

Trout Cove Branch and Tributary Stream Restoration

NCEEP Project Number: 388

Monitoring Year 5

2009 Final Report



**Submitted to
North Carolina Ecosystem Enhancement Program
North Carolina Department of Environment and Natural Resources
May 2010**



**1619 Mail Service Center
Raleigh, NC 27699**

Trout Cove Branch and Tributary Stream Restoration 2009 Monitoring Report (MY 5)

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1.0 EXECUTIVE SUMMARY / PROJECT ABSTRACT

Trout Cove Branch and Tributary Restoration Project Goals

- Improve stream and buffer conditions to limit lateral inputs of nutrients and sediments to the project reaches;
- Improve stream and buffer conditions to limit the loss of bank derived fines to the receiving watershed;
- Improve instream and riparian habitat cover;
- Improve conditions and opportunity for thermoregulation and oxygenation;
- Improve and maintain hydrologic function to include a floodplain connection appropriate to the stream type and to manage storm flows such that the channel improvements are sustainable; and
- Transport bedload sediments in equilibrium.

Trout Cove Branch and Tributary Restoration Project Objectives

- Exclude cattle through the fencing of a conservation easement;
- Install a native riparian buffer;
- Design and construct a sustainable step-pool stream reach with a reference appropriate dimension and profile to provide floodplain connection and extent appropriate to the stream type; and
- Install structures designed to provide grade control, bank protection, and habitat.

The monitoring year five (MY5) vegetation plot data indicate that the project meets the established criterion for planted stem density, which is a minimum survival of 260 planted stems per acre at the end of the five year monitoring period. Average stem density for planted stems in MY5 is approximately 428 stems per acre. However, when planted and natural stems are combined, the average stem density is 890 stems per acre, which is well above the minimum established criterion. There was an approximately 15% increase in total stem density between MY4 and MY5. Problems with vegetation consist of small isolated bare bench and floodplain areas as well as approximately 10 currently isolated patches of high threat invasive plant species that span the project extent. EEP has a contract in place to treat the invasives on site in early summer 2010.

Stream longitudinal profiles have remained relatively stable among monitoring years. The two main issues observed during MY5 and as seen in previous years were pool aggradation and water piping through structures. All other morphological metrics indicated performance percentages averaging between 92 and 99%. The extent of pool aggradation observed during MY4 was primarily attributed to historic low flows preventing pool scour and sediment transport. While stream flows in MY5 appeared normal and included two bankfull events, pool aggradation was still common and was independent of structure condition. Limited upstream observations indicated poor land use activities which may be overwhelming the restored reaches ability to sufficiently transport the existing bed load within the watershed. Approximately half the structures surveyed had some level of piping, but the visual observations and the profile plots indicate no significant or systemic loss of grade.

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

2.0 Methodology

The stream monitoring methodologies utilized in 2009 were intended to replicate those employed during previous monitoring years and are based on standard guidance and procedures documents (Rosgen 1996 and USACE 2003). Vegetation monitoring data were collected following the standard CVS-EEP Protocol for Recording Vegetation, Level II (Lee et al. 2006).

3.0 References

Lee, M.T; Peet, R.K.; Roberts, S.D.; and T.R. Wentworth. 2006. CVS-EEP Protocol for Recording Vegetation. Version 4.0. <http://cvs.bio.unc.edu/methods.htm>. Accessed November 2009.

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

USACE (U.S. Army Corps of Engineers). 2003. Stream Mitigation Guidelines. USACOE, USEPA, NCWRC, NCDENR-DWQ. Wilmington District.

Appendix A
General Figures and Plan Views

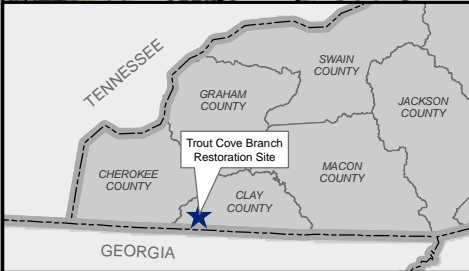
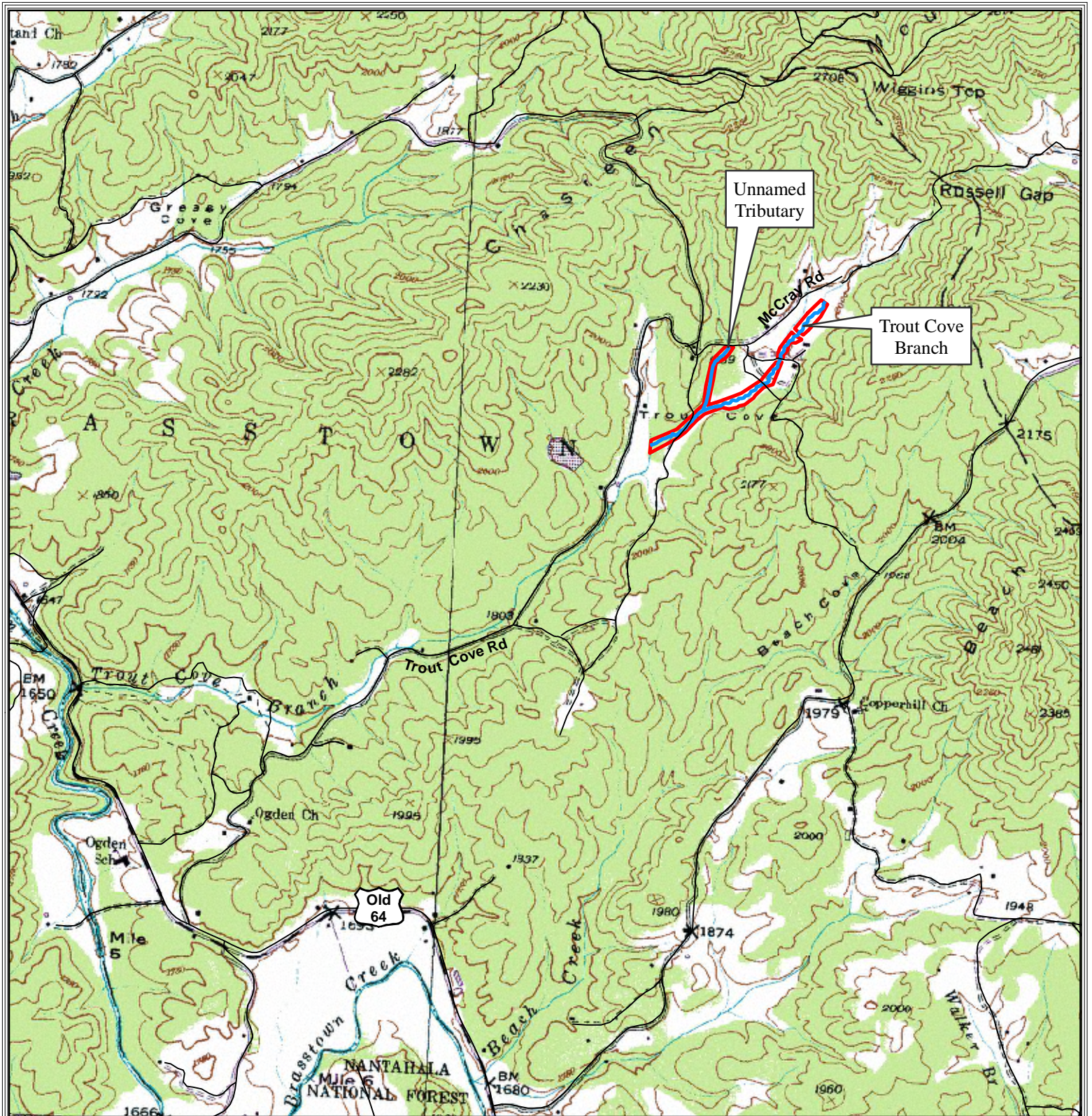
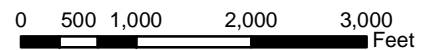


Figure 1 - Vicinity Map

Trout Cove Branch & Tributary
Restoration Site
Project No. 388

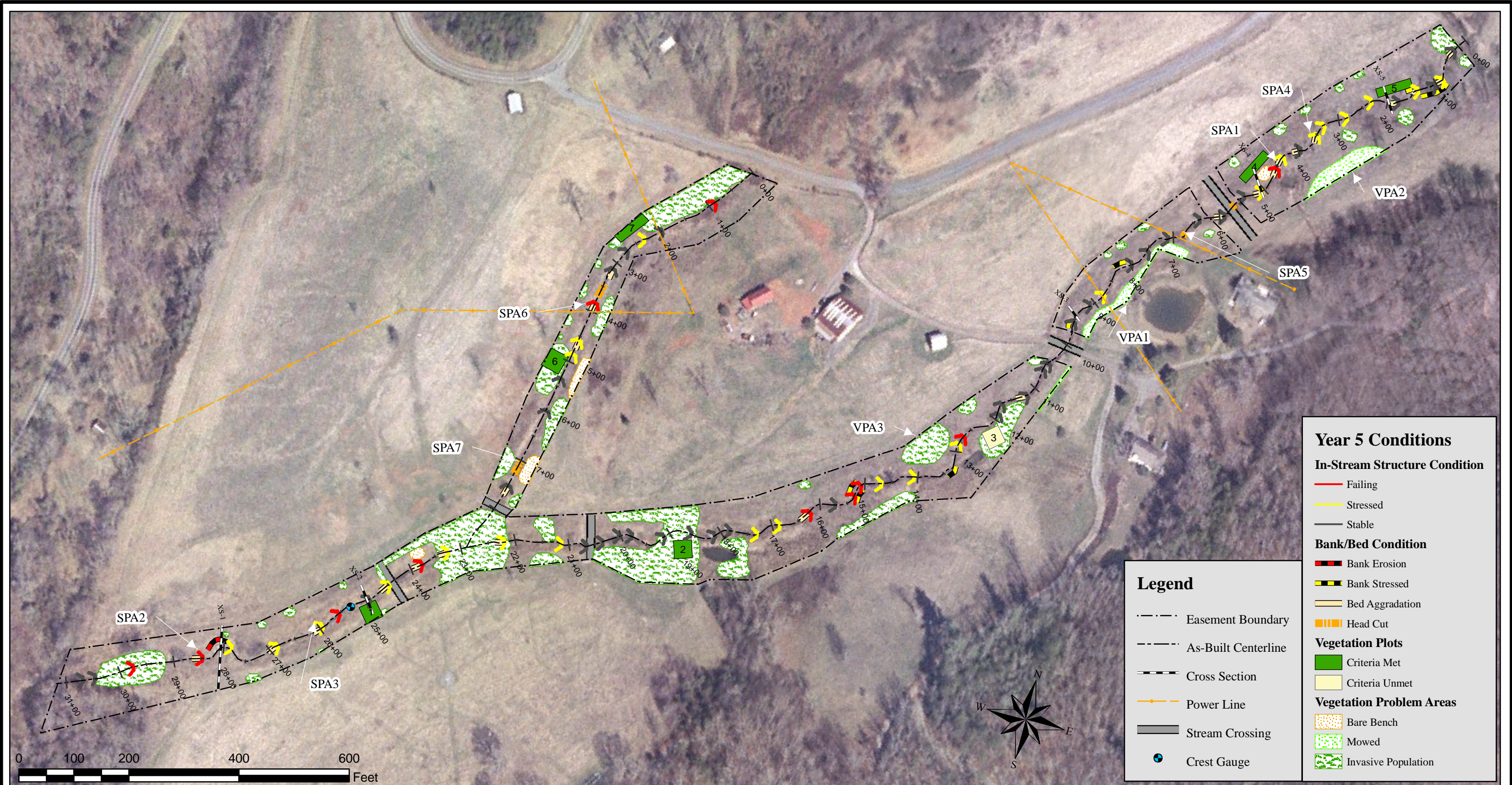
Clay County, North Carolina
May 2010


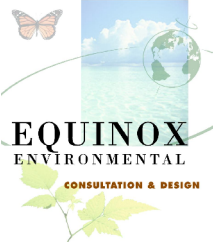


7.5 Minute Series Peachtree Quadrangle

Directions: From I-40, take US-74 West. Turn left onto NC-141 South. Turn left onto US-64 and turn right onto Old US-64 West. Continue through the Town of Brasstown and turn left onto Trout Cove Rd. Turn right onto McCray Rd. The site is located on the right.

