YEAR 5 (2012)
ANNUAL MONITORING REPORT

CANE CREEK RESTORATION SITE

RUTHERFORD COUNTY, NORTH CAROLINA

(CONTRACT D06027-E)
FULL DELIVERY PROJECT
BROAD RIVER BASIN
CATALOGING UNIT 03050105

Prepared for:

NORTH CAROLINA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
RALEIGH, NORTH CAROLINA

Prepared by:

Restoration Systems, LLC
1101 Haynes Street, Suite 211
Raleigh, North Carolina 27604

And

Axiom Environmental, Inc.
218 Snow Avenue
Raleigh, North Carolina 27603

November 2012

EXECUTIVE SUMMARY

Restoration Systems has completed restoration of streams and wetlands at the Cane Creek Stream and Wetland Restoration Site to assist the North Carolina Ecosystem Enhancement Program in fulfilling stream and wetland mitigation goals. The Site is located in northern Rutherford County less than 0.2 mile south of the Rutherford/McDowell County line along the eastern edge of Highway 64. The Site is located in United States Geological Survey (USGS) Hydrologic Unit 03050105060020 (North Carolina Division of Water Quality Subbasin 03-08-02) of the Broad River Basin and will service the USGS 8-digit Cataloging Unit (CU) 03050105. The Site is not located in a Targeted Local Watershed. This report serves as the Year 5 (2012) annual monitoring report.

Primary activities at the Site included 1) stream restoration, 2) stream enhancement, 3) stream preservation, 4) wetland restoration, 5) soil scarification, and 6) plant community restoration. Project restoration efforts provide a minimum of 6748 Stream Mitigation Units, 4.4 riverine Wetland Mitigation Units, and 5.0 nonriverine Wetland Mitigation Units as outlined in the March 2006 Technical Proposal.

Fifteen vegetation plots (10 meters by 10 meters in size) were established and permanently monumented. These plots were initially surveyed in July 2012 for the Year 5 (2012) monitoring season and revisited again in October of 2012 due to additional guidance provided by the EEP. No changes in the monitoring plots were observed. Vegetation sampling across the Site was above the required average density with 618 planted stems per acre surviving. All individual plots with the exception of Plot 1 and Plot 13 met success criteria based on planted stems alone; however, when including appropriate natural recruits such as *Acer negundo*, *Fraxinus pennsylvanica*, and *Platanus occidentalis* in Plot 1 and *Acer negundo*, *Cercis canadensis*, *Diospyros virginiana*, *Juglans nigra*, and *Liriodendron tulipifera* in Plot 13 these plots were well-above success criteria with 1133 and 2428 stems per acre, respectively.

Twenty cross-sections and longitudinal profiles within five 600-foot reaches (3000 linear feet total) were measured for the Year 5 (2012) monitoring period. As a whole, monitoring measurements indicate that there have been minimal changes in both longitudinal profile and cross-sections as compared to as-built data. The as-built channel geometry compares favorably with the emulated, stable E/C type stream reach as set forth in the detailed mitigation plan and construction plans. Current monitoring has demonstrated dimension, pattern, and profile were stable over the course of the monitoring period. One stream problem area was noted within the Site during the Year 3 (2010) monitoring year. Clearing of land and subsequent erosion upstream of the Site has resulted in sediment input into the upper reaches of Tributary 2. Remedial actions are not recommended at this time; however, close monitoring of Tributary 2 will continue to occur.

One of the five monitored gauges (Gauge 5) within restoration areas was inundated/saturated within 12 inches of the surface for greater than 5 percent of the growing season, which extends from April 4 to November 6 (217 days).

TABLE OF CONTENTS

FIGURES

TABLES

APPENDICES

1.0 PROJECT BACKGROUND

1.1 Location and Setting

Restoration Systems, L.L.C. (Restoration Systems) has completed restoration of streams and wetlands at the Cane Creek Stream and Wetland Restoration Site (hereafter referred to as the "Site") to assist the North Carolina Ecosystem Enhancement Program (EEP) in fulfilling stream and wetland mitigation goals. The Site is located in northern Rutherford County less than 0.2 mile south of the Rutherford/McDowell County line along the eastern edge of Highway 64. The Site is located in United States Geological Survey (USGS) Hydrologic Unit (HU) 03050105060020 (North Carolina Division of Water Quality [NCDWQ] Subbasin 03-08-02) of the Broad River Basin and will service USGS 8-digit Cataloging Unit (CU) 03050105. The Site is not located in a Targeted Local Watershed.

Directions to the Site from Rutherfordton, North Carolina, are as follows:

- Travel northeast on Highway 64 for approximately 15 miles
- The Site is on the right ~ 0.2 miles south of the Rutherford and McDowell County lines.

1.2 Project Objectives

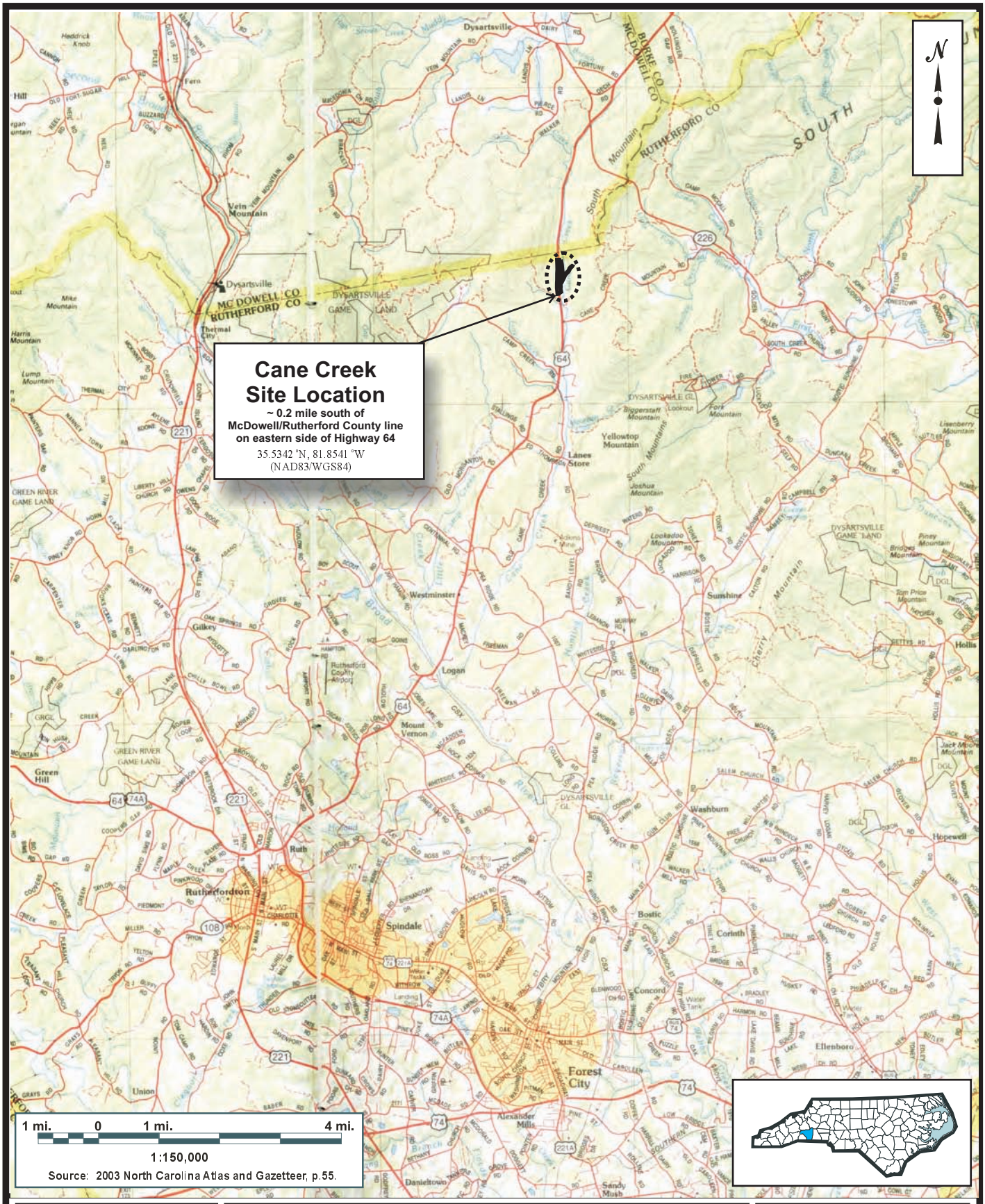
The primary components of the restoration project included 1) construction of a stable, riffle-pool stream channel; 2) enhancement of water quality functions within, upstream, and downstream of the Site; 3) creation of a natural vegetated buffer along restored stream channels; 4) restoration of jurisdictional riverine and nonriverine wetlands in the Site; 5) improvement of aquatic habitat and species diversity by enhancing stream bed variability; and 6) restoration of wildlife functions associated with a riparian corridor/stable stream.

1.3 Project Structure, Restoration Type, and Approach

An approximately 43.5-acre conservation easement was placed on the Site to incorporate all restoration activities. The Site contains 9.4 acres of hydric soil, Cane Creek, three unnamed tributaries to Cane Creek, and adjacent floodplains. An undisturbed preservation reach located on the upper extents of Tributary 1 within the Site was utilized as the reference reach. Prior to implementation, the Site was characterized by agricultural land utilized primarily for row crop and hay production. Riparian vegetation adjacent to Site streams was sparse and disturbed due to plowing and regular maintenance, and row crop areas were subject to broadcast application of various agricultural chemicals.

Restoration, enhancement, and preservation of Site streams and wetlands will result in positive benefits for water quality and biological diversity in the Cane Creek watershed. Targeted mitigation efforts focused on improving water quality, enhancing flood attenuation, and restoring aquatic and riparian habitat and were accomplished by:

1. Removing nonpoint and point sources of pollution associated with agricultural practices including a) cessation of broadcasting fertilizer, pesticides, and other agricultural chemicals into and adjacent to the Site and b) provide a forested riparian buffer to treat surface runoff.
2. Reducing sedimentation within onsite and downstream receiving waters by a) reducing bank erosion associated with vegetation maintenance and agricultural plowing up to Site streams, and b) planting a forested riparian buffer adjacent to Site streams.
3. Reestablishing stream stability and the capacity to transport watershed flows and sediment loads by restoring a stable dimension, pattern, and profile supported by natural in-stream habitat and grade/bank stabilization structures.



Axiom Environmental, Inc.
20 Enterprise Stree, Suite 7
Raleigh, NC 27607
(919) 215-1693

SITE LOCATION
CANE CREEK RESTORATION SITE
Rutherford County, North Carolina

Dwn. by: CLF	FIGURE 1
Date: April 2007	
Project: 06-022	

4. Promoting floodwater attenuation by a) reconnecting bankfull stream flows to the abandoned floodplain terrace; b) restoring secondary, dredged, straightened, and entrenched tributaries, thereby reducing floodwater velocities within smaller catchment basins; and c) revegetating Site floodplains to increase frictional resistance on floodwaters.
5. Restoring onsite wetlands, thereby promoting flood storage, nutrient cycling, and aquatic wildlife habitat.
6. Improving aquatic habitat with bed variability and the use of in-stream structures.
7. Providing a terrestrial wildlife corridor and refuge in an area that is developed for agricultural and timber production.
8. Providing connectivity to a State Nature Preserve northeast of the Site.

Table 1 describes the Site restoration structures and objectives, which have provided a minimum of 6748 Stream Mitigation Units, 4.4 riverine Wetland Mitigation Units, and 5.0 nonriverine Wetland Mitigation Units as outlined in the March 2006 Technical Proposal as follows.

- Restoration of 4600 linear feet of stream within three UTs to Cane Creek by constructing meandering channels.
- Enhancement of (level II) 5708 linear feet of Cane Creek.
- Preservation of 1506 linear feet of the upper reaches of an unnamed tributary to Cane Creek.
- Restore 4.4 acres of jurisdictional riverine wetland by reestablishing historic water table elevations.
- Restore 5.0 acres of jurisdictional nonriverine wetland by filling ditches.
- Reforest approximately 30 acres of the Site with native forest species.

Table 1. Site Restoration Structures and Objectives

Restoration Segment/ Reach ID	Station Range	Restoration Type/Approach*	Designed Linear Footage/Acreage	SMU/WMUs
Tributary 1	10+00 – 19+25	Restoration/PI	925	925
Tributary 2	10+00 – 28+71	Restoration/PI	1871	1871
Tributary 3	10+00 – 17+96	Restoration/PI	1804	1804
Cane Creek	--	Enhancement II	5708	2283
Tributary 1	--	Preservation	1506	301
Riverine Wetlands	--	Restoration	4.4	4.4
Nonriverine Wetlands	--	Restoration	5.0	5.0
Mitigation Unit Summations				
Stream	**Riverine Wetland**	**Nonriverine Wetland**		
7184 SMU	4.4 WMU	5.0 WMU		

*PI=Priority 1

1.4 Project History and Background

Completed project activities, reporting history, completion dates, project contacts, and background information are summarized in Tables 2-4.

Table 2. Project Activity and Reporting History

Activity or Report	Data Collection Completion	Actual Completion or Delivery
Restoration Plan	April 2007	May 2007
Construction Completion	NA	April 2008
Site Planting	NA	April 2008
Mitigation Plan/As-builts	May 2008	July 2008
Year 1 Monitoring (2008)	November 2008	November 2008
Year 2 Monitoring (2009)	November 2009	October 2009
Year 3 Monitoring (2010)	November 2010	September 2010
Year 4 Monitoring (2011)	November 2011	October 2011
Year 5 Monitoring (2012)	November 2012	July 2012

Table 3. Project Contacts Table

Full Delivery Provider	Restoration Systems 1101 Haynes Street, Suite 211 Raleigh, North Carolina 27604 George Howard and John Preyer (919) 755-9490
Construction Contractor	Backwater Environmental PO Box 1654 Pittsboro, North Carolina 27312 Wes Newell (919) 523-4375
Planting Contractor	Carolina Silvics 908 Indian Trail Road Edenton, North Carolina 27932 Dwight McKinney (252) 482-8491
Designer and Monitoring Performer	Axiom Environmental, Inc. 218 Snow Avenue Raleigh, North Carolina 27603 Grant Lewis (919) 215-1693

Table 4. Project Background Table

Project County	Rutherford County, North Carolina
Drainage Area	Cane Creek: 8.7 square miles Tributaries: 0.1-0.4 square mile
Drainage impervious cover estimate (%)	< 1
Stream Order	Cane Creek: Fourth Tributaries: First and Second
Physiographic Region	Mountains
Ecoregion	Eastern Blue Ridge Foothills
Rosgen Classification of As-built	E-/C-type
Dominant Soil Types	Chewacla, Wehadkee, Fannin, Skyuka
Reference Site ID	Tributary 1 Preservation Reach
USGS HUC	03050105
NCDWQ Subbasin	03-08-02
NCDWQ Classification	WS-V (Stream Index # 9-41-12-(0.3))
Any portion of any project segment 303d listed?	No
Any portion of any project segment upstream of a 303d listed segment?	No
Reasons for 303d listing or stressor	Not Applicable
% of project easement fenced	0%

1.5 Monitoring Plan View

Monitoring activities for the Site, including relevant structures and utilities, project features, specific project structures, and monitoring features are detailed in the monitoring plan view in Appendix D. Site features including vegetation, stream dimension (cross-sections), stream profile and pattern, wetland hydrology, and photographic documentation were monitored in Year 5 (2012).

2.0 PROJECT CONDITION AND MONITORING RESULTS

2.1 Vegetation Assessment

Following Site construction, fifteen plots (10 meters by 10 meters in size) were established and monumented with metal fence posts at all plot corners and PVC at each plot origin. Sampling was conducted as outlined in the *CVS-EEP Protocol for Recording Vegetation, Version 4.0* (Lee et al. 2006) (http://cvs.bio.unc.edu/methods.htm); results are included in Appendix A. The taxonomic standard for vegetation used for this document was *Flora of the Carolinas, Virginia, Georgia, and Surrounding Areas* (Weakley 2007). The locations of vegetation monitoring plots were placed to accurately represent the entire Site and are depicted on the monitoring plan view in Appendix D.

2.1.1 Vegetation Success Criteria

Success criteria have been established to verify that the vegetation component supports community elements necessary for forest development. Success criteria are dependent upon the density and growth of characteristic forest species. Additional success criteria are dependent upon density and growth of "Characteristic Tree Species." Characteristic Tree Species include planted species, species identified through inventory of a reference (relatively undisturbed) forest community used to orient the planting plan, and appropriate Schafale and Weakley (1990) community descriptions. All canopy tree species planted and identified in the reference forest will be utilized to define “Characteristic Tree Species” as termed in the success criteria. Table 5 below outlines planted and reference forest species.

Table 5. Planted Species and Reference Forest Ecosystem

Planted Species	Reference Species
Pawpaw (*Asimina triloba*)	Red maple (*Acer rubrum*)
Mockernut hickory (*Carya alba/tomentosa*)	Ironwood (*Carpinus caroliniana*)
Hackberry (*Celtis laevigata*)	Mockernut hickory (*Carya alba/tomentosa*)
Buttonbush (*Cephalanthus occidentalis*)	Hickory (*Carya* sp.)
Silky dogwood (*Cornus amomum*)	Dogwood (*Cornus florida*)
Persimmon (*Diospyros virginiana*)	Persimmon (*Diospyros virginiana*)
Green ash (*Fraxinus pennsylvanica*)	American beech (*Fagus grandifolia*)
Sycamore (*Platanus occidentalis*)	Eastern red cedar (*Juniperus virginiana*)
Black cherry (*Prunus serotina*)	Mountain laurel (*Kalmia latifolia*)
White oak (*Quercus alba*)	Doghobble (*Leucothoe fontanesiana*)
Swamp chestnut oak (*Quercus michauxii*)	Sycamore (*Platanus occidentalis*)
Cherrybark oak (*Quercus pagoda*)	Black cherry (*Prunus serotina*)
Northern red oak (*Quercus rubra*)	White oak (*Quercus alba*)
Elderberry (*Sambucus canadensis*)	Northern red oak (Q*uercus rubra*)
American elm (*Ulmus americana*)	

Success criteria dictate that an average density of 320 stems per acre of Character Tree Species must be surviving in the first three monitoring years. Subsequently, 290 Character Tree Species per acre must be surviving in Year 4 and 260 Character Tree Species per acre in Year 5.

2.1.2 Vegetative Problem Areas

Vegetation sampling across the Site was above the required average density with 618 planted stems per acre surviving. All individual plots with the exception of Plot 1 and Plot 13 met success criteria based on planted stems alone; however, when including appropriate natural recruits such as *Acer negundo*, *Fraxinus pennsylvanica*, and *Platanus occidentalis* in Plot 1 and *Acer negundo*, *Cercis canadensis*, *Diospyros virginiana*, *Juglans nigra*, and *Liriodendron tulipifera* in Plot 13 these plots were well-above success criteria with 1133 and 2428 stems per acre, respectively.

Active measures to control kudzu (*Pueraria montana*) in the northern portion of the Site and a few stems of multiflora rose (*Rosa multiflora*) and privet (*Ligustrum sinense*) in the southern portion of the Site, including spraying and manual removal to control invasive species, continue as necessary. All three invasive species were previously treated with the herbicide Milestone VM (aminopyralid) at a rate of seven ounces per acre.

2.2 Stream Assessment

Twenty permanent cross-sections within five 600-foot reaches were established after construction was completed. Measurements of each cross-section include points at all breaks in slope including top of bank, bankfull, and thalweg. Riffle cross-sections are classified using the Rosgen stream classification system.

