Glade Creek
Stream Restoration
NCEEP Project Number: 854
Monitoring Contract Number: D08033S
Monitoring Year 4
2014 Draft Report

Submitted to
North Carolina Ecosystem Enhancement Program
North Carolina Department of Environment and Natural Resources
January 2015

1652 Mail Service Center
Raleigh, NC 27699

Monitoring Firm

EQUINOX

balance through proper planning

37 Haywood Street, Suite 100
Asheville, North Carolina 28801
Phone: 828-253-6856

Project Contact: Hunter Terrell
Email: Hunter@equinoxenvironmental.com

Glade Creek Stream Restoration
2014 Monitoring Report (MY 4)

Table of Contents

Appendices

1.0 EXECUTIVE SUMMARY/PROJECT ABSTRACT

The goals and objectives stated in the Glade Creek Restoration Plan (NCEEP 2007) are as follows:

Project Goals

- Rapidly stabilize the channel of Glade Creek relative to natural processes;
- Rapidly stabilize and preserve the channel of the Unnamed Tributary relative to natural processes;
- Restore and rehabilitate channel features and aquatic habitat in Glade Creek and the Unnamed Tributary;
- Rehabilitate the riparian buffer along both streams; and
- Preserve the existing wetlands onsite.

Project Objectives

- Restore approximately 2,430 linear feet of stream channel on Glade Creek;
- Restore approximately 275 linear feet of the Unnamed Tributary;
- Preserve 570 linear feet of the Unnamed Tributary; and
- Preserve the existing 0.33 acre wetlands within the project site.

The monitoring year four (MY4) vegetation plot data revealed the average planted stem density to be 472 stems/acre; exceeding both the interim 320 stems per acre density as well as the final 260 stems per acre minimum density criterion that must be achieved by the end of MY5. Stem densities were found to have declined by approximately 7% from the previous year due to dead or missing stems. Additionally, 16 isolated patches of high threat invasive plants are distributed throughout the project area and are illustrated on the Current Condition Plan View (Figure 2). Multiflora rose *Rosa multiflora* and oriental bittersweet *Celastrus orbiculatus* are the most dominant species present, while secondary species found included Japanese honeysuckle *Lonicera japonica*, Japanese barberry *Berberis thunbergii*, and Japanese spiraea *Spiraea japonica*. These targeted invasive plants have been treated in the spring, summer, and fall of 2014 with good efficacy. Follow up treatments in spring and summers are also scheduled.

The stream longitudinal profile along the mainstem showed several areas of change, including several areas of bed scour, resulting in variations in the profile dimensions. Bed scour from 9+54 to 9+99 and subsequent deposition in the pool has resulted in a flattening of the bed profile in the approach to the first Rockvane/Rockstep structure series at station 10+67. Downstream of this series, the stream has gone through a series of adjustments between stations 12+79 and 13+69 resulting in bed scour. One additional area of bed scour was noted between station 16+44 and 17+01 resulting in a mid-channel bar within the downstream pool. Although, adjustment in the channel is apparent within the reach, no signs of significant instability, such as sloughing banks or failing structures, have been documented. These areas will be closely monitored in future monitoring years. The stream longitudinal profile along the unnamed tributary has remained relatively stable between MY3 and MY4. Deposition at the beginning of the longitudinal profile, at station 2+70 to 2+62, and scour in the following pool, station 2+61 to 2+50, has reduced the number of riffles in this reach from 6 to 5. This ultimately increased the average riffle length from 10.5 to 12.3 and decreased riffle slope from 0.012 to 0.010. While

these changes represent change from the baseline calculations, they are considered insignificant. In general, cross-section data indicated that the continued growth of berms and point bars are resulting in narrower bankfull widths. This includes XS-1, XS-2, and XS-5 which all saw reductions in bankfull width. At XS-4 and XS-6, scour along the left-descending bank caused increased maximum depth. The scour resulted from the migration and formation of transverse riffles downstream of the cross-section. One bankfull event was documented on the mainstem. The crest gauge documented the event as being 0.26 feet above bankfull. The exact date of the event is unknown.

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 restoration plan on EEP's website (NCEEP 2007). All raw data supporting tables and figures in the appendices are available from EEP upon request.

2.0 Methodology

The stream monitoring methodologies utilized in MY4 replicate those employed during the previous monitoring year and are based on standard guidance and procedures documents (Rosgen 1996; USACE 2003). Vegetation monitoring data were collected following the standard CVS-EEP Protocol for Recording Vegetation, Level II, Version 4.2 (Lee et al. 2008).

3.0 References

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

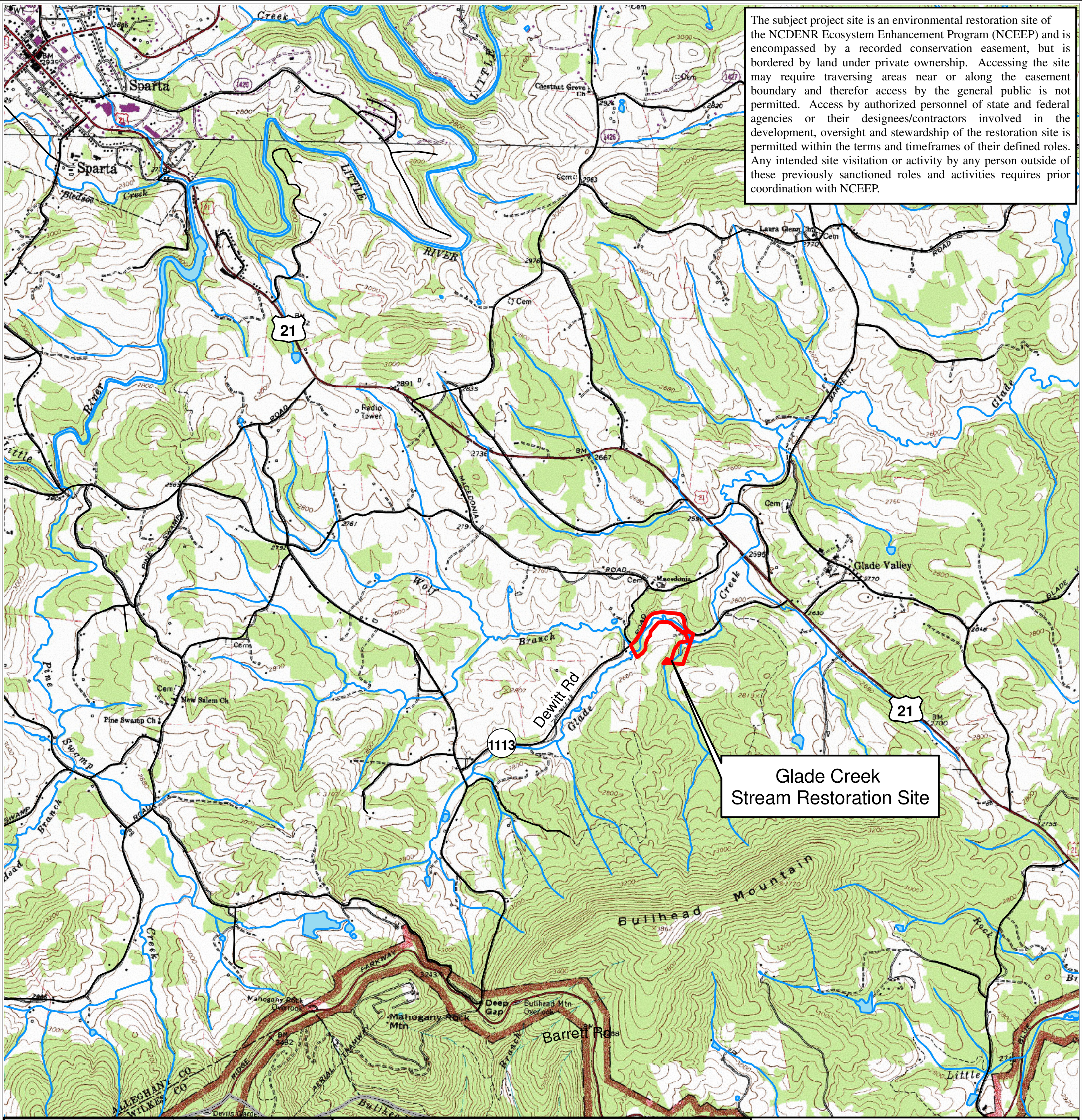
NCEEP (North Carolina Ecosystem Enhancement Program). 2007. Restoration Plan. Glade Creek Stream Restoration. Alleghany County, North Carolina. Raleigh.

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

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

Appendix A
Project Vicinity Map and Background Tables

The subject project site is an environmental restoration site of the NCDENR Ecosystem Enhancement Program (NCEEP) 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 NCEEP.



Directions: The project site is located in Alleghany County, North Carolina, approximately 4 miles southeast of the town of Sparta. From the south and east, the site can be accessed by exiting Interstate 77 North at the US 21 Bypass exit in Elkin. Proceed on US 21 towards Sparta for 23.1 miles to Dewitt Road. Turn left on Dewitt Road and travel 0.7 miles to the site entrance on the left at 541 Dewitt Road.

Figure 1 - Vicinity Map

Glade Creek
Stream Restoration Site
Project No. 854

Alleghany County, North Carolina

N

EQUINOX ENVIRONMENTAL CONSULTATION & DESIGN

Ecosystem Enhancement PROGRAM

0 1,500 3,000 6,000 Feet

7.5 Minute Series
Glade Valley Quadrangle

Table 1a. Project Components Glade Creek / Project No. 854								
Project Component or Reach ID	**Existing Feet/Acres**	**Restoration Level**	**Approach**	**Footage or Acreage**	**Stationing**	**Buffer Acres**	**BMP Elements**	**Comment**
Glade Creek	2,569 lf	R	P2	2,513 lf*	0+00 - 25+58			
Unnamed Tributary Downstream	300 lf	R	P2	265 lf	0+00 - 2+65			
Unnamed Tributary Upstream	784 lf	P		784 lf	Not Established			
Wetlands	0.26 ac	P		0.26 ac	N/A			

*Excludes the 45 linear feet of stream associated with the private drive access location.
=Non-Applicable

Table 1b. Component Summations Glade Creek / Project No. 854							
Restoration Level	**Stream (lf)**	**Riparian Wetland (Ac)**		**Non-Riparian (ac)**	**Upland (ac)**	**Buffer (ac)**	**BMP**
		Riverine	**Non-Riverine**				
Restoration	2,778*	0.00	0.00				
Enhancement		0.00	0.00				
Enhancement I	0						
Enhancement II	0						
Creation		0.00	0.00				
Preservation	784	0.00	0.26				
HQ Preservation	0	0.00	0.00				
		0.00	0.00				
Totals	**3,562**	**0.26**		**0**	**0**	**0**	**0**

*Excludes the 45 linear feet of stream associated with the private drive access location.
=Non-Applicable

Table 2. Project Activity and Reporting History Glade Creek / Project No. 854		
Activity or Report	**Data Collection Complete**	**Completion or Delivery**
Mitigation Plan	June 2007	Dec 2007
Final Design - Construction Plans	Aug 2007	Dec 2008
Construction	N/A	April 2011
Temporary S&E mix applied to entire project area	N/A	Sept - Nov 2010 March - April 2011
Permanent seed mix applied	N/A	Sept - Nov 2010 March - April 2011
Planting	May 2011	May 2011
Baseline Monitoring Document (Year 0 Monitoring - Baseline)	May 2011	Dec 2011
Year 1 Monitoring	Dec 2011	Feb 2012
Year 2 Monitoring	Nov 2012	Jan 2013
Year 3 Monitoring	Nov 2013	Dec 2013
Year 4 Monitoring	Nov 2014	Nov 2014
Year 5 Monitoring		

N/A - Item does not apply.

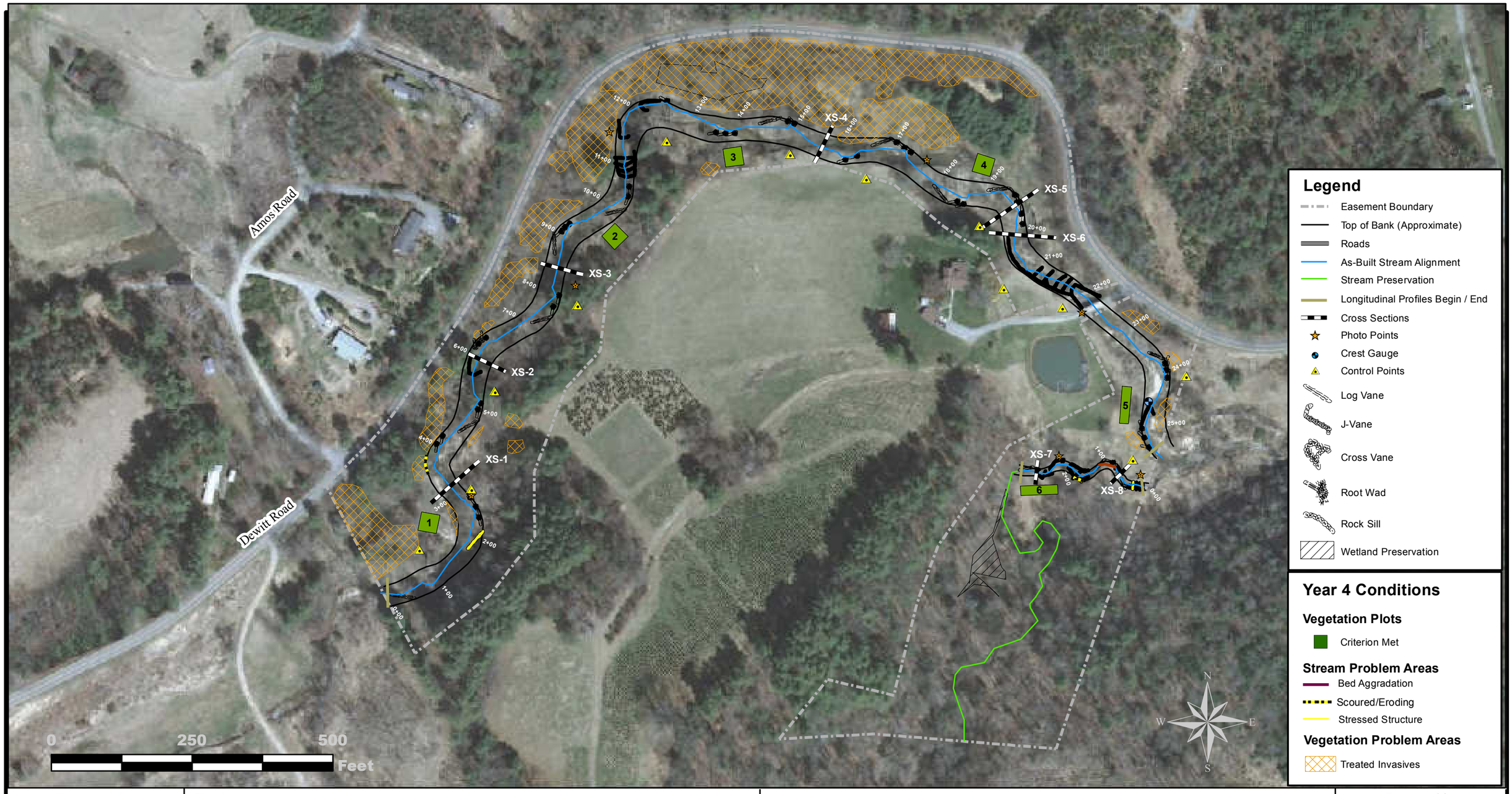
Table 3. Project Contacts Glade Creek / Project No. 854	
Designer	Biohabitats Southeast Bioregion Inc. 8218 Creedmoor Road, Suite 200 Raleigh, North Carolina 27613
Primary Project Design POC	Kevin Nunnery (919) 518-0313
Construction Contractor	Yadkin Valley Construction 2961 Old 60 Highway Ronda, North Carolina 28670
Construction Contractor POC	Terry Benton (336) 984-2219
Planting Contractor	Foggy Mountain Nursery 2251 Ed Little Road Creston, North Carolina 28615
Planting Contractor POC	Glen Sullivan (336) 384-5323
Seeding Contractor	Yadkin Valley Construction 2961 Old 60 Highway Ronda, North Carolina 28670
Seeding Contractor POC	Terry Benton (336) 984-2219
Seed Mix Sources	Hanes Geo (336) 747-1600
Nursery Stock Suppliers	Foggy Mountain Nursery Glen Sullivan (336) 384-5323
Monitoring Performers (Y0) - 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 (Y1) - 2011	Equinox Environmental Consultation & Design, Inc. 37 Haywood Street, Suite 100 Asheville, North Carolina 28801
Stream Monitoring POC	Win Taylor (828) 253-6856
Vegetation Monitoring POC	Win Taylor (828) 253-6856
Monitoring Performers (Y2) - 2012	Equinox Environmental Consultation & Design, Inc. 37 Haywood Street, Suite 100 Asheville, North Carolina 28801
Stream Monitoring POC	Kevin Mitchell (828) 253-6856
Vegetation Monitoring POC	Kevin Mitchell (828) 253-6856
Monitoring Performers (Y3)- 2013	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 (Y4)- 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 (Y5)- 2015	
Stream Monitoring POC	
Vegetation Monitoring POC	

Table 4. Project Baseline Information and Attributes Glade Creek / Project No. 854			
Project Information			
Project Name	Glade Creek		
County	Alleghany		
Project Area (acres)	15.86		
Project Coordinates (latitude and longitude)	Latitude 36.468090 / Longitude -81.066384		
Project Watershed Summary Information			
Physiographic Province	Blue Ridge		
River Basin	New River		
USGS Hydrologic Unit 8-dgit	05050001		
USGS Hydrologic Unit 14-dgit	05050001000801		
NCDWQ Sub-Basin	05-07-03		
Project Drainage Area (acres)	3,443		
Project Drainage Area Percentage of Impervious Cover	<1%		
CGIA Land Use Classification	Deciduous Forest Land		
Reach Summary Information			
Parameters	**Glade Creek**	**UT-Lower**	**UT-Upper**
Length of Reach (linear feet)	2,558	265	784
Valley Classification	-	-	-
Drainage Area (acres)	2,922	521	520
NCDWQ Stream Identification Score	59	50.5	50.5
NCDWQ Water Quality Classification	C-Tr	C-Tr	C-Tr
Morphological Description (stream type)	C	C	-
Evolutionary Trend	-	-	-
Underlying Mapped Soils	Alluvial	Alluvial	Alluvial
Drainage Class	-	-	-
Soil Hydric Status	-	-	-
Slope	0.0075	0.0075	0.0075
FEMA Classification	-	-	-
Native Vegetatation Community	Northern Hardwood Forest & Rich Cove Forest		
Percent Composition of Exotic Invasive Vegetation	14.5%		
Wetland Summary Information			
Parameters	**Wetland 1 (Glade Ck)**	**Wetland 2 (UT)**	
Size of Wetland (acres)	0.178	0.085	
Wetland Type	Riparian	Riparian	
Soil Series	Toxaway		
Soil Hydric Status	Hydric		
Source of Hydrology	-	-	
Hydrologic Impairment	-	-	
Native Vegetatation Community	High Elevation Seep		
Percent Composition of Exotic Invasive Vegetation	100%	0%	
Regulatory Considerations			
Regulation	**Applicable?**	**Resolved?**	**Supporting Documentation**
Waters of the United States - Section 404	Yes	N/A	-
Waters of the United States - Section 401	Yes	N/A	-
Endangered Species	No	N/A	N/A
Historic Preservation Act	No	N/A	N/A
Coastal Zone Management Act (CZMA) Coastal Area Management Act (CAMA)	No	N/A	N/A
FEMA Floodplain Compliance	No	N/A	N/A
Essential Fisheries Habitat	No	N/A	N/A

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

Appendix B
Visual Assessment Data

Figure 2. Integrated Current Condition Plan View



Prepared for	**Project:** Glade Creek Stream Restoration Year 4 Monitoring Alleghany County, North Carolina	Notes: 1) Base Map Data Provided by NCEEP & Biohabitats 2) NC OneMap 2010 Aerial Photo 3) All Invasives Received Initial Treatment during MY3 (2013)	Prepared by
Ecosystem Enhancement Program	Sheet 1 of 1		EQUINOX
	Date	Project Number	
	November 2014	NCEEP # 854	

Table 5. Visual Stream Morphology Stability Assessment
Glade Creek / Project No. 854 - Glade Creek
Assessed Length 2,558 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).			2	45	98%			
		2. Degradation - Evidence of downcutting.			0	0	100%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate.	17	17			100%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6).	17	17			100%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream riffle).	17	17			100%			
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run).	14	17			82%			
		2. Thalweg centering at downstream of meander bend (Glide).	16	16			100%			
2. Bank	**1. Scoured / Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion.			0	0	100%	N/A	N/A	N/A
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does 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	0	0	100%	N/A	N/A	N/A
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	40	40			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	13	13			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	13	13			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does NOT exceed 15%.	18	18			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth Ratio ≥ 1.6. Rootwads/logs providing some cover at base-flow.	22	22			100%			

N/A - Item does not apply.