Figure 2. Integrated Current Condition Plan View Final



Prepared for	Project: Trout Cove Branch & Tributary Restoration	Notes: 1) Base Map from CAD file "TROUT 2007 MONT.AND PAPV.dwg" Provided by NCEEP	Prepared by
	Year 5 Monitoring Clay County, North Carolina	2) 2004 Aerial Photo	
	Sheet 1 of 1		
	Date	Project Number	
	May 2010	NCEEP # 388	

Appendix B

General Project Tables

Table 1a. Project Components Trout Cove Branch / Project No. 388								
Project Component or Reach ID	Existing Feet	Restoration Level	Approach	Footage or Acreage	Stationing	Buffer Acres	BMP Elements	Comment
Reach I	-	R	-	3,120 lf	0+00 - 31+20	8.6		Included riparian re-vegetation
Reach II -Trib	-	R	-	888 lf	0+00 - 08+88			Included riparian re-vegetation

- Information unavailable.

Table 1b. Component Summations Trout Cove Branch / Project No. 388							
Restoration Level	Stream (lf)	Riparian Wetland (Ac)		Non-Ripar (Ac)	Upland (Ac)	Buffer (Ac)	BMP
		Riverine	Non-Riverine				
Restoration	4,008						
Enhancement							
Enhancement I							
Enhancement II							
Creation							
Preservation							
HQ Preservation							
		0	0				
Totals	4,008	0	0	0	0	8.6	0
Non-Applicable							

Table 2. Project Activity and Reporting History Trout Cove Branch / Project No. 388		
Activity or Report	Data Collection Complete	Actual Completion or Delivery
Restoration Plan	-	2001
Final Design - 90%	-	-
Permitting	N/A	Jan 2002
Construction	N/A	-
Temporary S&E Mix Applied to Project Area	N/A	-
Live Stakes and Bare Root Trees Planted	N/A	-
Project Completion	N/A	May 2002
Baseline / Year 1 Monitoring	2005	2006
Year 2 Monitoring	Nov 2006	Jan 2007
Year 3 Monitoring	Nov 2007	March 2008
Year 4 Monitoring	Nov 2008	May 2009
Year 5 Monitoring	Nov 2009	Dec 2009

- Information unavailable.

N/A - Item does not apply.

Table 3. Project Contacts Trout Cove Branch / Project No. 388	
Designer	ARCADIS G&M
Primary Project Design POC	Unknown
Construction Contractor	C & H Services
Primary Project Design POC	Unknown
Planting Contractor	Unknown
Planting Contractor POC	Unknown
Seeding Contractor	Unknown
Seeding Contractor POC	Unknown
Seed Mix Sources	Unknown
Nursery Stock Suppliers	Unknown
Monitoring Performers (Y1) - 2005	North Carolina State University
Stream Monitoring POC	Unknown
Vegetation Monitoring POC	Unknown
Monitoring Performers (Y2) - 2006	Soil & Environmental Consultants, PA 11010 Raven Ridge Road Raleigh, NC 26714
Stream Monitoring POC	Jessica Regan (919) 846-5900
Vegetation Monitoring POC	Jessica Regan (919) 846-5900
Monitoring Performers (Y3) - 2007	Soil & Environmental Consultants, PA 11010 Raven Ridge Road Raleigh, NC 26714
Stream Monitoring POC	Jessica Regan (919) 846-5900
Vegetation Monitoring POC	Jessica Regan (919) 846-5900
Monitoring Performers (Y4) - 2008	Equinox Environmental Consultation & Design, Inc. 37 Haywood Street, Suite 100 Asheville, North Carolina 28801
Stream Monitoring POC	Steve Melton (828) 253-6856
Vegetation Monitoring POC	Sarah Marcinko (828) 253-6856
Monitoring Performers (Y5) - 2009	Equinox Environmental Consultation & Design, Inc. 37 Haywood Street, Suite 100 Asheville, North Carolina 28801
Stream Monitoring POC	Steve Melton (828) 253-6856
Vegetation Monitoring POC	Sarah Marcinko (828) 253-6856

Unknown - Information was unknown at time of report submittal.

Table 4. Project Attributes		
Trout Cove Branch / Project No. 388		
Project County	Clay	
Physiographic Region	Blue Ridge	
Ecoregion	Southern Crystalline Ridges & Mountains	
River Basin	Hiwassee	
USGS HUC	06020002	
NCDWQ Sub-Basin	04-05-01	
Within Extent of EEP Watershed Plan	Hiwassee River Local Watershed Plans	
WRC Class	Cold	
% of Project Easement Fenced or Demarcated	83%	
Beaver Activity Observed During Design Phase	-	
Restoration Component Attributes		
	Trout Cove Branch	Unnamed Tributary
Drainage Area (sq.mi.)	0.453	0.094
Stream Order	Second	First
Restored Length (feet)	3,120	888
Perennial or Intermittent	Perennial	Perennial
Watershed Type	Rural	Rural
Watershed LULC Distribution	-	-
Watershed Impervious Cover	<1%	1.3%
NCDWQ AU/Index Number	1-42-5	
NCDWQ Classification	WS-IV	WS-IV
303d Listed	No	No
Upstream of 303d Listed Segment	No	No
Reasons for 303d Listing or Stressor	N/A	N/A
Total Acreage of Easement	8.6	
Total Vegetated Acreage within Easement	8.6	
Total Planted Acreage as Part of Restoration	-	
Rosgen Classification of Pre-Existing	-	-
Rosgen Classification of As-Built	-	-
Valley Type	-	-
Valley Slope	-	-
Valley Side Slope Range	-	-
Valley Toe Slope Range	-	-
Cowardin Classification	N/A	N/A
Trout Waters Designation	No	No
Species of Concern, Endangered, Etc.	-	
Dominant Soil Series and Characteristics		
	Series	Rha / LoC / FrA
	Depth	-
	Clay%	-
	K	-
	T	-

- Information unavailable.

N/A - Item does not apply.

Appendix C

Vegetation Assessment Data

Table 5. Vegetation Plot Mitigation Success Summary Trout Cove Branch / Project No. 388		
Vegetation Plot ID	Vegetation Survival Threshold Met?	Tract Mean
1	Yes	86%
2	Yes	
3	No	
4	Yes	
5	Yes	
6	Yes	
7	Yes	



Vegetation Monitoring Plot #1
Monitoring Year 5 – June 9, 2009



Vegetation Monitoring Plot #2
Monitoring Year 5 – June 9, 2009



Vegetation Monitoring Plot #3
Monitoring Year 5 – June 9, 2009



Vegetation Monitoring Plot #4
Monitoring Year 5 – June 9, 2009



Vegetation Monitoring Plot #5
Monitoring Year 5 – June 9, 2009



Vegetation Monitoring Plot #6
Monitoring Year 5 – June 9, 2009



Vegetation Monitoring Plot #7
Monitoring Year 5 – June 9, 2009

Table 6. Vegetation Metadata Trout Cove Branch / Project No. 388	
Report prepared by	Sarah Marcinko
Date prepared	10/26/2009 10:17
Database name	TroutCove-v2.2.7.mdb
Database location	Z:\ES\S&WM\EEP Monitoring\EEP-Trout Cove\TC-MY5-2009\Data\Veg
Computer name	D16TNK71
File size	49319936
DESCRIPTION OF WORKSHEETS IN THIS DOCUMENT	
Metadata	Description of database file, the report worksheets, and a summary of project(s) and project data.
Project planted	Each project is listed with its PLANTED stems per acre, for each year. This excludes live stakes.
Project total stems	Each project is listed with its TOTAL stems per acre, for each year. This includes live stakes, all planted stems, and all natural/volunteer stems.
Plots	List of plots surveyed with location and summary data (live stems, dead stems, missing, etc.).
Vigor	Frequency distribution of vigor classes for stems for all plots.
Vigor by 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 species	Damage values tallied by type for each species.
Damage by plot	Damage values tallied by type for each plot.
Planted stems by plot and spp.	A matrix of the count of PLANTED living stems of each species for each plot; dead and missing stems are excluded.
PROJECT SUMMARY	
Project code	388
Project name	Trout Cove
Description	Trout Cove Stream Restoration
River basin	Hiawassee
Length(ft)	N/A
Stream-to-edge width (ft)	N/A
Area (sq m)	N/A
Required plots (calculated)	N/A
Sampled plots	7

Appendix D
Stream Assessment Data



Trout Cove Branch – Cross Section #1 – Pool
(Looking Downstream)
Monitoring Year 5 – April 9, 2009



Trout Cove Branch – Cross Section #1 – Pool
(Looking Upstream)
Monitoring Year 5 – April 9, 2009



Trout Cove Branch – Cross Section #2 – Pool
(Looking Downstream)
Monitoring Year 5 – April 9, 2009



Trout Cove Branch – Cross Section #2 – Pool
(Looking Upstream)
Monitoring Year 5 – April 9, 2009



Trout Cove Branch – Cross Section #3 – Riffle
(Looking Downstream)
Monitoring Year 5 – April 8, 2009



Trout Cove Branch – Cross Section #3 – Riffle
(Looking Upstream)
Monitoring Year 5 – April 8, 2009



Trout Cove Branch – Cross Section #4 – Riffle
(Looking Downstream)
Monitoring Year 5 – April 8, 2009



Trout Cove Branch – Cross Section #4 – Riffle
(Looking Upstream)
Monitoring Year 5 – April 8, 2009



Trout Cove Branch – Cross Section #5 – Riffle
(Looking Downstream)
Monitoring Year 5 – April 8, 2009



Trout Cove Branch – Cross Section #5 – Riffle
(Looking Upstream)
Monitoring Year 5 – April 9, 2009

Table 8. Visual Morphological Stability Assessment Trout Cove Branch / Project No. 388 Trout Cove Branch / Reach 1 (3,120 feet)						
Feature Category	Metric (Per As-built and Reference Baselines)	(# Stable) Number Performing as Intended	Total Number per As-built	Total Number / Feet in Unstable State	% Perform. in Stable Condition	Feature Perform. Mean or Total
A. Riffles	1. Present?	64	64	N/A	100%	99%
	2. Armor stable (e.g. no displacement)?	64	64	N/A	100%	
	3. Facet grade appears stable?	64	64	N/A	100%	
	4. Minimal evidence of embedding/fining?	62	64	N/A	97%	
	5. Length appropriate?	62	64	N/A	97%	
B. Pools	1. Present? (e.g. not subject to severe aggrad. or migrat.?)	40	59	N/A	68%	79%
	2. Sufficiently deep (Max Pool D : Mean Bkf >1.6)	40	59	N/A	68%	
	3. Length appropriate?	59	59	N/A	100%	
C. Thalweg	1. Upstream of meander bend (run/inflection) centering?	57	59	N/A	97%	92%
	2. Downstream of meander (glide/inflection) centering?	52	59	N/A	88%	
D. Meanders	1. Outer bend in state of limited/controlled erosion?	54	59	N/A	92%	97%
	2. Of those eroding, # w/ concomitant point bar formation?	0	N/A	N/A	100%	
	3. Apparent Rc within spec?	59	59	N/A	100%	
	4. Sufficient floodplain access and relief?	58	59	N/A	98%	
E. Bed General	1. General channel bed aggradation areas (bar formation)?	N/A	N/A	19/262	92%	96%
	2. Channel bed degradation - areas of increasing down cutting or head cutting?	N/A	N/A	2/38	99%	
F. Bank	1. Actively eroding, wasting, or slumping bank?	N/A	N/A	8/224	96%	96%
G. Vanes	1. Free of back or arm scour?	56	59	N/A	95%	84%
	2. Height appropriate?	55	59	N/A	93%	
	3. Angle and geometry appear appropriate?	59	59	N/A	100%	
	4. Free of piping or other structural failures?	28	59	N/A	47%	
H. Wads	1. Free of scour?	*	-	N/A	*	*
	2. Footing stable?	*	-	N/A	*	

N/A - Item does not apply.