Longitudinal profile measurements of five 600-foot reaches include thalweg, water surface, and bankfull; with each measurement taken at the head of facets (i.e. riffle, run, pool, and glide) in addition to the maximum pool depth.

2.2.1 Stream Success Criteria

Success criteria for stream restoration will include 1) successful classification of the reach as a functioning stream system (Rosgen 1996) and 2) channel variables indicative of a stable stream system. Annual monitoring will continue until success criteria are met and no less than two bankfull events have occurred, as determined by in situ crest gauge, otherwise monitoring will continue until the second bankfull event has occurred.

Visual assessment of in-stream structures will be conducted to determine if failure has occurred. Failure of a structure may be indicated by collapse of the structure, undermining of the structure, abandonment of the channel around the structure, and/or stream flow beneath the structure.

2.2.2 Bankfull Events

One bankfull events was documented during the Year 5 (2012) monitoring period for a total of at least eight bankfull events.

Table 6. Verification of Bankfull Events

Date of Data Collection	Date of Occurrence	Method	Photo
March 12, 2009	March 2, 2009	A total of 3.65 inches of rain were documented to fall at the Site by an onsite rain gauge from February 27-March 2, 2009. In addition, wrack was observed adjacent to restored channels.	1-2
November 30, 2009	November 11, 2009	A total of 2.3 inches of rain were documented to fall at the Site November 10-11, 2009*. In addition, wrack was observed adjacent to restored channels.	3
May 13, 2010	January 24, 2010	A total of 3.19 inches of rain were documented to fall at the Site January 24, 2010*. In addition, wrack was observed adjacent to restored channels.	4-5
September 28, 2010	August 19, 2010	A total of 4.63 inches of rain were documented to fall at the Site from August 13- 21, 2010*.	--
September 28, 2010	September 27, 2010	A total of 2.12 inches of rain were documented to fall at the Site from September 26-27, 2010*.	--
October 18, 2011	September 23, 2011	A total of 3.11 inches of rain were documented to fall by an onsite rain gauge from September 21-23, 2011.	--
March 9, 2012	November 28, 2011	A total of 2.41 inches of rain were documented to fall by an onsite rain gauge on November 28, 2011.	--
July 25, 2012	May 14, 2012	A total of 3.49 inches of rain were documented to fall by an onsite rain gauge on May 14, 2012 with an additional 0.38 inches on May 13, 2012 and 0.95 inches on May 16, 2012.	--

*Weatherunderground 2010

Bankfull Photos 1-2

Bankfull Photo 3

Bankfull Photos 4-5

2.2.3 Stream Problem Areas

One stream problem area was noted within the Site during the Year 3 (2010) monitoring year. Clearing of land and subsequent erosion upstream of the Site has resulted in sediment input into the upper reaches of Tributary 2. Remedial actions are not recommended at this time; however, close monitoring of Tributary 2 will continue to occur.

2.2.4 Categorical Stream Feature Visual Stability Assessment

Each stream reach was visually inspected during the Year 5 (2012) monitoring period using eight feature categories and various metrics within each category. Assessment features included riffles, pools, thalweg, meanders, channel bed, structures, and root wads/boulders. Tables for semi-quantitative assessments of each reach are included in Appendix B (Tables B1-B5). The mean percentages of performance for features in each reach are summarized in the tables below. Issues within the Site are minimal and are not causing any stream problems at this time.

Table 7A. Categorical Stream Feature Visual Stability Assessment

Cane Creek (Reach 1)

Feature	Year 1 (2008)	Year 2 (2009)	Year 3 (2010)	Year 4 (2011)	Year 5 (2012)
A. Riffles	100%	100%	100%	100%	100%
B. Pools	100%	100%	95%	95%	95%
C. Thalweg	100%	100%	100%	100%	100%
D. Meanders	100%	100%	98%	98%	98%
E. Bed General	100%	100%	96%	96%	96%
F. Vanes / J. Hooks, Etc.	75%	75%	100%	100%	100%
G. Wads and Boulders	NA	NA	NA	NA	NA

Table 7B. Categorical Stream Feature Visual Stability Assessment

Cane Creek (Reach 2)

Feature	Year 1 (2008)	Year 2 (2009)	Year 3 (2010)	Year 4 (2011)	Year 5 (2012)
A. Riffles	100%	100%	92%	92%	92%
B. Pools	97%	97%	94%	94%	94%
C. Thalweg	100%	100%	100%	100%	100%
D. Meanders	100%	100%	100%	100%	100%
E. Bed General	100%	100%	79%	79%	79%
F. Vanes / J. Hooks, Etc.	75%	75%	75%	75%	75%
G. Wads and Boulders	NA	NA	NA	NA	NA

Table 7C. Categorical Stream Feature Visual Stability Assessment

Cane Creek (Reach 3)

Feature	Year 1 (2008)	Year 2 (2009)	Year 3 (2010)	Year 4 (2011)	Year 5 (2012)
A. Riffles	100%	100%	100%	100%	100%
B. Pools	100%	100%	100%	100%	100%
C. Thalweg	100%	100%	100%	100%	100%
D. Meanders	100%	100%	100%	100%	100%
E. Bed General	100%	100%	100%	100%	100%
F. Vanes / J. Hooks, Etc.	75%	75%	100%	100%	100%
G. Wads and Boulders	NA	NA	NA	NA	NA

Table 7D. Categorical Stream Feature Visual Stability Assessment

Cane Creek (Reach 4)

Feature	Year 1 (2008)	Year 2 (2009)	Year 3 (2010)	Year 4 (2011)	Year 5 (2012)
A. Riffles	100%	100%	100%	100%	100%
B. Pools	100%	100%	100%	100%	100%
C. Thalweg	100%	100%	100%	100%	100%
D. Meanders	100%	100%	100%	100%	100%
E. Bed General	100%	100%	100%	100%	100%
F. Vanes / J. Hooks, Etc.	100%	100%	100%	100%	100%
G. Wads and Boulders	NA	NA	NA	NA	NA

Table 7E. Categorical Stream Feature Visual Stability Assessment

Cane Creek (Reach 5)

Feature	Year 1 (2008)	Year 2 (2009)	Year 3 (2010)	Year 4 (2011)	Year 5 (2012)
A. Riffles	100%	100%	100%	100%	100%
B. Pools	100%	100%	100%	100%	100%
C. Thalweg	100%	100%	100%	100%	100%
D. Meanders	100%	100%	100%	100%	100%
E. Bed General	100%	100%	100%	100%	100%
F. Vanes / J. Hooks, Etc.	100%	100%	100%	100%	100%
G. Wads and Boulders	NA	NA	NA	NA	NA

2.2.5 Quantitative Stream Measurements

During the Year 5 (2012) monitoring period 20 cross-sections and longitudinal profiles within five 600-foot reaches were measured. Permanent cross-sections and longitudinal profiles are included in Appendix B; each is graphically depicted for as-built through Year 5 (2012) for analysis. As a whole, monitoring measurements indicate minimal changes in both the longitudinal profile and cross-sections as compared to as-built data. The channel geometry compares favorably with the emulated, stable E/C type stream reach as set forth in the detailed mitigation plan and as constructed. Current monitoring has demonstrated dimension, pattern, and profile were stable over the course of the monitoring period. Tables for quantitative assessments are included below; these tables include data from previous years. In addition, visual assessments of the enhancement of Cane Creek were completed; photographs are included in Appendix B.

2.3 Wetland Assessment

Five groundwater monitoring gauges and one reference groundwater gauge were maintained and monitored throughout the Year 4 (2011) growing season. Graphs of groundwater hydrology and precipitation from an onsite rain gauge for the growing season are included in Appendix C.

2.3.1 Wetland Success Criteria

Target hydrological characteristics include saturation or inundation for 5 to 12.5 percent of the growing season, during average climatic conditions. During growing seasons with atypical climatic conditions, groundwater gauges in reference wetlands may dictate threshold hydrology success criteria (75 percent of reference). These areas are expected to support hydrophytic vegetation. If wetland parameters are marginal as indicated by vegetation and/or hydrology monitoring, a jurisdictional determination will be performed.

2.3.2 Wetland Criteria Attainment

One of the five monitored gauges (Gauge 5) within restoration areas was inundated/saturated within 12 inches of the surface for greater than 5 percent of the growing season, which extends from April 4 to November 6 (217 days) (Table 10). Hydrographs containing groundwater and precipitation data for each gauge can be found in Appendix B.

Table 10. Wetland Criteria Attainment for Year 5 (2012)

Gauge ID	Hydrology Threshold Met?	Hydrophytic Vegetation Criteria Met?	Site Mean	Vegetation Plot ID	Vegetation Survival Threshold Met?	Site Mean
1	No	Yes	20 %	1	Yes	100 %
2	No	Yes		2	Yes	
3	No	Yes		3	Yes	
4	No	Yes		4	Yes	
5	Yes	Yes		5	Yes	
				6	Yes	
				7	Yes	
				8	Yes	
				9	Yes	
				10	Yes	
				11	Yes	
				12	Yes	
				13	Yes	
				14	Yes	
				15	Yes	

Table 8A. Baseline Morphology and Hydraulic Summary
Cane Creek (Reach 1)

Parameter	USGS Gage Data			Pre-Existing Condition			Project Reference Stream			Design			As-built		
Dimension	**Min**	**Max**	**Med**	**Min**	**Max**	**Med**	**Min**	**Max**	**Med**	**Min**	**Max**	**Med**	**Min**	**Max**	**Med**
BF Width (ft)	USGS gage data is unavailable for this project			6.9	12	9.8	8.1	8.7	8.4	9.6	11.1	8.4	10.4	12.2	11.3
Floodprone Width (ft)				9	18	14.9	25	150	87.5	80	200	150			150
BF Cross Sectional Area (ft2)						10.3			8.5			10.3	9.3	11.3	10.3
BF Mean Depth (ft)				0.9	1.5	1.1	0.9	1.2	1.1	0.9	1.1	1	0.6	0.7	0.9
BF Max Depth (ft)				1.3	2.1	1.8	1.3	1.4	1.4	1.3	1.9	1.5	1.4	1.5	1.4
Width/Depth Ratio				4.6	14	9.6	7.1	9.7	8.4	10	16	14	11.7	13.2	12.5
Entrenchment Ratio				1.3	1.6	1.5	2.9	18.5	10.7	7.8	18.9	14.2	12.3	14.4	13.4
Bank Height Ratio				2.9	4.6	3.8			1			1			1
Wetted Perimeter(ft)						===			===			===			===
Hydraulic radius (ft)						===			===			===			===
Pattern															
Channel Beltwidth (ft)				No distinct repetitive pattern of riffles and pools			19	60	37	21	74	42	21	74	42
Radius of Curvature (ft)							7	29	12.9	21	42	23	21	42	23
Meander Wavelength (ft)							36.5	87.9	58.9	53	117	74	53	117	74
Meander Width ratio							2.3	7.1	4.4	2	7	4	2	7	4
Profile															
Riffle length (ft)				No distinct repetitive pattern of riffles and pools					===			===	8	36	16
Riffle slope (ft/ft)							1.48%	4.92%	2.84%	1.13%	3.39%	1.81%	0.80%	5.60%	2.40%
Pool length (ft)									===			===	8	58	33
Pool spacing (ft)							23.2	89.3	42.3	31	106	53	31	106	53
Substrate															
d50 (mm)						===			===			===			===
d84 (mm)						===			===			===			===
Additional Reach Parameters															
Valley Length (ft)						===			===			712			712
Channel Length (ft)						===			===			925			925
Sinuosity						1.1			1.5			1.3			1.3
Water Surface Slope (ft/ft)						1.12%			1.61%			1.13%			0.92%
BF slope (ft/ft)						===			===			===			===
Rosgen Classification						G4			E4			C/E4			C/E4

Table 8B. Baseline Morphology and Hydraulic Summary
Cane Creek (Reaches 2, 3, 4, and 5)

Parameter	USGS Gage Data			Pre-Existing Condition (Trib 2)			Pre-Existing Condition (Trib 3)			Project Reference Stream			Design			As-built		
Dimension	**Min**	**Max**	**Med**	**Min**	**Max**	**Med**	**Min**	**Max**	**Med**	**Min**	**Max**	**Med**	**Min**	**Max**	**Med**	**Min**	**Max**	**Med**
BF Width (ft)	USGS gage data is unavailable for this project			4.3	5.5	5	5.1	6	5.6	8.1	8.7	8.4	4.5	6.7	5	4.8	10.5	8.05
Floodprone Width (ft)				6	7	6.7	10	20	15	25	150	87.5	80	200	150			150
BF Cross Sectional Area (ft2)						4.8			3.2			8.5			4.1	2.1	6.3	4.3
BF Mean Depth (ft)				0.9	1.1	1	0.5	0.6	0.6	0.9	1.2	1.1	0.6	1	0.8	0.4	0.7	0.5
BF Max Depth (ft)				1.1	1.4	1.2	0.9	1.3	1.1	1.3	1.4	1.4	0.7	1.4	1.1	0.6	1.5	0.9
Width/Depth Ratio				3.8	6.3	5.2	8	11.2	9.6	7.1	9.7	8.4	12	16	14	11.0	21.9	14.7
Entrenchment Ratio				1.2	1.6	1.4	1.9	3.3	2.7	2.9	18.5	10.7	16	40	30	14.3	31.2	18.7
Bank Height Ratio				3.9	7.4	5.3	2.3	4.1	3.2			1			1			1
Wetted Perimeter(ft)						===			===			===			===			===
Hydraulic radius (ft)						===			===			===			===			===
Pattern																		
Channel Beltwidth (ft)				No distinct repetitive pattern of riffles and pools			No distinct repetitive pattern of riffles and pools			19	60	37	10	35	20	10	35	20
Radius of Curvature (ft)										7	29	12.9	10	20	11	10	20	11
Meander Wavelength (ft)										36.5	87.9	58.9	25	55	35	25	55	35
Meander Width ratio										2.3	7.1	4.4	2	7	4	2	7	4
Profile																		
Riffle length (ft)				No distinct repetitive pattern of riffles and pools			No distinct repetitive pattern of riffles and pools					===			===			===
Riffle slope (ft/ft)										1.48%	4.92%	2.84%	0.49%	1.47%	0.78%	NA*	NA*	NA*
Pool length (ft)												===			===			===
Pool spacing (ft)										23.2	89.3	42.3	15	50	25	15	50	25
Substrate																		
d50 (mm)						===			===			===			===			===
d84 (mm)						===			===			===			===			===
Additional Reach Parameters																		
Valley Length (ft)						===			===			===			===			===
Channel Length (ft)						===			===			===			===			===
Sinuosity						1.1			1			1.5			1.3			1.3
Water Surface Slope (ft/ft)						2.43%			2.44%			1.61%			0.49%			NA*
BF slope (ft/ft)						===			===			===			===			===
Rosgen Classification						G4			Eg4			E4			C/E4			C/E4

Table 9A. Morphology and Hydraulic Monitoring Summary
Cane Creek
Reach 1 (Tributary 1 - Sta. 17+50 to 10+60)

Parameter	Cross Section 1 Pool						Cross Section 2 Riffle						Cross Section 3 Riffle						Cross Section 4 Pool					
Dimension	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+
BF Width (ft)	10.1	10.2	10.7	10.6	10.0		10.4	9.3	11.0	9.9	10.3		12.2	13.8	13.0	13.3	13.2		13.9	13.9	13.8	13.3	13.3	
Floodprone Width (ft) (approx)	150.0						150.0						150.0						150.0					
BF Cross Sectional Area (ft^2)	10.9	11.1	10.6	11.1	11.2		9.3	7.8	7.9	7.9	7.9		11.3	12.5	11.9	11.7	10.3		16.3	16.6	13.5	15.8	14.3	
BF Mean Depth (ft)	1.1	1.1	1.0	1.0	1.1		0.9	0.8	0.7	0.8	0.8		0.9	0.9	0.9	0.9	0.8		1.2	1.2	1.0	1.2	1.1	
BF Max Depth (ft)	2.3	2.3	1.8	2.1	2.4		1.4	1.3	1.3	1.3	1.4		1.5	1.6	1.7	1.6	1.5		2.6	2.7	1.8	2.5	2.2	
Width/Depth Ratio	NA	NA	NA	NA	NA		11.7	11.1	15.2	12.3	13.5		13.2	15.1	14.1	15.2	17.0		NA	NA	NA	NA	NA	
Entrenchment Ratio	NA	NA	NA	NA	NA		14.4	16.1	13.6	15.2	14.5		12.3	10.9	11.6	11.2	11.3		NA	NA	NA	NA	NA	
Bank Height Ratio	NA	NA	NA	NA	NA		1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0	1.0		NA	NA	NA	NA	NA	
Wetted Perimeter(ft)	11.4	11.5	11.8	12.0	11.6		10.9	9.9	11.6	10.6	10.9		12.7	14.2	13.6	13.9	13.7		15.0	15.0	14.6	14.4	14.3	
Hydraulic radius (ft)	1.0	1.0	0.9	0.9	1.0		0.8	0.8	0.7	0.7	0.7		0.9	0.9	0.9	0.8	0.8		1.1	1.1	0.9	1.1	1.0	
Substrate	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+
d50 (mm)		0.1	0.6	0.2	0.3			66	87	71	9.4			66	87	71	9.4			0.1	0.6	0.2	0.3	
d84 (mm)		1	1.0	1.0	2.0			107	158	170	90.0			107	158	170	90.0			1	1.0	1.0	2.0	

Parameter	MY-01 (2008)			MY-02 (2009)			MY-03 (2010)			MY-04 (2011)			MY-05 (2012)			MY+		
Pattern	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med
Channel Beltwidth (ft)	21	74	42	21	74	42	21	74	42	21	74	42	21	74	42			
Radius of Curvature (ft)	21	42	23	21	42	23	21	42	23	21	42	23	21	42	23			
Meander Wavelength (ft)	53	117	74	53	117	74	53	117	74	53	117	74	53	117	74			
Meander Width ratio	2.0	7.0	4.0	2.0	7.0	4.0	2.0	7.0	4.0	2.0	7.0	4.0	2.0	7.0	4.0			
Profile	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med
Riffle length (ft)	8	36	16	8	38	20	9	34	18	3	45	19	7	41	16			
Riffle slope (ft/ft)	0.8%	5.6%	2.4%	0.8%	5.8%	2.2%	0.9%	3.8%	2.1%	0.5%	4.1%	2.0%	0.5%	5.2%	2.5%			
Pool length (ft)	8	58	33	13	48	24	11	42	27	13	41	26	13	50	22			
Pool spacing (ft)	31	106	53	31	106	53	31	106	53	31	106	53	31	106	53			

Additional Reach Parameters	MY-01 (2008)	MY-02 (2009)	MY-03 (2010)	MY-04 (2011)	MY-05 (2012)	MY+
Valley Length (ft)	551	551	551	568	562	
Channel Length (ft)	716	716	716	739	731	
Sinuosity	1.3	1.3	1.3	1.3	1.3	
Water Surface Slope (ft/ft)	0.92%	0.92%	0.91%	0.89%	0.93%	
BF slope (ft/ft)	– – –	– – –	– – –	– – –	– – –	
Rosgen Classification	C/E type	C/E type	C/E type	C/E type	C/E type	
Number of Bankfull Events	0	2	3	2	1	

Table 9B. Morphology and Hydraulic Monitoring Summary
Cane Creek
Reach 2 (Tributary 2 - Sta. 14+10 to 19+50)

