Entrenchment Ratio	>2.3	>2.2	>2.3	>2.5	>2.5	>2.6	>2.9	>2.8	>2.8	>2.9	>3.0	>3.1	>2.5	>2.7	>2.8	>2.9	>2.9	>2.9	>2.0	>2.2	>2.5	>2.6	>2.6	>3.1
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	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	22.4	165.1	167.7	28.8	23.7	35.0	35.2	120.1	115.9	46.9	37.5	36.2	36.0	266.3	262.4	29.5	24.2	19.9	21.4	254.6	258.6.
d50 (mm)	N/A	1.2	1.2	1.0	1.9	0.42	N/A	6.0	1.7	13.0	1.6	1.9	N/A	1.9	4.5	1.6	1.2	1.5	N/A	2.7	8.0	7.4	2.4	1.3

N/A - Item does not apply.

Cross Sectional Area between End Pins was miscalculated during MY1-MY3, correct values presented in MY4

Table 11a. Baseline Morphology & Hydraulic Monitoring Summary Dye Branch II / Project No. 92255 - Dye Branch-Downstream (869 Feet)																		
Parameter	**Cross Section 8 Riffle**						**Cross Section 9 Pool**						**Cross Section 10 Riffle**					
Dimension	**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	809.3	809.3	809.3	806.1	806.1	806.1	806.1	806.1	806.1	801.1	801.1	801.1	801.1	801.1	801.1
Bankfull Width (ft)	18.8	18.8	19.6	18.6	19.6	19.6	26.3	26.3	24.3	24.6	23.8	23.7	18.4	18.5	17.7	17.9	17.8	16.6
Floodprone Width (ft)	>74.8	>73.5	>73.5	>73.5	>73.5	>73.5	>70	>70	>70	>70	>70	>70	>48.7	>47.6	>47.6	>47.6	>47.6	>47.6
Bankfull Mean Depth (ft)	2.0	1.9	2.1	2.0	2.2	2.1	1.8	1.7	2.3	2.6	2.6	2.6	1.9	1.6	1.6	1.6	1.8	1.8
Bankfull Max Depth (ft)	3.1	3.0	3.9	3.3	3.9	3.9	3.5	3.5	3.5	4.1	3.4	3.6	2.9	2.4	2.5	2.7	2.8	2.6
Bankfull Cross Sectional Area (ft^2)	38.1	35.9	41.0	36.8	43.2	41.8	48.4	43.6	55.3	63.5	61.1	62.7	34.0	29.5	27.8	29.4	31.6	29.4
Bankfull Width/Depth Ratio	9.3	9.9	9.3	9.4	8.9	9.2	14.3	15.9	10.7	9.6	9.3	9.0	9.9	11.7	11.3	11.0	10.0	9.4
Bankfull Entrenchment Ratio	>4.0	>3.9	>3.8	>4.0	>3.8	>3.7	>2.7	>2.7	2.9	>2.8	>2.9	>2.9	>2.7	>2.6	>2.7	>2.7	>2.7	>2.9
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	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	36.9	286.9	282.8	48.4	43.6	55.3	63.5	207.3	207.5	34.0	29.5	27.8	29.4	279.5	277.9
d50 (mm)	N/A	1.3	1.1	0.9	2.0	0.26	N/A	0.72	6.4	1.7	1.4	0.32	N/A	1.0	0.9	0.1	1.8	2.7

N/A - Item does not apply.

Cross Sectional Area between End Pins was miscalculated during MY1-MY3, correct values presented in MY4