Table 5. Visual Stream Morphology Stability Assessment
Glade Creek / Project No. 854 - Unnamed Tributary - Downstream
Assessed Length 265 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).			1	29	89%			
		2. Degradation - Evidence of downcutting.			0	0	100%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate.	4	4			100%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6).	4	5			80%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream riffle).	4	5			80%			
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run).	5	5			100%			
		2. Thalweg centering at downstream of meander bend (Glide).	5	5			100%			
2. Bank	**1. Scoured / Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion.			1	18	97%	0	0	97%
	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	18	97%	N/A	N/A	N/A
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	13	13			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	6	6			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	5	6			83%			
	3. Bank Protection	Bank erosion within the structures extent of influence does NOT exceed 15%.	9	9			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth Ratio ≥ 1.6. Rootwads/logs providing some cover at base-flow.	6	6			100%			

N/A - Item does not apply.

Table 6. Vegetation Condition Assessment Glade Creek / Project No. 854 Planted Acreage 4.31					
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.	N/A	0	0.00	0%
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	0%
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	0%
Easement Acreage 15.86					
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/Orange - Treated)	16	2.34	15%
5. Easement Encroachment Areas	Areas or points (if too small to render as polygons at map scale).	N/A	0	0.00	0%

N/A - Item does not apply.

Glade Creek – Permanent Photo Station 1
Upstream

Glade Creek – Permanent Photo Station 2
Upstream

Glade Creek – Permanent Photo Station 3
Upstream

Glade Creek – Permanent Photo Station 4
Upstream

Glade Creek – Permanent Photo Station 5
Upstream

Glade Creek – Permanent Photo Station 5
Downstream

Unnamed Tributary Lower – Permanent Photo Station 6
Upstream

Unnamed Tributary Lower – Permanent Photo Station 7
Upstream

Appendix C
Vegetation Plot Data

Table 7. Vegetation Plot Criteria Attainment Glade Creek / Project No. 854		
Vegetation Plot ID	**Vegetation Survival Threshold Met?**	**Tract Mean**
1	Yes	100%
2	Yes	
3	Yes	
4	Yes	
5	Yes	
6	Yes	

Vegetation Monitoring Plot 1
Monitoring Year 4 – July 15, 2014

Vegetation Monitoring Plot 2
Monitoring Year 4 – July 15, 2014

Vegetation Monitoring Plot 3
Monitoring Year 4 – July 15, 2014

Vegetation Monitoring Plot 4
Monitoring Year 4 – July 15, 2014

Vegetation Monitoring Plot 5
Monitoring Year 4 – July 15, 2014

Vegetation Monitoring Plot 6
Monitoring Year 4 – July 15, 2014

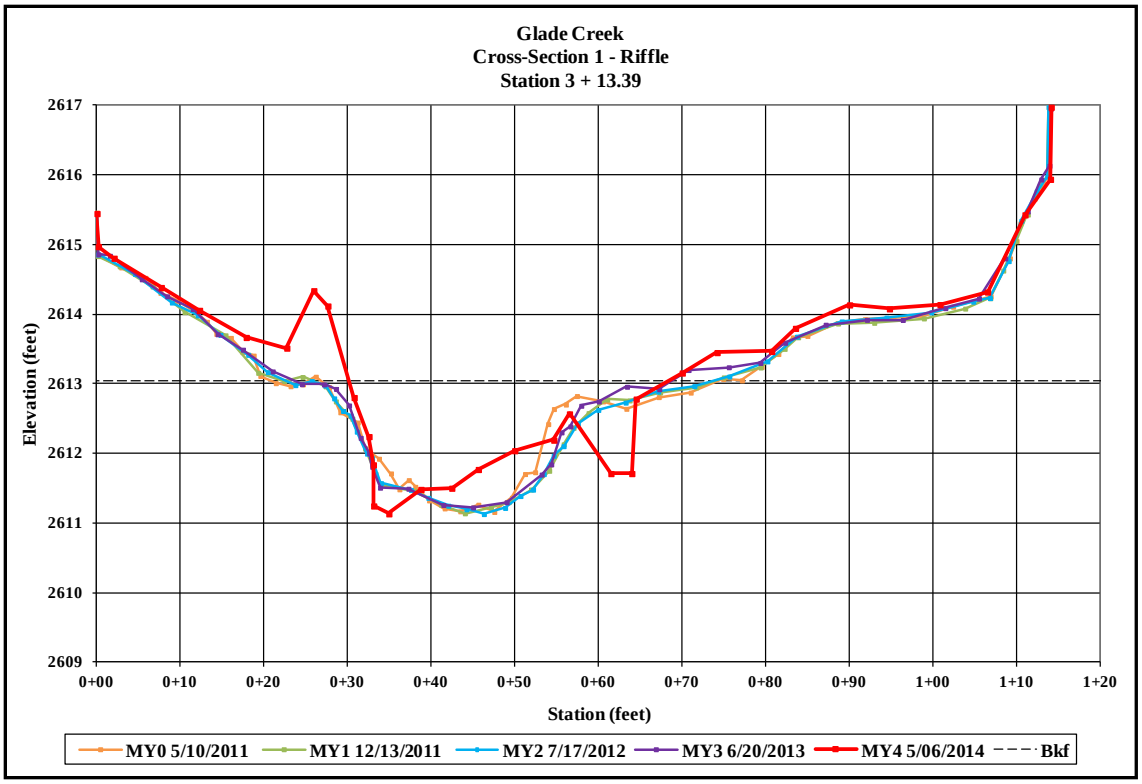
Table 8. CVS Vegetation Plot Metadata Glade Creek/Project No. 854	
Report Prepared By	Owen Carson
Date Prepared	7/18/2014 8:56
database name	Equinox-2014-A-GladeCreek-MY4.mdb
database location	Z:\ES\NRI&M\EEP Monitoring\Glade Creek\Glade-MY4_2014\Data\Veg
computer name	FIELDTECH3-PC
file size	51527680
	DESCRIPTION OF WORKSHEETS IN THIS DOCUMENT----------
Metadata	Description of database file, the report worksheets, and a summary of project(s) and project data.
Proj, planted	Each project is listed with its PLANTED stems per acre, for each year. This excludes live stakes.
Proj, total stems	Each project is listed with its TOTAL stems per acre, for each year. This includes live stakes, all planted stems, and all natural/volunteer stems.
Plots	List of plots surveyed with location and summary data (live stems, dead stems, missing, etc.).
Vigor	Frequency distribution of vigor classes for stems for all plots.
Vigor by Spp	Frequency distribution of vigor classes listed by species.
Damage	List of most frequent damage classes with number of occurrences and percent of total stems impacted by each.
Damage by Spp	Damage values tallied by type for each species.
Damage by Plot	Damage values tallied by type for each plot.
Planted Stems by Plot and Spp	A matrix of the count of PLANTED living stems of each species for each plot; dead and missing stems are excluded.
ALL Stems by Plot and spp	A matrix of the count of total living stems of each species (planted and natural volunteers combined) for each plot; dead and missing stems are excluded.
	PROJECT SUMMARY
Project Code	854
project Name	Glade Creek
Description	
River Basin	New
length(ft)	
stream-to-edge width (ft)	
area (sq m)	
Required Plots (calculated)	
Sampled Plots	6

Table 9. Planted and Total Stem Counts (Species by Plot with Annual Means)
Glade Creek / Project No. 854

			Current Plot Data (MY4 2014)																		Annual Means																	
			854-01-0001			854-01-0002			854-01-0003			854-01-0004			854-01-0005			854-01-0006			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	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T
Alnus serrulata	hazel alder	Shrub						1			2			19	1	1	2				1	1	24	1	1	30	1	1	12			7						
Aronia arbutifolia	Red Chokeberry	Shrub	2	2	2	3	3	3	2	2	2	2	2	2	1	1	1				10	10	10	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
Betula nigra	river birch	Tree							2	2	2										2	2	2	2	2	2	2	2	2	1	1	1						
Callicarpa americana	American beautyberr	Shrub																												1	1	1	4	4	4			
Calycanthus floridus	eastern sweetshrub	Shrub													1	1	1				1	1	1	1	1	1	1	1	1	4	4	4	3	3	3			
Carpinus caroliniana	American hornbeam	Tree				2	2	2	1	1	1	2	2	2				1	1	1	6	6	6	7	7	7	7	7	7	8	8	8	13	13	13			
Carpinus caroliniana var.	Coastal American Ho	Tree																								2												
Celtis	hackberry	Tree						3															3															
Cephalanthus occidentali	common buttonbush	Shrub				5	5	5													5	5	5	5	5	5	5	5	5	2	2	2	3	3	3			
Cercis canadensis	eastern redbud	Tree	1	1	1				1	1	1				1	1	1	2	2	2	5	5	5	5	5	5	7	7	7	7	7	7	7	7	7			
Cornus amomum	silky dogwood	Shrub			2									1		1	1					1	4		1	1		1	2									
Diospyros virginiana	common persimmon	Tree				1	1	1	1	1	1				1	1	1				3	3	3	5	5	5	5	5	5	5	5	5	5	5	5			
Hamamelis virginiana	American witchhazel	Tree	1	1	1	1	1	1													2	2	2	2	2	2	2	2	2	3	3	3	3	3	3			
Hibiscus	rosemallow	Shrub						5						2									7															
Hydrangea arborescens	wild hydrangea	Shrub																									1	1	1	1	1	1	8	8	8			
Kalmia latifolia	mountain laurel	Shrub Tree	1	1	1													1	1	1	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3			
Lindera benzoin	northern spicebush	Shrub																															4	4	4			
Lindera benzoin var. ben	northern spicebush	Shrub			1																		1			1											
Liriodendron tulipifera	tuliptree	Tree	2	2	2				1	1	1	1	1	1							4	4	4	4	4	4	4	4	4	5	5	5	5	5	5			
Malus angustifolia	southern crabapple	Tree	1	1	1	1	1	1	1	1	1							3	3	3	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6			
Pinus virginiana	Virginia pine	Tree						1															1															
Platanus occidentalis	American sycamore	Tree	2	2	2	3	3	3	2	2	2	2	2	2	1	1	1	3	3	3	13	13	13	13	13	13	14	14	14	14	14	14	14	14	14			
Quercus alba	white oak	Tree																											1									
Quercus rubra	northern red oak	Tree	2	2	2				1	1	1	1	1	1	3	3	3	2	2	2	9	9	9	9	9	9	11	11	11	12	12	12	12	12	12			
Rhododendron	rhododendron								1	1	1										1	1	1	2	2	2	2	2	2	3	3	3	3	3	3			
Salix	willow	Shrub or Tree																													3	3		3	3			
Salix nigra	black willow	Tree			3									2		2	2					2	7		2	2		2	9									
Spiraea latifolia		Shrub																		3			3															
Unknown		Shrub or Tree																															2	2	2			
		Stem count	12	12	18	16	16	26	13	13	15	8	8	32	9	12	13	12	12	15	70	73	119	75	78	110	81	84	104	86	89	96	106	109	109			
		size (ares)	1			1			1			1			1			1			6			6			6			6			6					
		size (ACRES)	0.02			0.02			0.02			0.02			0.02			0.02			0.15			0.15			0.15			0.15			0.15					
		Species count	8	8	11	7	7	11	10	10	11	5	5	9	7	9	9	6	6	7	15	17	22	15	17	19	16	18	19	16	17	18	17	18	18			
		Stems per ACRE	485.6	485.6	728.4	647.5	647.5	1052	526.1	526.1	607	323.7	323.7	1295	364.2	485.6	526.1	485.6	485.6	607	472.1	492.4	802.6	505.9	526.1	741.9	546.3	566.6	701.5	580	600.3	647.5	714.9446	735.1789	735.1789			