Parameter	Cross Section 1 Pool						Cross Section 2 Riffle						Cross Section 3 Pool						Cross Section 4 Riffle					
Dimension	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+
BF Width (ft)	13.0	13.6	5.6	6.6	5.8		9.3	13.3	7.7	9.1	9.8		11.2	10.5	9.6	9.4	10.3		10.5	10.3	7.9	9.8	12.7	
Floodprone Width (ft) (approx)	150.0						150.0						150.0						150.0					
BF Cross Sectional Area (ft^2)	8.6	6.7	3.8	2.6	3.1		6.3	5.9	4.1	4.8	5.1		9.8	9.8	8.1	8.0	8.0		5.0	5.0	3.8	5.0	5.1	
BF Mean Depth (ft)	0.7	0.5	0.7	0.4	0.5		0.7	0.4	0.5	0.5	0.5		0.9	0.9	0.8	0.9	0.8		0.5	0.5	0.5	0.5	0.4	
BF Max Depth (ft)	1.4	1.3	1.3	1.4	1.0		1.5	1.2	1.0	1.1	1.1		2.0	2.0	1.8	1.7	1.3		0.9	0.9	0.8	0.9	0.9	
Width/Depth Ratio	NA	NA	NA	NA	NA		13.7	29.9	14.5	17.1	18.7		NA	NA	NA	NA	NA		21.9	21.2	16.2	19.4	31.6	
Entrenchment Ratio	NA	NA	NA	NA	NA		16.2	11.2	19.5	16.6	15.3		NA	NA	NA	NA	NA		14.3	14.6	19.0	15.2	11.8	
Bank Height Ratio	NA	NA	NA	NA	NA		1.0	1.0	1.0	1.0	1.0		NA	NA	NA	NA	NA		1.0	1.0	1.0	1.0	1.0	
Wetted Perimeter(ft)	13.4	14.0	6.3	7.0	6.2		9.8	13.7	8.1	9.4	10.1		12.0	11.5	10.4	10.2	10.8		10.7	10.6	8.1	10.1	12.9	
Hydraulic radius (ft)	0.6	0.5	0.6	0.4	0.5		0.6	0.4	0.5	0.5	0.5		0.8	0.9	0.8	0.8	0.7		0.5	0.5	0.5	0.5	0.4	
Substrate	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+
d50 (mm)		NA	NA	NA	NA			60	51	90	NA			NA	NA	NA	NA			60	51	90	NA	
d84 (mm)		NA	NA	NA	NA			98	128	191	54			NA	NA	NA	NA			98	128	191	54.0	

Parameter	MY-01 (2008)			MY-02 (2009)			MY-03 (2010)			MY-04 (2011)			MY-05 (2012)			MY+		
Pattern	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med
Channel Beltwidth (ft)	10	35	20	10	35	20	10	35	20	10	35	20	10	35	20			
Radius of Curvature (ft)	10	20	11	10	20	11	10	20	11	10	20	11	10	20	11			
Meander Wavelength (ft)	25	55	35	25	55	35	25	55	35	25	55	35	25	55	35			
Meander Width ratio	2.0	7.0	4.0	2.0	7.0	4.0	2.0	7.0	4.0	2.0	7.0	4.0	2.0	7.0	4.0			
Profile	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med
Riffle length (ft)	8	26	15	6	35	13	6	45	10	7	49	12	7	29	13			
Riffle slope (ft/ft)	NA*	NA*	NA*	NA*	NA*	NA*	0.0%	1.9%	0.4%	0.0%	2.4%	0.3%	0.0%	1.5%	0.3%			
Pool length (ft)	15	23	18	6	40	11	11	33	19	11	21	14	**9**	**41**	**15**			
Pool spacing (ft)	15	50	25	15	50	25	15	50	25	15	50	25	15	50	25			

Additional Reach Parameters	MY-01 (2008)	MY-02 (2009)	MY-03 (2010)	MY-04 (2011)	MY-05 (2012)	MY+
Valley Length (ft)	415	415	427	422	417	
Channel Length (ft)	540	542	555	548	543	
Sinuosity	1.3	1.3	1.3	1.3	1.3	
Water Surface Slope (ft/ft)	NA*	NA*	0.29%	0.30%	0.26%	
BF slope (ft/ft)	– – –	– – –	– – –	– – –	– – –	
Rosgen Classification	C type	C type	C type	C type	C type	
Number of Bankfull Events	0	2	3	2	1	

Table 9C. Morphology and Hydraulic Monitoring Summary
Cane Creek
Reach 3 (Tributary 2 - Sta.19+84 to 26+10)

Parameter	Cross Section 5 Pool						Cross Section 6 Riffle						Cross Section 7 Riffle						Cross Section 8 Pool					
Dimension	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+
BF Width (ft)	7.8	8.1	7.7	8.1	7.9		4.8	5.0	5.7	5.7	5.5		7.4	8.8	6.6	7.6	6.1		11.8	9.8	10.7	11.2	10.8	
Floodprone Width (ft) (approx)	150.0						150.0						150.0						150.0					
BF Cross Sectional Area (ft^2)	5.8	5.8	5.8	5.9	5.8		2.1	2.2	2.6	2.1	2.3		3.5	3.4	3.2	3.0	2.6		11.2	9.2	9.8	9.7	9.3	
BF Mean Depth (ft)	0.7	0.7	0.8	0.7	0.7		0.4	0.4	0.5	0.4	0.4		0.5	0.4	0.5	0.4	0.4		0.9	0.9	0.9	0.9	0.9	
BF Max Depth (ft)	1.3	1.4	1.4	1.4	1.3		0.8	0.8	0.9	0.7	0.7		0.9	0.9	0.9	0.8	0.8		1.7	1.9	1.6	1.6	1.6	
Width/Depth Ratio	NA	NA	NA	NA	NA		11.0	11.1	12.4	14.9	13.0		15.6	22.9	13.8	19.5	14.3		NA	NA	NA	NA	NA	
Entrenchment Ratio	NA	NA	NA	NA	NA		31.2	30.1	26.1	26.5	27.5		20.1	17.1	22.7	19.8	24.4		NA	NA	NA	NA	NA	
Bank Height Ratio	NA	NA	NA	NA	NA		1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0	1.0		NA	NA	NA	NA	NA	
Wetted Perimeter(ft)	8.5	8.7	8.3	8.6	8.3		5.1	5.3	6.1	6.0	5.7		7.7	9.0	7.0	7.9	6.4		12.3	10.5	11.3	11.7	11.3	
Hydraulic radius (ft)	0.7	0.7	0.7	0.7	0.7		0.8	0.4	0.4	0.4	0.4		0.4	0.4	0.5	0.4	0.4		0.9	0.9	0.9	0.8	0.8	
Substrate	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+
d50 (mm)		NA	NA	NA	NA			48	59	83	38			48	59	83	38			NA	NA	NA	NA	
d84 (mm)		NA	NA	NA	NA			98	124	174	90			98	124	174	90			NA	NA	NA	NA	

Parameter	MY-01 (2008)			MY-02 (2009)			MY-03 (2010)			MY-04 (2011)			MY-05 (2012)			MY+		
Pattern	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med
Channel Beltwidth (ft)	10	35	20	10	35	20	10	35	20	10	35	20	10	35	20			
Radius of Curvature (ft)	10	20	11	10	20	11	10	20	11	10	20	11	10	20	11			
Meander Wavelength (ft)	25	55	35	25	55	35	25	55	35	25	55	35	25	55	35			
Meander Width ratio	2.0	7.0	4.0	2.0	7.0	4.0	2.0	7.0	4.0	2.0	7.0	4.0	2.0	7.0	4.0			
Profile	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med
Riffle length (ft)	12	27	15	5	16	10	5	20	9	4	21	10	6	19	9			
Riffle slope (ft/ft)	NA*	NA*	NA*	NA*	NA*	NA*	0.0%	3.6%	1.1%	0.0%	2.3%	0.7%	NA*	NA*	NA*			
Pool length (ft)	18	33	21	12	30	18	8	30	18	8	28	16	9	25	17			
Pool spacing (ft)	15	50	25	15	50	25	15	50	25	15	50	25	15	50	25			

Additional Reach Parameters	MY-01 (2008)	MY-02 (2009)	MY-03 (2010)	MY-04 (2011)	MY-05 (2012)	MY+
Valley Length (ft)	482	485	481	492	492	
Channel Length (ft)	626	631	625	639	640	
Sinuosity	1.3	1.3	1.3	1.3	1.3	
Water Surface Slope (ft/ft)	NA*	NA*	0.44%	0.44%	NA*	
BF slope (ft/ft)	– – –	– – –	– – –	– – –	– – –	
Rosgen Classification	C/E type	C/E type	C/E type	C/E type	C/E type	
Number of Bankfull Events	0	2	3	2	1	

Table 9D. Morphology and Hydraulic Monitoring Summary
Cane Creek
Reach 4 (Tributary 3 - Sta. 14+45 to 20+40)

Parameter	Cross Section 1 Riffle						Cross Section 2 Riffle						Cross Section 3 Pool						Cross Section 4 Pool					
Dimension	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+
BF Width (ft)	9.1	9.0	9.9	9.5	8.1		7.5	10.5	7.2	7.5	7.4		11.8	10.7	10.6	11.3	9.6		9.1	9.8	10.4	10.0	10.9	
Floodprone Width (ft) (approx)	150.0						150.0						150.0						150.0					
BF Cross Sectional Area (ft^2)	5.2	5.2	5.6	5.7	4.3		3.1	4.7	3.0	3.4	2.8		10.3	9.7	9.4	10.1	7.1		8.3	8.7	9.0	9.3	9.2	
BF Mean Depth (ft)	0.6	0.6	0.6	0.6	0.5		0.4	0.4	0.4	0.4	0.4		0.9	0.9	0.9	0.9	0.7		0.9	0.9	0.9	0.9	0.8	
BF Max Depth (ft)	1.1	1.1	1.1	1.1	0.9		0.6	0.8	0.6	0.7	0.6		1.7	1.7	1.7	1.6	1.5		1.8	1.8	1.9	1.8	1.8	
Width/Depth Ratio	16.1	15.4	17.3	16.0	15.0		18.5	23.3	17.6	16.7	19.7		NA	NA	NA	NA	NA		NA	NA	NA	NA	NA	
Entrenchment Ratio	16.5	16.8	15.2	15.8	18.6		19.9	14.3	20.7	20.0	20.2		NA	NA	NA	NA	NA		NA	NA	NA	NA	NA	
Bank Height Ratio	1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0	1.0		NA	NA	NA	NA	NA		NA	NA	NA	NA	NA	
Wetted Perimeter(ft)	9.4	9.2	10.2	9.9	8.3		7.7	10.7	7.4	7.7	7.6		12.4	11.3	11.2	11.9	10.1		9.8	10.6	11.2	10.8	11.5	
Hydraulic radius (ft)	0.5	0.6	0.5	0.6	0.5		0.4	0.4	0.4	0.4	0.4		0.8	0.9	0.8	0.9	0.7		0.8	0.8	0.8	0.9	0.8	
Substrate	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+
d50 (mm)		57	73	102	57			57	73	102	57			NA	NA	NA	NA			NA	NA	NA	NA	
d84 (mm)		90	138	156	107			90	138	156	107			NA	NA	NA	NA			NA	NA	NA	NA	

Parameter	MY-01 (2008)			MY-02 (2009)			MY-03 (2010)			MY-04 (2011)			MY-05 (2012)			MY+		
Pattern	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med
Channel Beltwidth (ft)	10	35	20	10	35	20	10	35	20	10	35	20	10	35	20			
Radius of Curvature (ft)	10	20	35	10	20	35	10	20	35	10	20	35	10	20	35			
Meander Wavelength (ft)	25	55	35	25	55	35	25	55	35	25	55	35	25	55	35			
Meander Width ratio	2.0	7.0	4.0	2.0	7.0	4.0	2.0	7.0	4.0	2.0	7.0	4.0	2.0	7.0	4.0			
Profile	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med
Riffle length (ft)	5	17	11	6	19	13	5	18	10	5	18	11	10	25	18			
Riffle slope (ft/ft)	NA*	NA*	NA*	NA*	NA*	NA*	0.0%	1.2%	0.2%	0.0%	2.3%	0.3%	NA*	NA*	NA*			
Pool length (ft)	9	33	21	8	33	17	11	35	17	8	32	16	10	27	15			
Pool spacing (ft)	15	50	25	15	50	25	15	50	25	15	50	25	15	50	25			

Additional Reach Parameters	MY-01 (2008)	MY-02 (2009)	MY-03 (2010)	MY-04 (2011)	MY-05 (2012)	MY+
Valley Length (ft)	457	472	472	457	455	
Channel Length (ft)	594	613	614	594	591	
Sinuosity	1.3	1.3	1.3	1.3	1.3	
Water Surface Slope (ft/ft)	NA*	NA*	0.19%	0.17%	NA*	
BF slope (ft/ft)	– – –	– – –	– – –	– – –	– – –	
Rosgen Classification	C type	C type	C type	C type	C type	
Number of Bankfull Events	0	2	3	2	1	

* No water in channel due to drought conditions.

Table 9E. Morphology and Hydraulic Monitoring Summary
Cane Creek
Reach 5 (Tributary 3 - Sta. 20+68 to 26+60)

Parameter	Cross Section 5 Riffle						Cross Section 6 Pool						Cross Section 7 Pool						Cross Section 8 Riffle					
Dimension	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+
BF Width (ft)	8.6	9.3	9.6	9.1	9.0		12.1	11.6	10.8	10.5	10.6		12.5	13.2	11.4	11.6	13.2		6.8	7.6	7.6	7.2	6.7	
Floodprone Width (ft) (approx)	150.0						150.0						150.0						150.0					
BF Cross Sectional Area (ft^2)	5.5	5.9	6.4	5.9	55.1		10.9	10.2	9.5	9.6	9.1		11.2	12.5	10.9	11.0	11.3		3.6	3.8	3.8	3.9	3.6	
BF Mean Depth (ft)	0.6	0.6	0.7	0.7	0.6		0.9	0.9	0.9	0.9	0.9		0.9	1.0	1.0	1.0	0.9		0.5	0.5	0.5	0.5	0.5	
BF Max Depth (ft)	1.1	1.1	1.2	1.2	1.0		1.8	1.8	1.8	1.7	1.6		1.9	2.0	1.8	1.8	1.7		0.8	0.8	0.8	0.9	0.8	
Width/Depth Ratio	13.4	14.5	14.5	13.9	16.0		NA	NA	NA	NA	NA		NA	NA	NA	NA	NA		13.1	15.2	14.9	13.3	12.3	
Entrenchment Ratio	17.4	16.2	15.6	16.6	16.6		NA	NA	NA	NA	NA		NA	NA	NA	NA	NA		21.9	19.8	19.8	20.8	22.4	
Bank Height Ratio	1.0	1.0	1.0	1.0	1.0		NA	NA	NA	NA	NA		NA	NA	NA	NA	NA		1.0	1.0	1.0	1.0	1.0	
Wetted Perimeter(ft)	8.9	9.6	10.0	9.4	9.2		12.7	12.2	11.5	11.2	11.2		13.3	13.8	12.1	12.3	13.8		7.2	7.8	8.0	7.5	7.0	
Hydraulic radius (ft)	0.6	0.6	0.6	0.6	0.6		0.9	0.8	0.8	0.9	0.8		0.8	0.9	0.9	0.9	0.8		0.5	0.5	0.8	0.5	0.5	
Substrate	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+
d50 (mm)		54	73	102	57			NA	NA	NA	NA			NA	NA	NA	NA			54	73	102	57	
d84 (mm)		80	138	156	107			NA	NA	NA	NA			NA	NA	NA	NA			80	138	156	107	

Parameter	MY-01 (2008)			MY-02 (2009)			MY-03 (2010)			MY-04 (2011)			MY-05 (2012)			MY+		
Pattern	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med
Channel Beltwidth (ft)	10	35	20	10	35	20	10	35	20	10	35	20	10	35	20			
Radius of Curvature (ft)	10	20	35	10	20	35	10	20	35	10	20	35	10	20	35			
Meander Wavelength (ft)	25	55	35	25	55	35	25	55	35	25	55	35	25	55	35			
Meander Width ratio	2.0	7.0	4.0	2.0	7.0	4.0	2.0	7.0	4.0	2.0	7.0	4.0	2.0	7.0	4.0			
Profile	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med
Riffle length (ft)	13	22	18	6	14	9	6	12	9	5	17	10	5	18	9			
Riffle slope (ft/ft)	NA*	NA*	NA*	NA*	NA*	NA*	0.0%	2.0%	1.0%	0.0%	1.0%	0.6%	NA*	NA*	NA*			
Pool length (ft)	15	42	24	10	31	16	11	34	25	10	32	16	11	33	14			
Pool spacing (ft)	15	50	25	15	50	25	15	50	25	15	50	25	15	50	25			

Additional Reach Parameters	MY-01 (2008)	MY-02 (2009)	MY-03 (2010)	MY-04 (2011)	MY-05 (2012)	MY+
Valley Length (ft)	456	480	468	465	492	
Channel Length (ft)	593	624	609	605	640	
Sinuosity	1.3	1.3	1.3	1.3	1.3	
Water Surface Slope (ft/ft)	NA*	NA*	0.29%	NA*	NA*	
BF slope (ft/ft)	– – –	– – –	– – –	– – –	– – –	
Rosgen Classification	C type	C type	C-type	C type	C type	
Number of Bankfull Events	0	2	3	2	1	

3.0 CONCLUSIONS

One of the five monitored gauges (Gauge 5) within restoration areas was inundated/saturated within 12 inches of the surface for greater than 5 percent of the growing season. A summary of groundwater gauge data for the is included in Table 11.

Table 11. Summary of Groundwater Gauge Results

Gauge	Success Criteria Achieved/Max Consecutive Days During Growing Season (Percentage)				
	Year 1 (2008)*	**Year 2 (2009)***	**Year 3 (2010)**	**Year 4 (2011)**	**Year 5 (2012)**
1	No/0 days (0.0%)	No/0 days (0.0%)	No/0 days (0.0%)	No/0 days (0.0%)	No/0 days (0.0%)
2	No/0 days (0.0%)	No/0 days (0.0%)	No/0 days (0.0%)	No/0 days (0.0%)	No/0 days (0.0%)
3	No/0 days (0.0%)	No/0 days (0.0%)	No/0 days (0.0%)	No/0 days (0.0%)	No/1 days (0.5%)
4	No/1 day (0.0%)	No/4 days (0.0%)	No/0 days (0.0%)	No/0 days (0.0%)	No/3 days (1.4%)
5	No/4 days (1.8%)	No/6 days (2.8%)	No/0 days (0.0%)	Yes/16 days (7.4%)	Yes/14 days (6.5%)
Ref 1	2 days (0.9 %)	3 days (1.4 %)	1 day (0.5 %)	1 day (0.5 %)	1 day (0.5 %)

* Regional rainfall from January through October for Year 1 (2008) was 36.02 inches, 9.46 inches (20.8%) below the WETS mean of 45.48 inches; therefore, success criteria are based on the reference gauge.

** Regional rainfall from January through October for Year 2 (2008) was 43.27 inches, 2.21 inches (6.1%) below the WETS mean; therefore, success criteria are based on comparisons to reference gauge data.

Vegetation sampling across the Site was above the required average density with 618 planted stems per acre surviving. Thirteen of the fifteen plots are meeting success criteria based on planted stems alone. When including natural recruits of appropriate species such as box elder (*Acer negundo*), green ash (*Fraxinus pennsylvanica*), sycamore (*Platanus occidentalis*), tulip tree (*Liriodendron tulipifera*), black cherry (*Prunus serotina*), and black walnut (*Juglans nigra*), all plots are meeting success criteria. (Table 12).

Channel geometry compares favorably with the emulated, stable E/C type stream reach as set forth in the detailed mitigation plan and as constructed. Current monitoring has demonstrated dimension, pattern, and profile were stable over the course of the monitoring period.