- Information unavailable.

*There were a few remnants of what appeared to be stable root wads during the 2009 assessment. Data not calculated due to unknown numbers for As-built.

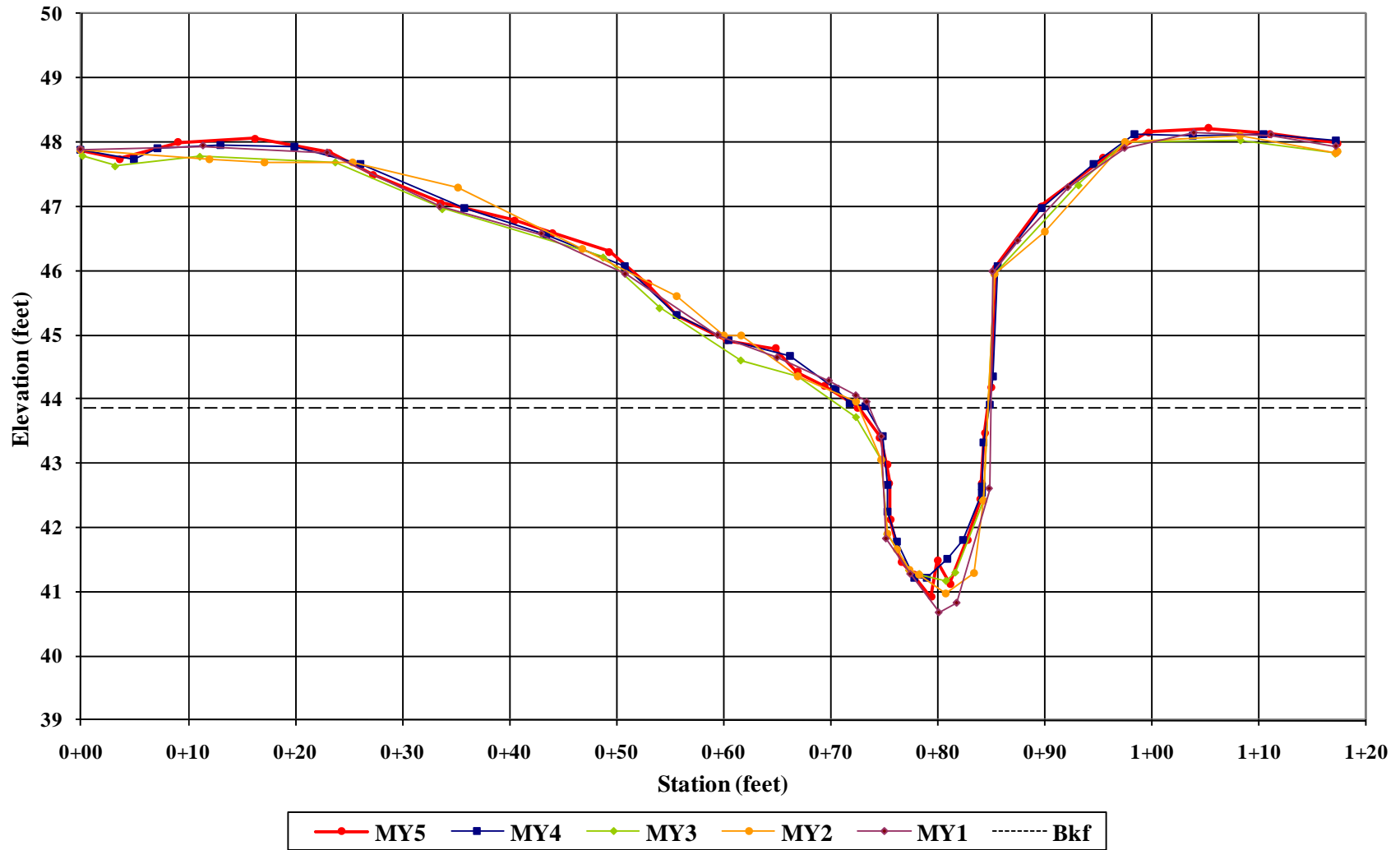
Table 8 Continued. Visual Morphological Stability Assessment						
Trout Cove Branch / Project No. 388						
Unnamed Tributary / Reach 2 (888 feet)						
Feature Category	Metric (Per As-built and Reference Baselines)	(# Stable Number Performing as Intended)	Total Number per As-built*	Total Number / Feet in Unstable State	% Perform. in Stable Condition	Feature Perform. Mean or Total
A. Riffles	1. Present?	8	8	N/A	100%	
	2. Armor stable (e.g. no displacement)?	8	8	N/A	100%	
	3. Facet grade appears stable?	8	8	N/A	100%	
	4. Minimal evidence of embedding/fining?	8	8	N/A	100%	
	5. Length appropriate?	6	8	N/A	75%	95%
B. Pools	1. Present? (e.g. not subject to severe aggrad. or migrat.?)	9	11	N/A	82%	
	2. Sufficiently deep (Max Pool D : Mean Bkf >1.6)	9	11	N/A	82%	
	3. Length appropriate?	11	11	N/A	100%	88%
C. Thalweg	1. Upstream of meander bend (run/inflection) centering?	4	4	N/A	100%	
	2. Downstream of meander (glide/inflection) centering?	4	4	N/A	100%	100%
D. Meanders	1. Outer bend in state of limited/controlled erosion?	4	4	N/A	100%	
	2. Of those eroding, # w/ concomitant point bar formation?	0	N/A	N/A	100%	
	3. Apparent Rc within spec?	4	4	N/A	100%	
	4. Sufficient floodplain access and relief?	4	4	N/A	100%	100%
E. Bed General	1. General channel bed aggradation areas (bar formation)?	N/A	N/A	2/10	99%	
	2. Channel bed degradation - areas of increasing down cutting or head cutting?	N/A	N/A	2/54	94%	97%
F. Bank	1. Actively eroding, wasting, or slumping bank?	N/A	N/A	0/0	100%	100%
G. Vanes	1. Free of back or arm scour?	11	11	N/A	100%	
	2. Height appropriate?	10	11	N/A	91%	
	3. Angle and geometry appear appropriate?	11	11	N/A	100%	
	4. Free of piping or other structural failures?	5	11	N/A	45%	84%
H. Wads	1. Free of scour?	N/A	N/A	N/A	N/A	
	2. Footing stable?	N/A	N/A	N/A	N/A	N/A

N/A - Item does not apply.

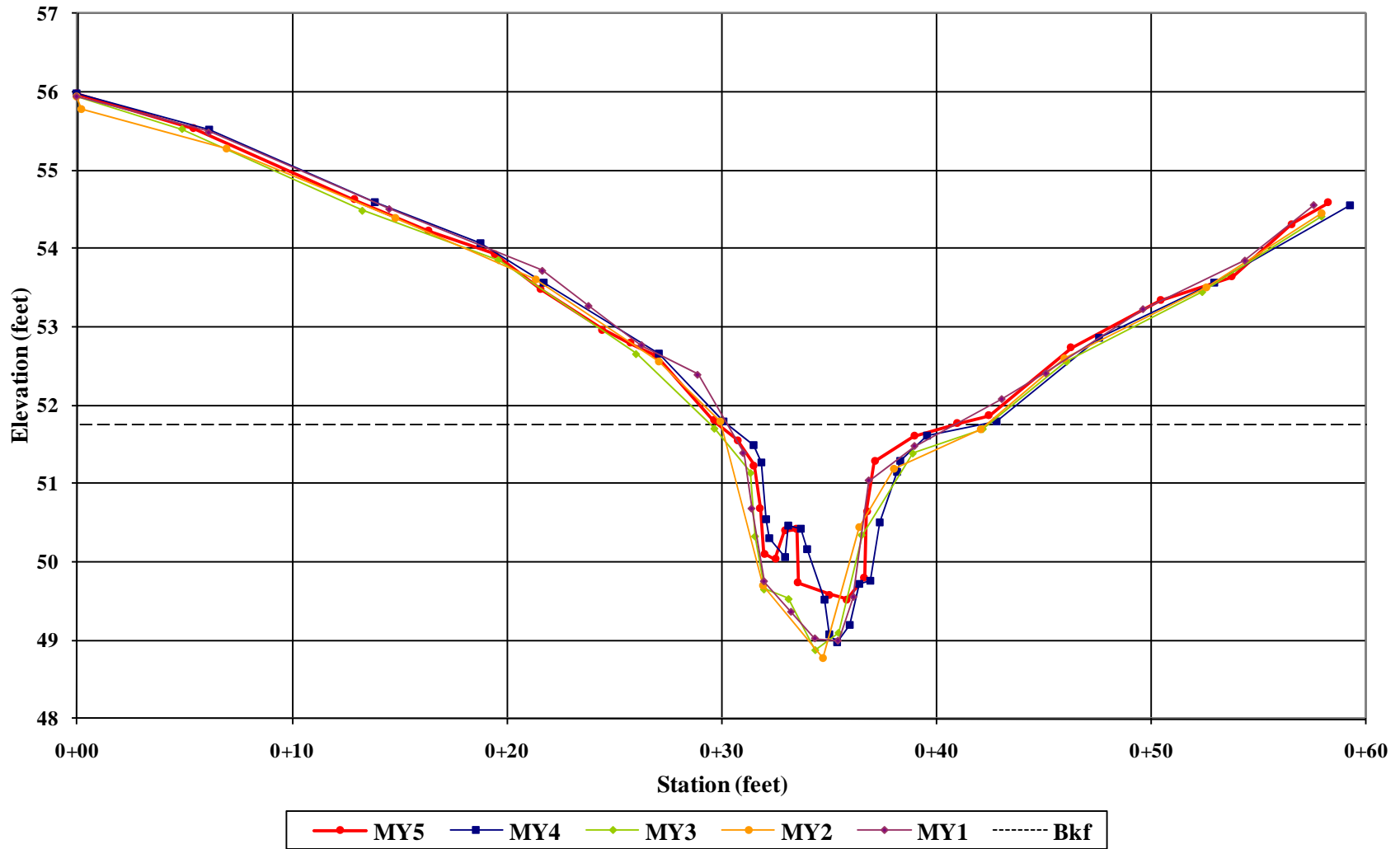
*As-built numbers were unknown. Numbers provided were established based on visual field assessment.