Exceeds requirements by 10%

Appendix D
Stream Survey Data

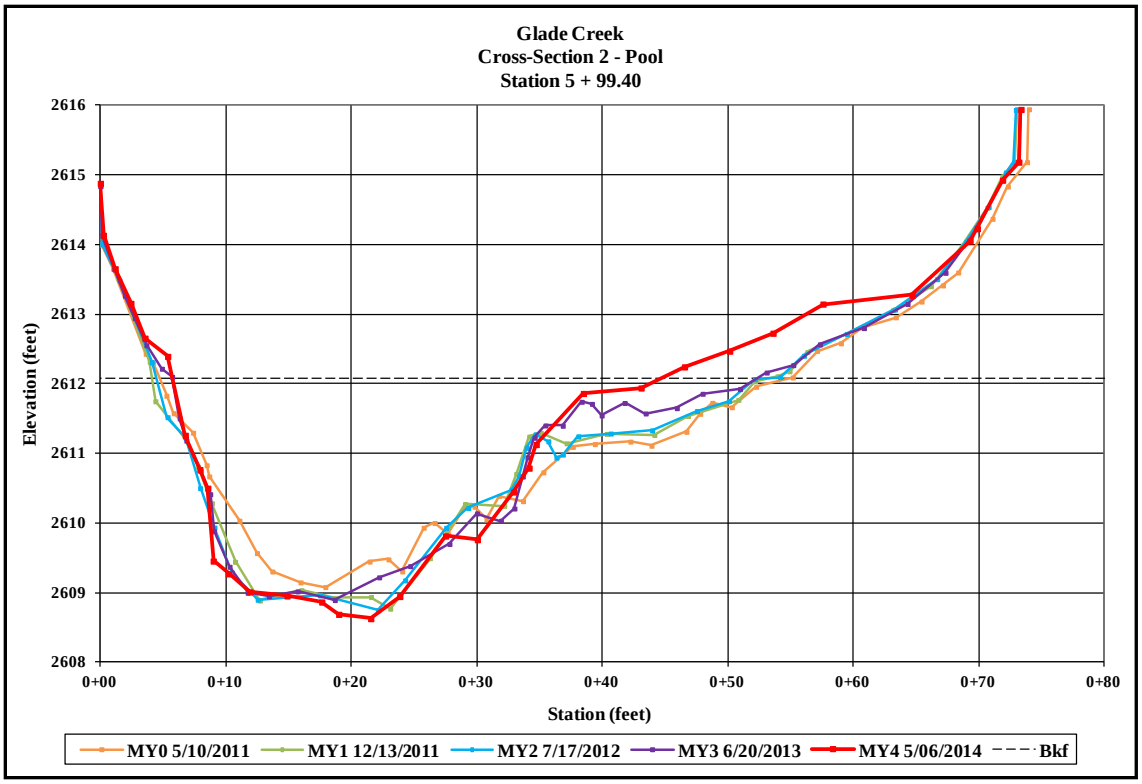


Left Descending Bank

Right Descending Bank

Upstream

Downstream

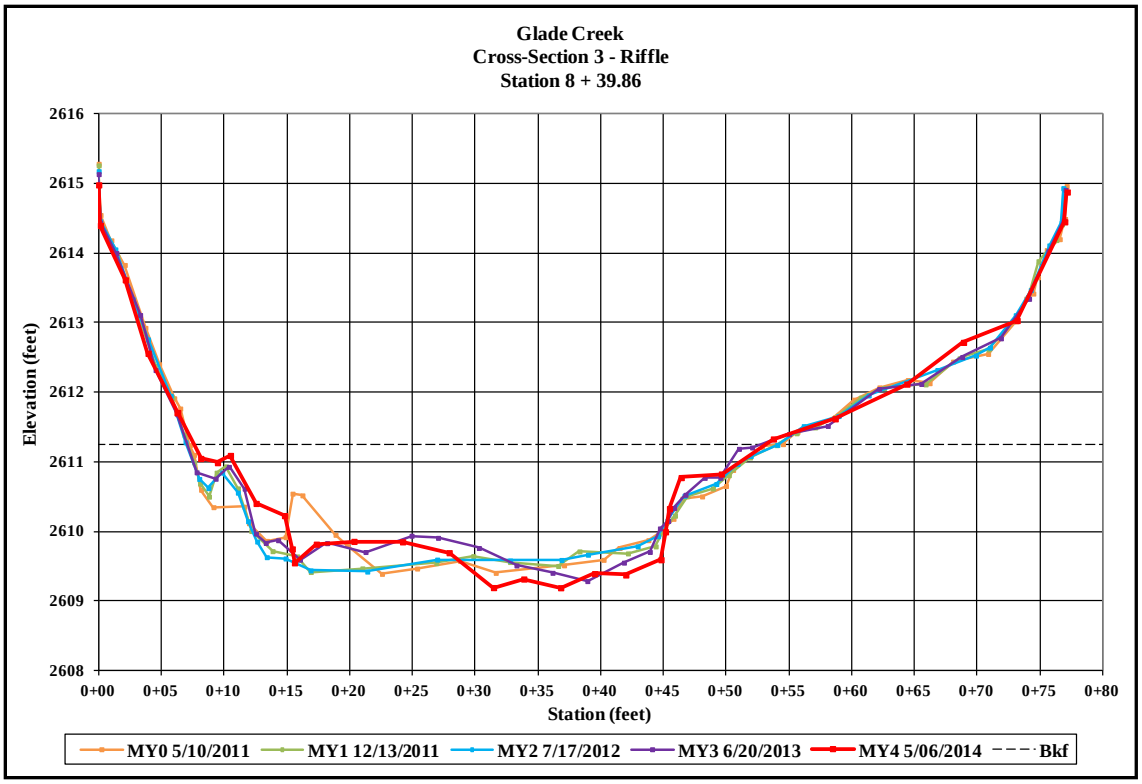


Left Descending Bank

Right Descending Bank

Upstream

Downstream

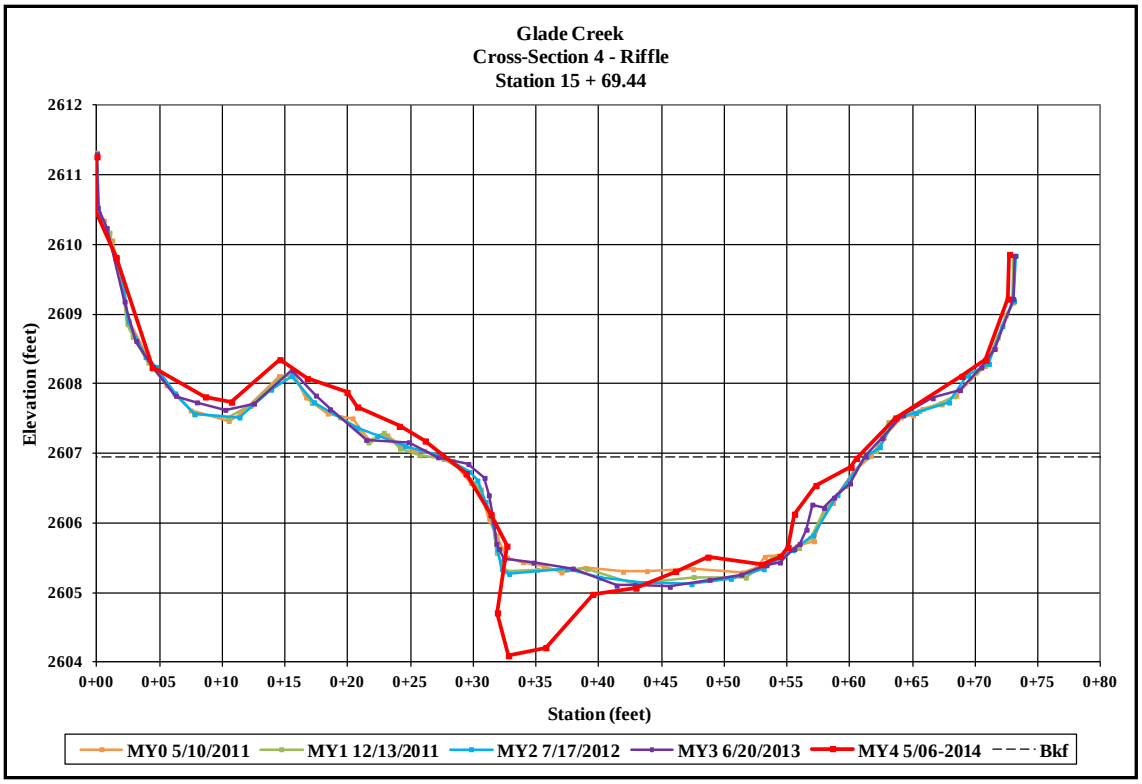


Left Descending Bank

Right Descending Bank

Upstream

Downstream

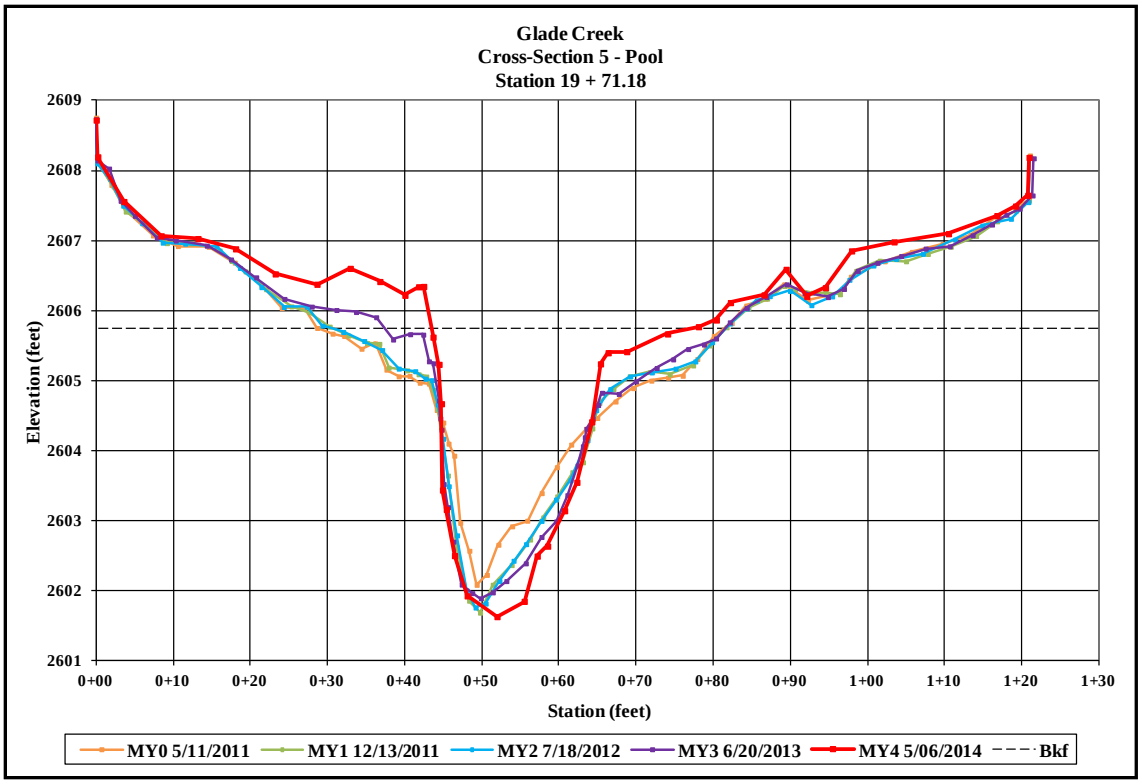


Left Descending Bank

Right Descending Bank

Upstream

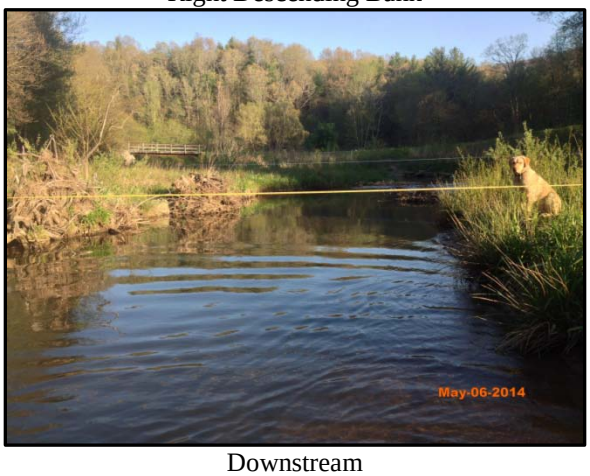
Downstream



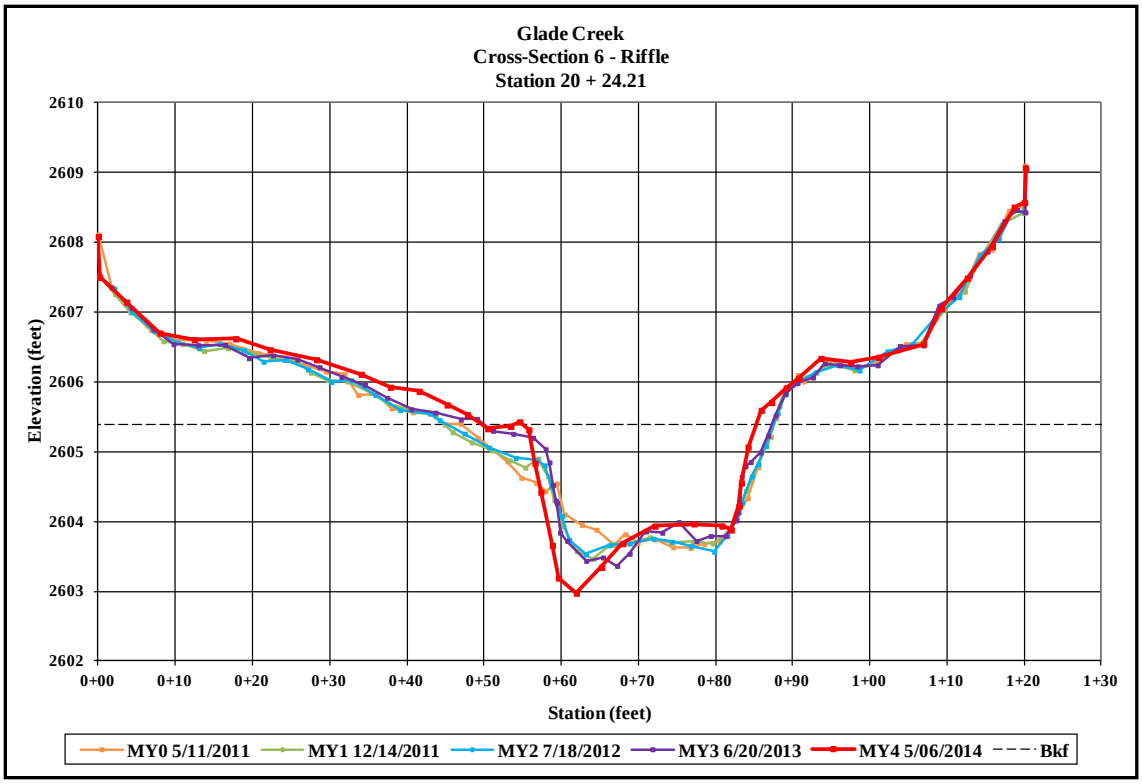
Left Descending Bank

Right Descending Bank

Upstream



Downstream

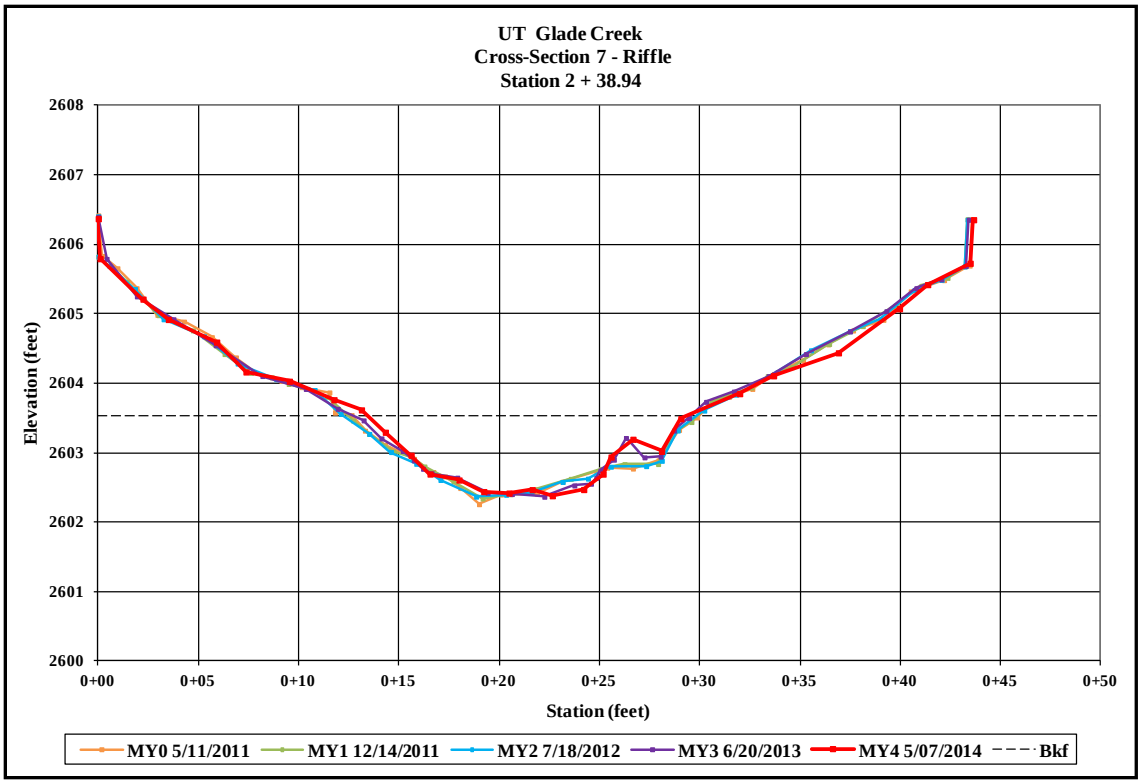


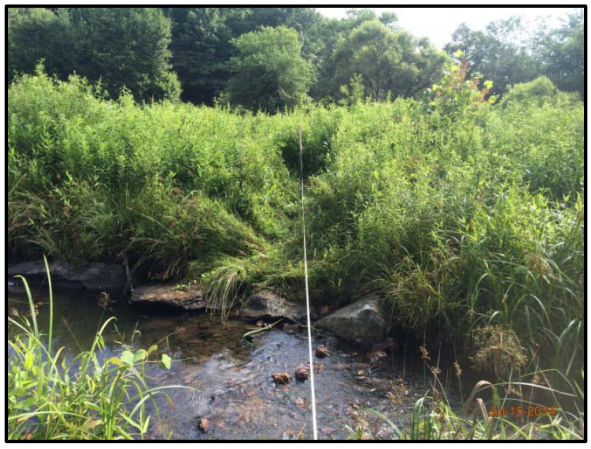
Left Descending Bank

Right Descending Bank

Upstream

Downstream



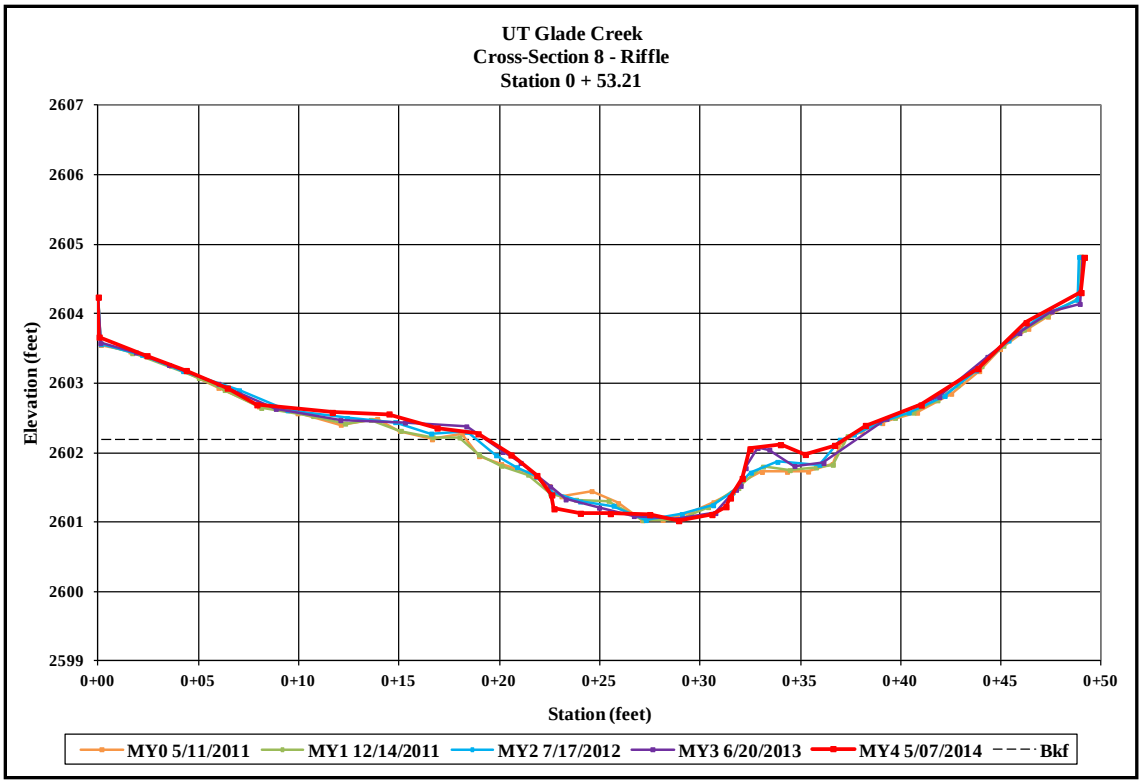


Left Descending Bank

Right Descending Bank

Upstream

Downstream



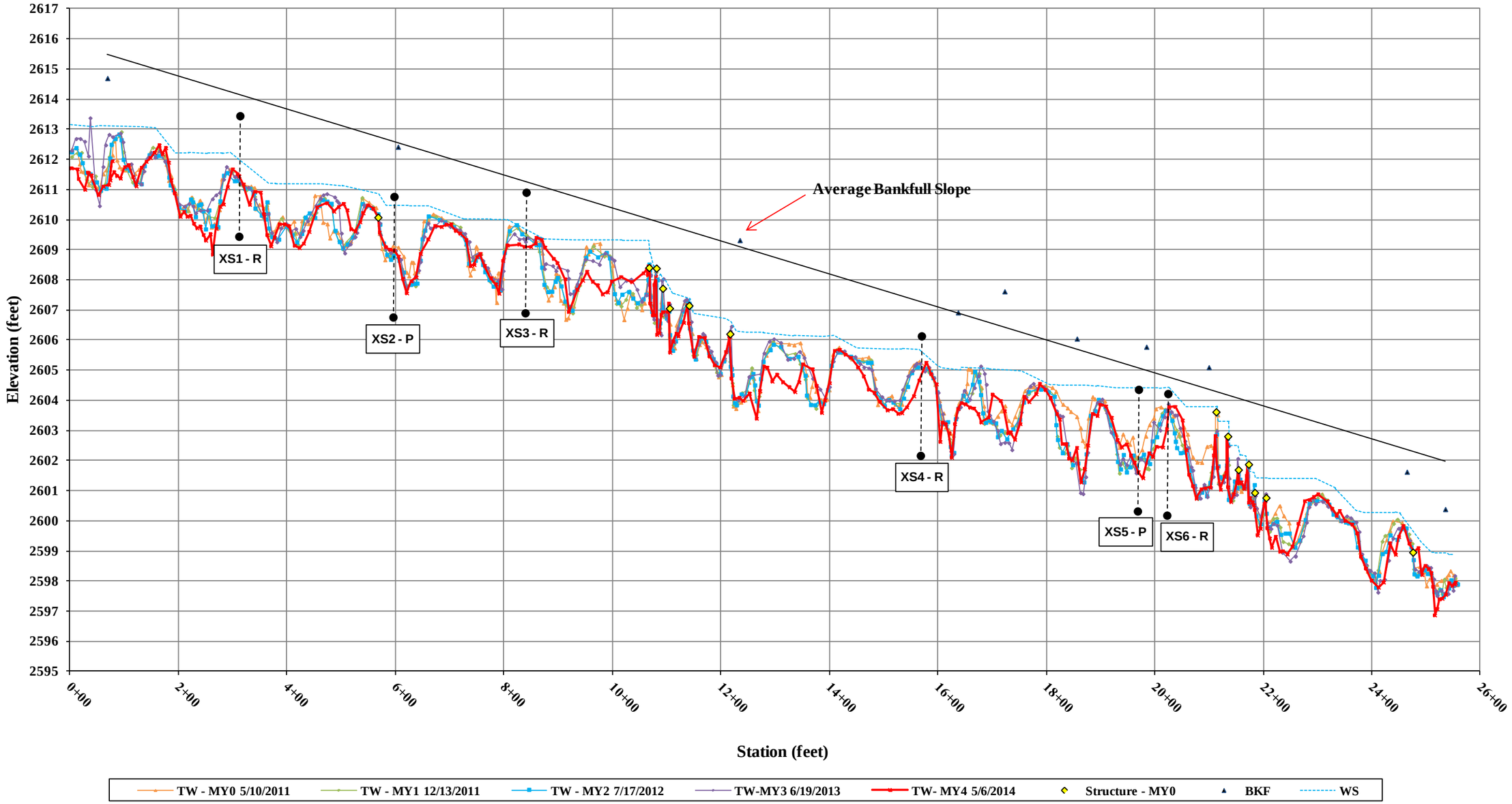