Table 12. Summary of Planted Vegetation Plot Results

Plot	Planted Stems/Acre				
	Year 1 (2008)	Year 2 (2009)	Year 3 (2010)	Year 4 (2011)	Year 5 (2012)
1	0	121	121	121	121
2	0	0	526	688	688
3	324	486	567	607	728
4	0	0	567	607	688
5	243	1012	1295	1295	1174
6	162	850	1093	1052	971
7	526	931	850	890	850
8	486	688	607	809	769
9	162	567	567	567	526
10	202	526	486	526	567
11	162	526	607	647	728
12	486	810	728	728	728
13	162	162	162	162	162
14	243	486	526	567	526
15	40	324	364	405	445
Average of All Plots (1-15)	**213**	**499**	**604**	**645**	**618**

4.0 REFERENCES

Environmental Laboratory. 1987. Corps of Engineers Wetlands Delineation Manual. Technical Report Y-87-1. United States Army Engineer Waterways Experiment Station, Vicksburg, Mississippi.

Lee, Michael T., R.K. Peet, S.D. Roberts, and T.R. Wentworth. 2006. CVS-EEP Protocol for Recording Vegetation, Version 4.0. (online). Available: http://cvs.bio.unc.edu/methods.htm

National Oceanic and Atmospheric Administration (NOAA). 2004. Climatography of the United States No. 20; Monthly Station Climate Summaries, 1971-2000. National Oceanic and Atmospheric Administration, National Environmental Satellite, Data, and Information Service, National Climatic Data Center, Asheville, North Carolina.

Restoration Systems. 2007. Cane Creek Restoration Site Restoration Plan. Restoration Systems, Raleigh, North Carolina

Rosgen, D. 1996. Applied River Morphology. Wildland Hydrology (Publisher). Pagosa Springs, Colorado.

Schafale, M. P. and A.S. Weakley. 1990. Classification of the Natural Communities of North Carolina: Third Approximation, NC Natural Heritage Program, Division of Parks and Recreation, NC DEM, Raleigh NC.

Weakley, Alan S. 2007. Flora of the Carolinas, Virginia, Georgia, and Surrounding Areas (online). Available: http://www.herbarium.unc.edu/WeakleysFlora.pdf [February 1, 2008]. University of North Carolina Herbarium, North Carolina Botanical Garden, University of North Carolina, Chapel Hill, North Carolina.

Weather Underground. 2011. Weather History for Morganton, North Carolina (online). Available: http://www.wunderground.com/weatherstation/WXDailyHistory.asp?ID=KNCMORGA7 [October 13, 2011].

APPENDIX A
VEGETATION DATA

1. **Vegetation Survey Data Tables**
2. **Vegetation Monitoring Plot Photos**

Cane Creek Stream and Wetland Restoration Site
Year 5 (2012) Annual Monitoring
Vegetation Plot Photos
Taken July 2012

Plot 1

Plot 2

Plot 3

Plot 4

Plot 5

Plot 6

Plot 7

Plot 8

Cane Creek Stream and Wetland Restoration Site
Year 5 (2012) Annual Monitoring
Vegetation Plot Photos
Taken July 2012
(continued)

APPENDIX B
GEOMORPHOLOGIC DATA

1. **Tables B1-B5. Qualitative Visual Stability Assessment**
2. **Cross-section Plots and Tables**
3. **Longitudinal Profile Plots**
4. **Substrate Data**
5. **Representative Structure Photographs**
6. **Enhancement Reach Photographs**

Table B1. Visual Morphological Stability Assessment
Cane Creek
Reach 1 (Tributary 1 - Sta. 17+50 to 10+60)

Feature Category	Metric (per As-built and reference baselines)	(# Stable) Number Performing as Intended	Total number	Total Number / feet in unstable state	% Perform in Stable Condition	Feature Perform. Mean or Total
	1. Present	16	16	NA	100%	
	2. Armor stable (e.g. no displacement)?	16	16	NA	100%	
	3. Facet grade appears stable?	16	16	NA	100%	
	4. Minimal evidence of embedding / fining?	16	16	NA	100%	
A. Riffles	5. Length appropriate?	16	16	NA	100%	100%
	1. Present? (e.g. not subject to severe aggrad. Or migrat.?)	18	21	NA	86%	
	2. Sufficiently deep (Max Pool D:Mean Bkf>1.6?)	21	21	NA	100%	
B. Pools	3. Length appropriate?	21	21	NA	100%	95%
	1. Upstream of meander bend (run/inflection) centering?	21	21	NA	100%	
C. Thalweg	2. Downstream of meander (glide/inflection) centering?	21	21	NA	100%	100%
	1. Outer bend in state of limited/controlled erosion?	20	21	NA	95%	
	2. Of those eroding, # w/concomitant point bar formation?	NA	NA	NA	100%	
	3. Apparent Rc within spec?	21	21	NA	100%	
D. Meanders	4. Sufficient floodplain access and relief?	21	21	NA	100%	98%
	1. General channel bed aggradation areas (bar formation)	NA	NA	30	98.5%	
E. Bed General	2. Channel bed degradation – areas of increasing down-cutting or head cutting?	NA	NA	0	100%	96%
	1. Free of back or arm scour?	2	2	NA	100%	
	2. Height appropriate?	2	2	NA	100%	
	3. Angle and geometry appear appropriate?	2	2	NA	100%	
F. Vanes	4. Free of piping or other structural failures?	2	2	NA	100%	100%
	1. Free of scour?	NA	NA	NA	NA	
G. Wads / Boulders	2. Footing stable?	NA	NA	NA	NA	NA

Table B2. Visual Morphological Stability Assessment
Cane Creek
Reach 2 (Tributary 2 - Sta. 14+10 to 19+50)

Feature Category	Metric (per As-built and reference baselines)	(# Stable) Number Performing as Intended	Total number	Total Number / feet in unstable state	% Perform in Stable Condition	Feature Perform. Mean or Total
	1. Present	19	19	NA	100%	
	2. Armor stable (e.g. no displacement)?	19	19	NA	100%	
	3. Facet grade appears stable?	19	19	NA	100%	
	4. Minimal evidence of embedding / fining?	11	19	NA	58%	
A. Riffles	5. Length appropriate?	19	19	NA	100%	92%
	1. Present? (e.g. not subject to severe aggrad. Or migrat.?)	21	23	NA	91%	
	2. Sufficiently deep (Max Pool D:Mean Bkf>1.6?)	21	23	NA	91%	
B. Pools	3. Length appropriate?	23	23	NA	100%	94%
	1. Upstream of meander bend (run/inflection) centering?	23	23	NA	100%	
C. Thalweg	2. Downstream of meander (glide/inflection) centering?	23	23	NA	100%	100%
	1. Outer bend in state of limited/controlled erosion?	23	28	NA	100%	
	2. Of those eroding, # w/concomitant point bar formation?	0	0	NA	100%	
	3. Apparent Rc within spec?	23	23	NA	100%	
D. Meanders	4. Sufficient floodplain access and relief?	23	23	NA	100%	100%
	1. General channel bed aggradation areas (bar formation)	350	600	250	58%	
E. Bed General	2. Channel bed degradation – areas of increasing down-cutting or head cutting?	NA	NA	0	100%	79%
	1. Free of back or arm scour?	2	2	NA	100%	
	2. Height appropriate?	0	2	NA	0%	
	3. Angle and geometry appear appropriate?	2	2	NA	100%	
F. Vanes	4. Free of piping or other structural failures?	2	2	NA	100%	75%
	1. Free of scour?	NA	NA	NA	NA	
G. Wads / Boulders	2. Footing stable?	NA	NA	NA	NA	NA

Table B3. Visual Morphological Stability Assessment
Cane Creek
Reach 3 (Tributary 2 - Sta.19+84 to 26+10)

Feature Category	Metric (per As-built and reference baselines)	(# Stable) Number Performing as Intended	Total number	Total Number / feet in unstable state	% Perform in Stable Condition	Feature Perform. Mean or Total
	1. Present	20	20	NA	100%	
	2. Armor stable (e.g. no displacement)?	20	20	NA	100%	
	3. Facet grade appears stable?	20	20	NA	100%	
	4. Minimal evidence of embedding / fining?	20	20	NA	100%	
A. Riffles	5. Length appropriate?	20	20	NA	100%	100%
	1. Present? (e.g. not subject to severe aggrad. Or migrat.?)	28	28	NA	100%	
	2. Sufficiently deep (Max Pool D:Mean Bkf>1.6?)	28	28	NA	100%	
B. Pools	3. Length appropriate?	28	28	NA	100%	100%
	1. Upstream of meander bend (run/inflection) centering?	28	28	NA	100%	
C. Thalweg	2. Downstream of meander (glide/inflection) centering?	28	28	NA	100%	100%
	1. Outer bend in state of limited/controlled erosion?	28	28	NA	100%	
	2. Of those eroding, # w/concomitant point bar formation?	0	0	NA	100%	
	3. Apparent Rc within spec?	28	28	NA	100%	
D. Meanders	4. Sufficient floodplain access and relief?	28	28	NA	100%	100%
	1. General channel bed aggradation areas (bar formation)	NA	NA	0	100%	
E. Bed General	2. Channel bed degradation – areas of increasing down-cutting or head cutting?	NA	NA	0	100%	100%
	1. Free of back or arm scour?	2	2	NA	100%	
	2. Height appropriate?	2	2	NA	100%	
	3. Angle and geometry appear appropriate?	2	2	NA	100%	
F. Vanes	4. Free of piping or other structural failures?	2	2	NA	100%	100%
	1. Free of scour?	NA	NA	NA	NA	
G. Wads / Boulders	2. Footing stable?	NA	NA	NA	NA	NA

Table B4. Visual Morphological Stability Assessment
Cane Creek
Reach 4 (Tributary 3 - Sta. 14+45 to 20+40)

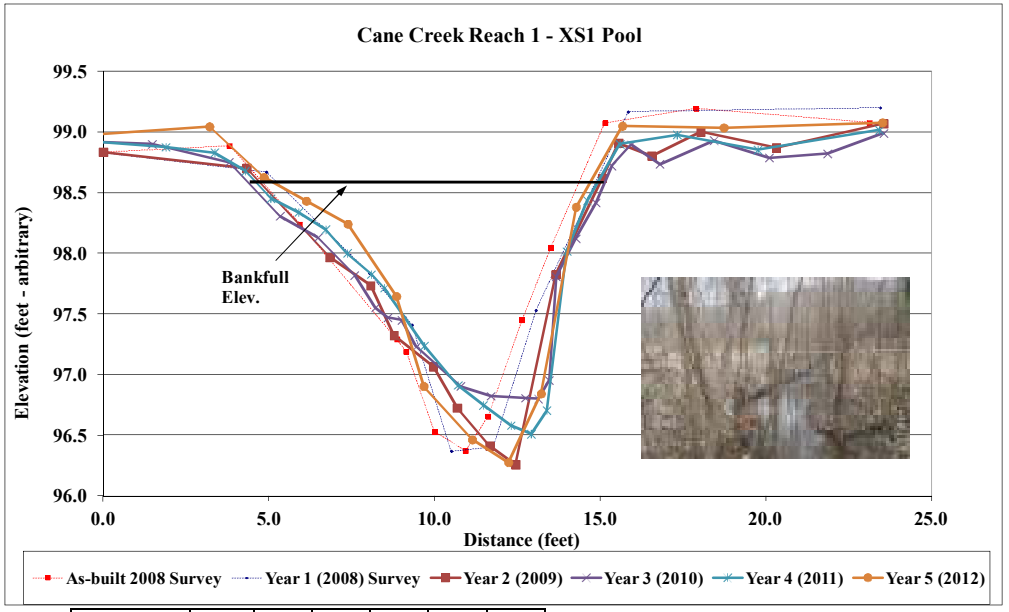
Feature Category	Metric (per As-built and reference baselines)	(# Stable) Number Performing as Intended	Total number	Total Number / feet in unstable state	% Perform in Stable Condition	Feature Perform. Mean or Total
	1. Present	19	19	NA	100%	
	2. Armor stable (e.g. no displacement)?	19	19	NA	100%	
	3. Facet grade appears stable?	19	19	NA	100%	
	4. Minimal evidence of embedding / fining?	19	19	NA	100%	
A. Riffles	5. Length appropriate?	19	19	NA	100%	100%
	1. Present? (e.g. not subject to severe aggrad. Or migrat.?)	26	26	NA	100%	
	2. Sufficiently deep (Max Pool D:Mean Bkf>1.6?)	26	26	NA	100%	
B. Pools	3. Length appropriate?	26	26	NA	100%	100%
	1. Upstream of meander bend (run/inflection) centering?	26	26	NA	100%	
C. Thalweg	2. Downstream of meander (glide/inflection) centering?	26	26	NA	100%	100%
	1. Outer bend in state of limited/controlled erosion?	26	26	NA	100%	
	2. Of those eroding, # w/concomitant point bar formation?	0	0	NA	100%	
	3. Apparent Rc within spec?	26	26	NA	100%	
D. Meanders	4. Sufficient floodplain access and relief?	26	26	NA	100%	100%
	1. General channel bed aggradation areas (bar formation)	NA	NA	0	100%	
E. Bed General	2. Channel bed degradation – areas of increasing down-cutting or head cutting?	NA	NA	0	100%	100%
	1. Free of back or arm scour?	2	2	NA	100%	
	2. Height appropriate?	2	2	NA	100%	
	3. Angle and geometry appear appropriate?	2	2	NA	100%	
F. Vanes	4. Free of piping or other structural failures?	2	2	NA	100%	100%
	1. Free of scour?	NA	NA	NA	NA	
G. Wads / Boulders	2. Footing stable?	NA	NA	NA	NA	NA

Table B5. Visual Morphological Stability Assessment
Cane Creek
Reach 5 (Tributary 3 - Sta. 20+68 to 26+60)

Feature Category	Metric (per As-built and reference baselines)	(# Stable) Number Performing as Intended	Total number	Total Number / feet in unstable state	% Perform in Stable Condition	Feature Perform. Mean or Total
	1. Present	20	20	NA	100%	
	2. Armor stable (e.g. no displacement)?	20	20	NA	100%	
	3. Facet grade appears stable?	20	20	NA	100%	
	4. Minimal evidence of embedding / fining?	20	20	NA	100%	
A. Riffles	5. Length appropriate?	20	20	NA	100%	100%
	1. Present? (e.g. not subject to severe aggrad. Or migrat.?)	30	30	NA	100%	
	2. Sufficiently deep (Max Pool D:Mean Bkf>1.6?)	30	30	NA	100%	
B. Pools	3. Length appropriate?	30	30	NA	100%	100%
	1. Upstream of meander bend (run/inflection) centering?	30	30	NA	100%	
C. Thalweg	2. Downstream of meander (glide/inflection) centering?	30	30	NA	100%	100%
	1. Outer bend in state of limited/controlled erosion?	30	30	NA	100%	
	2. Of those eroding, # w/concomitant point bar formation?	0	0	NA	100%	
	3. Apparent Rc within spec?	30	30	NA	100%	
D. Meanders	4. Sufficient floodplain access and relief?	30	30	NA	100%	100%
	1. General channel bed aggradation areas (bar formation)	NA	NA	0	100%	
E. Bed General	2. Channel bed degradation – areas of increasing down-cutting or head cutting?	NA	NA	0	100%	100%
	1. Free of back or arm scour?	3	3	NA	100%	
	2. Height appropriate?	3	3	NA	100%	
	3. Angle and geometry appear appropriate?	3	3	NA	100%	
F. Vanes	4. Free of piping or other structural failures?	3	3	NA	100%	100%
	1. Free of scour?	NA	NA	NA	NA	
G. Wads / Boulders	2. Footing stable?	NA	NA	NA	NA	NA

Project Name Cane Creek
Cross Section R1-XS1
Feature Pool
Date 3/8/12
Crew Jernigan, Perkinson

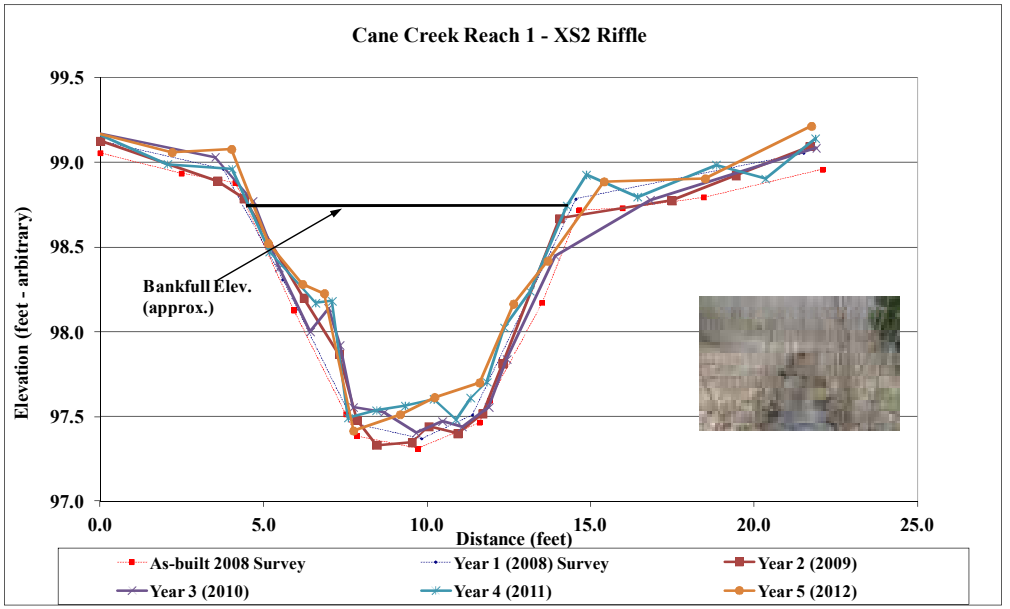
As-built 2008 Survey		Year 1 2008 Survey		Year 2 2009 Survey		Year 3 2010 Survey		Year 4 2011 Survey		Year 5 2012 Survey	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0.0	98.8	0.0	98.8	0.0	98.8	-0.1	98.9	-0.1	98.9	-0.1	99.0
3.8	98.9	4.9	98.7	4.3	98.7	1.5	98.9	1.9	98.9	3.2	99.0
5.9	98.2	8.0	97.8	6.8	98.0	3.8	98.7	3.4	98.8	4.8	98.6
8.9	97.3	9.3	97.4	8.1	97.7	5.3	98.3	4.3	98.7	6.1	98.4
9.1	97.2	10.5	96.4	8.8	97.3	6.5	98.1	5.1	98.5	7.4	98.2
10.0	96.5	11.8	96.4	10.0	97.1	7.6	97.8	5.9	98.3	8.8	97.6
10.9	96.4	13.1	97.5	10.7	96.7	8.2	97.6	6.7	98.2	9.7	96.9
11.6	96.7	15.8	99.2	11.7	96.4	8.6	97.5	7.4	98.0	11.1	96.5
12.6	97.4	23.5	99.2	12.4	96.3	9.0	97.4	8.1	97.8	12.2	96.3
13.5	98.0			13.7	97.8	9.4	97.2	8.5	97.7	13.2	96.8
15.1	99.1			15.1	98.6	10.8	96.9	9.7	97.2	14.3	98.4
17.9	99.2			15.6	98.9	11.7	96.8	10.7	96.9	15.7	99.0
23.1	99.1			16.5	98.8	12.7	96.8	11.5	96.7	18.7	99.0
				18.0	99.0	13.1	96.8	12.3	96.6	23.5	99.1
				20.3	98.9	13.5	97.0	12.9	96.5		
				23.6	99.1	13.7	97.8	13.4	96.7		
						14.3	98.1	14.0	98.0		
						14.9	98.4	14.6	98.4		
						15.3	98.7	15.6	98.9		
						15.9	98.9	17.3	99.0		
						16.8	98.7	19.8	98.9		
						18.4	98.9	23.4	99.0		
						20.1	98.8				
						21.9	98.8				
						23.6	99.0				