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					
Dimension & Substrate - Riffle	**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**
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	6.1	7.3	7.3	8.4	N/A	2	5.9	6.0	6.0	6.1	N/A	2	5.8	5.9	5.9	6.0	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	>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	0.5	0.6	0.6	0.6	N/A	2	0.7	0.7	0.7	0.7	N/A	2	0.7	0.8	0.8	0.8	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	0.9	1.1	1.1	1.2	N/A	2	1.1	1.3	1.3	1.4	N/A	2	1.1	1.3	1.3	1.5	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	3.6	3.9	3.9	4.1	N/A	2	4.2	4.2	4.2	4.2	N/A	2	4.3	4.5	4.5	4.7	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	10.4	13.9	13.9	17.3	N/A	2	8.3	8.5	8.5	8.7	N/A	2	7.5	7.7	7.7	7.9	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	3.6	4.3	4.3	4.9	N/A	2	4.9	5.0	5.0	5.1	N/A	2	5.0	5.1	5.1	5.1	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	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	8.4	24.4	13.2	53.7	17.8	12	7.7	23.4	18.2	48.8	15.2	12	5.2	27.2	29.1	48.7	17.6	9
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	0.005	0.025	0.021	0.057	0.017	12	0.005	0.019	0.018	0.037	0.011	12	0.006	0.017	0.014	0.029	0.009	9
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	6.8	16.6	14.8	39.2	7.2	26	5.1	16.4	14.3	37.5	7.3	26	4.5	16.4	14.7	39.8	7.7	27
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	0.8	2.2	2.4	3.4	0.8	24	1.0	2.2	2.2	3.2	0.7 [1]	25 [1]	1.2	2.5	2.8	3.5	0.8	26
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	11.0	36.7	27.9	96.6	22.5	25	14.9	36.6	27.8	89.3	20.9	25	9.9	35.6	28.6	93.4	20.4	26
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						C4						C4						C4					
Channel Thalweg Length (ft)	977						971						970						969						970						958					
Sinuosity (ft)	1.08						1.08						1.08						1.07						1.12						1.06					
Water Surface Slope (Channel) (ft/ft)	-						0.0200						0.0203						0.0203						0.0177						0.0186					
Bankfull Slope (ft/ft)	0.0191						0.0195						0.0198						0.0189						0.0183						0.0190					
Ri% / Ru% / P% / G% / S%	35%	4%	42%	13%	7%		42%	6%	34%	13%	6%		34%	4%	46%	11%	6%		32%	3%	47%	13%	6%		31%	4%	47%	12%	6%		27%	4%	48%	15%	6%	
SC% / SA% / G% / C% / B% / Be%*							0%	38%	54%	7%	0%	0%	0%	30%	67%	3%	0%	0%	1%	41%	53%	4%	0%	0%	0%	49%	45%	6%	0%	0%	0%	52.5%	26.2%	21.1%	0%	0%
d16 / d35 / d50 / d84 / d95 (mm)																									0.86	1.5	4.1	7.0	28.3	71.7	0.2	1.35	24.85	65	93	
% of Reach with Eroding Banks	0%						0%						0%						0%						1%						1%					
Channel Stability or Habitat Metric	N/A						N/A						N/A						N/A						N/A						N/A					
Biological or Other	N/A						N/A						N/A						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.

[1] Corrected Values

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					
Dimension & Substrate - Riffle	**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**
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	20.1	22.6	20.8	26.9	N/A	3	19.9	22.6	21.5	26.5	N/A	3	17.1	21.7	20.7	27.2	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	52.6	61.2	52.8	78.2	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	1.1	1.2	1.1	1.3	N/A	3	1.0	1.1	1.0	1.3	N/A	3	1.0	1.1	1.0	1.2	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	2.3	2.7	2.4	3.3	N/A	3	2.2	2.6	2.3	3.3	N/A	3	2.2	2.5	2.3	3.0	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	21.3	26.6	22.4	36.0	N/A	3	19.4	24.9	21.1	34.2	N/A	3	17.9	23.4	21.0	31.3	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	18.9	19.4	19.3	20.0	N/A	3	20.4	21.0	20.8	21.9	N/A	3	16.3	20.1	20.4	23.6	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	2.5	2.7	2.6	2.9	N/A	3	2.5	2.7	2.6	2.9	N/A	3	2.6	2.9	2.9	3.1	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	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	16.8	41.4	47.0	54.0	16.2	6	19.4	40.3	39.6	63.9	18.1	6	10.1	32.9	25.6	58.3	21.1	7
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	0.002	0.008	0.006	0.016	0.006	6	0.003	0.007	0.005	0.016	0.005	6	0.004	0.011	0.007	0.031	0.010	7
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	7.7	26.2	21.8	81.6	17.7	21	8.9	26.9	20.6	85.8	19.4	21	8.1	28.3	21.7	94.0	19.5	21
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	1.6	3.1	3.1	4.3	0.8	20	1.4	3.0	3.4	4.4	0.9	20	2.00	3.55	3.64	4.88	0.84	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	13.2	65.1	64.0	127.5	30.7	18	11.7	58.7	48.2	118.6	30.8	20	15.1	57.9	45.8	114.4	30.1	20
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						C4						C4						C4					
Channel Thalweg Length (ft)	1,465						1,471						1,465						1,447						1,448 [1]						1,437					
Sinuosity (ft)	1.15						1.16						1.15						1.14						1.13 [1]						1.13					
Water Surface Slope (Channel) (ft/ft)	-						0.0092						0.0091						0.0092						0.0093						0.0092					
Bankfull Slope (ft/ft)	0.0091						0.0094						0.0095						0.0091						0.0094						0.0093					
Ri% / Ru% / P% / G% / S%	28%	15%	34%	20%	3%		31%	10%	41%	15%	4%		23%	14%	40%	19%	3%		17%	15%	38%	26%	3%		17%	23%	39%	17%	4%		16%	23%	42%	16%	4%	
SC% / SA% / G% / C% / B% / Be%*							0%	50%	47%	3%	0%	0%	2%	45%	50%	3%	0%	0%	3%	43%	48%	6%	0%	0%	5%	58%	35%	2%	0%	0%	2.3%	77.5%	19%	1.1%	0%	0%
d16 / d35 / d50 / d84 / d95 (mm)																									0.48	1.08	1.8	3.3	6.7	23.0	0.235	0.89	1.07	3.47	23.7	
% of Reach with Eroding Banks	0%						0%						7%						10%						10%						9%					
Channel Stability or Habitat Metric	N/A						N/A						N/A						N/A						N/A						N/A					
Biological or Other	N/A						N/A						N/A						N/A						N/A						N/A					