Left Descending Bank

Right Descending Bank

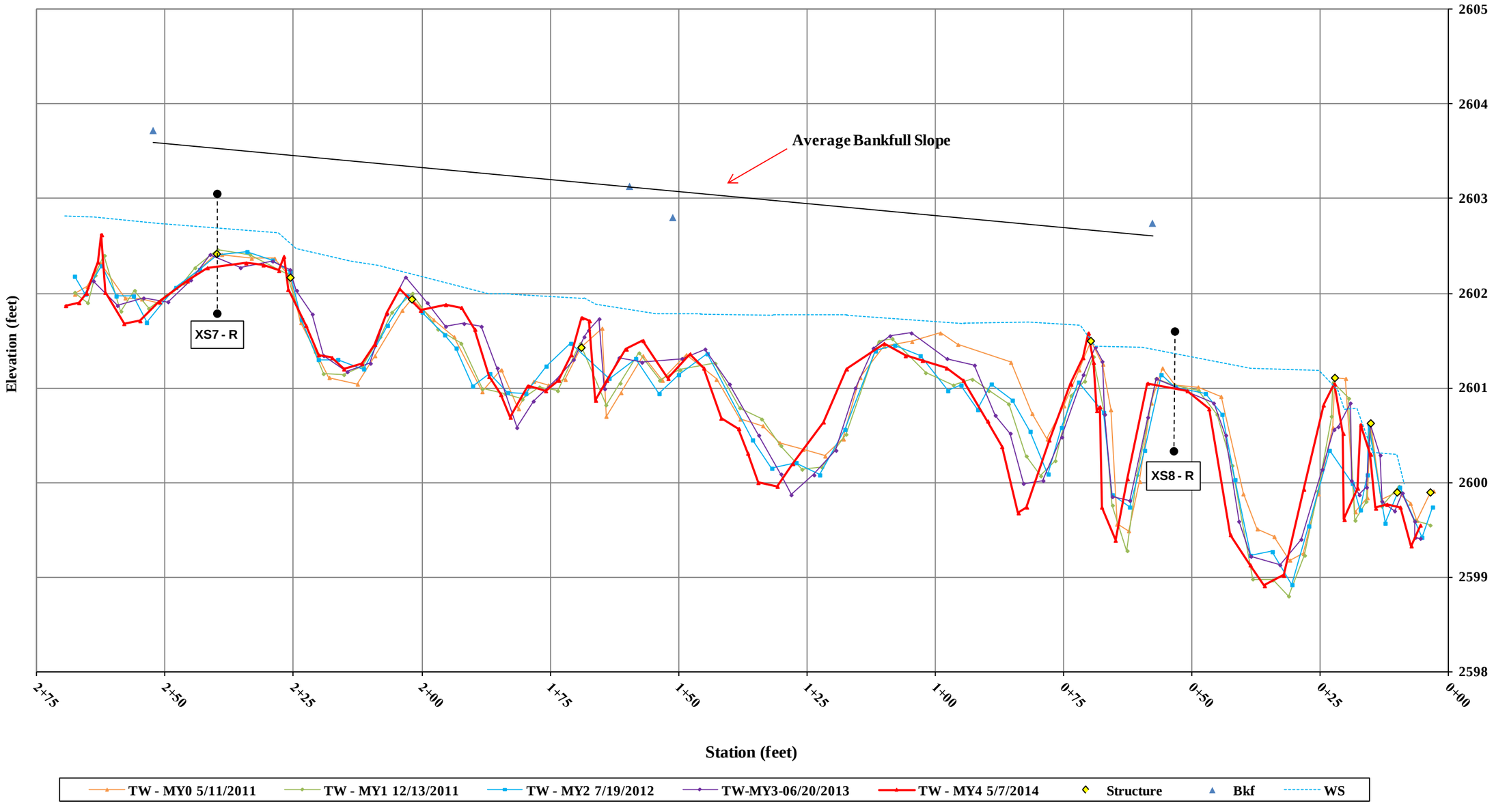
Upstream

Downstream

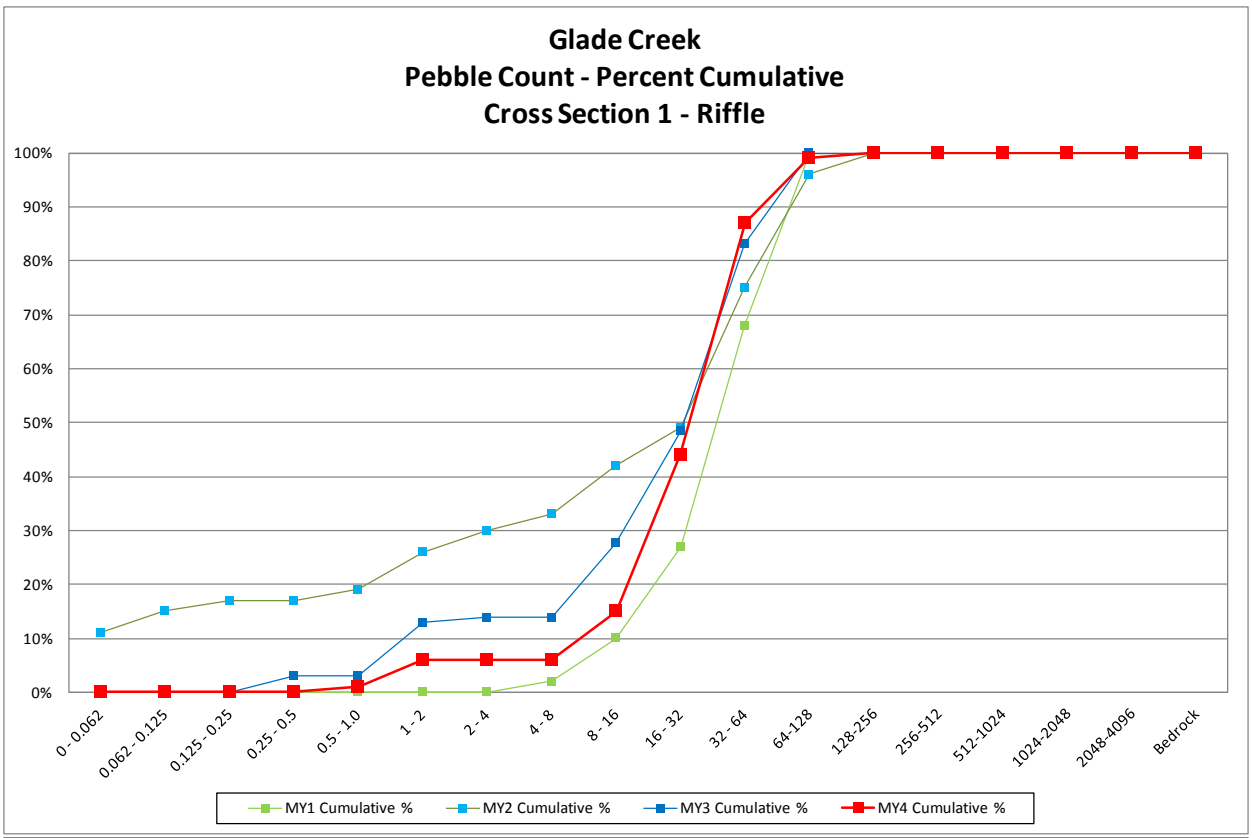
Glade Creek Mainstem
Longitudinal Profile
Staioning 0+03 - 25+58

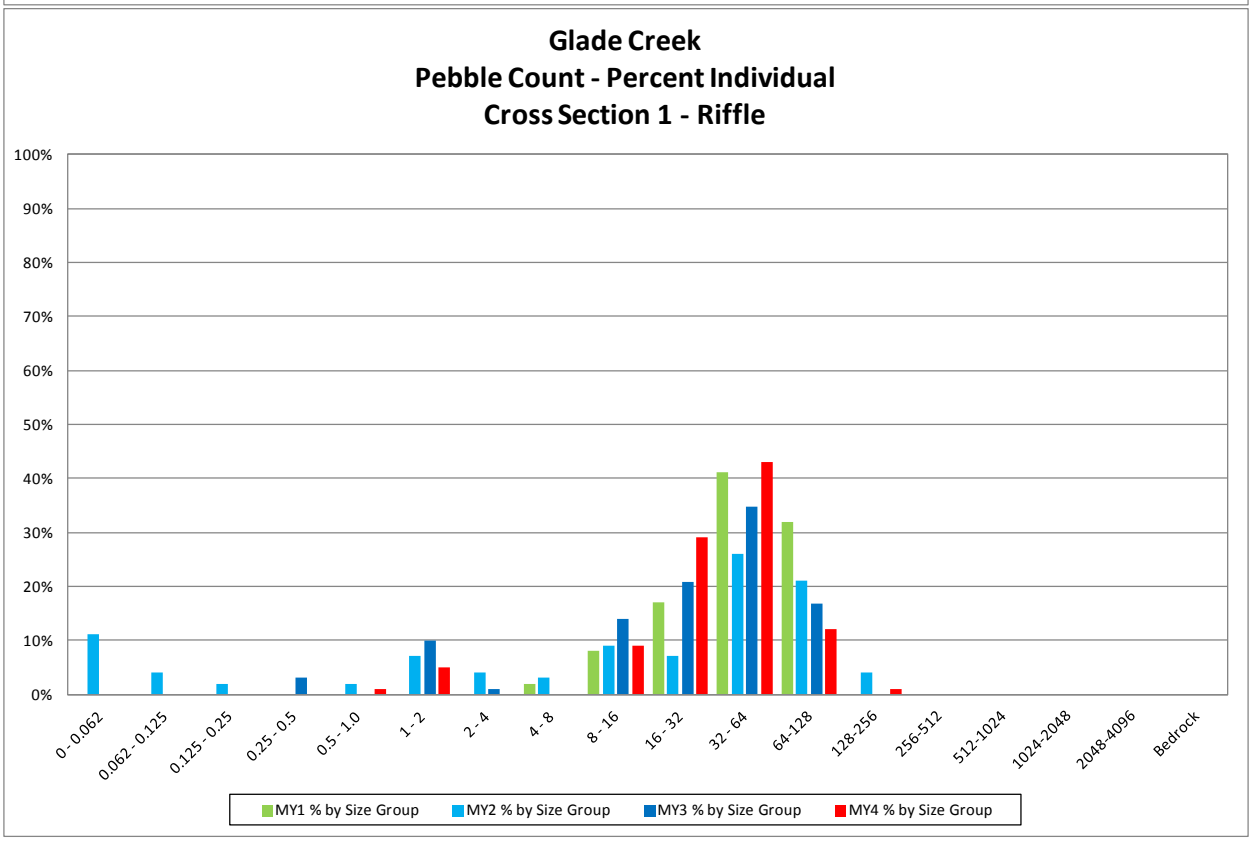


Unnamed Tributary
Longitudinal Profile
Station 0+03 - 2+68

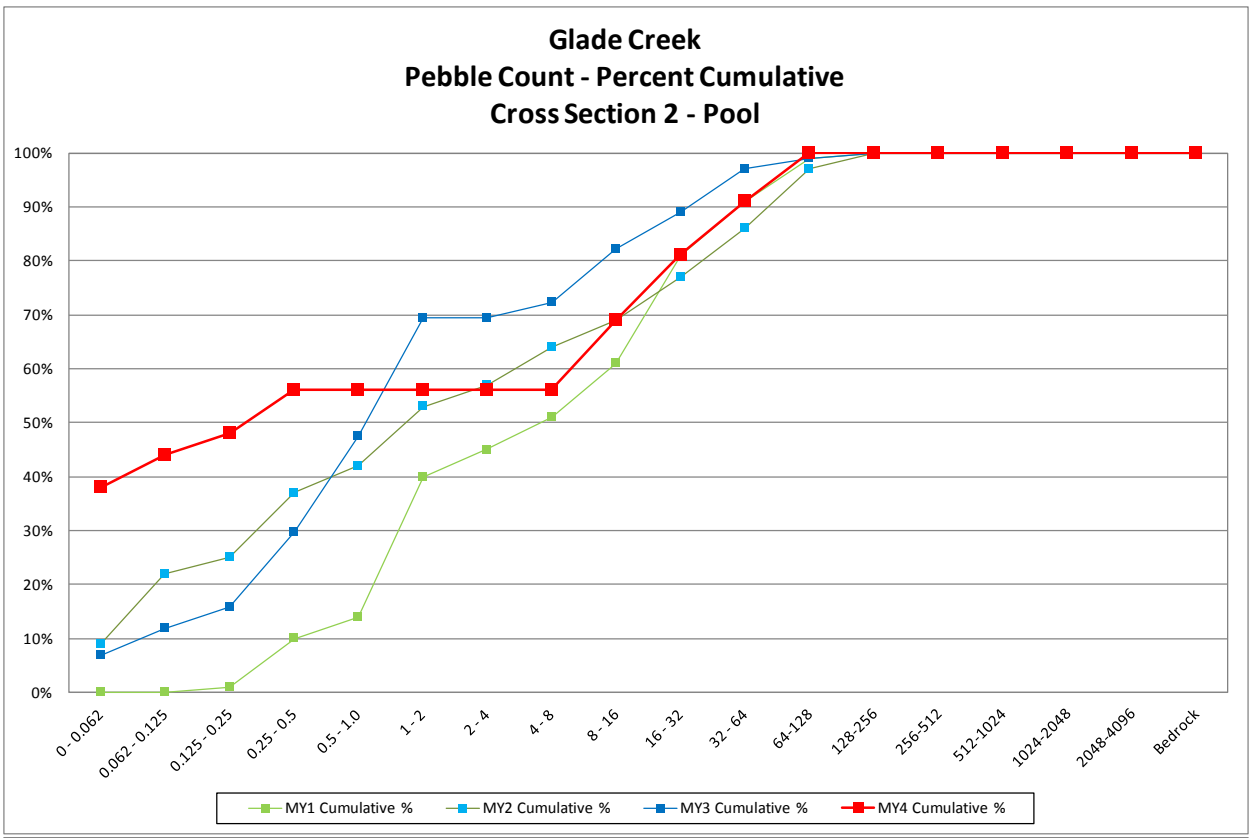


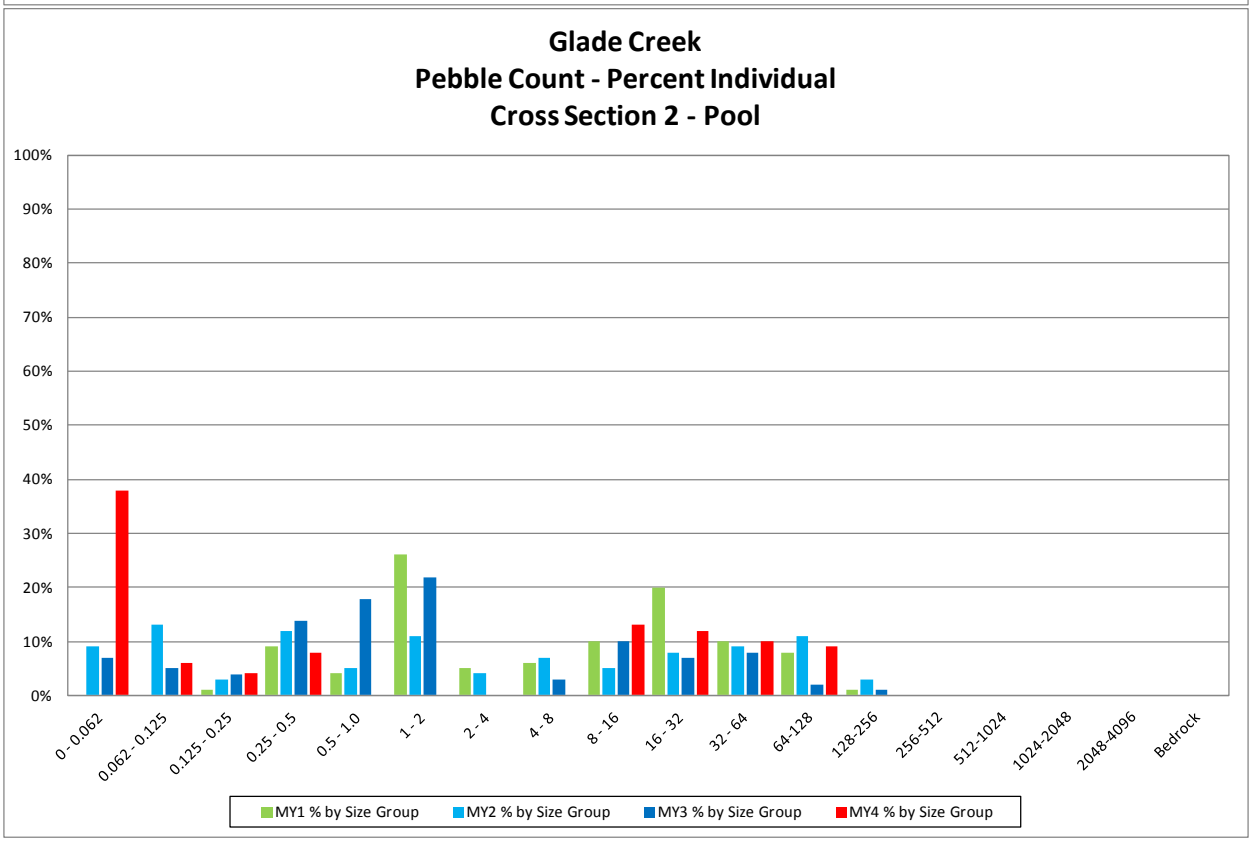
Glade Creek			
Cross Section 1 - Riffle			
Monitoring Year - 2014; MY4			
Bed Surface Material Particle Size Class (mm)	**Number**	**% Individual**	**% Cumulative**
0 - 0.062	0	0.0%	0%
0.062 - 0.125	0	0.0%	0%
0.125 - 0.25	0	0.0%	0%
0.25 - 0.5	0	0.0%	0%
0.5 - 1.0	1	1.0%	1%
1 - 2	5	5.0%	6%
2 - 4	0	0.0%	6%
4 - 8	0	0.0%	6%
8 - 16	9	9.0%	15%
16 - 32	29	29.0%	44%
32 - 64	43	43.0%	87%
64-128	12	12.0%	99%
128-256	1	1.0%	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	**100**	**100%**	**100%**
		Summary Data	
		D50	**35**
		D84	**61**
		D95	**90**