	As-built	2008	2009	2010	2011	2012
Area	13.5	10.9	11.1	10.6	11.1	11.2
Width	11.0	10.1	10.2	10.7	10.6	10
Mean Depth	1.2	1.1	1.1	1.0	1.0	1.1
Max Depth	2.5	2.3	2.3	1.8	2.1	2.4
W/D Ratio	NA	NA	NA	NA	NA	NA

Project Name Cane Creek
Cross Section R1-XS2
Feature Riffle
Date 3/8/12
Crew Jernigan, Perkinson

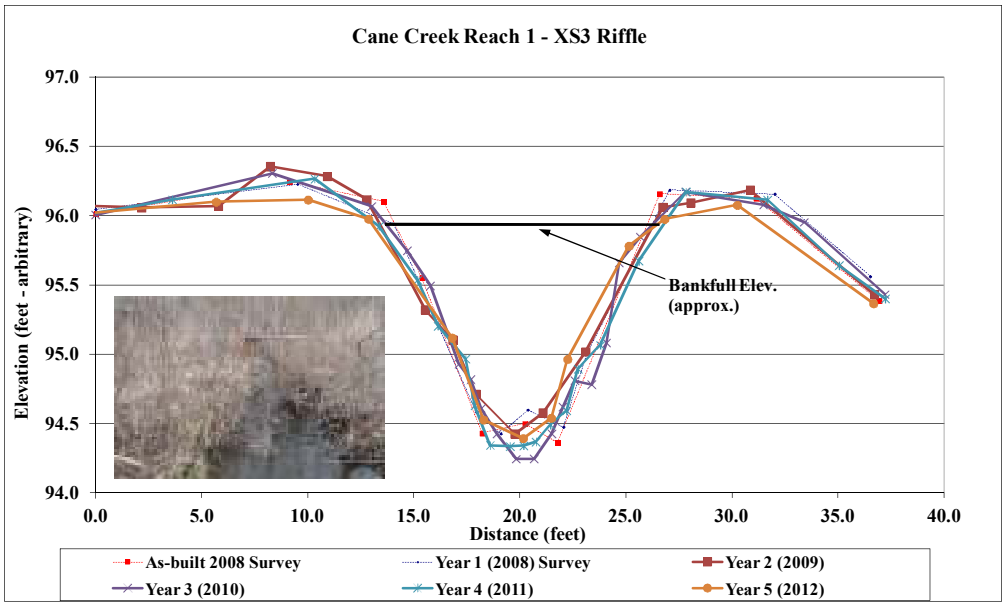
As-built 2008 Survey		Year 1 2008 Survey		Year 2 2009 Survey		Year 3 2010 Survey		Year 4 2011 Survey		Year 5 2012 Survey	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0.0	99.1	0.0	99.1	0.0	99.1	-0.2	99.2	-0.2	99.2	-0.2	99.2
2.5	98.9	3.8	99.0	3.6	98.9	3.5	99.0	2.1	99.0	2.2	99.1
4.1	98.9	5.6	98.3	4.4	98.8	4.7	98.8	4.0	99.0	4.0	99.1
5.9	98.1	7.8	97.5	6.2	98.2	5.5	98.4	5.2	98.5	5.1	98.5
7.5	97.5	9.8	97.4	7.3	97.9	6.4	98.0	6.6	98.2	6.2	98.3
7.9	97.4	11.4	97.5	7.8	97.5	7.0	98.1	7.1	98.2	6.9	98.2
9.7	97.3	14.5	98.8	8.5	97.3	7.3	97.9	7.6	97.5	7.7	97.4
11.6	97.5	21.5	99.1	9.5	97.3	7.7	97.6	8.4	97.5	9.2	97.5
11.9	97.6			10.0	97.4	8.7	97.5	9.3	97.6	10.2	97.6
13.5	98.2			10.9	97.4	9.7	97.4	10.2	97.6	11.6	97.7
14.7	98.7			11.7	97.5	10.5	97.5	10.9	97.5	12.6	98.2
16.0	98.7			12.3	97.8	11.1	97.4	11.3	97.6	13.7	98.4
18.5	98.8			14.1	98.7	11.9	97.6	11.8	97.7	15.4	98.9
22.1	99.0			17.5	98.8	12.4	97.8	12.4	98.0	18.5	98.9
				19.4	98.9	13.9	98.4	13.1	98.2	21.8	99.2
				21.7	99.1	16.8	98.8	14.3	98.7		
						21.9	99.1	14.9	98.9		
								16.4	98.8		
								18.8	99.0		
								20.4	98.9		
								21.9	99.1		



	As-built	2008	2009	2010	2011	2012
Area	9.4	9.3	7.8	7.9	7.9	7.9
Width	10.1	10.4	9.3	11.0	9.9	10.3
Mean Depth	0.9	0.9	0.8	0.7	0.8	0.8
Max Depth	1.4	1.4	1.3	1.3	1.3	1.4
W/D Ratio	11.0	11.7	11.1	15.2	12.3	13.5

Project Name Cane Creek
Cross Section R1-XS3
Feature Riffle
Date 3/8/12
Crew Jernigan, Perkinson

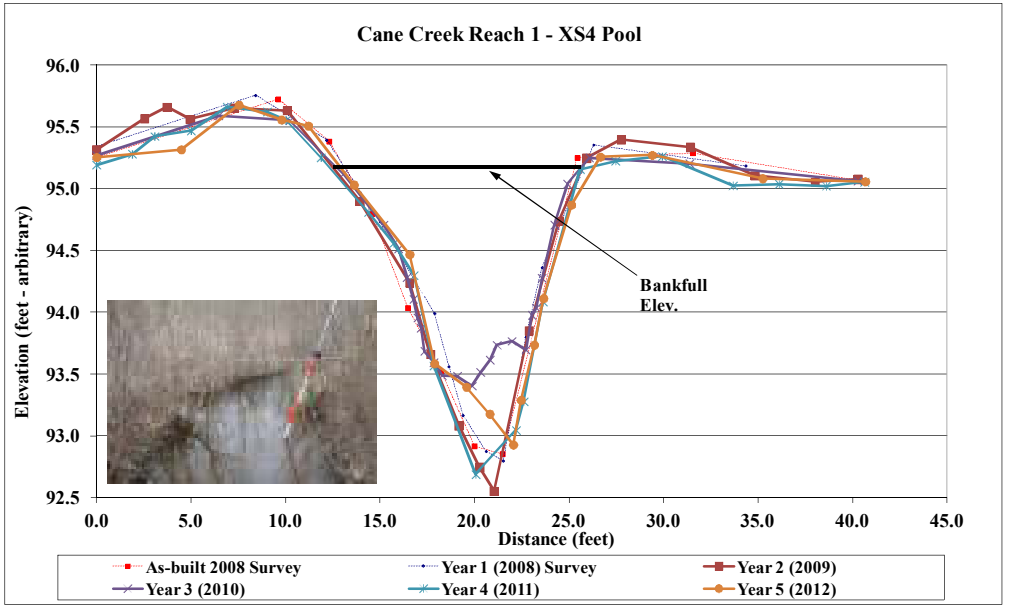
As-built 2008 Survey		Year 1 2008 Survey		Year 2 2009 Survey		Year 3 2010 Survey		Year 4 2011 Survey		Year 5 2012 Survey	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0.0	96.0	0.0	96.0	-1.0	96.1	0.0	96.0	-0.6	96.0	-0.6	96.0
9.1	96.2	9.5	96.2	2.2	96.1	8.3	96.3	3.6	96.1	5.7	96.1
13.6	96.1	14.0	95.9	5.8	96.1	13.0	96.1	10.3	96.3	10.0	96.1
15.4	95.5	18.0	94.6	8.2	96.4	14.7	95.7	13.4	95.9	12.9	96.0
18.2	94.4	19.1	94.4	10.9	96.3	15.8	95.5	15.2	95.5	16.8	95.1
20.2	94.5	20.4	94.6	12.8	96.1	17.1	94.9	16.1	95.2	18.3	94.5
21.8	94.4	22.1	94.5	15.5	95.3	17.7	94.8	17.4	95.0	20.2	94.4
26.6	96.2	23.2	95.0	16.8	95.1	18.2	94.6	17.9	94.6	21.5	94.5
31.1	96.1	27.1	96.2	17.9	94.7	18.9	94.4	18.6	94.3	22.2	95.0
36.9	95.4	32.0	96.2	19.8	94.4	19.8	94.2	19.5	94.3	25.1	95.8
		36.5	95.6	21.1	94.6	20.7	94.2	20.2	94.3	26.8	96.0
				23.1	95.0	21.5	94.4	20.8	94.4	30.2	96.1
				26.7	96.1	22.0	94.6	21.4	94.5	36.7	95.4
				28.0	96.1	22.6	94.8	22.2	94.6		
				30.8	96.2	23.4	94.8	22.7	94.9		
				36.7	95.4	24.1	95.1	23.8	95.1		
						24.7	95.7	25.6	95.7		
						25.7	95.8	27.8	96.2		
						27.8	96.2	31.7	96.1		
						31.5	96.1	35.0	95.6		
						33.4	96.0	37.2	95.4		
						37.2	95.4				



	As-built	2008	2009	2010	2011	2012
Area	13.6	11.3	12.5	11.9	11.7	10.3
Width	12.9	12.2	13.8	13.0	13.3	13.2
Mean Depth	1.1	0.9	0.9	0.9	0.9	0.8
Max Depth	1.7	1.5	1.6	1.7	1.6	1.5
W/D Ratio	12.2	13.3	15.1	14.1	15.2	17

Project Name Cane Creek
Cross Section R1-XS4
Feature Pool
Date 3/8/12
Crew Jernigan, Perkinson

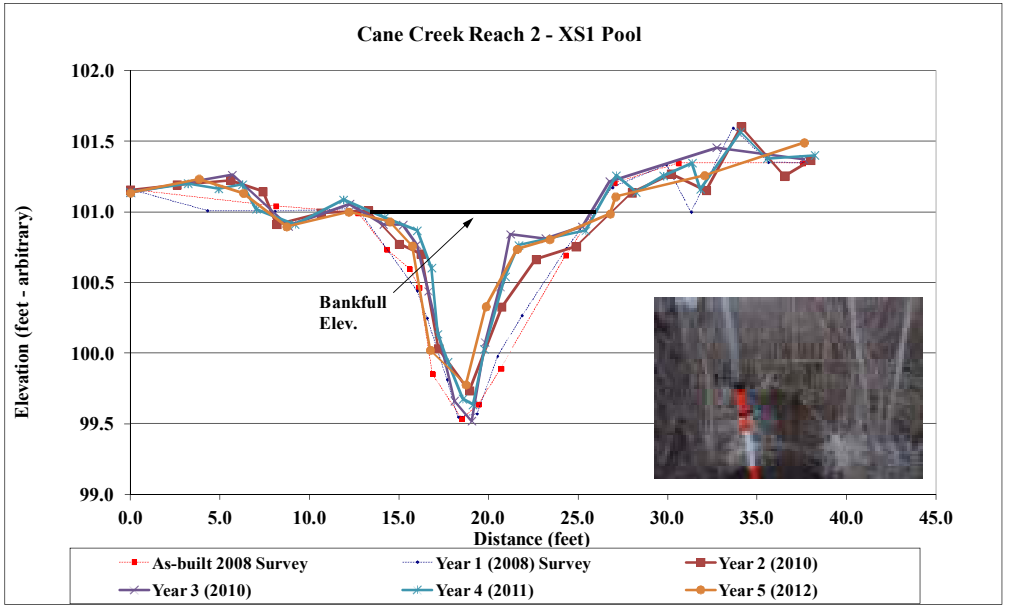
As-built 2008 Survey		Year 1 2008 Survey		Year 2 2009 Survey		Year 3 2010 Survey		Year 4 2011 Survey		Year 5 2012 Survey	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0.0	95.3	0.0	95.3	0.0	95.3	0.0	95.3	0.0	95.2	0.0	95.3
9.6	95.7	8.4	95.8	2.5	95.6	6.5	95.6	1.9	95.3	4.5	95.3
12.3	95.4	12.2	95.4	3.7	95.7	10.2	95.6	3.1	95.4	7.5	95.7
14.6	94.8	15.0	94.7	5.0	95.6	13.1	95.1	5.0	95.5	9.8	95.6
16.5	94.0	17.9	94.0	7.3	95.7	15.2	94.7	6.9	95.7	11.2	95.5
18.2	93.5	18.6	93.6	10.1	95.6	16.0	94.5	9.0	95.6	13.6	95.0
20.0	92.9	19.4	93.2	13.9	94.9	16.4	94.3	10.0	95.6	16.6	94.5
21.5	92.9	20.6	92.9	16.6	94.2	16.8	94.1	11.9	95.3	17.9	93.6
25.4	95.3	21.5	92.8	17.7	93.7	17.0	94.0	14.4	94.8	19.6	93.4
31.5	95.3	22.7	93.8	19.2	93.1	17.2	93.9	15.7	94.6	20.8	93.2
40.4	95.1	23.6	94.4	20.3	92.7	17.4	93.7	16.8	94.3	22.1	92.9
		26.3	95.4	21.0	92.6	17.8	93.6	17.8	93.6	22.5	93.3
		34.3	95.2	22.9	93.9	18.3	93.5	20.1	92.7	23.2	93.7
				24.5	94.7	19.1	93.5	22.2	93.0	23.6	94.1
				25.9	95.2	19.9	93.4	22.6	93.3	25.1	94.9
				27.7	95.4	20.3	93.5	23.6	94.1	26.7	95.3
				31.4	95.3	20.8	93.6	25.6	95.2	29.4	95.3
				34.8	95.1	21.2	93.7	27.5	95.2	35.2	95.1
				38.0	95.1	22.0	93.8	29.9	95.3	40.7	95.1
				40.3	95.1	22.7	93.7	33.7	95.0		
						23.0	94.0	36.1	95.0		
						23.3	94.0	38.6	95.0		
						23.6	94.3	40.6	95.1		
						24.2	94.7				
						24.9	95.0				
						26.1	95.2				
						31.4	95.2				
						40.3	95.1				



	As-built	2008	2009	2010	2011	2012
Area	16.4	16.3	16.6	13.5	15.8	14.3
Width	12.6	13.9	13.9	13.8	13.3	13.3
Mean Depth	1.3	1.2	1.2	1.0	1.2	1.1
Max Depth	2.4	2.6	2.7	1.8	2.5	2.2
W/D Ratio	NA	NA	NA	NA	NA	NA

Project Name Cane Creek
Cross Section R2-XS1
Feature Pool
Date 3/8/12
Crew Jernigan, Perkinson

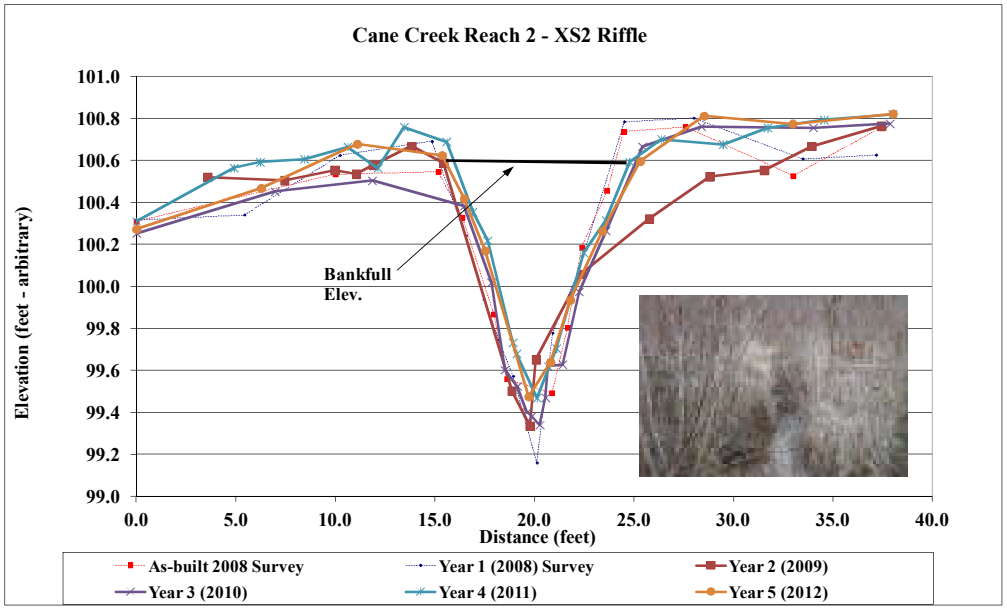
As-built 2008 Survey		Year 1 2008 Survey		Year 2 2009 Survey		Year 3 2010 Survey		Year 4 2011 Survey		Year 5 2012 Survey	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0.0	101.2	0.0	101.2	0.0	101.2	0.0	101.1	0.0	101.1	0.0	101.1
8.1	101.0	4.3	101.0	2.6	101.2	5.7	101.3	3.2	101.2	3.8	101.2
12.7	101.0	8.1	101.0	5.6	101.2	8.8	100.9	4.9	101.2	6.3	101.1
14.3	100.7	12.7	101.0	7.4	101.1	12.2	101.1	6.2	101.2	8.7	100.9
15.6	100.6	16.0	100.4	8.2	100.9	14.1	100.9	7.0	101.0	12.2	101.0
16.1	100.5	16.6	100.2	10.7	101.0	15.2	100.9	9.2	100.9	14.5	100.9
16.9	99.9	17.7	99.8	13.3	101.0	16.0	100.8	11.9	101.1	15.7	100.8
18.5	99.5	18.3	99.5	15.0	100.8	16.6	100.4	14.2	101.0	16.7	100.0
19.4	99.6	19.4	99.6	16.2	100.7	18.1	99.7	16.0	100.9	18.7	99.8
20.7	99.9	20.5	100.0	17.2	100.0	19.1	99.5	16.8	100.6	19.9	100.3
24.3	100.7	21.9	100.3	18.9	99.7	19.8	100.1	17.2	100.1	21.6	100.7
27.0	101.2	24.4	100.7	20.7	100.3	20.6	100.5	17.7	99.9	23.4	100.8
30.6	101.3	26.9	101.2	22.6	100.7	21.2	100.8	18.6	99.7	26.8	101.0
37.6	101.3	29.9	101.3	24.9	100.8	23.2	100.8	19.1	99.6	27.1	101.1
		31.3	101.0	28.0	101.1	25.2	100.9	19.8	100.0	32.1	101.3
		33.7	101.6	30.2	101.3	26.8	101.2	20.9	100.5	37.6	101.5
		35.6	101.4	32.1	101.2	32.7	101.5	21.7	100.8		
		37.7	101.3	34.1	101.6	37.6	101.4	25.4	100.9		
				36.5	101.3			27.1	101.3		
				38.0	101.4			28.2	101.1		
								29.8	101.3		
								31.4	101.3		
								31.8	101.2		
								34.1	101.6		
								35.6	101.4		
								38.2	101.4		



	As-built	2008	2009	2010	2011	2012
Area	9.3	8.6	6.7	3.8	2.6	3.1
Width	13.4	13.0	13.6	5.6	6.6	5.8
Mean Depth	0.7	0.7	0.5	0.7	0.4	0.5
Max Depth	1.5	1.4	1.3	1.3	1.4	1
W/D Ratio	N/A	NA	NA	NA	NA	NA

Project Name	Cane Creek
Cross Section	R2-XS2
Feature	Riffle
Date	3/8/12
Crew	Jernigan, Perkinson