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					
Dimension & Substrate - Riffle	**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**
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	17.9	20.4	18.6	24.6	N/A	2	17.8	18.7	18.7	19.6	N/A	2	16.60	18.10	18.10	19.60	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	47.6	63.7	70.0	73.5	N/A	2	47.6	60.6	60.6	73.5	N/A	2	47.60	60.55	60.55	73.50	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	1.6	2.1	2.0	2.6	N/A	2	1.8	2.0	2.0	2.2	N/A	2	1.80	1.95	1.95	2.10	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	2.7	3.4	3.3	4.1	N/A	2	2.8	3.4	3.4	3.9	N/A	2	2.60	3.25	3.25	3.90	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	29.4	43.2	36.8	63.5	N/A	2	31.6	37.4	37.4	43.2	N/A	2	29.40	35.60	35.60	41.80	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	9.4	10.0	9.6	11.0	N/A	2	8.9	9.5	9.5	10.0	N/A	2	9.20	9.30	9.30	9.40	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	2.7	3.2	2.8	4.0	N/A	2	2.7	3.3	3.3	3.8	N/A	2	2.90	3.30	3.30	3.70	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	1.0	1.0	1.0	1.0	N/A	2	1.0	1.0	1.0	1.0	N/A	2	1.00	1.00	1.00	1.00	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	18.9	42.8	41.0	70.4	23.4	4	18.1	43.4	39.0	77.7	26.5	4	18.7	46.6	44.0	77.2	29.3	3
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	0.001	0.005	0.005	0.008	0.004	4	0.0005	0.004	0.001	0.014	0.007	4	0.002	0.007	0.004	0.015	0.007	3
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	8.7	26.6	30.2	56.6	15.7	15	8.0	23.4	23.7	43.3	10.7	16	5.9	23.1	20.2	57.9	15.0	16
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	3.0	3.9	3.8	5.3	0.7	12	1.8	3.4	3.4	5.0	0.8	14	3.4	4.3	4.2	5.8	0.7	14
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	12.0	57.3	48.3	114.8	36.8	14	9.7	53.4	39.2	122.8	38.0	15	10.9	53.5	38.4	116.5	36.2	15
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						C5						C5						C5					
Channel Thalweg Length (ft)	870						869						875						867						868						855					
Sinuosity (ft)	1.10						1.09						1.10						1.09						1.09						1.07					
Water Surface Slope (Channel) (ft/ft)	-						0.0099						0.0094						0.0099						0.0098						0.0095					
Bankfull Slope (ft/ft)	0.0106						0.0104						0.0101						0.0089						0.0103						0.0088					
Ri% / Ru% / P% / G% / S%	43%	6%	34%	13%	3%		39%	10%	31%	18%	2%		17%	19%	42%	19%	3%		20%	11%	46%	20%	4%		20%	14%	43%	20%	3%		19%	19%	42%	18%	2%	
SC% / SA% / G% / C% / B% / Be%*							3%	75%	22%	0%	0%	0	3%	59%	38%	0%	0%	0%	12%	52%	36%	0%	0%	0%	5%	56%	38%	1%	0%	0%	24.6%	46.5%	27.9%	0.9%	0%	0%
d16 / d35 / d50 / d84 / d95 (mm)																									1.1	1.5	1.9	3.9	8.3	31	0.062	0.705	1.48	4.72	8.955	
% of Reach with Eroding Banks	0%						0%						8%						10%						10%						11%					
Channel Stability or Habitat Metric	N/A						N/A						N/A						N/A						N/A						N/A					
Biological or Other	N/A						N/A						N/A						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.