Table 9. Verification of Bankfull Events Trout Cove Branch / Project No. 388			
Date of Data Collection	Date of Occurrence	Method	Photo # (if available)
2006	Unknown	Wrack lines, stained vegetation, displaced/flattened vegetation, and sediment deposition	
2007	Unknown	Wrack lines, stained vegetation, displaced/flattened vegetation, and sediment deposition	
6/27/08	Unknown	Crest gauge & wrack lines	
4/9/09	Unknown	Crest gauge & wrack lines	
11/6/09	Unknown	Crest gauge & wrack lines	

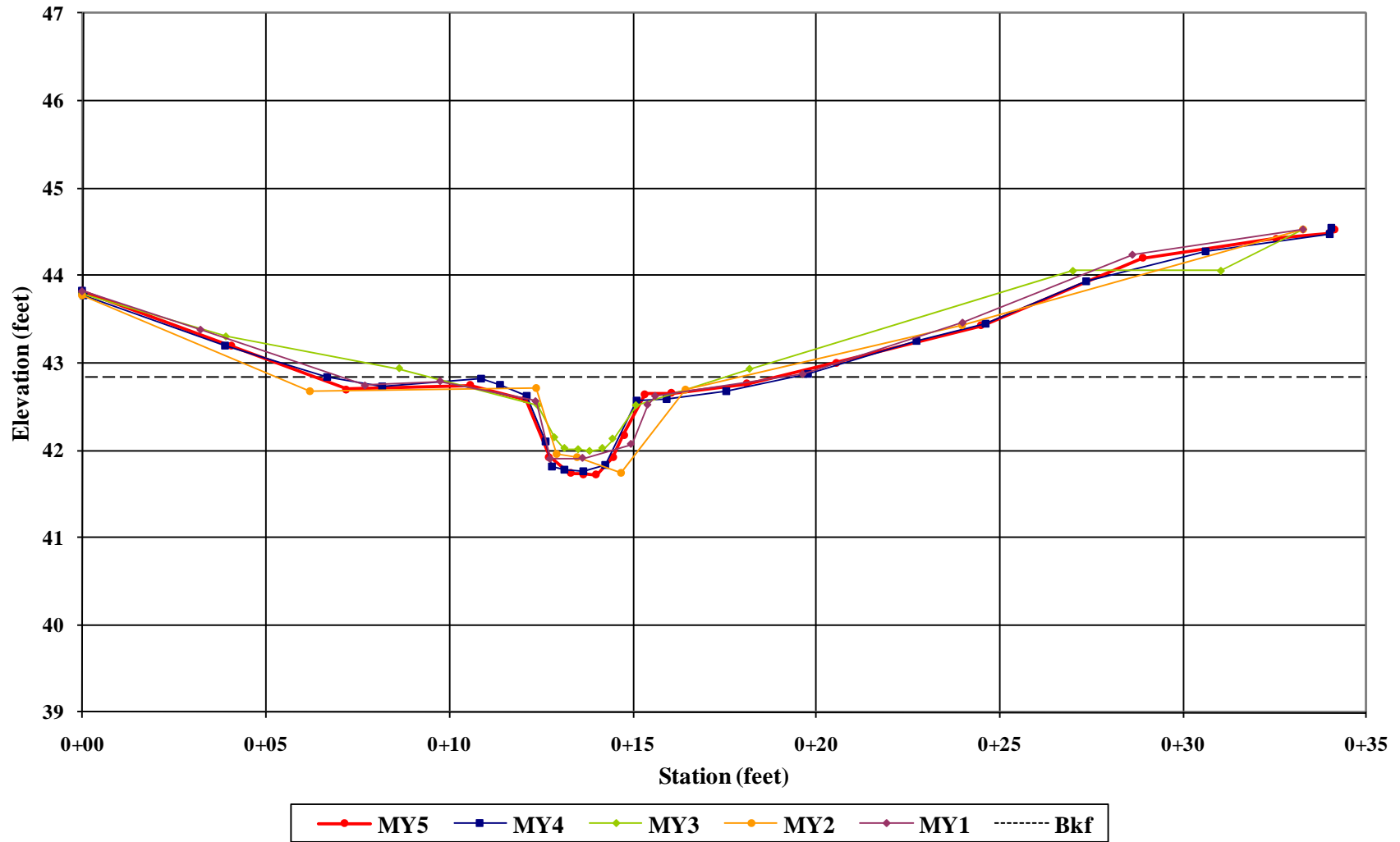
**Trout Cove Branch
Cross-Section #1 - Pool
April 9, 2009**



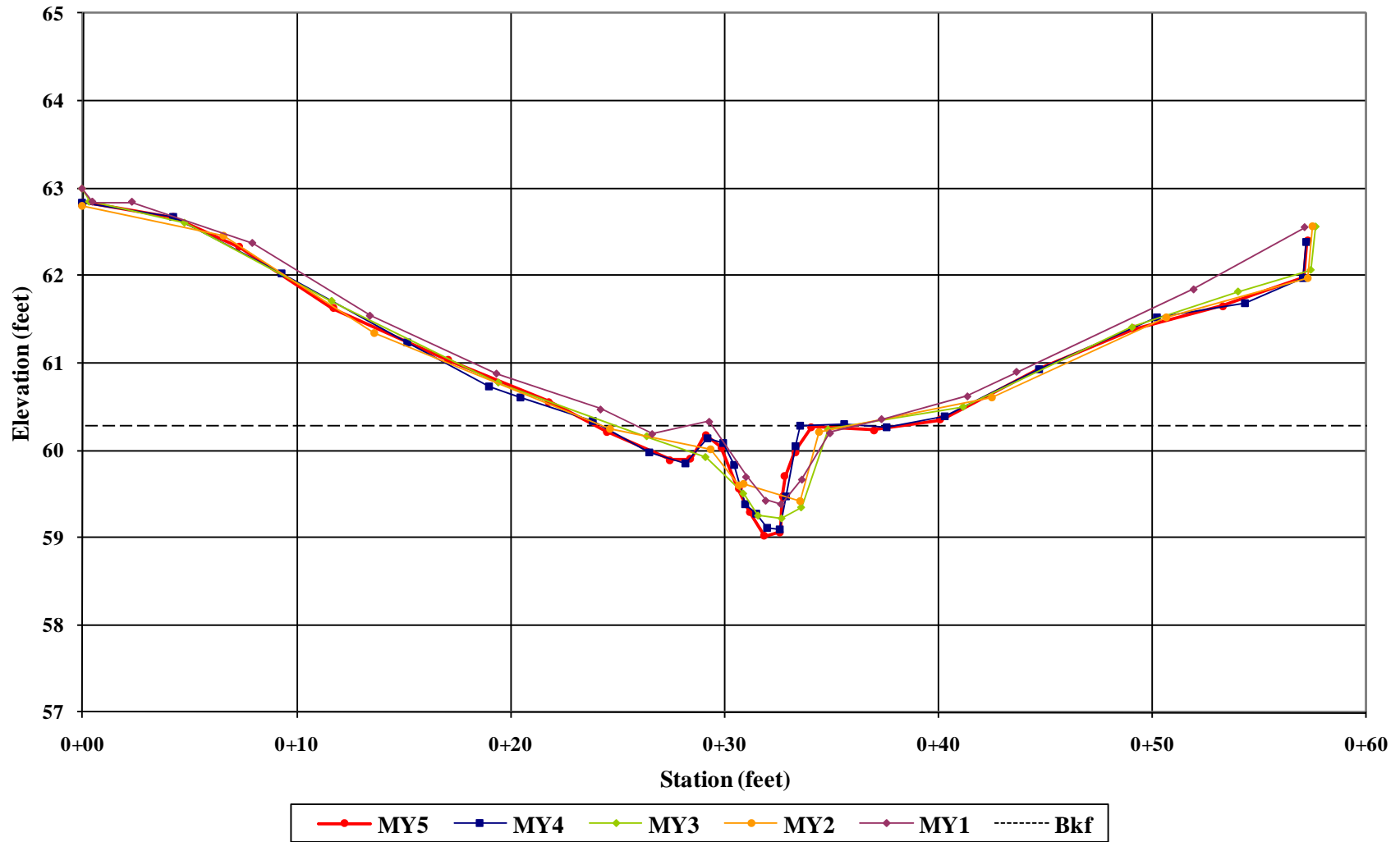
Trout Cove Branch Cross-Section #2 - Pool April 9, 2009



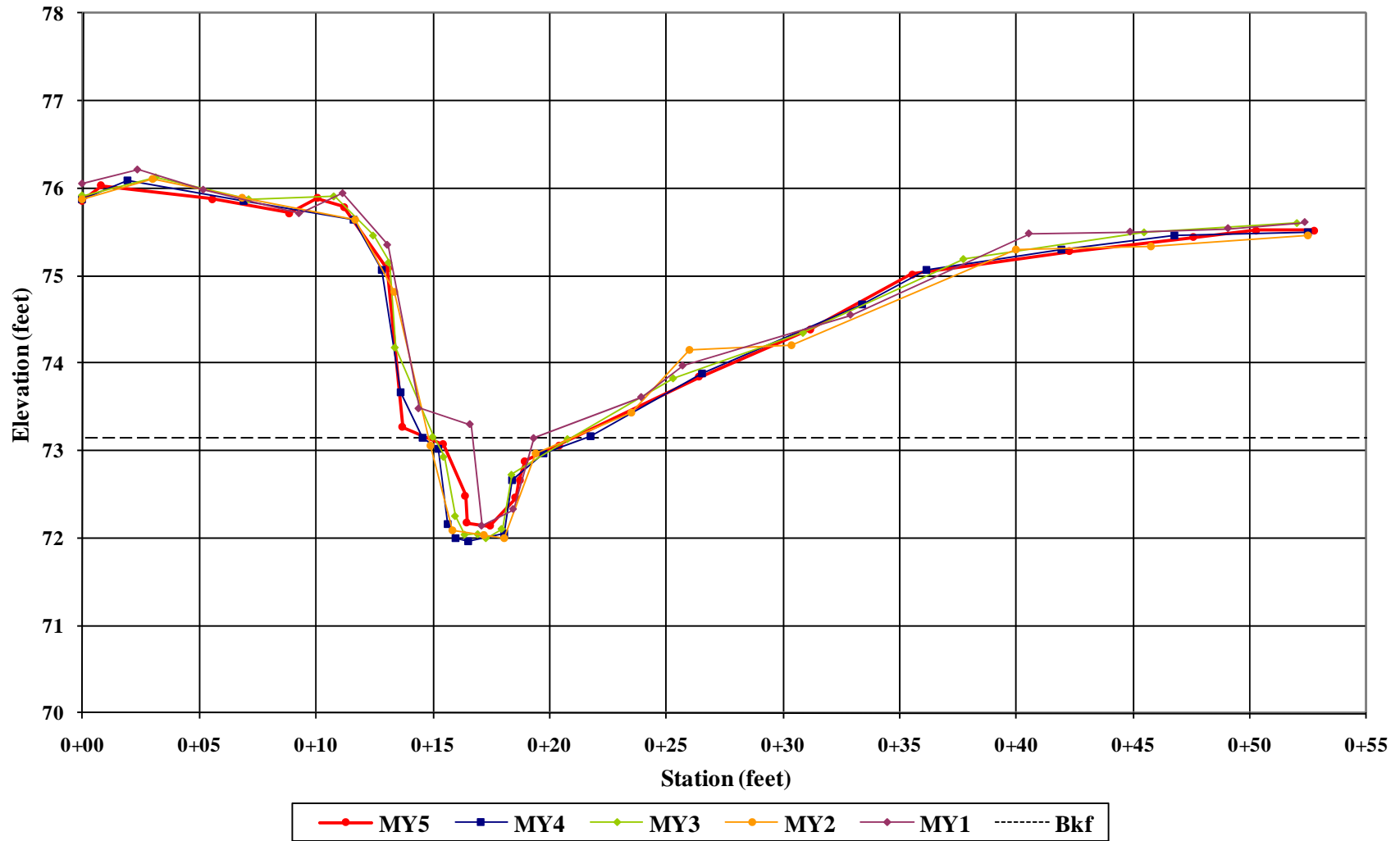
**Trout Cove Branch
Cross-Section #3 - Riffle
April 8, 2009**