Glade Creek
Pebble Count - Percent Cumulative
Cross Section 1 - 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 %

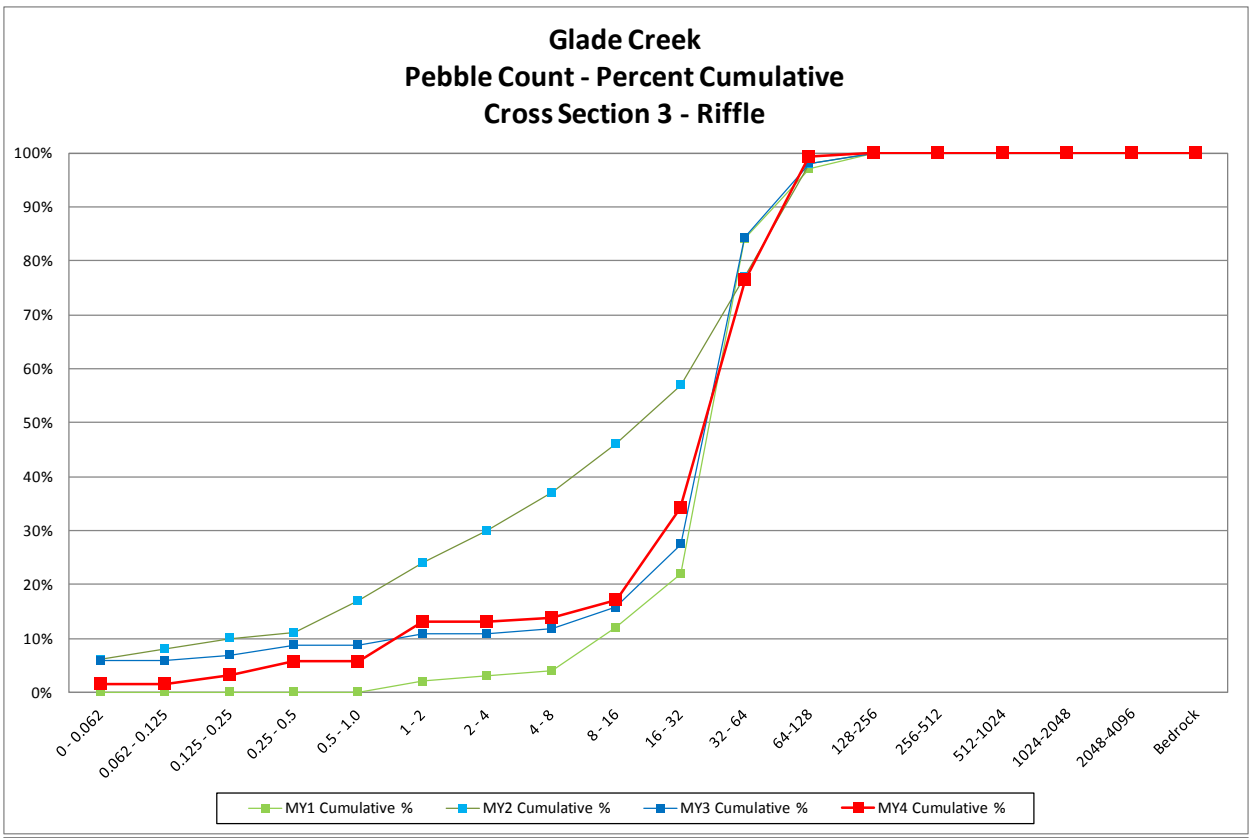

Glade Creek
Pebble Count - Percent Individual
Cross Section 1 - Riffle
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0 - 0.062
0.062 - 0.125
0.125 - 0.25
0.25 - 0.5
0.5 - 1.0
1 - 2
2 - 4
4 - 8
8 - 16
16 - 32
32 - 64
64-128
128-256
256-512
512-1024
1024-2048
2048-4096
Bedrock
MY1 % by Size Group
MY2 % by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

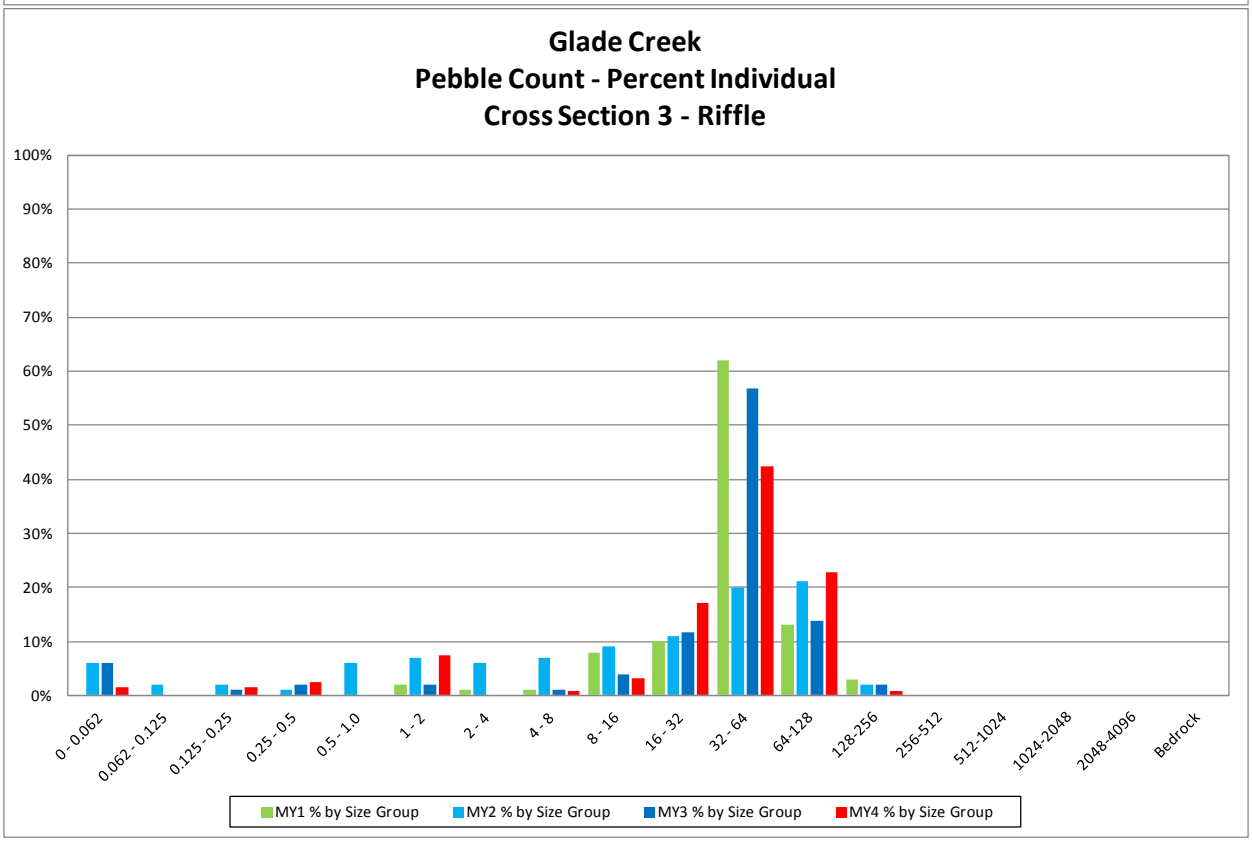
Glade Creek			
Cross Section 2 - Pool			
Monitoring Year - 2014; MY4			
Bed Surface Material Particle Size Class (mm)	**Number**	**% Individual**	**% Cumulative**
0 - 0.062	38	38.0%	38%
0.062 - 0.125	6	6.0%	44%
0.125 - 0.25	4	4.0%	48%
0.25 - 0.5	8	8.0%	56%
0.5 - 1.0	0	0.0%	56%
1 - 2	0	0.0%	56%
2 - 4	0	0.0%	56%
4 - 8	0	0.0%	56%
8 - 16	13	13.0%	69%
16 - 32	12	12.0%	81%
32 - 64	10	10.0%	91%
64-128	9	9.0%	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	**100**	**100%**	**100%**
		Summary Data	
		D50	**0.3**
		D84	**37**
		D95	**80**


Glade Creek
Pebble Count - Percent Cumulative
Cross Section 2 - 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 %

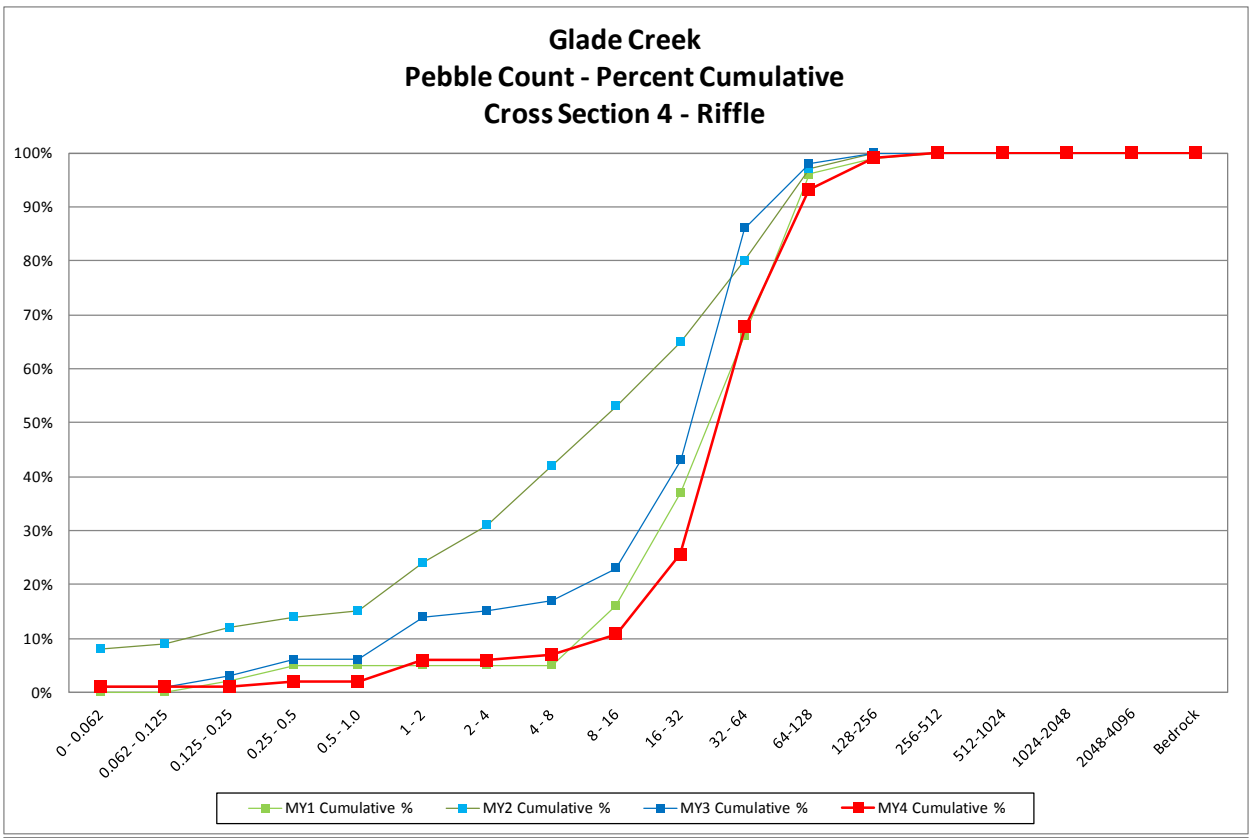

Glade Creek
Pebble Count - Percent Individual
Cross Section 2 - Pool
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0 - 0.062
0.062 - 0.125
0.125 - 0.25
0.25 - 0.5
0.5 - 1.0
1 - 2
2 - 4
4 - 8
8 - 16
16 - 32
32 - 64
64-128
128-256
256-512
512-1024
1024-2048
2048-4096
Bedrock
MY1 % by Size Group
MY2 % by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

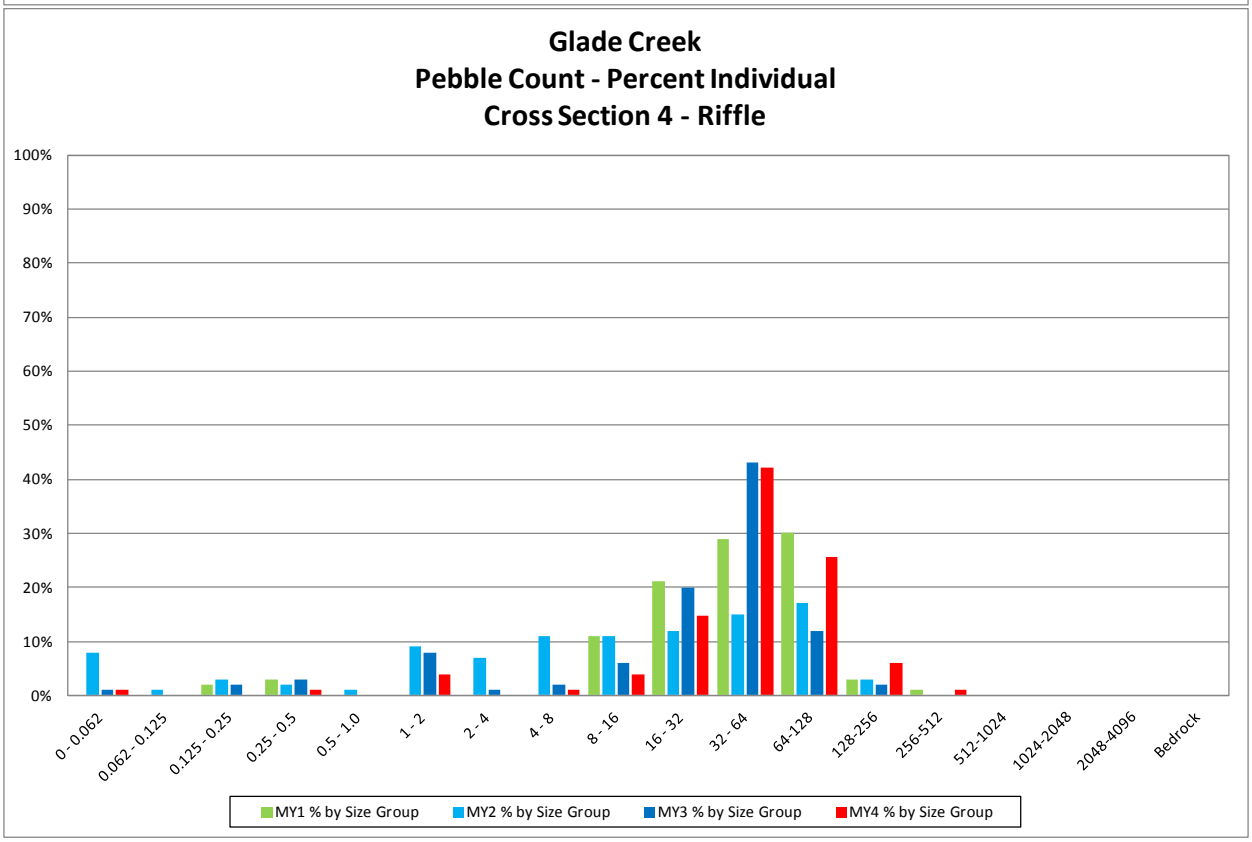
Glade Creek			
Cross Section 3 - Riffle			
Monitoring Year - 2014; MY4			
Bed Surface Material Particle Size Class (mm)	**Number**	**% Individual**	**% Cumulative**
0 - 0.062	2	1.6%	2%
0.062 - 0.125	0	0.0%	2%
0.125 - 0.25	2	1.6%	3%
0.25 - 0.5	3	2.4%	6%
0.5 - 1.0	0	0.0%	6%
1 - 2	9	7.3%	13%
2 - 4	0	0.0%	13%
4 - 8	1	0.8%	14%
8 - 16	4	3.3%	17%
16 - 32	21	17.1%	34%
32 - 64	52	42.3%	76%
64-128	28	22.8%	99%
128-256	1	0.8%	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	**123**	**100%**	**100%**
		Summary Data	
		D50	**41**
		D84	**76**
		D95	**110**


Glade Creek
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 %


Glade Creek
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

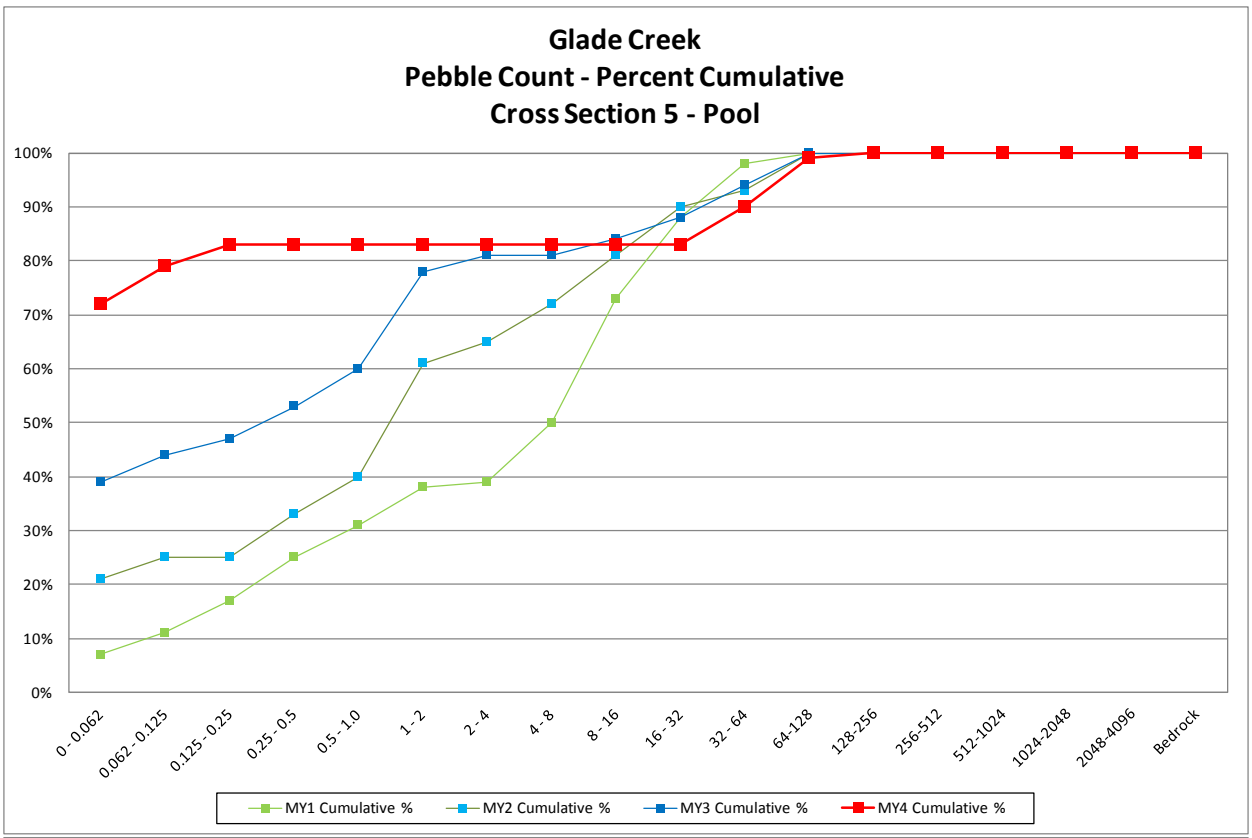
Glade Creek			
Cross Section 4 - Riffle			
Monitoring Year - 2014; MY4			
Bed Surface Material Particle Size Class (mm)	**Number**	**% Individual**	**% Cumulative**
0 - 0.062	1	1.0%	1%
0.062 - 0.125	0	0.0%	1%
0.125 - 0.25	0	0.0%	1%
0.25 - 0.5	1	1.0%	2%
0.5 - 1.0	0	0.0%	2%
1 - 2	4	3.9%	6%
2 - 4	0	0.0%	6%
4 - 8	1	1.0%	7%
8 - 16	4	3.9%	11%
16 - 32	15	14.7%	25%
32 - 64	43	42.2%	68%
64-128	26	25.5%	93%
128-256	6	5.9%	99%
256-512	1	1.0%	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	**102**	**100%**	**100%**
		Summary Data	
		D50	**50**
		D84	**88**
		D95	**140**