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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
4/12/2013	Water level logger	0.08
6/28/2013	Water level logger	0.81
6/30/2013	Water level logger	0.72
7/9/2013	Water level logger	1.62
7/31/2013	Water level logger	0.53
1/11/2014	Water level logger	1.29
5/14/2014	Water level logger	0.07
6/8/2014	Water level logger	0.21
Between 6/5/2015 and 11/7/2015	Wrack Lines	0.5

Figure 3. Dye Branch Water Level Logger Chart

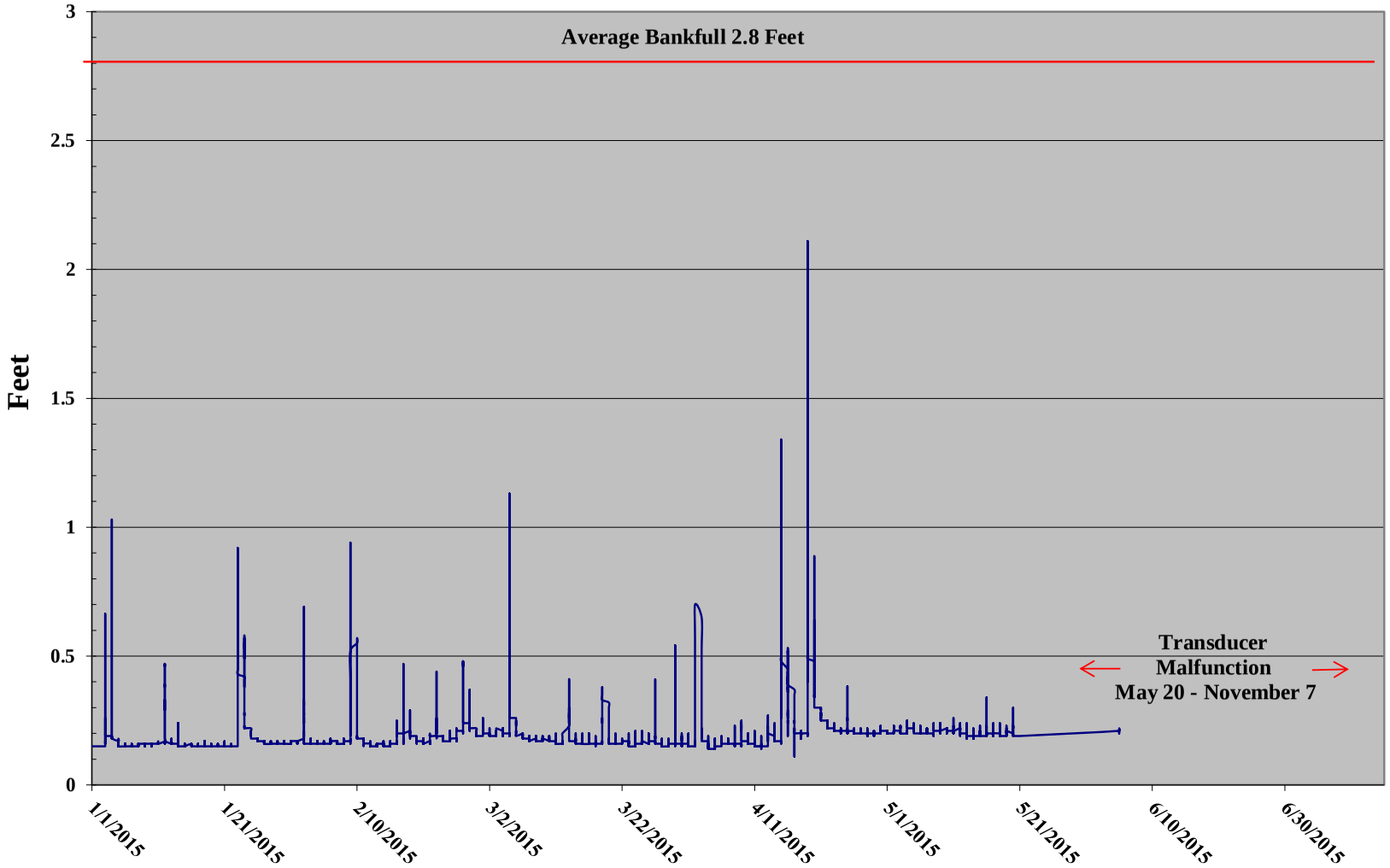
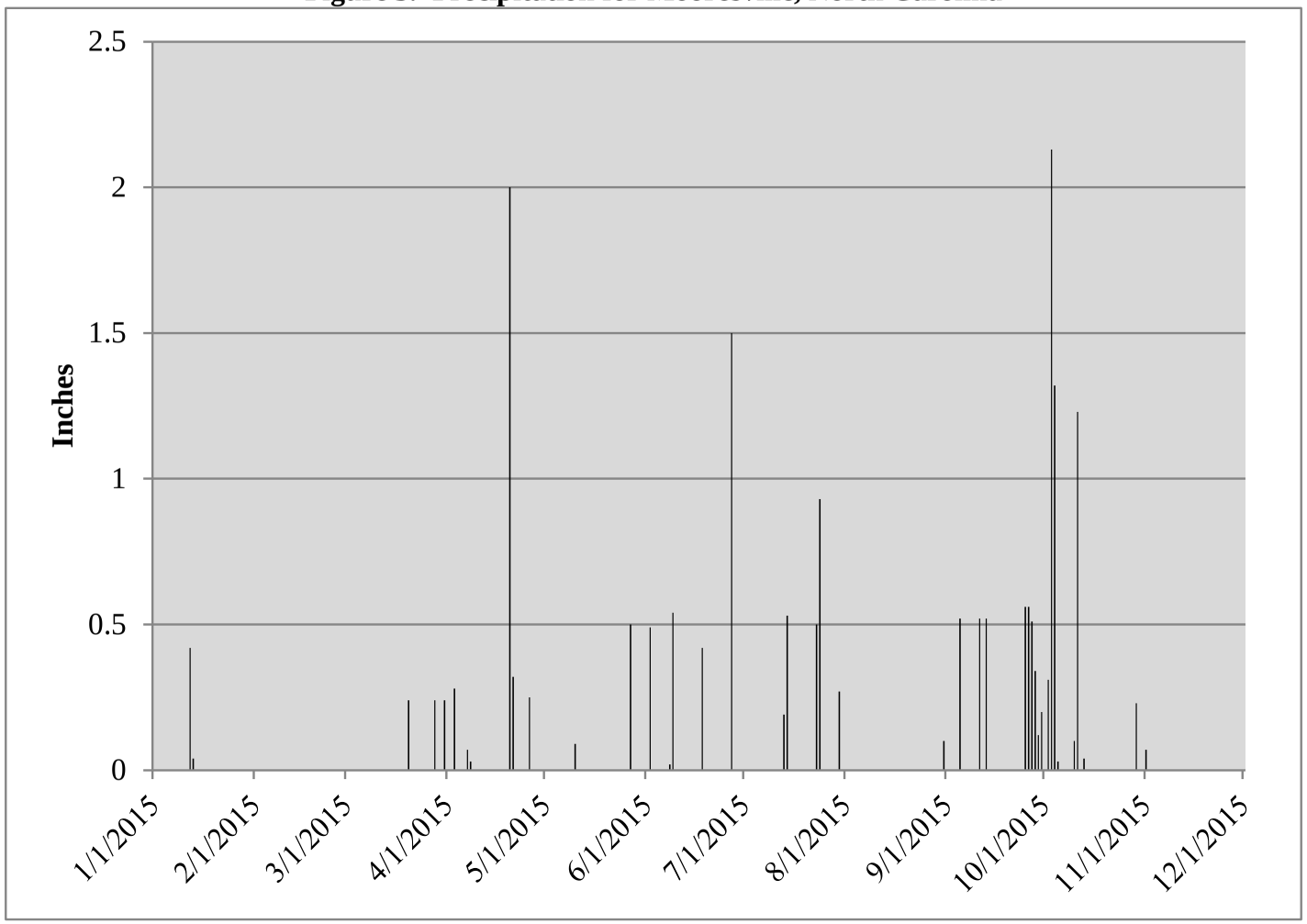


Figure 3. Precipitation for Mooresville, North Carolina



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 2015.