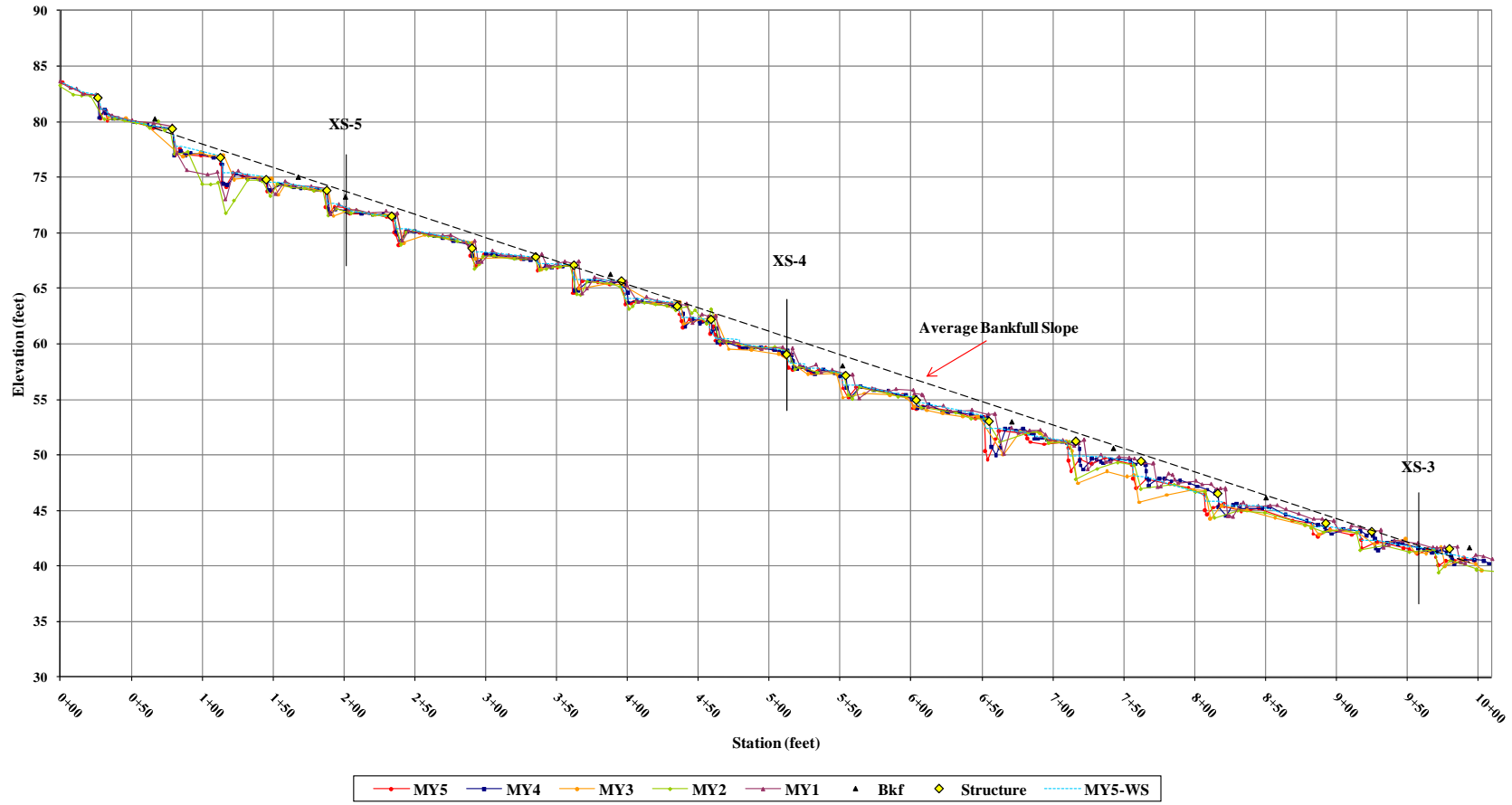
**Trout Cove Branch
Cross-Section #4 - Riffle
April 8, 2009**



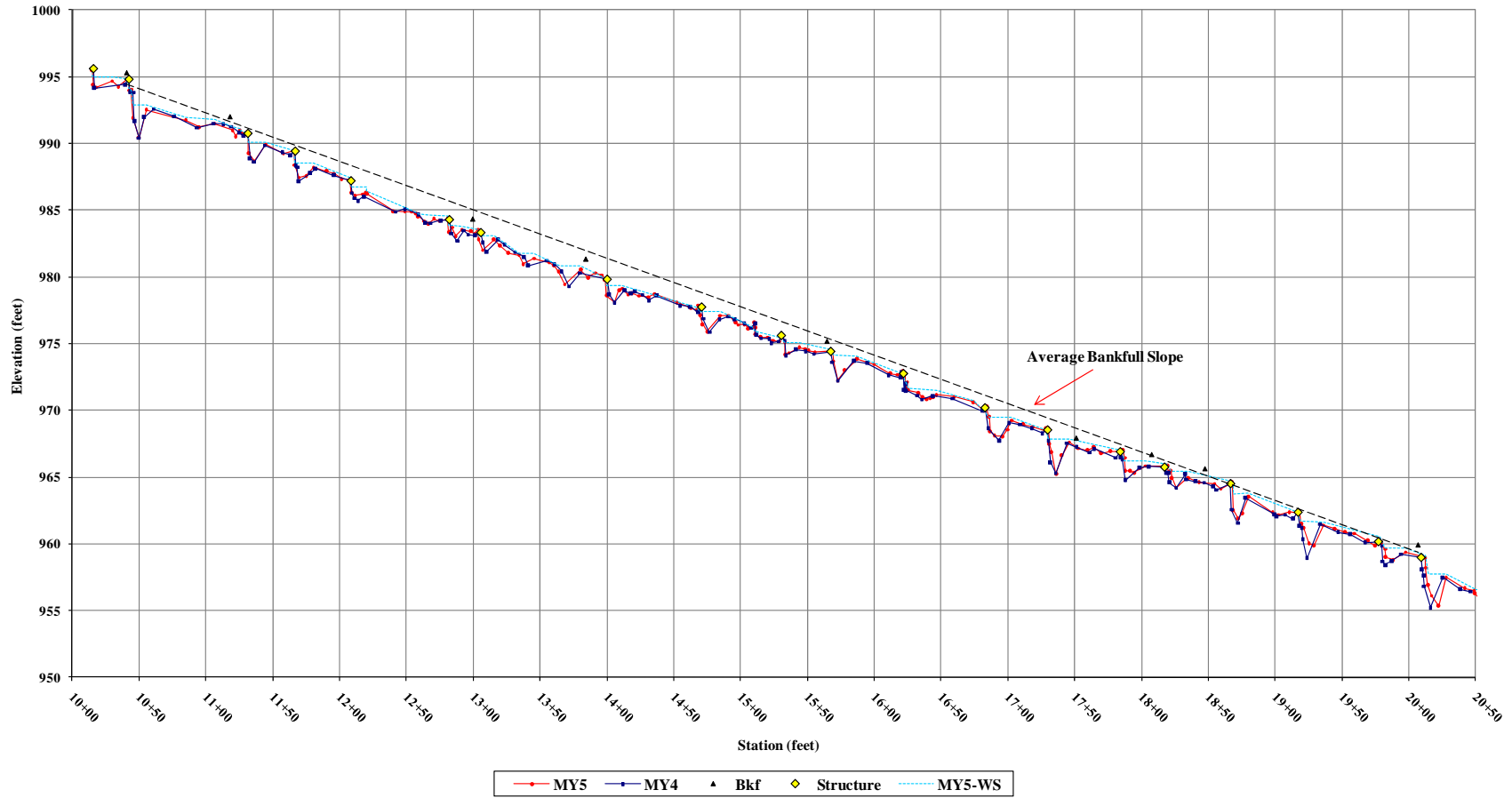
**Trout Cove Branch
Cross-Section #5 - Riffle
April 8, 2009**



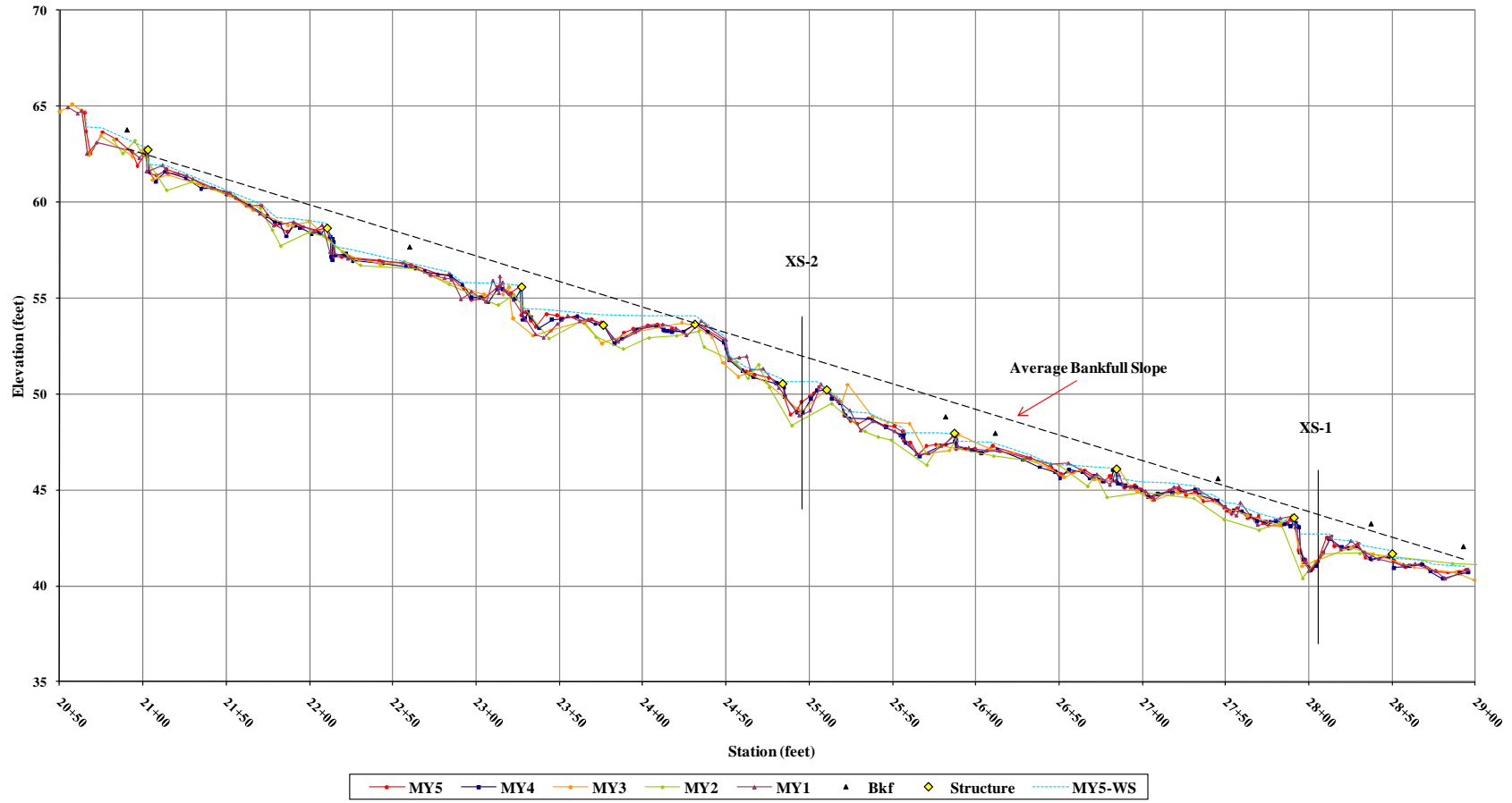
Trout Cove Branch
Longitudinal Profile - Upper Reach
April 8, 2009