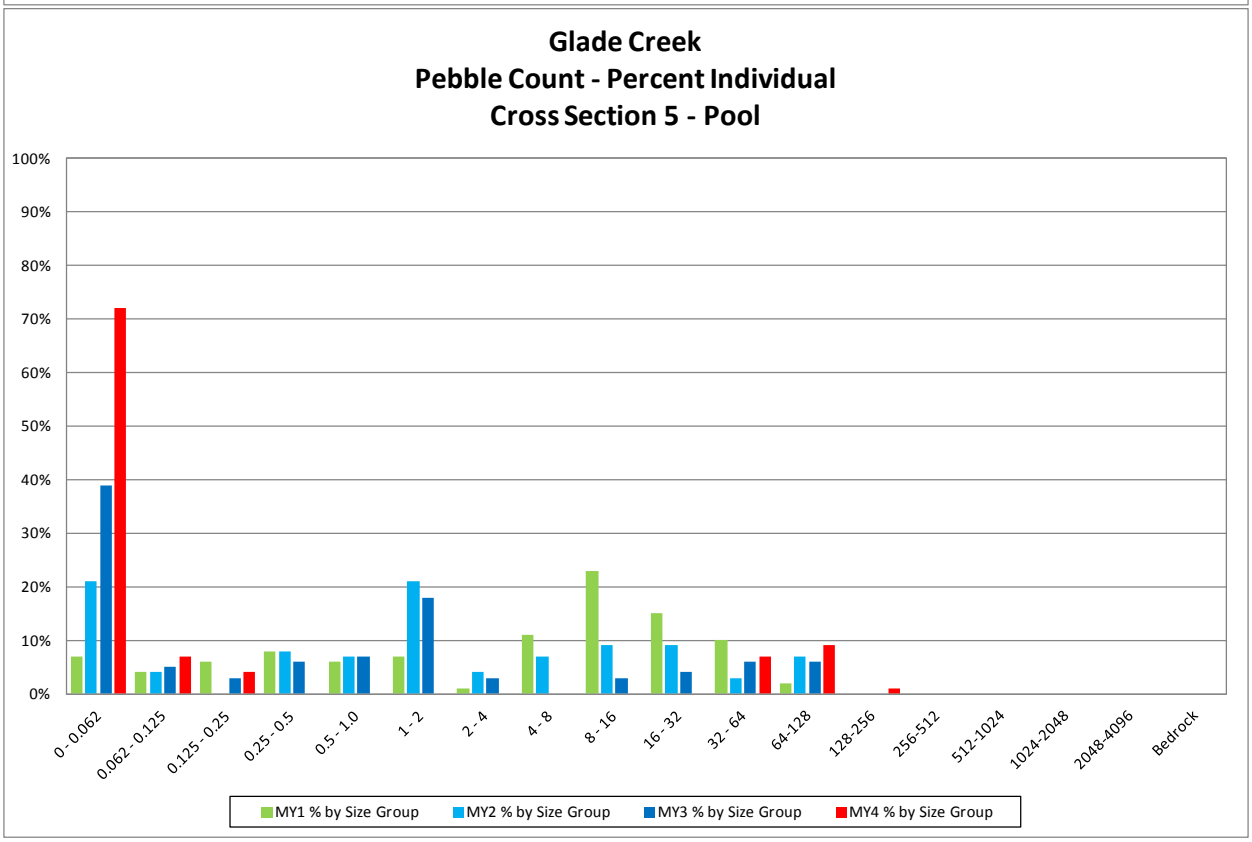

Glade Creek
Pebble Count - Percent Cumulative
Cross Section 4 - Riffle
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0 - 0.062
0.062 - 0.125
0.125 - 0.25
0.25 - 0.5
0.5 - 1.0
1 - 2
2 - 4
4 - 8
8 - 16
16 - 32
32 - 64
64-128
128-256
256-512
512-1024
1024-2048
2048-4096
Bedrock
MY1 Cumulative %
MY2 Cumulative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


Glade Creek
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

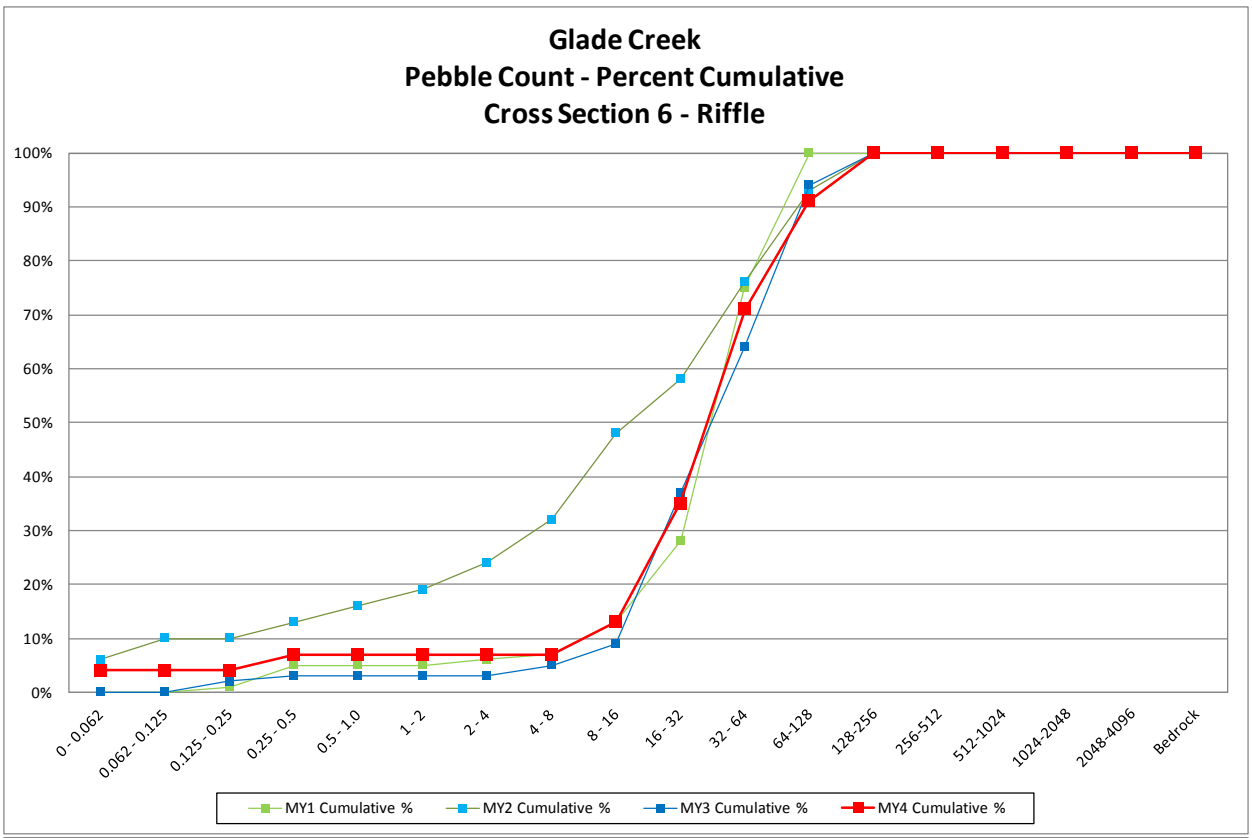
Glade Creek			
Cross Section 5 - Pool			
Monitoring Year - 2014; MY4			
Bed Surface Material Particle Size Class (mm)	**Number**	**% Individual**	**% Cumulative**
0 - 0.062	72	72.0%	72%
0.062 - 0.125	7	7.0%	79%
0.125 - 0.25	4	4.0%	83%
0.25 - 0.5	0	0.0%	83%
0.5 - 1.0	0	0.0%	83%
1 - 2	0	0.0%	83%
2 - 4	0	0.0%	83%
4 - 8	0	0.0%	83%
8 - 16	0	0.0%	83%
16 - 32	0	0.0%	83%
32 - 64	7	7.0%	90%
64-128	9	9.0%	99%
128-256	1	1.0%	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	**100**	**100%**	**100%**

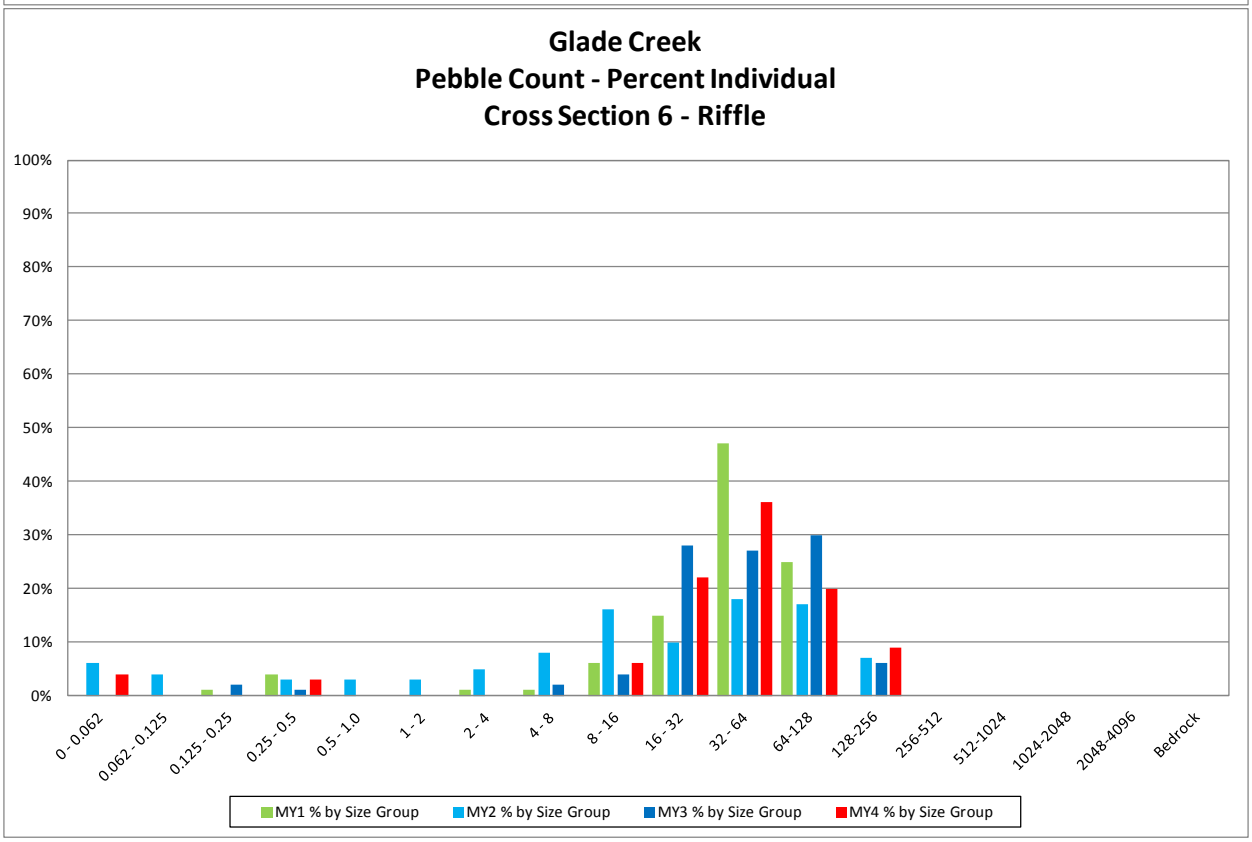
Summary Data	
D50	**0.062**
D84	**36**
D95	**85**


Glade Creek
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 %

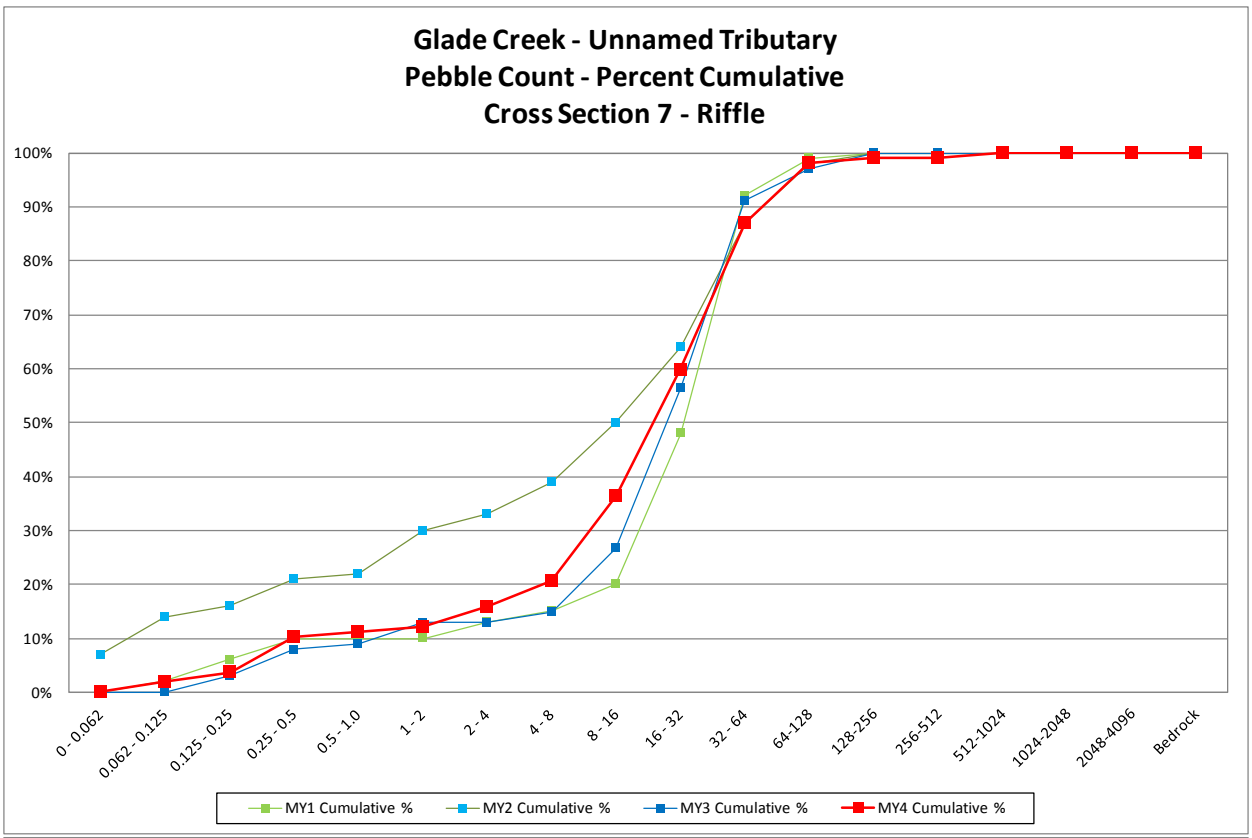

Glade Creek
Pebble Count - Percent Individual
Cross Section 5 - Pool
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0 - 0.062
0.062 - 0.125
0.125 - 0.25
0.25 - 0.5
0.5 - 1.0
1 - 2
2 - 4
4 - 8
8 - 16
16 - 32
32 - 64
64-128
128-256
256-512
512-1024
1024-2048
2048-4096
Bedrock
MY1 % by Size Group
MY2 % by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