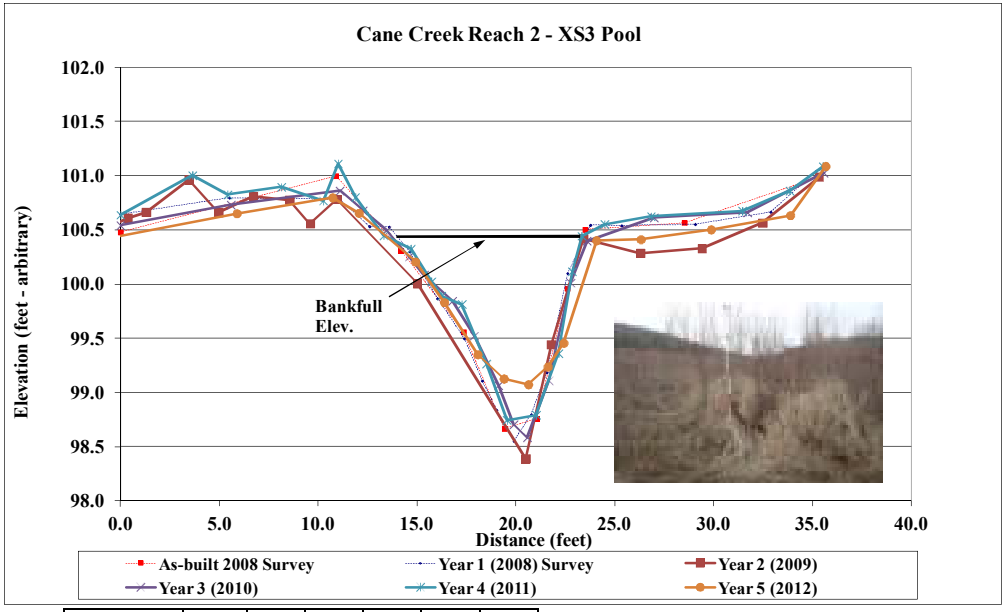
As-built 2008 Survey		Year 1 2008 Survey		Year 2 2009 Survey		Year 3 2010 Survey		Year 4 2011 Survey		Year 5 2012 Survey	
Sta	**Elev**	**Sta**	**Elev**	**Sta**	**Elev**	**Sta**	**Elev**	**Sta**	**Elev**	**Sta**	**Elev**
0.0	100.3	0.0	100.3	3.6	100.5	0.0	100.3	0.0	100.3	0.0	100.3
10.0	100.5	5.4	100.3	7.4	100.5	7.0	100.5	4.9	100.6	6.3	100.5
15.2	100.5	10.2	100.6	10.0	100.6	11.8	100.5	6.2	100.6	11.1	100.7
16.4	100.3	14.8	100.7	11.0	100.5	16.5	100.4	8.4	100.6	15.4	100.6
17.9	99.9	16.5	100.2	11.9	100.6	17.8	100.0	10.6	100.7	16.5	100.4
18.6	99.6	17.5	99.9	13.8	100.7	18.5	99.6	12.1	100.6	17.5	100.2
20.9	99.5	18.2	99.7	15.4	100.6	19.1	99.5	13.4	100.8	19.7	99.5
21.7	99.8	18.9	99.6	18.9	99.5	19.6	99.4	15.6	100.7	20.8	99.6
22.4	100.2	20.1	99.2	19.8	99.3	19.9	99.4	16.9	100.4	21.8	99.9
23.6	100.5	20.9	99.8	20.1	99.7	20.3	99.3	17.6	100.2	23.4	100.3
24.5	100.7	22.2	100.1	22.3	100.1	20.6	99.5	18.9	99.7	25.3	100.6
27.6	100.8	24.5	100.8	25.8	100.3	20.7	99.6	19.1	99.7	28.5	100.8
33.0	100.5	28.0	100.8	28.8	100.5	21.4	99.6	20.1	99.5	33.0	100.8
37.4	100.8	33.5	100.6	31.5	100.6	22.2	100.0	21.1	99.7	38.0	100.8
		37.2	100.6	33.9	100.7	23.6	100.3	22.5	100.2		
				37.4	100.8	25.4	100.7	23.6	100.3		
						28.4	100.8	24.8	100.6		
						34.0	100.8	26.4	100.7		
						37.9	100.8	29.5	100.7		
								31.7	100.8		
								34.6	100.8		
								38.0	100.8		



	As-built	2008	2009	2010	2011	2012
Area	5.1	6.3	5.9	4.1	4.8	5.1
Width	9.2	9.3	13.3	7.7	9.1	9.8
Mean Depth	0.6	0.7	0.4	0.5	0.5	0.5
Max Depth	1.1	1.5	1.2	1.0	1.1	1.1
W/D Ratio	16.5	13.6	29.9	14.5	17.1	18.7

Project Name	Cane Creek
Cross Section	R2-XS3
Feature	Pool
Date	3/8/12
Crew	Jernigan, Perkinson

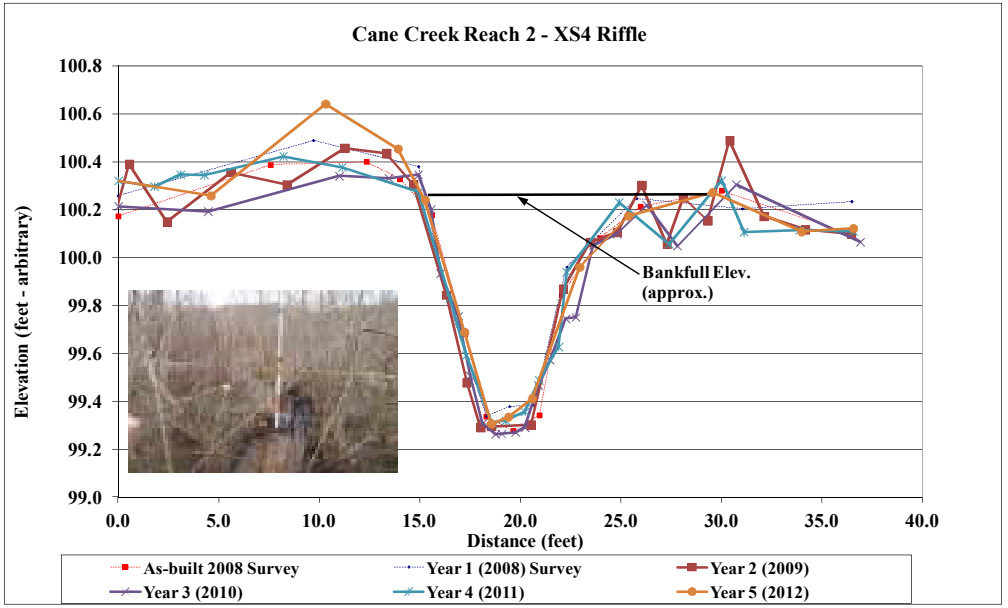
As-built 2008 Survey		Year 1 2008 Survey		Year 2 2009 Survey		Year 3 2010 Survey		Year 4 2011 Survey		Year 5 2012 Survey	
Sta	**Elev**	**Sta**	**Elev**	**Sta**	**Elev**	**Sta**	**Elev**	**Sta**	**Elev**	**Sta**	**Elev**
0.0	100.5	0.0	100.6	-0.5	100.5	0.0	100.5	0.0	100.6	-0.2	100.4
10.9	101.0	5.5	100.8	0.4	100.6	5.6	100.7	3.6	101.0	5.9	100.7
14.2	100.3	11.1	100.8	1.3	100.7	11.1	100.9	5.4	100.8	10.7	100.8
17.3	99.6	12.6	100.5	3.5	101.0	12.3	100.7	8.1	100.9	12.1	100.7
19.4	98.7	13.6	100.5	5.0	100.7	13.5	100.5	10.3	100.8	14.9	100.2
21.1	98.8	14.6	100.3	6.7	100.8	14.6	100.3	11.0	101.1	16.4	99.8
22.6	100.0	16.0	99.9	8.5	100.8	15.4	100.1	11.9	100.8	18.1	99.3
23.5	100.5	17.4	99.5	9.6	100.6	16.8	99.8	13.3	100.4	19.4	99.1
28.5	100.6	18.3	99.1	10.9	100.8	17.9	99.5	14.7	100.3	20.6	99.1
35.3	101.0	19.0	98.8	15.0	100.0	19.1	99.1	15.7	100.0	21.6	99.2
		19.9	98.6	20.5	98.4	19.9	98.7	16.2	99.9	22.4	99.5
		20.8	98.8	21.8	99.4	20.6	98.6	17.3	99.8	24.1	100.4
		21.6	99.2	23.4	100.4	21.7	99.1	18.5	99.3	26.3	100.4
		22.6	100.1	26.3	100.3	22.8	100.0	19.5	98.7	29.9	100.5
		23.8	100.5	29.4	100.3	23.6	100.4	21.0	98.8	33.9	100.6
		25.3	100.5	32.5	100.6	27.0	100.6	22.2	99.4	35.7	101.1
		29.1	100.6	35.3	101.0	31.7	100.7	22.8	100.1		
		32.9	100.7			35.6	101.0	23.3	100.4		
		35.2	101.0					24.5	100.6		
								26.8	100.6		
								31.4	100.7		
								33.8	100.9		
								35.5	101.1		



	As-built	2008	2009	2010	2011	2012
Area	9.7	9.8	9.8	8.1	8.0	8
Width	10.2	11.2	10.5	9.6	9.4	10.3
Mean Depth	1.0	0.9	0.9	0.8	0.9	0.8
Max Depth	1.8	2.0	2.0	1.8	1.7	1.3
W/D Ratio	N/A	NA	NA	NA	NA	NA

Project Name Cane Creek
Cross Section R2-XS4
Feature Riffle
Date 3/8/12
Crew Jernigan, Perkinson

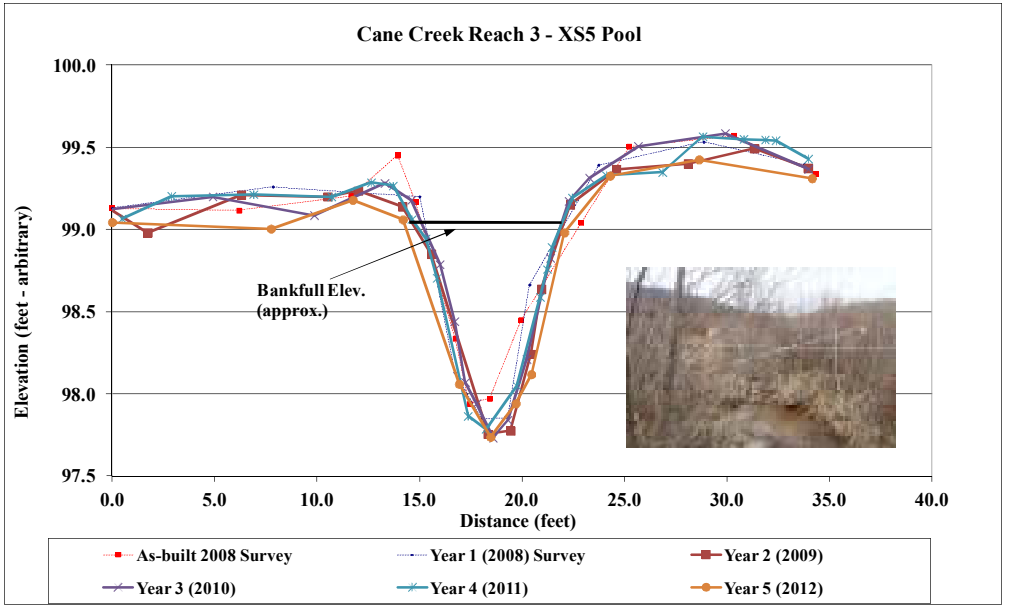
As-built 2008 Survey		Year 1 2008 Survey		Year 2 2009 Survey		Year 3 2010 Survey		Year 4 2011 Survey		Year 5 2012 Survey	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0.0	100.2	0.0	100.3	-4.0	100.2	0.0	100.2	0.0	100.3	-0.4	100.3
7.6	100.4	9.7	100.5	-1.7	100.3	4.5	100.2	1.8	100.3	4.6	100.3
12.3	100.4	14.9	100.4	-0.1	100.2	11.0	100.3	3.1	100.3	10.3	100.6
14.0	100.3	16.3	99.8	0.5	100.4	13.5	100.3	4.3	100.3	13.9	100.5
15.6	100.2	18.3	99.3	2.4	100.1	14.9	100.3	8.2	100.4	15.3	100.2
17.3	99.7	19.5	99.4	5.6	100.4	15.6	100.2	11.1	100.4	17.2	99.7
18.3	99.3	20.7	99.4	8.4	100.3	16.0	99.9	14.9	100.3	18.6	99.3
19.6	99.3	22.3	100.0	11.3	100.5	16.9	99.8	16.5	99.8	19.4	99.3
20.9	99.3	25.8	100.2	13.3	100.4	17.5	99.5	17.3	99.6	20.6	99.4
22.0	99.8	31.0	100.2	14.7	100.3	18.1	99.3	18.6	99.3	22.9	100.0
24.0	100.1	36.5	100.2	16.3	99.8	18.8	99.3	19.3	99.3	25.4	100.2
26.0	100.2			17.3	99.5	19.1	99.3	20.2	99.4	29.6	100.3
30.0	100.3			18.0	99.3	19.8	99.3	20.9	99.5	34.0	100.1
36.5	100.1			18.6	99.3	20.2	99.3	21.9	99.6	36.6	100.1
				20.5	99.3	20.9	99.5	22.3	99.9		
				22.1	99.9	21.5	99.6	24.9	100.2		
				23.5	100.1	22.3	99.7	27.4	100.1		
				24.8	100.1	22.8	99.8	30.0	100.3		
				26.0	100.3	23.6	100.1	31.1	100.1		
				27.3	100.1	24.8	100.1	33.9	100.1		
				28.1	100.3	26.3	100.2	36.6	100.1		
				29.3	100.2	27.8	100.0				
				30.4	100.5	30.7	100.3				
				32.1	100.2	36.9	100.1				
				34.2	100.1						
				36.5	100.1						



	As-built	2008	2009	2010	2011	2012
Area	3.7	5.0	5.0	3.8	5.0	5.1
Width	8.1	10.5	10.3	7.9	9.8	12.7
Mean Depth	0.5	0.5	0.5	0.5	0.5	0.4
Max Depth	0.8	0.9	0.9	0.8	0.9	0.9
W/D Ratio	17.8	21.9	21.2	16.2	19.4	31.6

Project Name	Cane Creek
Cross Section	R3-XS5
Feature	Pool
Date	3/8/12
Crew	Jernigan, Perkinson

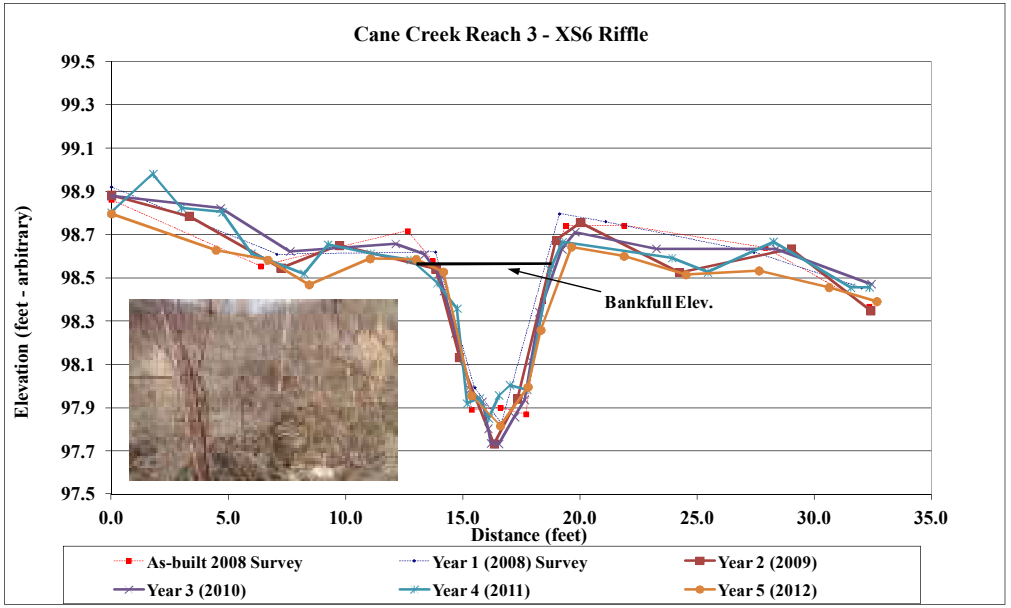
As-built 2008 Survey		Year 1 2008 Survey		Year 2 2009 Survey		Year 3 2010 Survey		Year 4 2011 Survey		Year 5 2012 Survey	
Sta	**Elev**	**Sta**	**Elev**	**Sta**	**Elev**	**Sta**	**Elev**	**Sta**	**Elev**	**Sta**	**Elev**
0.0	99.1	0.0	99.1	-0.2	99.1	-0.3	99.1	0.5	99.1	0.0	99.0
6.2	99.1	7.9	99.3	1.7	99.0	4.9	99.2	2.9	99.2	7.8	99.0
11.7	99.2	15.0	99.2	6.3	99.2	9.9	99.1	6.9	99.2	11.7	99.2
13.9	99.5	16.7	98.1	10.5	99.2	13.3	99.3	10.7	99.2	14.2	99.1
14.8	99.2	18.0	97.8	12.0	99.2	14.6	99.2	12.6	99.3	16.9	98.1
16.7	98.3	19.3	97.9	14.2	99.1	16.0	98.8	13.7	99.3	18.5	97.7
17.4	97.9	20.4	98.7	15.6	98.9	16.7	98.4	14.6	99.1	19.7	97.9
18.4	98.0	23.7	99.4	18.3	97.8	17.2	98.1	15.3	98.9	20.4	98.1
19.9	98.4	28.9	99.5	19.4	97.8	17.8	97.9	15.8	98.7	22.1	99.0
22.9	99.0	33.8	99.4	20.4	98.2	18.6	97.7	17.4	97.9	24.3	99.3
25.2	99.5			20.9	98.6	19.3	97.8	18.2	97.8	28.6	99.4
30.3	99.6			22.3	99.1	20.2	98.2	19.7	98.0	34.1	99.3
34.3	99.3			24.6	99.4	21.4	98.8	20.9	98.6		
				28.1	99.4	22.3	99.2	21.2	98.8		
				31.3	99.5	23.3	99.3	21.5	98.9		
				33.9	99.4	25.7	99.5	22.4	99.2		
						29.9	99.6	24.1	99.3		
						34.0	99.4	26.9	99.3		
								28.8	99.6		
								30.8	99.5		
								31.9	99.5		
								32.4	99.5		
								33.9	99.4		



	As-built	2008	2009	2010	2011	2012
Area	5.4	5.8	5.8	5.8	5.9	5.8
Width	8.7	7.8	8.1	7.7	8.1	7.9
Mean Depth	0.6	0.7	0.7	0.8	0.7	0.7
Max Depth	1.2	1.3	1.4	1.4	1.4	1.3
W/D Ratio	N/A	NA	NA	NA	NA	NA

Project Name Cane Creek
Cross Section R3-XS6
Feature Riffle
Date 3/8/12
Crew Jernigan, Perkinson