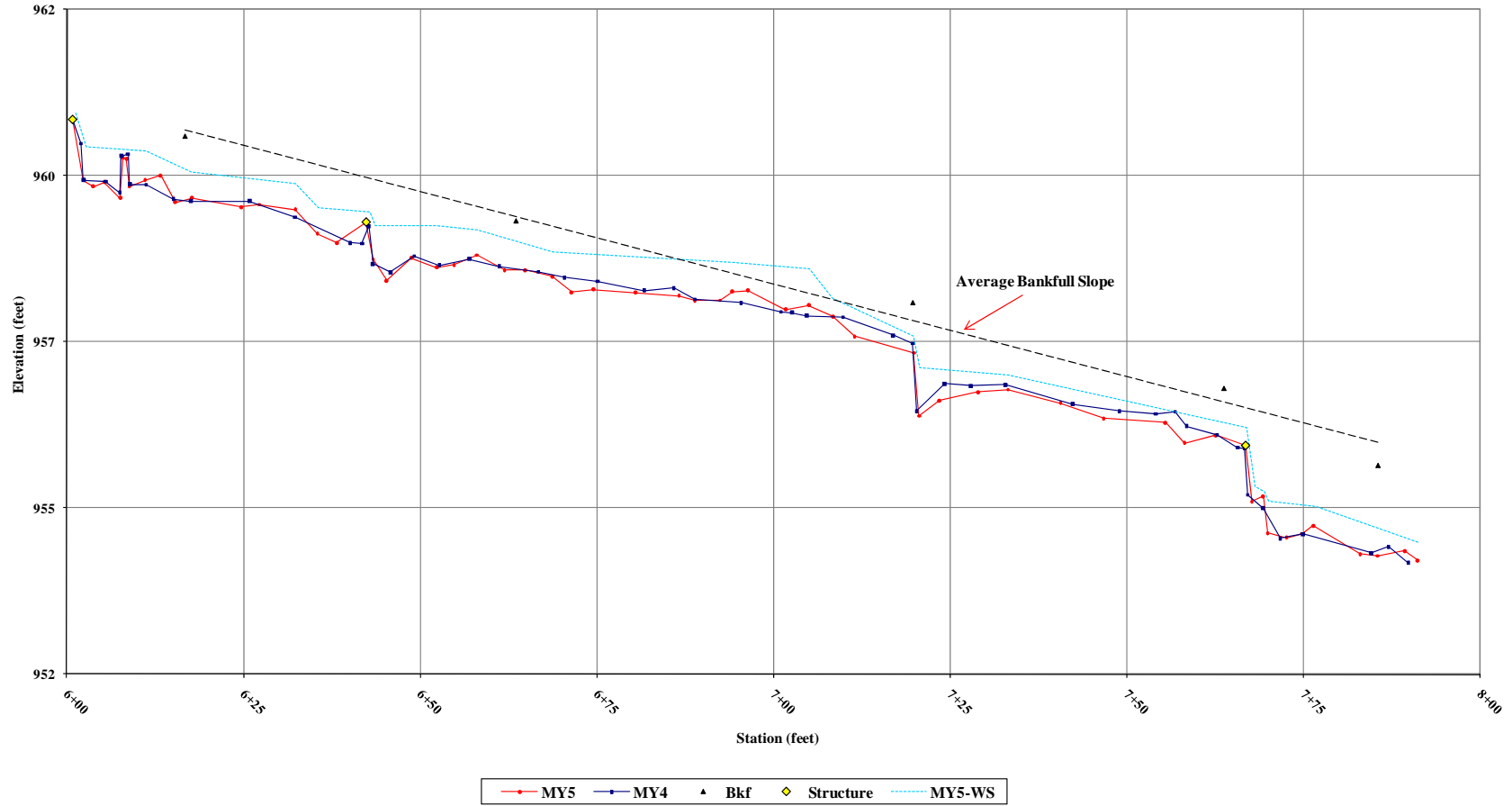
Trout Cove Branch
Longitudinal Profile - Middle Reach
April 9, 2009



Trout Cove Branch
 Longitudinal Profile - Lower Reach
 April 9, 2009



Trout Cove Branch
Longitudinal Profile - Tributary Reach
April 10, 2009



Appendix C
Vegetation Assessment Data
Electronic Submission



Vegetation Problem Area (VPA 1) – Mowed Floodplain
Monitoring Year 5 – April 8, 2009



Vegetation Problem Area (VPA 2) – Livestock Encroachment
Monitoring Year 5 – November 6, 2009



Vegetation Problem Area (VPA 3) – Invasive / Exotic Population
Monitoring Year 5 – April 10, 2009

Vegetation Problem Areas			
Trout Cove Branch / Project No. 388			
Feature Issue	Station Numbers	Suspected Cause	Photo Number
Bare Bench	See CCPV	Poor soil substrate	N/A
	See CCPV	Poor soil substrate	
Mowed Floodplain	See CCPV	Unauthorized mowing	VPA 1
	See CCPV	Unauthorized mowing	
Livestock Encroachment	See CCPV	Exclusion fence within easement boundary	VPA 2
Invasive / Exotic Populations	See CCPV	<i>Rosa multiflora</i> : On site seed source	VPA 3
	See CCPV	<i>Lonicera japonica</i> : On site seed source	
	See CCPV	<i>Ligustrum sp</i> : On site seed source	

Appendix D
Stream Assessment Data
Electronic Submission

Baseline Morphology and Hydraulic Monitoring Summary																		
Trout Cove Branch / Project No. 388																		
Trout Cove Branch / Upstream from Confluence of Unnamed Tributary																		
Parameter	USGS Gauge Data			Regional Curve Interval			Pre-Existing Condition			Project Reference Stream			Design			As-built		
	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
Dimension																		
BF Width (ft)	-	-	108.0	-	-	-	5.2	22.5	10.4	24.9	34.1	29.5	-	-	14.8	-	-	-
Floodprone Width (ft)	-	-	-	-	-	-	10.6	30.0	19.4	40.0	50.0	45.0	20.7	32.6	26.6	-	-	-
BF Cross Sectional Area (ft ²)	-	-	498.0	-	-	-	4.5	13.9	7.8	34.3	42.4	38.4	-	-	9.7	-	-	-
BF Mean Depth (ft)	-	-	4.6	-	-	-	0.6	0.9	0.7	1.2	1.4	1.3	-	-	0.6	-	-	-
BF Max Depth (ft)	-	-	-	-	-	-	0.8	2.9	1.8	1.8	2.0	1.9	1.1	1.2	1.1	-	-	-
Width/Depth Ratio	-	-	23.5	-	-	-	6.0	36.4	14.0	19.2	26.2	22.7	-	-	22.7	-	-	-
Entrenchment Ratio	-	-	-	-	-	-	1.0	2.9	1.9	1.4	1.7	1.6	1.4	2.2	-	-	-	-
Bank Height Ratio	-	-	-	-	-	-	1.0	3.5	1.8	-	-	1.0	-	-	1.0	-	-	-
Wetted Perimeter (ft)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hydraulic Radius (ft)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pattern																		
Channel Beltwidth (ft)	-	-	-	-	-	-	60.0	135.0	111.3	66.0	87.0	76.5	33.4	44.1	39.5	-	-	-
Radius of Curvature (ft)	-	-	-	-	-	-	114.0	860.0	491.0	54.0	147.0	84.3	26.6	74.0	50.3	-	-	-
Meander Wavelength (ft)	-	-	-	-	-	-	1100.0	1525.0	1292.0	195.0	225.0	210.0	97.7	112.5	105.1	-	-	-
Meander Width Ratio	-	-	-	-	-	-	5.7	12.9	10.7	2.2	2.9	2.6	2.2	2.9	2.6	-	-	-
Profile																		
Riffle Length (ft)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Riffle Slope (ft/ft)	-	-	-	-	-	-	0.018	0.206	0.061	0.023	0.049	0.041	0.012	0.023	0.023	-	-	-
Pool Length (ft)	-	-	-	-	-	-	1.9	20.1	9.6	2.9	23.6	11.8	1.5	12.1	6.1	-	-	-
Pool Spacing (ft)	-	-	-	-	-	-	19.7	186.7	86.4	10.8	118.1	59.1	4.6	53.2	28.9	-	-	-
Substrate																		
d50 (mm)	-	-	-	-	-	-	0.3 mm	-	-	20.0 mm	-	-	-	-	-	-	-	-
d84 (mm)	-	-	-	-	-	-	33.0 mm	-	-	120.0 mm	-	-	-	-	-	-	-	-
Additional Reach Parameters																		
Valley Length (ft)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Channel Length (ft)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sinuosity	-	-	-	-	-	-	1.09	-	-	1.14	-	-	1.03	-	-	-	-	-
Water Surface Slope (ft/ft)	-	-	-	-	-	-	0.037	-	-	0.044	-	-	0.023	-	-	-	-	-
BF Slope (ft/ft)	-	-	-	-	-	-	0.037	-	-	0.044	-	-	0.023	-	-	-	-	-
Rosgen Classification	-	-	-	-	-	-	B5	-	-	B4a	-	-	B5	-	-	-	-	-
Habitat Index	-	N/A	-	-	N/A	-	-	-	-	-	-	-	N/A	-	-	-	-	-
Macrobenthos	-	N/A	-	-	N/A	-	-	-	-	-	-	-	N/A	-	-	-	-	-

- Information unavailable.

N/A - Information does not apply.