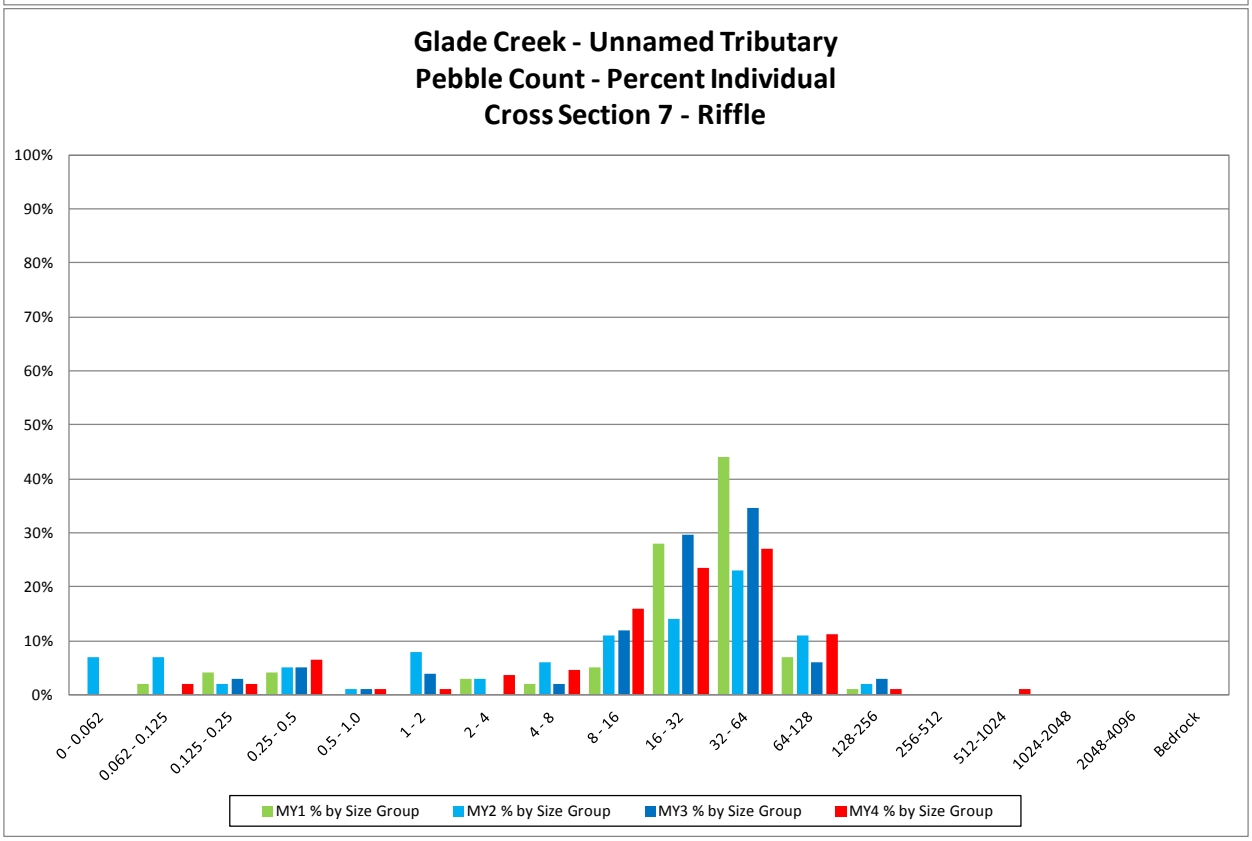
Glade Creek			
Cross Section 6 - Riffle			
Monitoring Year - 2014; MY4			
Bed Surface Material Particle Size Class (mm)	**Number**	**% Individual**	**% Cumulative**
0 - 0.062	4	4.0%	4%
0.062 - 0.125	0	0.0%	4%
0.125 - 0.25	0	0.0%	4%
0.25 - 0.5	3	3.0%	7%
0.5 - 1.0	0	0.0%	7%
1 - 2	0	0.0%	7%
2 - 4	0	0.0%	7%
4 - 8	0	0.0%	7%
8 - 16	6	6.0%	13%
16 - 32	22	22.0%	35%
32 - 64	36	36.0%	71%
64-128	20	20.0%	91%
128-256	9	9.0%	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	**100**	**100%**	**100%**
		Summary Data	
		D50	**43**
		D84	**90**
		D95	**160**


Glade Creek
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 %

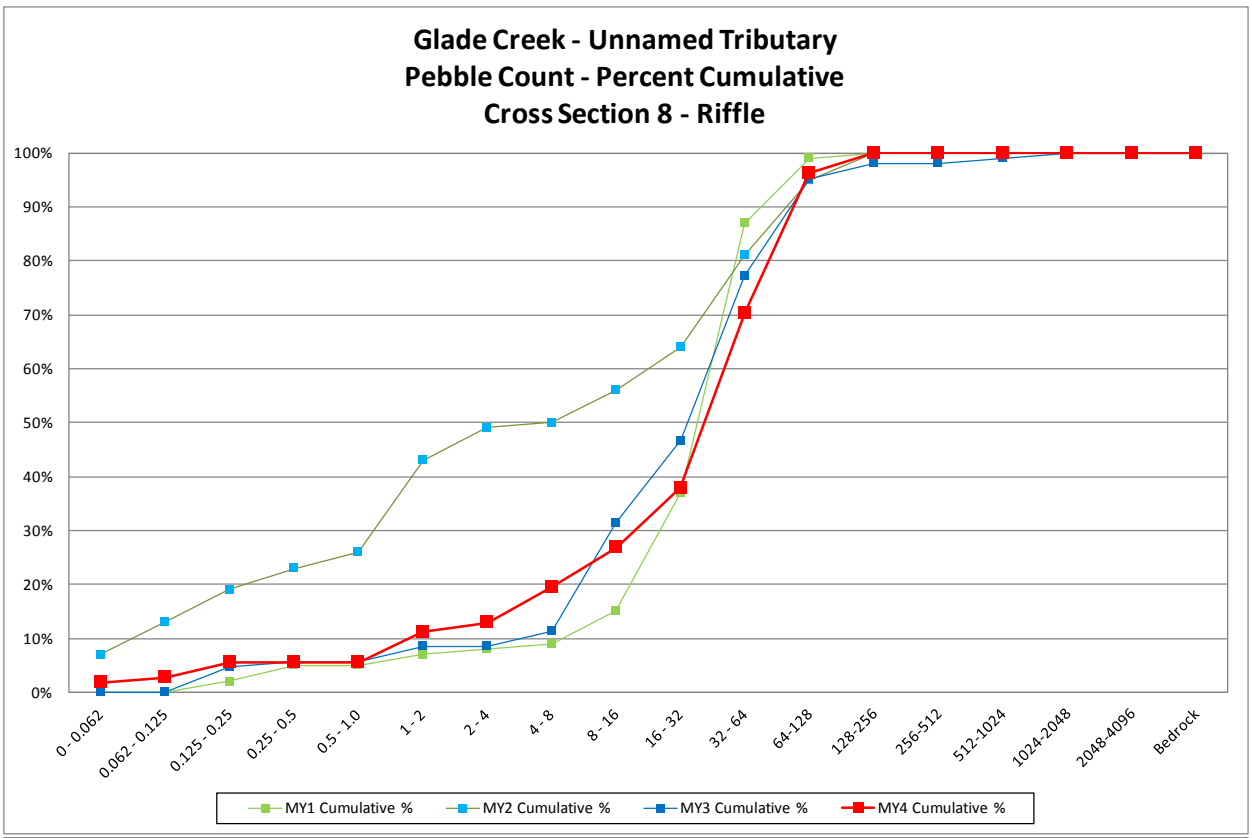

Glade Creek
Pebble Count - Percent Individual
Cross Section 6 - Riffle
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0 - 0.062
0.062 - 0.125
0.125 - 0.25
0.25 - 0.5
0.5 - 1.0
1 - 2
2 - 4
4 - 8
8 - 16
16 - 32
32 - 64
64-128
128-256
256-512
512-1024
1024-2048
2048-4096
Bedrock
MY1 % by Size Group
MY2 % by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

Glade Creek			
Cross Section 7 - Riffle			
Monitoring Year - 2014; MY4			
Bed Surface Material Particle Size Class (mm)	**Number**	**% Individual**	**% Cumulative**
0 - 0.062	0	0.0%	0%
0.062 - 0.125	2	1.9%	2%
0.125 - 0.25	2	1.9%	4%
0.25 - 0.5	7	6.5%	10%
0.5 - 1.0	1	0.9%	11%
1 - 2	1	0.9%	12%
2 - 4	4	3.7%	16%
4 - 8	5	4.7%	21%
8 - 16	17	15.9%	36%
16 - 32	25	23.4%	60%
32 - 64	29	27.1%	87%
64-128	12	11.2%	98%
128-256	1	0.9%	99%
256-512	0	0.0%	99%
512-1024	1	0.9%	100%
1024-2048	0	0.0%	100%
2048-4096	0	0.0%	100%
Bedrock	0	0.0%	100%
Total	**107**	**100%**	**100%**
		Summary Data	
		D50	**25**
		D84	**59**
		D95	**86**


Glade Creek - Unnamed Tributary
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 %


Glade Creek - Unnamed Tributary
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

Glade Creek			
Cross Section 8 - Riffle			
Monitoring Year - 2014; MY4			
Bed Surface Material Particle Size Class (mm)	**Number**	**% Individual**	**% Cumulative**
0 - 0.062	2	1.9%	2%
0.062 - 0.125	1	0.9%	3%
0.125 - 0.25	3	2.8%	6%
0.25 - 0.5	0	0.0%	6%
0.5 - 1.0	0	0.0%	6%
1 - 2	6	5.6%	11%
2 - 4	2	1.9%	13%
4 - 8	7	6.5%	19%
8 - 16	8	7.4%	27%
16 - 32	12	11.1%	38%
32 - 64	35	32.4%	70%
64-128	28	25.9%	96%
128-256	4	3.7%	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	**108**	**100%**	**100%**
		Summary Data	
		D50	**41**
		D84	**81**
		D95	**120**


Glade Creek - Unnamed Tributary
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 %

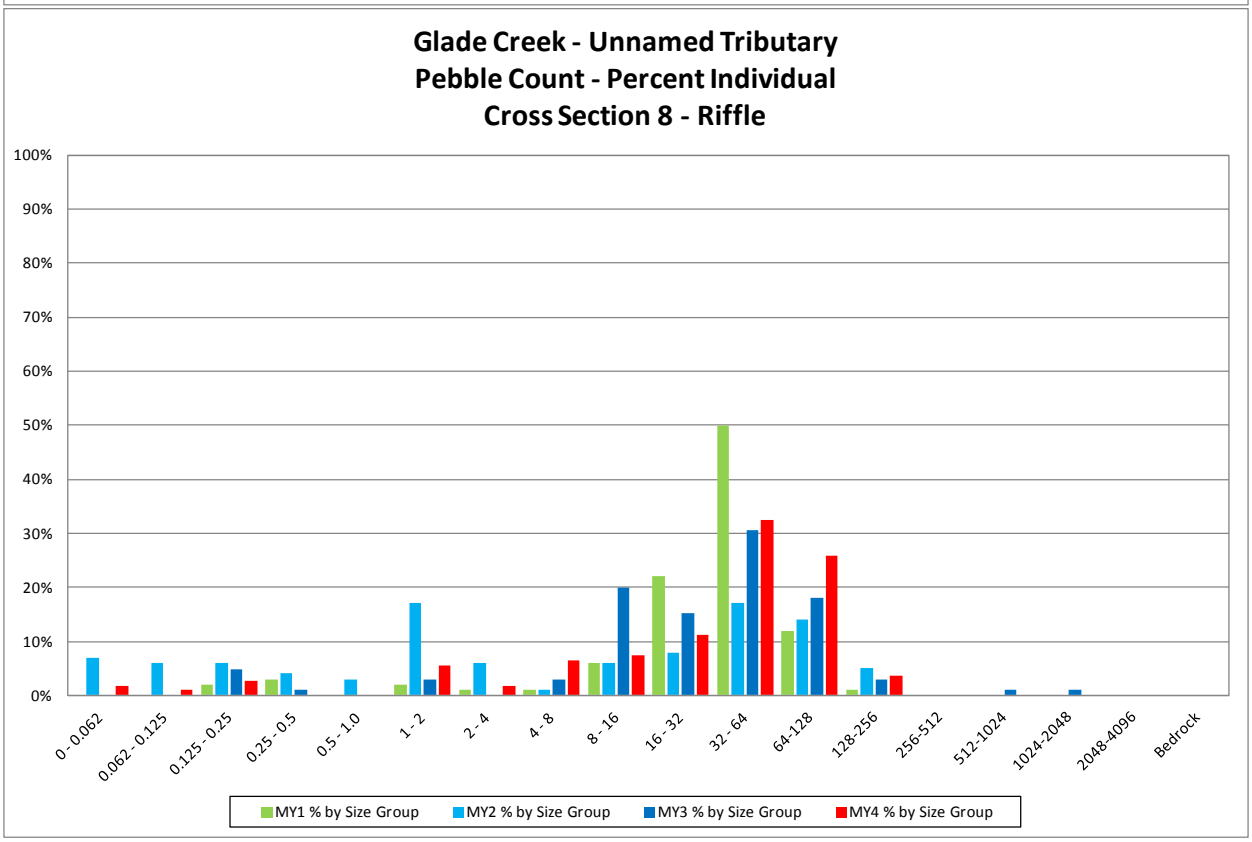

Glade Creek - Unnamed Tributary
Pebble Count - Percent Individual
Cross Section 8 - Riffle
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0 - 0.062
0.062 - 0.125
0.125 - 0.25
0.25 - 0.5
0.5 - 1.0
1 - 2
2 - 4
4 - 8
8 - 16
16 - 32
32 - 64
64-128
128-256
256-512
512-1024
1024-2048
2048-4096
Bedrock
MY1 % by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

Table 10a. Baseline Stream Data Summary
Glade Creek / Project No. 854 - Glade Creek (2,558 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)	-	-	-	-	44.7	-	-	-	-	-	30.7	-	-	-	-	-	34.0	-	35.2	43.2	44.9	47.7	5.9	4
Floodprone Width (ft)				-	45	-	-	-	-	-	70	-	-	-	-	-	>76	-	68.8	89.1	89.0	109.4	22.5	4
Bankfull Mean Depth (ft)	-	-	-	-	1.41	-	-	-	-	-	1.90	-	-	-	-	-	1.56	-	0.9	1.2	1.2	1.3	0.2	4
Bankfull Max Depth (ft)				-	2.3	-	-	-	-	-	2.5	-	-	-	-	-	2.2	-	1.7	1.8	1.9	1.9	0.1	4
Bankfull Cross Sectional Area (ft^2)		-		-	63.0	-	-	-	-	-	57.4	-	-	-	-	-	53.0	-	41.6	49.1	46.3	62.2	9.1	4
Width/Depth Ratio				-	31.7	-	-	-	-	-	16.4	-	-	-	-	-	22.0	-	27.6	39.0	36.9	62.2	11.3	4
Entrenchment Ratio				-	6.0	-	-	-	-	-	2.3	-	-	-	-	-	>2.2	-	1.5	2.1	2.2	2.6	0.5	4
Bank Height Ratio				1.2	-	-	3.0	-	-	-	1.0	-	-	-	-	-	1.0	-	1.0	1.0	1.0	1.0	0.0	4
Profile																								
Riffle Length (ft)				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14.6	35.3	31.8	54.9	13.1	18
Riffle Slope (ft/ft)				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.002	0.011	0.010	0.025	0.006	18
Pool Length (ft)				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7.2	41.7	44.6	74.9	22.8	30
Pool Max Depth (ft)				-	5.7	-	-	-	-	-	3.1	-	-	-	-	-	4.4	-	3.2	4.1	4.1	5.6	0.7	31
Pool Spacing (ft)				110	-	-	228	-	7	-	224	-	-	-	-	91	-	155	10.7	84.5	98.5	162.5	51.0	29
Pattern																								
Channel Belt Width (ft)				77	-	-	184	-	8	90	-	-	104	-	-	55	-	134	59.3	76.7	74.5	92.1	11.22	12
Radius of Curvature (ft)				34	-	-	118	-	8	76	-	-	135	-	-	53	-	172	41.7	57.9	50.3	101.0	17.80	15
Rc: Bankfull Width (ft/ft)				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Meander Wavelength (ft)				66	-	-	403	-	10	-	350	-	-	-	-	136	-	261	163.9	223.6	230.7	259.1	28.34	13
Meander Width Ratio				3.6	-	-	18.7	-	-	2.9	-	-	3.4	-	-	1.6	-	4.0	1.6	1.8	1.7	2.1	0.26	4
Transport Parameters																								
Reach Shear Stress (Competency) lb/ft^2				0.41						-						0.39			0.36					
Max Part Size (mm) Mobilized at Bankfull				11						-						10			21					
Stream Power (Transport Capacity) W/m^2				-						-						-								
Additional Reach Parameters																								
Rosgen Classification				C_E4/F4/G4						C4						C4			C					
Bankfull Velocity (fps)		-		3.3						N/A						3.8								
Bankfull Discharge (cfs)		267-352		200						375						200								
Valley Length (ft)				2,180						-						2,180								
Channel Thalweg Length (ft)				2,569						-						2,555			2,558					
Sinuosity				1.18						1.10						1.17			1.17					
Water Surface Slope (Channel) (ft/ft)				-						-						-			0.0055					
Bankfull Slope (ft/ft)				0.005						0.014						0.004			0.0050					
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
Glade Creek / Project No. 854 - Unnamed Tributary (265 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)	-	-	-	-	12.6	-	-	-	-	-	30.7	-	-	-	-	-	12.0	-	17.3	18.1	18.1	18.9	N/A	2
Floodprone Width (ft)				13	-	-	25	-	-	-	70	-	-	-	-	-	>44	-	33.5	37.7	37.7	41.8	N/A	2
Bankfull Mean Depth (ft)	-	-	-	-	0.8	-	-	-	-	-	1.9	-	-	-	-	-	0.7	-	0.7	0.8	0.8	0.8	N/A	2
Bankfull Max Depth (ft)				-	1.0	-	-	-	-	-	2.5	-	-	-	-	-	1.0	-	1.2	1.3	1.3	1.3	N/A	2
Bankfull Cross Sectional Area (ft^2)		-		-	9.9	-	-	-	-	-	57.4	-	-	-	-	-	8.2	-	12.7	13.0	13.0	13.2	N/A	2
Width/Depth Ratio				-	16.0	-	-	-	-	-	16.4	-	-	-	-	-	18.0	-	22.7	25.5	25.5	28.3	N/A	2
Entrenchment Ratio				1.1	-	-	2.0	-	-	-	2.3	-	-	-	-	-	>2.2	-	1.9	2.1	2.1	2.2	N/A	2
Bank Height Ratio				-	≥2.0	-	-	-	-	-	1.0	-	-	-	-	-	1.0	-	1.0	1.0	1.0	1.0	N/A	2
Profile																								
Riffle Length (ft)				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.8	10.3	10.3	14.6	4.0	6
Riffle Slope (ft/ft)				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.001	0.017	0.015	0.034	0.011	6
Pool Length (ft)				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.6	13.3	10.8	29.5	8.5	9
Pool Max Depth (ft)				-	3.5	-	-	-	-	-	3.1	-	-	-	-	-	2.2	-	1.8	2.7	2.6	3.4	0.5	7
Pool Spacing (ft)				-	-	-	-	-	-	-	224	-	-	-	-	31	-	56	5.5	34.1	31.5	59.8	20.8	7
Pattern																								
Channel Belt Width (ft)				57	-	-	79	-	7	90	-	-	104	-	-	30	-	45	28.6	34.3	36.1	37.1	3.51	5
Radius of Curvature (ft)				17	-	-	71	-	10	76	-	-	135	-	-	27	-	33	17.1	19.8	19.5	22.5	2.21	5
Rc: Bankfull Width (ft/ft)				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Meander Wavelength (ft)				66	-	-	93	-	6	-	350	-	-	-	-	75	-	84	66.4	77.7	82.7	83.9	9.78	3
Meander Width Ratio				4.5	-	-	6.3	-	-	2.9	-	-	3.4	-	-	2.5	-	3.8	1.9	2.0	2.0	2.1	N/A	2.0
Transport Parameters																								
Reach Shear Stress (Competency) lb/ft^2						0.52						-					0.17				0.30			
Max Part Size (mm) Mobilized at Bankfull						15						-					3				65			
Stream Power (Transport Capacity) W/m^2						-						-					-							
Additional Reach Parameters																								
Rosgen Classification						C4						C4					C4				C			
Bankfull Velocity (fps)		-				2						N/A					2.4							
Bankfull Discharge (cfs)		76 - 98				20						375					20							
Valley Length (ft)						175						-					226							
Channel Thalweg Length (ft)						300						-					275				264			
Sinuosity						1.71						1.10					1.22				1.17			
Water Surface Slope (ft/ft)						-						-					-				0.0064			
Bankfull Slope (ft/ft)						0.011						0.014					0.006				0.0058			
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)
Glade Creek / Project No. 854 - Glade Creek (2,558 feet)