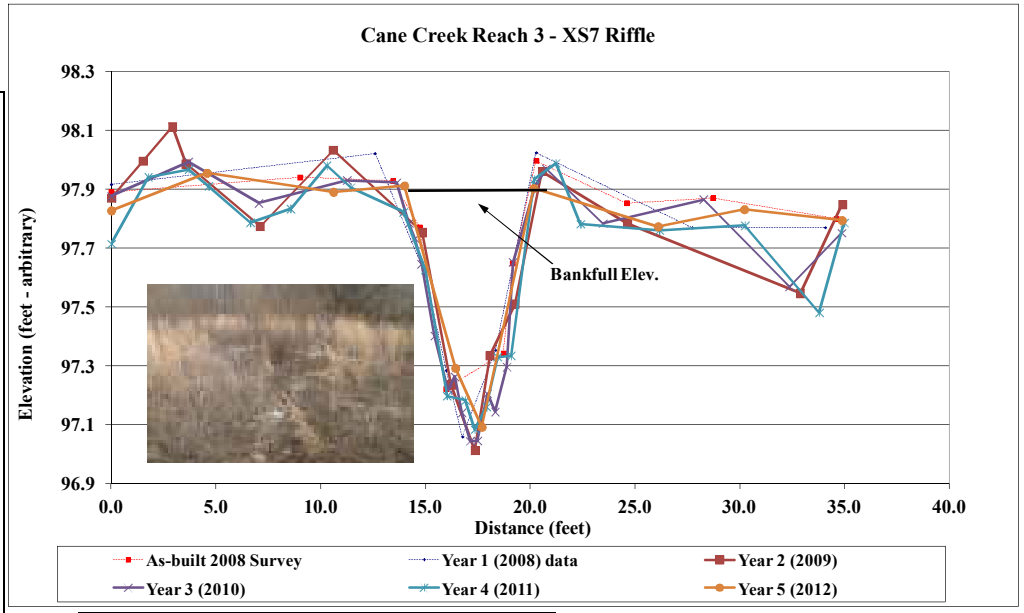
As-built 2007 Survey		Year 1 2008 Survey		Year 2 2009 Survey		Year 3 2010 Survey		Year 4 2011 Survey		Year 5 2012 Survey	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0.0	98.9	0.0	98.9	0.0	98.9	0.0	98.9	0.0	98.8	0.0	98.8
6.4	98.6	7.1	98.6	3.3	98.8	4.7	98.8	1.8	99.0	4.5	98.6
12.6	98.7	13.8	98.6	7.2	98.5	7.6	98.6	3.0	98.8	6.7	98.6
13.7	98.6	15.5	98.0	9.7	98.7	12.1	98.7	4.7	98.8	8.4	98.5
14.7	98.2	16.6	97.8	13.8	98.5	13.4	98.6	6.0	98.6	11.0	98.6
15.4	97.9	19.1	98.8	14.8	98.1	14.0	98.5	8.2	98.5	13.0	98.6
16.6	97.9	21.1	98.8	16.3	97.7	14.2	98.4	9.2	98.7	14.2	98.5
17.7	97.9	27.4	98.6	17.3	97.9	14.7	98.2	11.1	98.6	15.4	98.0
18.4	98.4	32.0	98.5	19.0	98.7	15.3	98.0	12.8	98.6	16.6	97.8
19.4	98.7			20.0	98.8	15.8	97.9	13.9	98.5	17.8	98.0
21.9	98.7			24.2	98.5	16.1	97.8	14.7	98.4	18.3	98.3
27.9	98.6			29.0	98.6	16.2	97.7	15.2	97.9	19.6	98.6
32.3	98.4			32.4	98.3	16.5	97.7	15.7	97.9	21.9	98.6
						17.2	97.9	16.1	97.9	24.5	98.5
						17.6	97.9	16.5	98.0	27.6	98.5
						17.9	98.1	17.0	98.0	30.6	98.5
						18.3	98.3	17.7	98.0	32.7	98.4
						19.2	98.6	18.7	98.5		
						19.8	98.7	19.2	98.7		
						23.2	98.6	23.9	98.6		
						28.3	98.6	25.4	98.5		
						32.4	98.5	28.2	98.7		
								31.5	98.5		
								32.3	98.5		



	As-built	2008	2009	2010	2011	2012
Area	3.3	2.1	2.2	2.6	2.1	2.3
Width	6.6	4.8	5.0	5.7	5.7	5.5
Mean Depth	0.5	0.4	0.4	0.5	0.4	0.4
Max Depth	0.8	0.8	0.8	0.9	0.7	0.7
W/D Ratio	13.5	11.0	11.1	12.4	14.9	13

Project Name Cane Creek
Cross Section R3-XS7
Feature Riffle
Date 3/8/12
Crew Jernigan, Perkinson

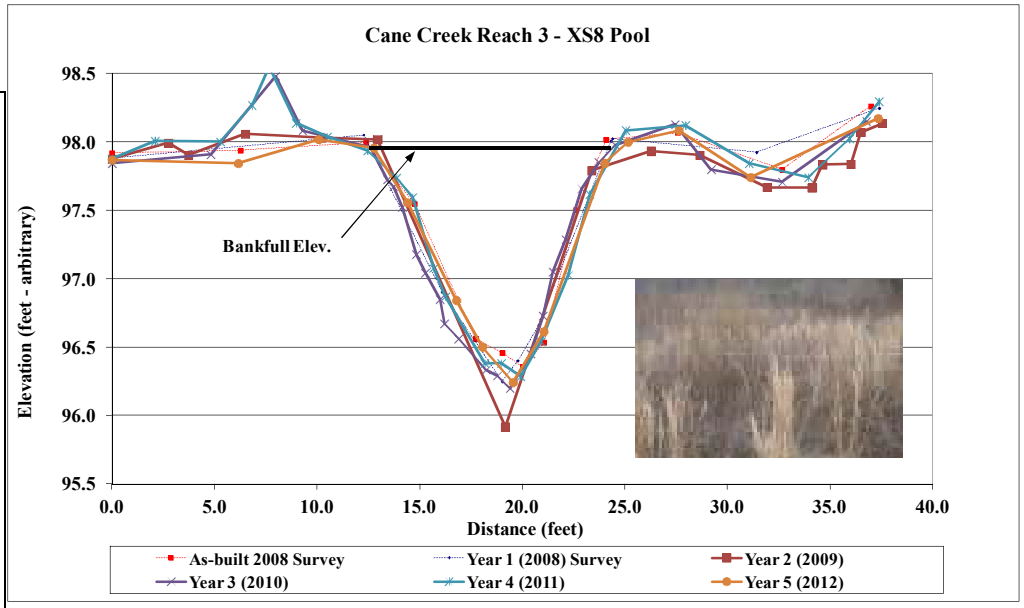
As-built 2008 Survey		Year 1 2008 Survey		Year 2 2009 Survey		Year 3 2010 Survey		Year 4 2011 Survey		Year 5 2012 Survey	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0.0	97.9	0.0	97.9	0.0	97.9	0.0	97.9	0.0	97.7	0.0	97.8
9.0	97.9	12.6	98.0	1.5	98.0	3.7	98.0	1.8	97.9	4.6	98.0
13.4	97.9	15.0	97.6	2.9	98.1	7.0	97.9	3.7	98.0	10.6	97.9
14.7	97.8	16.0	97.3	3.6	98.0	11.2	97.9	4.7	97.9	14.0	97.9
16.0	97.2	16.8	97.1	7.1	97.8	13.6	97.9	6.6	97.8	16.4	97.3
18.7	97.3	18.3	97.4	10.6	98.0	14.2	97.8	8.6	97.8	17.7	97.1
19.2	97.6	20.3	98.0	14.8	97.8	14.5	97.7	10.3	98.0	20.2	97.9
20.3	98.0	27.7	97.8	16.2	97.2	14.8	97.6	11.4	97.9	26.1	97.8
24.6	97.9	34.1	97.8	17.4	97.0	15.4	97.4	13.9	97.8	30.2	97.8
28.7	97.9			18.1	97.3	16.1	97.2	15.0	97.6	34.9	97.8
34.6	97.8			19.3	97.5	16.4	97.3	16.0	97.2		
				20.6	98.0	16.7	97.1	16.9	97.2		
				24.6	97.8	17.1	97.0	17.4	97.1		
				32.9	97.5	17.5	97.0	17.9	97.2		
				34.9	97.8	17.9	97.2	18.4	97.3		
						18.3	97.1	19.1	97.3		
						18.9	97.3	20.2	97.9		
						19.2	97.7	21.2	98.0		
						20.3	97.9	22.4	97.8		
						20.8	98.0	26.2	97.8		
						23.5	97.8	30.2	97.8		
						28.3	97.9	33.8	97.5		
						32.4	97.6	35.0	97.8		
						34.9	97.8				



	As-built	2008	2009	2010	2011	2012
Area	2.7	3.5	3.4	3.2	3.0	2.6
Width	6.6	7.4	8.8	6.6	7.6	6.1
Mean Depth	0.4	0.5	0.4	0.5	0.4	0.4
Max Depth	0.7	0.9	0.9	0.9	0.8	0.8
W/D Ratio	16.0	16.1	22.9	13.8	19.5	14.3

Project Name	Cane Creek
Cross Section	R3-XS8
Feature	Pool
Date	3/8/12
Crew	Jernigan, Perkinson

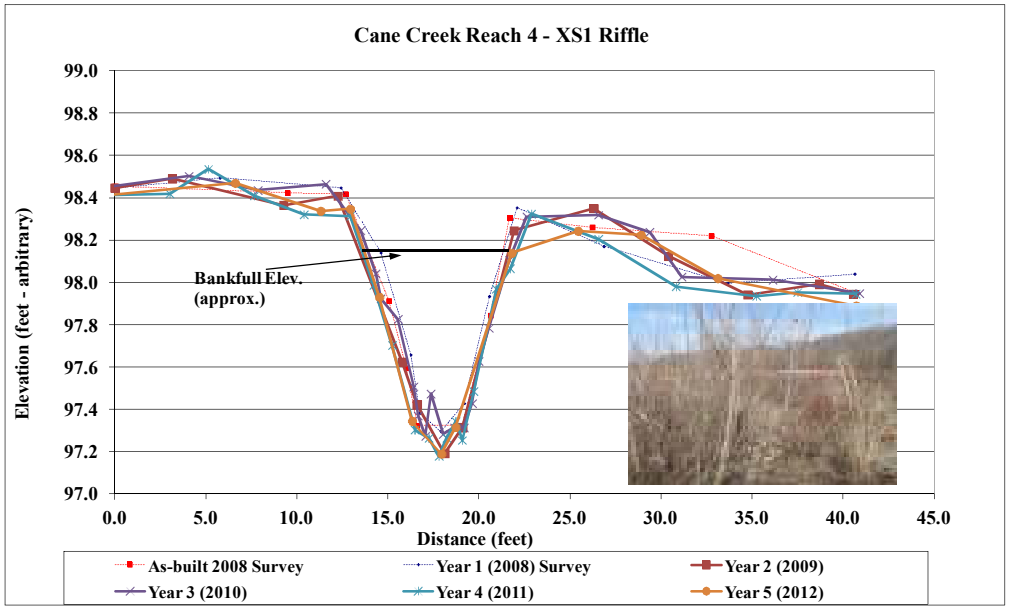
As-built 2008 Survey		Year 1 2008 Survey		Year 2 2009 Survey		Year 3 2010 Survey		Year 4 2011 Survey		Year 5 2012 Survey	
Sta	**Elev**	**Sta**	**Elev**	**Sta**	**Elev**	**Sta**	**Elev**	**Sta**	**Elev**	**Sta**	**Elev**
0.0	97.9	0.0	97.9	0.0	97.9	0.0	97.8	0.0	97.9	0.0	97.9
6.3	97.9	12.3	98.1	2.7	98.0	4.8	97.9	2.1	98.0	6.2	97.8
12.4	98.0	16.1	96.9	3.7	97.9	8.0	98.5	5.3	98.0	10.1	98.0
14.8	97.5	19.0	96.3	6.5	98.1	9.3	98.1	6.8	98.3	12.8	98.0
17.7	96.6	19.8	96.4	10.2	98.0	12.6	98.0	7.7	98.6	14.4	97.6
19.0	96.5	20.8	96.7	12.9	98.0	13.4	97.7	9.0	98.1	16.8	96.8
20.0	96.4	24.3	98.0	19.2	95.9	13.7	97.7	10.5	98.0	18.1	96.5
21.1	96.5	24.4	98.0	23.4	97.8	14.1	97.5	12.4	97.9	19.5	96.2
22.6	97.5	31.4	97.9	26.3	97.9	14.8	97.2	13.9	97.7	21.0	96.6
24.1	98.0	37.4	98.2	28.6	97.9	15.3	97.0	14.6	97.6	24.0	97.8
27.6	98.1			31.9	97.7	16.0	96.8	15.7	97.1	25.2	98.0
32.7	97.8			34.1	97.7	16.2	96.7	16.2	96.9	27.6	98.1
37.0	98.3			34.6	97.8	16.9	96.6	18.2	96.4	31.1	97.7
				36.0	97.8	18.2	96.3	19.0	96.4	37.3	98.2
				36.5	98.1	18.8	96.3	19.9	96.3		
				37.5	98.1	19.4	96.2	20.9	96.5		
						20.4	96.5	22.2	97.0		
						21.0	96.7	23.3	97.6		
						21.5	97.1	25.0	98.1		
						22.1	97.3	28.0	98.1		
						22.9	97.7	31.1	97.8		
						23.7	97.9	33.9	97.7		
						24.5	98.0	35.9	98.0		
						27.4	98.1	37.4	98.3		
						29.2	97.8				
						32.7	97.7				
						36.8	98.2				



	As-built	2008	2009	2010	2011	2012
Area	10.3	11.2	9.2	9.8	9.7	9.3
Width	11.6	11.8	9.8	10.7	11.2	10.8
Mean Depth	0.9	0.9	0.9	0.9	0.9	0.9
Max Depth	1.6	1.7	1.9	1.6	1.6	1.6
W/D Ratio	N/A	NA	NA	NA	NA	NA

Project Name Cane Creek
Cross Section R4-XS1
Feature Riffle
Date 3/8/12
Crew Jernigan, Perkinson

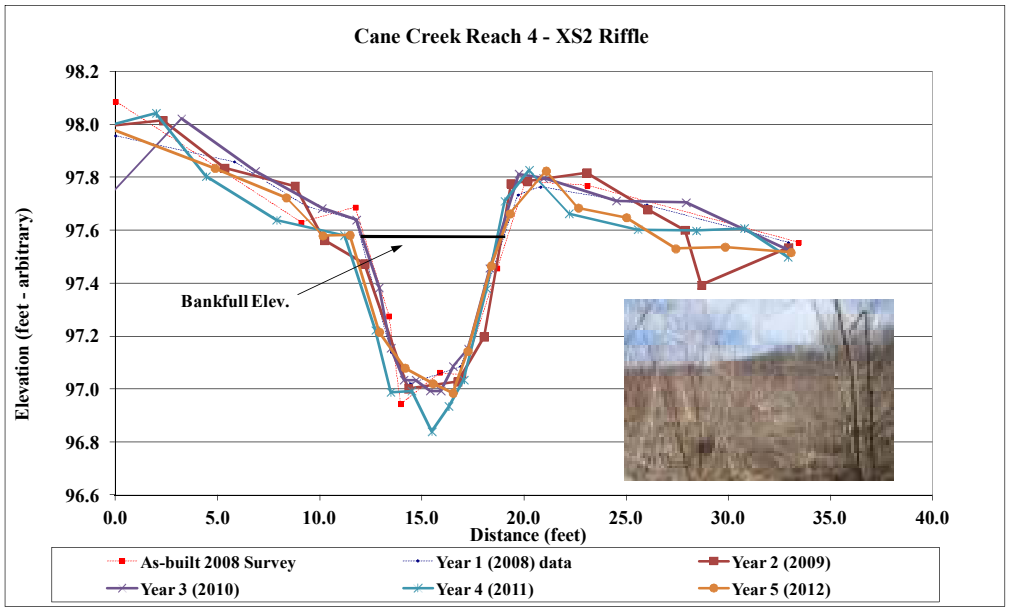
As-built 2008 Survey		Year 1 2008 Survey		Year 2 2009 Survey		Year 3 2010 Survey		Year 4 2011 Survey		Year 5 2012 Survey	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0.0	98.5	0.0	98.4	0.0	98.4	-0.4	98.5	-0.4	98.4	-0.4	98.4
9.5	98.4	5.8	98.5	3.2	98.5	4.1	98.5	3.0	98.4	6.6	98.5
12.7	98.4	12.4	98.4	9.3	98.4	7.9	98.4	5.1	98.5	11.3	98.3
15.1	97.9	14.6	98.1	12.3	98.4	11.6	98.5	7.7	98.4	12.9	98.3
16.0	97.6	16.3	97.7	15.8	97.6	13.5	98.2	10.4	98.3	14.5	97.9
16.6	97.3	16.7	97.4	16.6	97.4	14.3	98.0	12.9	98.3	16.3	97.3
19.0	97.3	17.9	97.3	18.1	97.2	14.6	97.9	14.2	98.0	17.9	97.2
20.6	97.8	19.2	97.4	19.1	97.3	15.6	97.8	15.2	97.7	18.7	97.3
21.7	98.3	20.6	97.9	21.9	98.2	16.4	97.5	16.5	97.3	21.8	98.1
26.2	98.3	22.1	98.4	26.3	98.3	16.7	97.4	17.2	97.3	25.4	98.2
32.8	98.2	26.9	98.2	30.4	98.1	17.1	97.3	17.8	97.2	28.9	98.2
40.7	98.0	33.7	98.0	34.8	97.9	17.4	97.5	18.2	97.3	33.1	98.0
		40.6	98.0	38.7	98.0	18.0	97.3	18.7	97.3	40.7	97.9
				40.5	97.9	18.6	97.3	19.1	97.3		
						19.2	97.3	19.7	97.5		
						19.6	97.4	20.9	98.0		
						20.0	97.6	21.7	98.1		
						20.5	97.8	22.9	98.3		
						21.7	98.1	26.6	98.2		
						22.6	98.3	30.8	98.0		
						26.6	98.3	35.2	97.9		
						29.4	98.2	37.5	98.0		
						31.1	98.0	40.7	97.9		
						36.1	98.0				
						40.9	97.9				



	As-built	2008	2009	2010	2011	2012
Area	5.2	5.2	5.2	5.6	5.7	4.3
Width	8.5	9.1	9.0	9.8	9.5	8.1
Mean Depth	0.6	0.6	0.6	0.6	0.6	0.5
Max Depth	1.0	1.1	1.1	1.1	1.1	0.9
W/D Ratio	13.8	16.1	15.4	17.3	16.0	15

Project Name Cane Creek
Cross Section R4-XS2
Feature Riffle
Date 3/8/12
Crew Jernigan, Perkinson