Baseline Morphology and Hydraulic Monitoring Summary																		
Trout Cove Branch / Project No. 388																		
Trout Cove Branch / Downstream from Confluence of Unnamed Tributary																		
Parameter	USGS Gauge Data			Regional Curve Interval			Pre-Existing Condition			Project Reference Stream			Design			As-built		
	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
Dimension																		
BF Width (ft)	-	-	108.0	-	-	-	5.2	22.5	10.4	24.9	34.1	29.5	-	-	15.2	-	-	-
Floodprone Width (ft)	-	-	-	-	-	-	10.6	30.0	19.4	40.0	50.0	45.0	21.3	33.4	27.3	-	-	-
BF Cross Sectional Area (ft ²)	-	-	498.0	-	-	-	4.5	13.9	7.8	34.3	42.4	38.4	-	-	10.2	-	-	-
BF Mean Depth (ft)	-	-	4.6	-	-	-	0.62	0.86	0.74	1.2	1.4	1.3	-	-	0.7	-	-	-
BF Max Depth (ft)	-	-	-	-	-	-	0.8	2.9	1.8	1.8	2.0	1.9	1.8	2.0	1.9	-	-	-
Width/Depth Ratio	-	-	23.5	-	-	-	6.0	36.4	14.0	19.2	26.2	22.7	-	-	21.7	-	-	-
Entrenchment Ratio	-	-	-	-	-	-	1.0	2.9	1.9	1.4	1.7	1.6	1.4	2.2	-	-	-	-
Bank Height Ratio	-	-	-	-	-	-	1.0	3.5	1.8	-	-	1.0	-	-	1.0	-	-	-
Wetted Perimeter (ft)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hydraulic Radius (ft)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pattern																		
Channel Beltwidth (ft)	-	-	-	-	-	-	60.0	135.0	111.3	66.0	87.0	76.5	32.6	42.9	38.5	-	-	-
Radius of Curvature (ft)	-	-	-	-	-	-	114.0	860.0	491.0	54.0	147.0	84.3	27.4	76.0	51.9	-	-	-
Meander Wavelength (ft)	-	-	-	-	-	-	1100.0	1525.0	1292.0	195.0	225.0	210.0	100.3	115.5	107.9	-	-	-
Meander Width Ratio	-	-	-	-	-	-	5.7	12.9	10.7	2.2	2.9	2.6	2.2	2.9	2.6	-	-	-
Profile																		
Riffle Length (ft)	-	-	-	-	-	-				-	-	-				-	-	-
Riffle Slope (ft/ft)	-	-	-	-	-	-	0.018	0.206	0.061	0.023	0.049	0.041	0.019	0.046	0.039	-	-	-
Pool Length (ft)	-	-	-	-	-	-	1.9	20.1	9.6	2.7	23.1	11.2	1.3	10.4	5.2	-	-	-
Pool Spacing (ft)	-	-	-	-	-	-	19.7	186.7	86.4	10.8	118.1	59.1	4.4	51.8	28.1	-	-	-
Substrate																		
d50 (mm)	-	-	-	-	-	-		0.3 mm			20.0 mm			-			-	
d84 (mm)	-	-	-	-	-	-		33.0 mm			120.0 mm			-			-	
Additional Reach Parameters																		
Valley Length (ft)	-	-	-	-	-	-												
Channel Length (ft)	-	-	-	-	-	-												
Sinuosity	-	-	-	-	-	-		1.07			1.14			1.1				
Water Surface Slope (ft/ft)	-	-	-	-	-	-		0.041			0.044			0.039				
BF Slope (ft/ft)	-	-	-	-	-	-		0.041			0.044			0.039				
Rosgen Classification	-	-	-	-	-	-		B5			B4a			B5				
Habitat Index	-	N/A	-	-	N/A	-		-			-			N/A				
Macrobenthos	-	N/A	-	-	N/A	-		-			-			N/A				

- Information unavailable.

N/A - Information does not apply.

Baseline Morphology and Hydraulic Monitoring Summary																		
Trout Cove Branch / Project No. 388																		
Unnamed Tributary																		
Parameter	USGS Gauge Data			Regional Curve Interval			Pre-Existing Condition			Project Reference Stream			Design			As-built		
	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
Dimension																		
BF Width (ft)	-	-	108	-	-	-	2.6	7.5	5.3	24.9	34.1	29.5	-	-	7.0	-	-	-
Floodprone Width (ft)	-	-	-	-	-	-	5.2	25.0	15.6	40.0	50.0	45.0	9.8	15.4	12.6	-	-	-
BF Cross Sectional Area (ft ²)	-	-	498.0	-	-	-	2.2	3.3	2.9	34.3	42.4	38.4	-	-	3.2	-	-	-
BF Mean Depth (ft)	-	-	4.6	-	-	-	0.4	0.9	0.6	1.2	1.4	1.3	-	-	0.5	-	-	-
BF Max Depth (ft)	-	-	-	-	-	-	1.0	2.0	1.4	1.8	2.0	1.9	0.7	0.8	0.7	-	-	-
Width/Depth Ratio	-	-	23.5	-	-	-	3.0	17.0	9.5	19.2	26.2	22.7	-	-	15.0	-	-	-
Entrenchment Ratio	-	-	-	-	-	-	1.0	4.8	3.0	1.4	1.7	1.6	1.4	2.2	-	-	-	-
Bank Height Ratio	-	-	-	-	-	-	-	-	-	-	-	1.0	1.0	1.5	1.2	-	-	-
Wetted Perimeter (ft)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hydraulic Radius (ft)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pattern																		
Channel Beltwidth (ft)	-	-	-	-	-	-	-	-	26.0	66.0	87.0	76.5	-	-	26.0	-	-	-
Radius of Curvature (ft)	-	-	-	-	-	-	-	-	170.0	54.0	147.0	84.3	-	-	170.0	-	-	-
Meander Wavelength (ft)	-	-	-	-	-	-	-	-	-	195.0	225.0	210.0	-	-	-	-	-	-
Meander Width Ratio	-	-	-	-	-	-	-	-	4.9	2.2	2.9	2.6	-	-	3.7	-	-	-
Profile																		
Riffle Length (ft)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Riffle Slope (ft/ft)	-	-	-	-	-	-	0.033	0.077	0.052	0.023	0.049	0.041	0.024	0.058	0.049	-	-	-
Pool Length (ft)	-	-	-	-	-	-	17.9	29.2	23.5	2.7	23.1	11.2	0.7	5.6	2.8	-	-	-
Pool Spacing (ft)	-	-	-	-	-	-	76.6	253.7	165.1	108	118.1	59.1	2.1	24.5	13.3	-	-	-
Substrate																		
d50 (mm)	-	-	-	-	-	-	-	-	0.3 mm	-	-	20.0 mm	-	-	-	-	-	-
d84 (mm)	-	-	-	-	-	-	-	-	13.0 mm	-	-	120.0 mm	-	-	-	-	-	-
Additional Reach Parameters																		
Valley Length (ft)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Channel Length (ft)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sinuosity	-	-	-	-	-	-	-	-	1.06	-	-	1.14	-	-	1.04	-	-	-
Water Surface Slope (ft/ft)	-	-	-	-	-	-	-	-	0.048	-	-	0.044	-	-	0.049	-	-	-
BF Slope (ft/ft)	-	-	-	-	-	-	-	-	0.048	-	-	0.044	-	-	0.049	-	-	-
Rosgen Classification	-	-	-	-	-	-	-	-	C5/E5	-	-	B4a	-	-	B4a	-	-	-
Habitat Index	-	N/A	-	-	N/A	-	-	-	-	-	-	-	-	-	N/A	-	-	-
Macrobenthos	-	N/A	-	-	N/A	-	-	-	-	-	-	-	-	-	N/A	-	-	-

- Information unavailable.

N/A - Information does not apply.

Morphology and Hydraulic Monitoring Summary										
Trout Cove / Project No. 388										
Trout Cove Branch / Lower Reach (794 feet)										
Parameter	Cross Section 1					Cross Section 2				
	Pool					Pool				
Dimension	MY1	MY2	MY3	MY4	MY5	MY1	MY2	MY3	MY4	MY5
BF Width (ft)	-	15.69	10.96	11.60	12.20	-	9.60	6.79	12.50	11.20
Floodprone Width (ft)	-	54.22	32.41	30.70	26.00	-	50.00	28.13	45.50	45.50
BF Cross Sectional Area (ft ²)	-	11.21	17.63	20.70	21.80	-	10.02	8.78	12.40	11.10
BF Mean Depth (ft)	-	0.71	1.61	1.80	1.80	-	1.04	1.29	1.00	1.00
BF Max Depth (ft)	-	2.35	2.22	2.70	3.00	-	2.30	2.19	2.80	2.20
Width/Depth Ratio	-	22.10	6.81	6.50	6.80	-	9.23	5.26	12.60	11.30
Entrenchment Ratio	-	3.46	2.96	2.60	2.10	-	5.21	4.15	3.60	4.10
Bank Height Ratio	-	1.04	1.08	1.00	1.00	-	1.20	1.26	1.00	1.00
Wetted Perimeter(ft)	-	16.93	12.77	13.70	14.70	-	10.88	8.64	15.30	14.00
Hydraulic Radius (ft)	-	0.66	1.38	1.50	1.50	-	0.92	1.02	0.80	0.80
Substrate										
d50 (mm)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
d84 (mm)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

- Information unavailable.

N/A - Does not apply to this project.

Morphology and Hydraulic Monitoring Summary															
Trout Cove / Project No. 388															
Trout Cove Branch / Upper Reach (983 feet)															
Parameter	Cross Section 3					Cross Section 4					Cross Section 5				
	Riffle					Riffle					Riffle				
Dimension	MY1	MY2	MY3	MY4	MY5	MY1	MY2	MY3	MY4	MY5	MY1	MY2	MY3	MY4	MY5
BF Width (ft)	-	18.63	15.52	12.60	12.60	-	23.33	21.64	11.50	14.00	-	12.47	11.13	7.00	6.10
Floodprone Width (ft)	-	50.00	32.93	>27.3	>28.0	-	50.00	48.58	36.40	38.80	-	50.00	39.88	17.30	15.60
BF Cross Sectional Area (ft ²)	-	10.10	7.16	3.60	3.90	-	10.30	11.35	4.20	4.40	-	10.07	8.85	3.90	2.70
BF Mean Depth (ft)	-	0.54	0.46	0.30	0.30	-	0.46	0.52	0.40	0.30	-	0.81	0.80	0.60	0.40
BF Max Depth (ft)	-	1.48	1.23	1.10	1.10	-	1.22	1.43	1.20	1.30	-	1.81	1.80	1.20	1.00
Width/Depth Ratio	-	34.50	33.74	44.60	41.10	-	48.54	41.62	31.00	44.40	-	15.40	13.91	12.40	13.60
Entrenchment Ratio	-	2.68	2.12	>2.2	>2.2	-	2.24	2.25	3.20	2.80	-	4.01	3.58	2.50	2.60
Bank Height Ratio	-	1.54	1.59	1.00	1.00	-	1.06	1.08	1.00	1.00	-	1.49	1.52	1.00	1.00
Wetted Perimeter(ft)	-	19.35	15.89	13.30	13.20	-	22.73	22.07	12.40	14.90	-	13.57	12.19	8.00	6.70
Hydraulic Radius (ft)	-	0.52	0.45	0.30	0.30	-	0.45	0.51	0.30	0.30	-	0.74	0.73	0.50	0.40
Substrate															
d50 (mm)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
d84 (mm)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

* Not calculated due to unknown as-built elevations.

N/A - Does not apply to this project.

Morphology and Hydraulic Monitoring Summary															
Trout Cove / Project No. 388															
Trout Cove Branch / Lower Reach (794 feet)															
Parameter	MY-01 (2005)			*MY-02 (2006)			*MY-03 (2007)			**MY-04 (2008)			**MY-05 (2009)		
Pattern	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med
Channel Beltwidth (ft)	-	-	-	24.28	84.50	45.88	22.06	80.88	47.35	21.79	65.15	55.31	22.80	76.90	55.10
Radius of Curvature (ft)	-	-	-	19.03	38.59	28.26	20.95	35.37	28.49	20.32	21.15	20.72	20.60	25.30	21.25
Meander Wavelength (ft)	-	-	-	87.75	135.06	103.88	57.00	124.64	90.36	69.93	123.80	111.14	86.20	127.00	117.50
Meander Width Ratio	-	-	-	3.93	6.05	4.65	3.25	11.91	6.97	N/A	N/A	N/A	N/A	N/A	N/A
Profile															
Riffle Length (ft)	-	-	-	-	-	-	4.69	7.98	5.98	3.30	69.80	34.40	8.22	60.13	34.12
***Riffle Slope (ft/ft)	-	-	-	0.087	0.073	0.041	0.024	0.097	0.066	0.023	0.052	0.034	0.009	0.066	0.034
Pool Length (ft)	-	-	-	4.34	30.09	14.39	4.75	22.33	11.98	7.20	35.90	18.90	9.86	56.79	24.19
Pool Spacing (ft)	-	-	-	11.29	105.54	52.21	29.94	87.91	57.62	12.20	90.80	53.40	21.29	78.68	39.31
Additional Reach Parameters															
Valley Length (ft)		-			1746			1746			736			736	
Channel Length (ft)		-			1876			1876			792			794	
Sinuosity		-			1.07			1.07			1.08			1.08	
Water Surface Slope (ft/ft)		-			0.041			0.041			0.026			0.029	
BF Slope (ft/ft)		-			0.041			0.041			0.027			0.027	
Rosgen Classification		-			C4b			C4b			C4b			C4b	
****Habitat Index		-			N/A			N/A			N/A			N/A	
****Macrobenthos		-			N/A			N/A			N/A			N/A	

* Calculations appear to be based on combined data sets from Lower and Upper Reaches.