Parameter	Pre-Existing Condition							Reference Reach Data							Design							Monitoring Baseline						
Ri% / Ru% / P% / G% / S%	-	-	-	-	-			-	-	-	-	-			-	-	-	-	-	-	-	25%	9%	49%	16%	2%		
SC% / Sa% / G% / C% / B% / Be%	-	-	-	-	-	-		-	-	-	-	-	-															
d16 / D35 / d50 / d84 / d95 / di^{p} / di^{sp} (mm)	0.136	0.87	12.5	114	-	-	-	0.17	29	58	180	300	-	-														
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)
Glade Creek / Project No. 854 - Dye Branch-Downstream (265 feet)

Parameter	Pre-Existing Condition							Reference Reach Data							Design							Monitoring Baseline						
Ri% / Ru% / P% / G% / S%	-	-	-	-	-			-	-	-	-	-			-	-	-	-	-	-	-	24%	11%	47%	16%	2%		
SC% / Sa% / G% / C% / B% / Be%	-	-	-	-	-	-		-	-	-	-	-	-															
d16 / D35 / d50 / d84 / d95 / di^{p} / di^{sp} (mm)	0.3	11	27	85	115.0	-	-	0.17	29	58	180	300	-	-														
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

Glade Creek / Project No. 854 - Glade Creek (2,558 feet)

	Cross-Section 1 Riffle						Cross-Section 2 Pool						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	2,613	2,613	2,613	2,613	2,613		2,612	2,612	2,612	2,612	2,612		2,611	2,611	2,611	2,611	2,611	
Bankfull Width (ft)	47.7	48.8	51.3	45.3	38.1		50.4	49.3	49.1	46.7	39.0		47.6	47.6	47.6	46.5	46.1	
Floodprone Width (ft)	109.0	109.4	109.4	109.4	109.4		69.1	69.1	69.1	69.1	69.1		70.4	70.4	70.4	70.4	70.4	
Bankfull Mean Depth (ft)	0.9	0.9	0.9	0.9	1.1		1.6	1.7	1.7	1.7	2.0		1.3	1.3	1.3	1.3	1.3	
Bankfull Max Depth (ft)	1.9	1.9	1.9	1.8	1.9		3.0	3.3	3.3	3.2	3.5		1.9	1.9	1.9	2.0	2.1	
Bankfull Cross Sectional Area (ft^2)	41.6	45.6	45.9	42.4	41.0		78.3	83.0	83.6	78.1	77.8		62.2	64.1	63.9	59.5	60.5	
Bankfull Width/Depth Ratio	54.7	52.2	57.4	48.4	35.3		32.5	29.3	28.9	27.9	19.6		36.5	35.3	35.5	36.3	35.1	
Bankfull Entrenchment Ratio	2.3	2.2	2.1	2.4	2.9		1.4	1.4	1.4	1.5	1.9		1.5	1.5	1.5	1.5	1.5	
Bankfull Bank Height Ratio	1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Cross Sectional Area between End Pins (ft^2)	41.8	45.6	45.9	48.4	41.0		78.3	83.0	83.6	78.1	77.8		62.2	64.1	63.9	59.5	60.5	
d50 (mm)	N/A	47	33	33	35		N/A	7.3	1.7	1.1	0.3		N/A	45	22	40	41	
	Cross-Section 4 Riffle						**Cross-Section 5 Pool**						**Cross-Section 6 Riffle**					
Dimension	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**
Record Elevation (datum) Used	2,607	2,607	2,607	2,607	2,607		2,606	2,606	2,606	2,606	2,606		2,605	2,605	2,605	2,605	2,605	
Bankfull Width (ft)	35.2	36.3	34.9	34.8	33.5		53.2	51.5	51.9	44.4	34.6		42.1	42.9	42.4	37.4	34.9	
Floodprone Width (ft)	68.8	68.8	68.8	68.8	68.8		117.9	117.9	117.9	117.9	117.9		107.6	107.6	107.6	107.6	107.6	
Bankfull Mean Depth (ft)	1.3	1.3	1.4	1.3	1.6		1.3	1.5	1.4	1.6	2.0		1.1	1.1	1.1	1.2	1.3	
Bankfull Max Depth (ft)	1.7	1.9	1.9	1.9	2.9		3.7	4.1	4.0	3.9	4.1		1.8	1.9	1.9	2.0	2.4	
Bankfull Cross Sectional Area (ft^2)	44.9	46.9	47.5	46.1	50.3		68.7	75.0	74.1	72.1	68.3		47.7	49.0	48.4	44.1	45.9	
Bankfull Width/Depth Ratio	27.6	28.1	25.6	26.3	22.3		41.1	35.3	36.3	27.3	17.5		37.2	37.5	37.1	31.7	26.5	
Bankfull Entrenchment Ratio	2.0	1.9	2.0	2.0	2.1		2.2	2.3	2.3	2.7	3.4		2.6	2.5	2.5	2.9	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	
Cross Sectional Area between End Pins (ft^2)	44.9	46.9	47.5	46.1	50.3		68.7	75.0	74.1	72.1	68.3		47.7	49.0	48.4	44.1	45.9	
d50 (mm)	N/A	47	14	38	50		N/A	8	1.4	0.062	0.062		N/A	44	18	51	43	

N/A - Item does not apply.

Table 11a. Baseline Morphology & Hydraulic Monitoring Summary Glade Creek / Project No. 854 - Unnamed Tributary (264 feet)												
	Cross-Section 7 Riffle						Cross-Section 8 Riffle					
Dimension	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**
Record Elevation (datum) Used	2,604	2,604	2,604	2,604	2,604		2,602	2,602	2,602	2,602	2,602	
Bankfull Width (ft)	17.3	17.5	17.7	16.9	16.0		18.9	19.1	18.1	18.5	17.8	
Floodprone Width (ft)	33.5	33.5	33.5	33.5	33.5		41.8	41.8	41.8	41.8	41.8	
Bankfull Mean Depth (ft)	0.8	0.7	0.8	0.7	0.7		0.7	0.7	0.7	0.7	0.7	
Bankfull Max Depth (ft)	1.3	1.2	1.2	1.2	1.2		1.2	1.2	1.2	1.1	1.2	
Bankfull Cross Sectional Area (ft^2)	13.2	13.0	13.4	12.4	12.0		12.7	13.0	12.2	12.1	11.7	
Bankfull Width/Depth Ratio	22.7	23.6	23.4	23.1	21.4		28.3	28.1	27.0	28.4	26.9	
Bankfull Entrenchment Ratio	1.9	1.9	1.9	2.0	2.1		2.2	2.2	2.3	2.3	2.4	
Bankfull Bank Height Ratio	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)	13.2	13.0	13.4	12.4	12.0		12.7	13.0	12.2	12.1	11.7	
d50 (mm)	N/A	33	16	28	25		N/A	38	6	35	41	

Table 11b. Monitoring Data - Stream Reach Data Summary
Glade Creek / Project No. 854 - Glade Creek (2,558 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)	35.2	43.2	44.9	47.7	5.91	4	36.3	43.9	45.3	48.8	5.67	4	34.9	44.1	45.0	51.3	7.11	4	34.8	41.0	41.4	46.5	5.78	4	33.50	38.15	36.50	46.10	5.64	4						
Floodprone Width (ft)	68.8	89.1	89.0	109.4	22.48	4	68.8	89.1	89.0	109.4	22.48	4	68.8	89.1	89.2	109.0	22.47	4	68.8	89.1	89.0	109.4	22.48	4	68.80	89.05	89.00	109.40	22.48	4						
Bankfull Mean Depth (ft)	0.9	1.2	1.2	1.3	0.19	4	0.9	1.2	1.2	1.3	0.19	4	0.9	1.2	1.2	1.4	0.22	4	0.9	1.2	1.3	1.3	0.19	4	1.10	1.40	1.45	1.60	0.24	4						
Bankfull Max Depth (ft)	1.7	1.8	1.9	1.9	0.10	4	1.9	1.9	1.9	1.9	0.00	4	1.9	1.9	1.9	1.9	0.00	4	1.8	1.9	2.0	2.0	0.10	4	1.90	2.33	2.25	2.90	0.43	4						
Bankfull Cross-Sectional Area (ft^2)	41.6	49.1	46.3	62.2	9.08	4	45.6	51.4	48.0	64.1	8.58	4	45.9	51.4	48.0	63.9	8.38	4	42.4	48.0	45.1	59.5	7.80	4	41.00	49.43	48.10	60.50	8.30	4						
Width/Depth Ratio	27.6	39.0	36.9	54.7	11.34	4	28.1	38.3	36.4	52.2	10.11	4	25.6	38.9	36.3	57.4	13.34	4	26.3	35.7	34.0	48.4	9.42	4	22.30	29.80	30.80	35.30	6.47	4						
Entrenchment Ratio	1.5	2.1	2.2	2.6	0.47	4	1.5	2.0	2.1	2.5	0.43	4	1.5	2.0	2.1	2.5	0.41	4	1.5	2.2	2.2	2.9	0.59	4	1.50	2.40	2.50	3.10	0.74	4						
Bank Height Ratio	1.0	1.0	1.0	1.0	0.00	4	1.0	1.0	1.0	1.0	0.00	4	1.0	1.0	1.0	1.0	0.00	4	0.0	0.8	1.0	1.0	0.50	4	1.00	1.00	1.00	1.00	0	4						
Profile																																				
Riffle Length (ft)	14.6	35.3	31.8	54.9	13.12	18	11.0	30.2	25.4	58.0	14.94	19	8.3	27.4	23.5	52.3	14.7	18	13.2	30.4	28.1	57.2	15.1	19	7.1	47.4	43.0	97.9	21.7	16						
Riffle Slope (ft/ft)	0.002	0.011	0.010	0.025	0.006	18	0.002	0.010	0.010	0.020	0.005	19	0.002	0.011	0.012	0.020	0.005	18	0.001	0.010	0.010	0.023	0.006	19	0.001	0.011	0.010	0.024	0.008	16						
Pool Length (ft)	7.2	41.7	44.6	74.9	22.75	30	7.7	40.2	43.1	76.8	23.59	30	7.8	41.1	44.8	76.3	23.6	30	6.7	42.2	44.3	90.7	25.0	30	6.4	39.4	32.7	104.5	27.4	28						
Pool Max Depth (ft)	3.2	4.1	4.1	5.6	0.65	31	2.8	4.0	3.9	5.4	0.65	30	2.5	3.7	3.6	4.9	0.6	30	2.7	3.9	3.9	5.2	0.7	30	2.90	4.16	4.15	5.65	0.74	28						
Pool Spacing (ft)	10.7	84.5	98.5	162.5	51.03	29	9.3	84.2	81.2	155.4	53.03	29	11.3	84.4	84.8	170.3	53.3	29	9.8	81.2	91.9	172.6	54.1	30	8.1	91.4	98.3	213.1	63.7	27						
Pattern																																				
Channel Belt Width (ft)	59.3	76.7	74.5	92.1	11.22	12																														
Radius of Curvature (ft)	41.7	57.9	50.3	101.0	17.81	15																														
Rc: Bankfull Width (ft/ft)	0.84	0.92	0.92	1.00	N/A	2																														
Meander Wavelength (ft)	163.9	223.6	230.7	259.1	28.34	13																														
Meander Width Ratio	1.6	1.8	1.7	2.1	0.26	4																														
Additional Reach Parameters																																				
Rosgen Classification	C						C4						C4						C4						C4											
Channel Thalweg Length (ft)	2,548						2,558						2,555						2,556						2,556											
Sinuosity (ft)	1.17						1.18						1.18						1.18						1.18											
Water Surface Slope (Channel) (ft/ft)	0.0055						0.0054						0.0053						0.0053						0.0054											
Bankfull Slope (ft/ft)	0.0050						0.0050						0.0052						0.0054						0.0055											
Ri% / Ru% / P% / G% / S%	25%	9%	49%	16%	2%		23%	12%	48%	15%	2%		20%	11%	49%	17%	3%		23%	12%	50%	12%	3%		30%	11%	44%	12%	3%							
SC% / SA% / G% / C% / B% / Be%*							1%	14%	65%	20%	<1%	0%	10%	24%	47%	19%	0%	0%	9%	23%	50%	17%	0%	0%	19%	9%	52%	19%	0%	0%						
d16 / d35 / d50 / d84 / d95 (mm)													0.504	7.25	21.75	78.25	125		13.2	27.5	40.5	72.75	108.3		18.5	32.5	42.25	78.75	125							
% of Reach with Eroding Banks	0%						0%						0%						0%						0%											
Channel Stability or Habitat Metric	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 - Information does not apply.
Ri = Riffle / Ru = Run / P = Pool / G = Glide / S = Step
SC = Silt-Clay / SA = Sand / G = Gravel / C = Cobble / B = Boulder / Be = Bedrock
*Percentages based on riffle and pool pebble counts.

Table 11b. Monitoring Data - Stream Reach Data Summary
Glade Creek / Project No. 854 - Unnamed Tributary (265 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)	17.3	18.1	18.1	18.9	N/A	2	17.5	18.3	18.3	19.1	N/A	2	17.7	17.9	17.9	18.1	N/A	2	16.9	17.7	17.7	18.5	N/A	2	16.00	16.90	16.90	17.80	N/A	2						
Floodprone Width (ft)	33.5	37.7	37.7	41.8	N/A	2	33.5	37.7	37.7	41.8	N/A	2	33.5	37.7	37.7	41.8	N/A	2	33.5	37.7	37.7	41.8	N/A	2	33.50	37.65	37.65	41.80	N/A	2						
Bankfull Mean Depth (ft)	0.7	0.8	0.8	0.8	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	0.7	0.7	0.7	0.7	N/A	2	0.70	0.70	0.70	0.70	N/A	2						
Bankfull Max Depth (ft)	1.2	1.3	1.3	1.3	N/A	2	1.2	1.2	1.2	1.2	N/A	2	1.2	1.2	1.2	1.2	N/A	2	1.1	1.2	1.2	1.2	N/A	2	1.20	1.20	1.20	1.20	N/A	2						
Bankfull Cross-Sectional Area (ft^2)	12.7	13.0	13.0	13.2	N/A	2	13.0	13.0	13.0	13.0	N/A	2	12.2	12.8	12.8	13.4	N/A	2	12.1	12.3	12.3	12.4	N/A	2	11.70	11.85	11.85	12.00	N/A	2						
Width/Depth Ratio	22.7	25.5	25.5	28.3	N/A	2	23.6	25.9	25.9	28.1	N/A	2	23.4	25.2	25.2	27.0	N/A	2	23.1	25.8	25.8	28.4	N/A	2	21.40	24.15	24.15	26.90	N/A	2						
Entrenchment Ratio	1.9	2.1	2.1	2.2	N/A	2	1.9	2.1	2.1	2.2	N/A	2	1.9	2.1	2.1	2.3	N/A	2	2.0	2.2	2.2	2.3	N/A	2	2.10	2.25	2.25	2.40	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	1.00	1.00	1.00	1.00	N/A	2						
Profile																																				
Riffle Length (ft)	5.8	10.3	10.3	14.6	4.0	6	3.6	10.1	10.5	16.0	4.9	6	6.18	11.1	10.1	19.2	4.4	6	3.2	10.5	11.8	19.1	6.0	6	7.5	12.3	12.2	15.6	3.1	5						
Riffle Slope (ft/ft)	0.001	0.017	0.015	0.034	0.011	6	0.001	0.013	0.011	0.024	0.009	6	0.003	0.013	0.016	0.021	0.008	6	0.002	0.012	0.009	0.031	0.011	6	0.004	0.010	0.011	0.014	0.004	5						
Pool Length (ft)	3.6	13.3	10.8	29.5	8.5	9	3.2	13.4	14.1	26.8	7.8	9	3.1	12.2	12.5	26.8	7.2	9	2.4	12.7	13.1	25.8	7.8	9	2.9	13.7	13.8	27.7	7.9	9						
Pool Max Depth (ft)	1.8	2.7	2.6	3.4	0.5	7	2.1	2.7	2.6	3.3	0.4	6	2.2	2.6	2.5	2.9	0.3	6	1.8	2.6	2.7	3.3	0.5	8	2.0	2.8	2.9	3.6	0.5	8						
Pool Spacing (ft)	5.5	34.1	31.5	59.8	20.8	7	5.3	30.7	35.2	54.6	17.4	8	5.1	30.2	31.5	57.3	17.8	8	6.6	31.0	31.0	53.4	16.3	8	6.6	30.5	30.8	51.9	16.1	8						
Pattern																																				
Channel Belt Width (ft)	28.6	34.3	36.1	37.1	3.5	5																														
Radius of Curvature (ft)	17.1	19.8	19.5	22.5	2.2	5																														
Rc: Bankfull Width (ft/ft)	N/A	N/A	N/A	N/A	N/A	N/A																														
Meander Wavelength (ft)	66.4	77.7	82.7	83.9	9.8	3																														
Meander Width Ratio	1.9	2.0	2.0	2.1	N/A	N/A																														
Additional Reach Parameters																																				
Rosgen Classification	C						C4						C4						C4						C4											
Channel Thalweg Length (ft)	263						264						264						269						271											
Sinuosity (ft)	1.17						1.18						1.18						1.20						1.20											
Water Surface Slope (Channel) (ft/ft)	0.0064						0.0068						0.0068						0.0051						0.0071											
Bankfull Slope (ft/ft)	0.0058						0.0066						0.0066						0.0065						0.0051											
Ri% / Ru% / P% / G% / S%	24%	11%	47%	16%	2%		24%	15%	47%	12%	2%		26%	14%	43%	15%	3%		25%	14%	46%	12%	2%		24%	14%	48%	13%	2%							
SC% / SA% / G% / C% / B% / Be%*							0%	8%	81%	11%	0%	0%	7%	29%	48%	16%	0%	0%	3.4%	20.0%	60.6%	15.5%	0.5%	0.0%	1%	11%	67%	20%	1%	0%						
d16 / d35 / d50 / d84 / d95 (mm)													0.215	3.05	11.0	65.0	114.0		9.15	22.0	31.5	66.0	107.0		5.1	21.5	33.0	70.0	103.0							
% of Reach with Eroding Banks	0%						0%						0%						0%						3%											
Channel Stability or Habitat Metric	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 - 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.

Appendix E
Hydrological Data

Table 12. Verification of Bankfull Events Glade Creek / Project No. 854			
Date of Collection	**Date of Occurrence**	**Method**	**Feet Above Average Bankfull Elevation**
3/25/2013	1/18/2013	Crest gauge & wrack lines	1.7
10/31/2013	Unknown	Wrack Lines	NA
7/15/2014	Unknown	Crest gauge	0.26