** Calculations derived from Lower Reach data set.

*** The minimum riffle slope data reported for MY 1 is greater than the max and median numbers reported.

**** Inclusion is project specific and determined primarily by as-built monitoring plan/success criteria.

- Information unavailable.

N/A - Does not apply to this project.

Morphology and Hydraulic Monitoring Summary															
Trout Cove / Project No. 388															
Trout Cove Branch / Middle Reach (1,030 feet)															
Parameter	MY-01 (2005)			MY-02 (2006)			MY-03 (2007)			MY-04 (2008)			MY-05 (2009)		
Pattern	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med
Channel Beltwidth (ft)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	25.09	67.64	43.51	16.60	59.70	47.90
Radius of Curvature (ft)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	19.09	43.34	23.99	15.00	52.80	26.25
Meander Wavelength (ft)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	80.41	130.17	95.24	69.70	124.50	96.60
Meander Width Ratio	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Profile															
Riffle Length (ft)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	6.80	70.50	31.00	11.89	56.96	25.38
Riffle Slope (ft/ft)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.030	0.044	0.038	0.019	0.070	0.036
Pool Length (ft)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	9.30	23.30	15.10	10.71	25.06	15.69
Pool Spacing (ft)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	23.40	88.90	46.00	20.11	66.64	40.66
Additional Reach Parameters															
Valley Length (ft)		N/A			N/A			N/A			919			919	
Channel Length (ft)		N/A			N/A			N/A			1030			1034	
Sinuosity		N/A			N/A			N/A			1.12			1.13	
Water Surface Slope (ft/ft)		N/A			N/A			N/A			0.036			0.037	
BF Slope (ft/ft)		N/A			N/A			N/A			0.037			0.036	
Rosgen Classification		N/A			N/A			N/A			C4b			C4b	
*Habitat Index		N/A			N/A			N/A			N/A			N/A	
*Macrobenthos		N/A			N/A			N/A			N/A			N/A	

* Inclusion is project specific and determined primarily by As-built monitoring plan/success criteria.

N/A - Does not apply to this project.

Morphology and Hydraulic Monitoring Summary															
Trout Cove / Project No. 388															
Trout Cove Branch / Upper Reach (983 feet)															
Parameter	MY-01 (2005)			*MY-02 (2006)			*MY-03 (2007)			**MY-04 (2008)			**MY-05 (2009)		
Pattern	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med
Channel Beltwidth (ft)	-	-	-	24.28	84.50	45.88	22.06	80.88	47.35	12.55	60.16	36.60	13.70	64.30	37.30
Radius of Curvature (ft)	-	-	-	19.03	38.59	28.26	20.95	35.37	28.49	19.87	57.66	31.58	16.35	55.25	30.08
Meander Wavelength (ft)	-	-	-	87.75	135.06	103.88	57.00	124.64	90.36	71.99	110.81	98.98	78.40	110.70	96.70
Meander Width Ratio	-	-	-	3.93	6.05	4.65	3.25	11.91	6.97	2.90	5.23	3.18	2.66	6.11	2.96
Profile															
Riffle Length (ft)	-	-	-	-	-	-	4.69	7.98	5.98	13.20	63.30	34.80	13.84	47.81	36.62
Riffle Slope (ft/ft)	-	-	-	0.087	0.073	0.041	0.020	0.096	0.065	**	*****	*****	0.012	0.053	0.026
Pool Length (ft)	-	-	-	4.34	30.09	14.39	4.75	22.33	11.98	5.90	14.90	10.60	5.24	38.12	10.15
Pool Spacing (ft)	-	-	-	11.29	105.54	52.21	29.94	87.91	57.62	22.20	77.40	45.50	24.85	78.40	46.01
Additional Reach Parameters															
Valley Length (ft)	-	-	-		1746			1746			881			881.00	
Channel Length (ft)	-	-	-		1876			1876			982			971.00	
Sinuosity	-	-	-		1.07			1.07			1.11			1.10	
Water Surface Slope (ft/ft)	-	-	-		0.041			0.041			*****			0.043	
BF Slope (ft/ft)	-	-	-		0.041			0.041			0.042			0.042	
Rosgen Classification	-	-	-		C4b			C4b			C4b			C4b	
****Habitat Index	-	-	-		N/A			N/A			N/A			N/A	
****Macrobenthos	-	-	-		N/A			N/A			N/A			N/A	

* Calculations appear to be based on combined data sets from Lower and Upper Reaches.

** Calculations derived from Upper Reach data set.

*** The minimum riffle slope data reported for MY 1 is greater than the max and median numbers reported.

**** Inclusion is project specific and determined primarily by As-built monitoring plan/success criteria.

***** No water in channel at time of survey preventing calculations.

- Information unavailable.

Morphology and Hydraulic Monitoring Summary															
Trout Cove / Project No. 388															
Trout Cove Branch / Unnamed Tributary (189 feet)															
Parameter	MY-01 (2005)			MY-02 (2006)			MY-03 (2007)			MY-04 (2008)			MY-05 (2009)		
Pattern	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med
Channel Beltwidth (ft)	-	-	-	N/A	N/A	N/A	N/A	N/A	N/A	3.22	5.79	4.53	3.30	6.70	5.15
Radius of Curvature (ft)	-	-	-	N/A	N/A	N/A	N/A	N/A	N/A	3.84	13.36	9.42	3.10	13.35	8.08
Meander Wavelength (ft)	-	-	-	N/A	N/A	N/A	N/A	N/A	N/A	14.00	36.33	30.42	15.60	13.35	32.50
Meander Width Ratio	-	-	-	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Profile															
Riffle Length (ft)	-	-	-	N/A	N/A	N/A	N/A	N/A	N/A	31.50	62.80	42.90	29.11	61.82	33.64
Riffle Slope (ft/ft)	-	-	-	N/A	N/A	N/A	N/A	N/A	N/A	*	*	*	0.0122	0.0374	0.0278
Pool Length (ft)	-	-	-	N/A	N/A	N/A	N/A	N/A	N/A	9.20	19.90	14.10	8.68	14.32	12.02
Pool Spacing (ft)	-	-	-	N/A	N/A	N/A	N/A	N/A	N/A	40.70	77.00	55.00	37.67	75.35	49.30
Additional Reach Parameters															
Valley Length (ft)	-	-	-		N/A			N/A			183			183.00	
Channel Length (ft)	-	-	-		N/A			N/A			189			190.00	
Sinuosity	-	-	-		N/A			N/A			1.03			1.04	
Water Surface Slope (ft/ft)	-	-	-		N/A			N/A			*			0.029	
BF Slope (ft/ft)	-	-	-		N/A			N/A			0.030			0.028	
Rosgen Classification	-	-	-		N/A			N/A			N/A			N/A	
**Habitat Index	-	-	-		N/A			N/A			N/A			N/A	
**Macrobenthos	-	-	-		N/A			N/A			N/A			N/A	

* No water in channel at time of survey preventing calculations.

** Inclusion is project specific and determined primarily by As-built monitoring plan/success criteria.

N/A - Does not apply to this project.



Stream Problem Area (SPA 1) – Pool Aggradation Associated with Stressed Structure
Monitoring Year 5 – April 8, 2009



Stream Problem Area (SPA 2) – Bank Erosion
Monitoring Year 5 – February 6, 2009



Stream Problem Area (SPA 3) – Stressed Structure
Monitoring Year 5 – February 6, 2009



Stream Problem Area (SPA 4) – Stressed Structure
Monitoring Year 5 – February 6, 2009



Stream Problem Area (SPA 5) – Small Headcut on Mainstem
Monitoring Year 5 – November 6, 2009



Stream Problem Area (SPA 6) – Failed Structure on Unnamed Tributary
Monitoring Year 5 – February 6, 2009



Stream Problem Area (SPA 7) – Small Headcut on Unnamed Tributary
Monitoring Year 5 – April 10, 2009

Stream Problem Areas Trout Cove Branch / Project No. 388 Trout Cove Branch / Reach 1 (3,120 feet)			
Feature Issue	Station Numbers	Suspected Cause	Photo Number
Aggradation	0+36	Minimal flow to transport sediment from upstream source	SPA 1
	0+95	Stressed structure preventing downstream pool scour	
	1+45	Failed structure preventing downstream pool scour	
	1+90	Minimal flow to transport sediment from upstream source	
	3+55	Failed structure preventing downstream pool scour	
	4+05	Minimal flow to transport sediment from upstream source	
	4+35	Minimal flow to transport sediment from upstream source	
	4+60	Failed structure preventing downstream pool scour	
	5+10	Stressed structure preventing downstream pool scour	
	6+00	Minimal flow to transport sediment from upstream source	
	11+25	Minimal flow to transport sediment from upstream source	
	16+30	Failed structure preventing downstream pool scour	
	22+26	Stressed structure preventing downstream pool scour	
	23+30	Stressed structure preventing downstream pool scour	
	23+82	Failed structure preventing downstream pool scour	
	24+55	Stressed structure preventing downstream pool scour	
26+03	Stressed structure preventing downstream pool scour		
26+98	Stressed structure preventing downstream pool scour		
28+55	Failed structure preventing downstream pool scour		
Bank Scour	1+05	Thalweg migration associated with stressed structure	SPA 2
	1+50	Thalweg migration associated with failing structure	
	8+18	Undercutting causing bank to slump	
	9+60	Undercutting causing bank to slump	
	13+37	Undercutting causing bank to slump	
	15+20	Thalweg migration associated with failing structure	
28+10	Thalweg migration associated with stressed structure		
Engineered Structures	0+85	Structure piping	SPA 3 SPA 4
	1+36	Structure piping	
	2+30	Structure piping	
	2+85	Structure piping	
	3+30	Structure piping	
	3+50	Structure piping	
	4+25	Structure piping	
	4+54	Structure piping	
	5+05	Structure piping	
	8+80	Structure piping	
	11+20	Structure piping	
	12+68	Structure piping	
	12+80	Structure piping	
	14+10	Structure piping	
	14+70	Structure piping	
	15+10	Structure piping	
	15+30	Structure piping	
	16+25	Structure piping	
	16+85	Structure piping	
	17+40	Structure piping	
	21+14	Structure piping	
	22+20	Structure piping	
	23+25	Structure piping	
23+78	Structure piping		
24+50	Structure piping		
25+55	Structure piping		
25+98	Structure piping		
26+91	Structure piping		
27+95	Structure piping		
28+50	Structure piping		
29+75	Structure piping		
Headcut	5+75	Unknown	SPA 5
	6+75	Unknown	

Stream Problem Areas			
Trout Cove Branch / Project No. 388			
Unnamed Tributary / Reach 2 (888 feet)			
Feature Issue	Station Numbers	Suspected Cause	Photo Number
Engineered Structure	0+90	Structure piping	SPA 6
	2+35	Structure piping	
	3+85	Structure piping	
	4+58	Structure piping	
	4+87	Structure piping	
Headcut	3+60	Unknown	SPA 7
	7+14	Unknown	