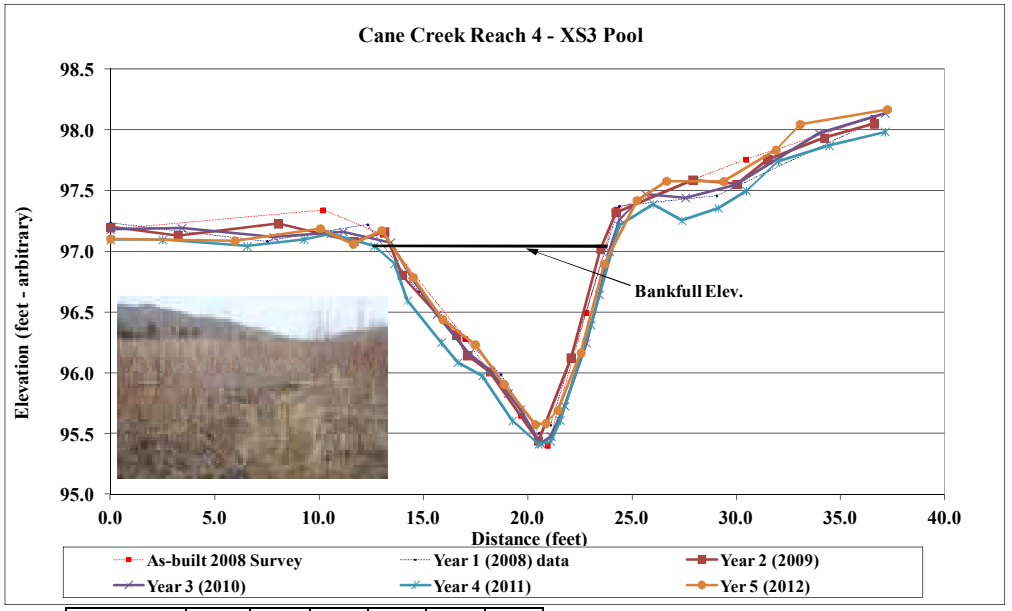
As-built 2008 Survey		Year 1 2008 Survey		Year 2 2009 Survey		Year 3 2010 Survey		Year 4 2011 Survey		Year 5 2012 Survey	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0.0	98.1	0.0	98.0	-0.6	98.0	-0.6	97.7	-0.6	98.0	-0.6	98.0
9.1	97.6	5.8	97.9	2.3	98.0	3.2	98.0	2.0	98.0	4.9	97.8
11.7	97.7	9.4	97.7	5.3	97.8	6.8	97.8	4.4	97.8	8.4	97.7
13.4	97.3	11.8	97.6	8.8	97.8	10.1	97.7	7.9	97.6	10.1	97.6
14.0	96.9	13.5	97.1	10.2	97.6	11.8	97.6	11.2	97.6	11.5	97.6
15.9	97.1	14.4	97.0	12.2	97.5	12.9	97.4	12.7	97.2	12.9	97.2
17.0	97.1	16.9	97.1	14.3	97.0	13.5	97.2	13.5	97.0	14.2	97.1
18.7	97.5	19.7	97.7	16.7	97.0	14.1	97.0	14.5	97.0	15.5	97.0
20.1	97.8	20.8	97.8	18.0	97.2	14.7	97.0	15.5	96.8	16.5	97.0
23.1	97.8	26.0	97.7	19.4	97.8	15.4	97.0	16.3	96.9	17.2	97.1
33.4	97.6	32.9	97.6	20.2	97.8	15.9	97.0	17.1	97.0	18.4	97.5
				23.1	97.8	16.5	97.1	18.2	97.4	19.3	97.7
				26.0	97.7	17.3	97.2	19.0	97.7	21.1	97.8
				27.9	97.6	18.3	97.5	20.2	97.8	22.7	97.7
				28.7	97.4	19.7	97.8	22.2	97.7	25.0	97.6
				32.9	97.5	20.9	97.8	25.6	97.6	27.4	97.5
						24.5	97.7	28.4	97.6	29.8	97.5
						27.9	97.7	30.8	97.6	33.1	97.5
						32.9	97.5	32.9	97.5		



	As-built	2008	2009	2010	2011	2012
Area	3.5	3.1	4.7	3.0	3.4	2.8
Width	7.9	7.5	10.5	7.2	7.5	7.4
Mean Depth	0.4	0.4	0.4	0.4	0.4	0.4
Max Depth	0.7	0.6	0.8	0.6	0.7	0.6
W/D Ratio	17.7	18.5	23.3	17.6	16.7	19.7

Project Name Cane Creek
Cross Section R4-XS3
Feature Pool
Date 3/8/12
Crew Jernigan, Perkinson

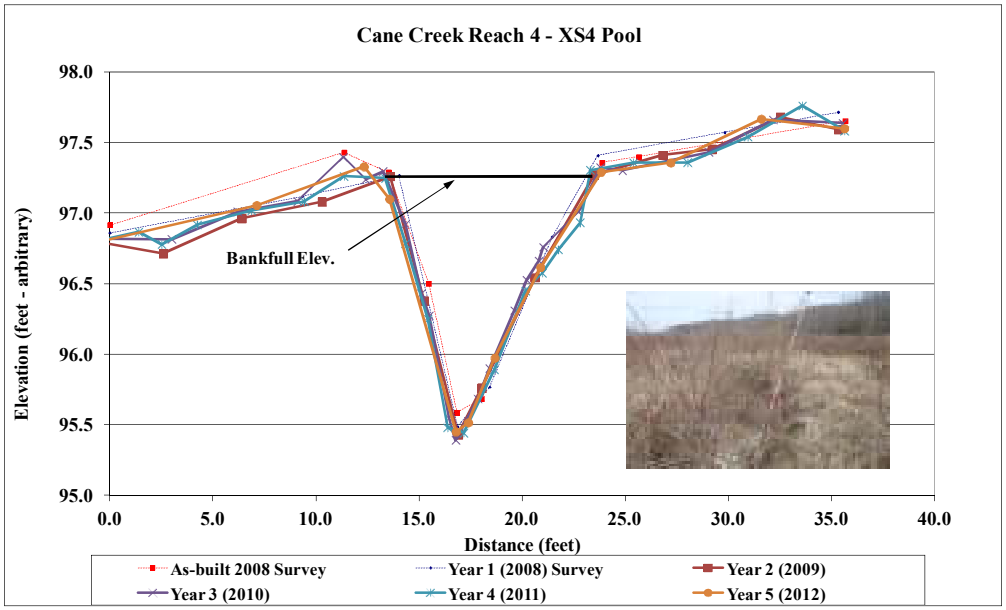
As-built 2008 Survey		Year 1 2008 Survey		Year 2 2009 Survey		Year 3 2010 Survey		Year 4 2011 Survey		Year 5 2012 Survey	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0.0	97.2	0.0	97.2	0.0	97.2	0.0	97.2	0.0	97.1	0.0	97.1
10.2	97.3	7.5	97.1	3.2	97.1	3.4	97.2	2.5	97.1	6.0	97.1
13.0	97.1	12.3	97.2	8.0	97.2	7.8	97.1	6.6	97.0	10.0	97.2
17.0	96.3	14.8	96.7	11.7	97.1	11.2	97.2	9.3	97.1	11.6	97.1
19.7	95.7	18.7	96.0	13.1	97.2	13.4	97.1	10.6	97.1	13.0	97.2
21.0	95.4	20.5	95.5	14.0	96.8	14.5	96.8	12.6	97.0	14.5	96.8
22.8	96.5	21.1	95.6	16.6	96.3	15.6	96.5	13.6	96.9	15.9	96.4
24.2	97.3	24.4	97.4	17.1	96.1	17.2	96.2	14.2	96.6	17.5	96.2
30.5	97.8	29.1	97.5	18.2	96.0	18.2	96.0	15.9	96.3	18.9	95.9
36.6	98.1	36.6	98.1	20.5	95.4	19.0	95.8	16.6	96.1	20.4	95.6
				22.1	96.1	19.7	95.7	17.8	96.0	20.9	95.6
				23.5	97.0	20.6	95.4	19.3	95.6	21.4	95.7
				24.2	97.3	21.1	95.5	20.5	95.4	22.6	96.2
				27.9	97.6	21.8	95.7	21.1	95.4	23.7	96.9
				30.0	97.6	22.8	96.2	21.5	95.6	25.2	97.4
				31.5	97.8	23.4	96.6	23.0	96.4	26.7	97.6
				34.2	97.9	23.9	97.0	24.4	97.2	29.4	97.6
				36.6	98.1	24.4	97.3	26.0	97.4	31.9	97.8
						25.6	97.5	27.4	97.3	33.1	98.0
						27.6	97.4	29.1	97.4	37.2	98.2
						29.9	97.5	30.5	97.5		
						34.0	98.0	32.0	97.7		
						37.1	98.1	34.5	97.9		
								37.1	98.0		



	As-built	2008	2009	2010	2011	2012
Area	9.5	10.3	9.7	10.1	10.1	7.1
Width	10.9	11.8	10.7	11.3	11.3	9.6
Mean Depth	0.9	0.9	0.9	0.9	0.9	0.7
Max Depth	1.7	1.7	1.7	1.6	1.6	1.5
W/D Ratio	N/A	NA	NA	NA	NA	NA

Project Name Cane Creek
Cross Section R4-XS4
Feature Pool
Date 3/8/12
Crew Jernigan, Perkinson

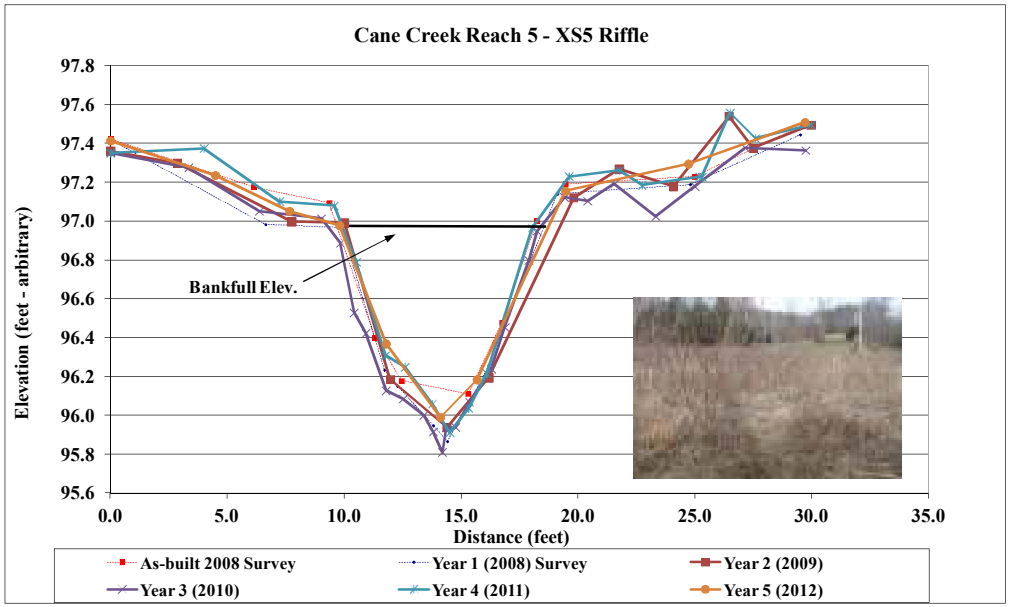
As-built 2008 Survey		Year 1 2008 Survey		Year 2 2009 Survey		Year 3 2010 Survey		Year 4 2011 Survey		Year 5 2012 Survey	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0.0	96.9	0.0	96.9	-0.5	96.8	-0.5	96.8	-0.5	96.8	-0.4	96.8
11.4	97.4	9.4	97.1	2.6	96.7	3.0	96.8	1.4	96.9	7.1	97.1
13.5	97.3	14.0	97.3	6.4	97.0	6.2	97.0	2.5	96.8	12.3	97.3
15.5	96.5	16.9	95.5	10.3	97.1	9.1	97.1	4.2	96.9	13.6	97.1
16.8	95.6	18.4	95.8	13.6	97.3	11.3	97.4	6.9	97.0	16.8	95.5
18.0	95.7	21.4	96.8	15.2	96.4	12.4	97.2	9.4	97.1	17.4	95.5
20.5	96.5	23.7	97.4	16.9	95.4	13.2	97.3	11.4	97.3	18.7	96.0
23.9	97.4	29.8	97.6	18.0	95.8	14.3	96.9	13.4	97.2	20.9	96.6
25.7	97.4	35.3	97.7	20.6	96.5	15.1	96.4	14.3	96.8	23.8	97.3
35.7	97.7			23.5	97.3	15.5	96.3	15.4	96.2	27.2	97.4
				26.8	97.4	16.4	95.5	16.4	95.5	31.6	97.7
				29.2	97.5	16.8	95.4	17.2	95.4	35.6	97.6
				32.5	97.7	17.9	95.7	18.7	95.9		
				35.3	97.6	18.4	95.9	20.2	96.4		
						19.6	96.3	21.0	96.6		
						20.2	96.5	21.7	96.7		
						20.8	96.7	22.8	96.9		
						21.0	96.8	23.3	97.3		
						22.7	97.0	25.4	97.4		
						23.8	97.3	28.0	97.4		
						24.9	97.3	30.9	97.5		
						29.0	97.4	33.6	97.8		
						32.2	97.7	35.6	97.6		
						35.5	97.6				



	As-built	2008	2009	2010	2011	2012
Area	8.5	8.3	8.7	9.0	9.3	9.2
Width	10.1	9.1	9.8	10.4	10.0	10.9
Mean Depth	0.8	0.9	0.9	0.9	0.9	0.8
Max Depth	1.7	1.8	1.8	1.9	1.8	1.8
W/D Ratio	NA	NA	NA	NA	NA	NA

Project Name Cane Creek
Cross Section R5-XS5
Feature Riffle
Date 3/8/12
Crew Jernigan, Perkinson

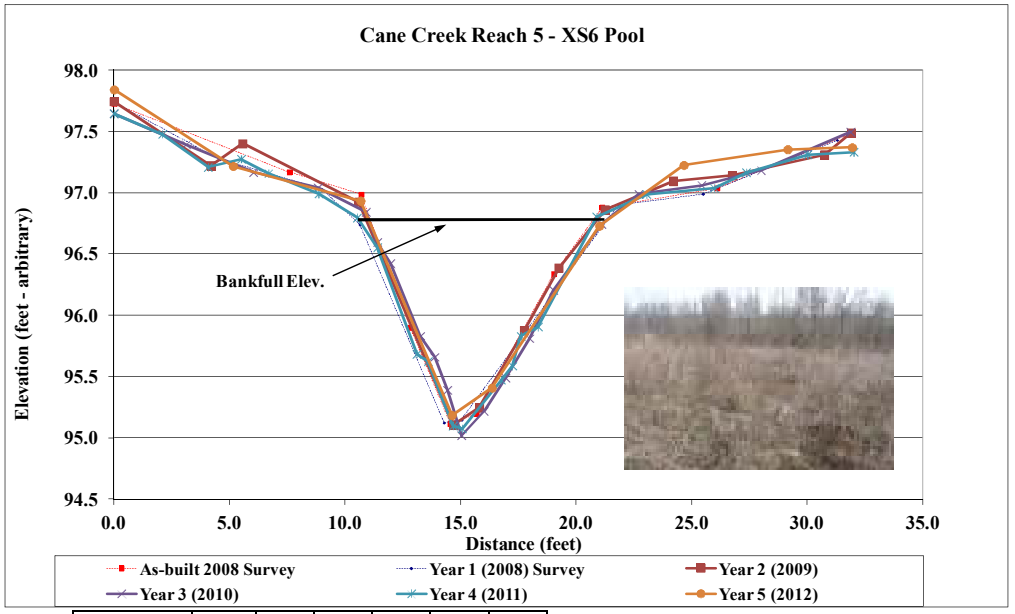
As-built 2008 Survey		Year 1 2008 Survey		Year 2 2009 Survey		Year 3 2010 Survey		Year 4 2011 Survey		Year 5 2012 Survey	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0.0	97.4	0.0	97.4	0.0	97.4	0.0	97.4	0.0	97.4	0.0	97.4
6.1	97.2	6.6	97.0	2.9	97.3	3.3	97.3	4.0	97.4	4.5	97.2
9.3	97.1	9.9	97.0	7.7	97.0	6.4	97.1	7.2	97.1	7.6	97.1
11.3	96.4	11.7	96.2	10.0	97.0	9.0	97.0	9.6	97.1	9.8	97.0
12.5	96.2	12.3	96.2	12.0	96.2	9.8	96.9	10.5	96.8	11.8	96.4
15.3	96.1	13.8	95.9	14.4	95.9	10.4	96.5	11.8	96.3	14.1	96.0
16.7	96.5	14.4	95.9	16.2	96.2	10.9	96.4	12.6	96.2	15.7	96.2
18.2	97.0	16.0	96.2	19.8	97.1	11.8	96.1	13.8	96.1	19.5	97.2
19.5	97.2	19.1	97.1	21.8	97.3	12.5	96.1	14.5	95.9	24.7	97.3
25.0	97.2	24.8	97.2	24.1	97.2	13.4	96.0	15.3	96.0	29.7	97.5
29.6	97.5	29.5	97.4	26.5	97.5	13.8	95.9	16.1	96.2		
				27.5	97.4	14.2	95.8	18.0	97.0		
				30.0	97.5	14.4	95.9	19.6	97.2		
						14.8	95.9	21.8	97.3		
						15.4	96.1	22.8	97.2		
						16.3	96.2	25.2	97.2		
						16.9	96.5	25.3	97.2		
						17.9	96.8	26.5	97.6		
						18.3	96.9	27.6	97.4		
						19.4	97.1	30.0	97.5		
						20.4	97.1				
						21.5	97.2				
						23.3	97.0				
						25.0	97.2				
						27.2	97.4				
						29.7	97.4				



	As-built	2008	2009	2010	2011	2012
Area	6.0	5.5	5.9	6.4	5.9	5.1
Width	9.4	8.6	9.3	9.6	9.1	9
Mean Depth	0.6	0.6	0.6	0.7	0.7	0.6
Max Depth	1.0	1.1	1.1	1.2	1.2	1
W/D Ratio	14.9	13.4	14.5	14.5	13.9	16

Project Name Cane Creek
Cross Section R5-XS6
Feature Pool
Date 3/8/12
Crew Jernigan, Perkinson

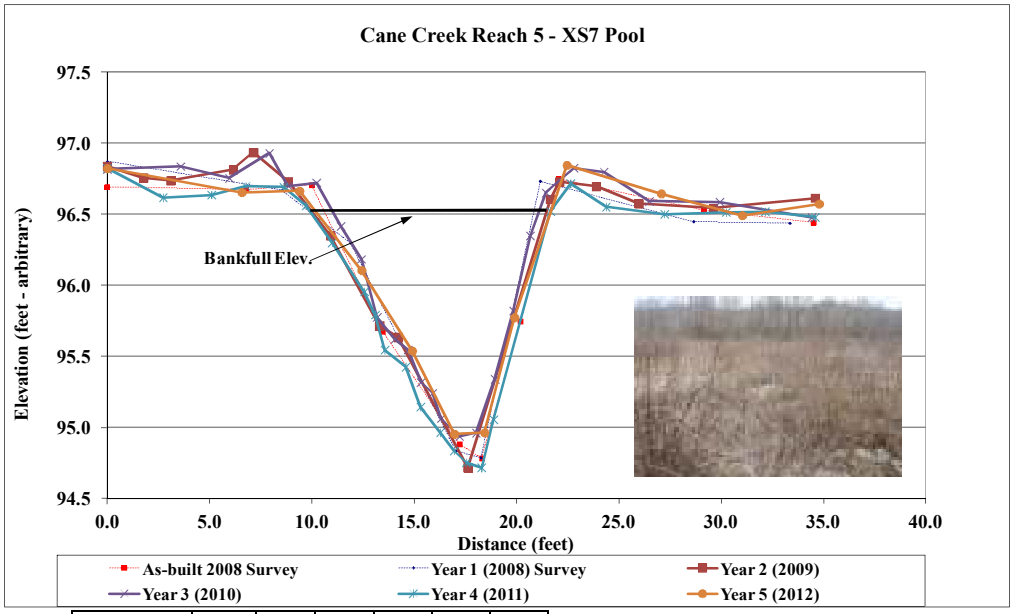
As-built 2008 Survey		Year 1 2008 Survey		Year 2 2009 Survey		Year 3 2010 Survey		Year 4 2011 Survey		Year 5 2012 Survey	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0.0	97.7	0.0	97.7	0.0	97.7	0.0	97.6	0.0	97.6	0.0	97.8
7.6	97.2	4.6	97.3	4.2	97.2	3.1	97.4	2.1	97.5	5.2	97.2
10.7	97.0	9.0	97.0	5.6	97.4	6.0	97.2	4.1	97.2	10.7	96.9
12.8	95.9	10.6	96.7	10.6	96.9	8.8	97.0	5.5	97.3	14.6	95.2
14.6	95.1	14.3	95.1	14.7	95.1	10.9	96.8	6.7	97.2	16.4	95.4
15.7	95.2	15.0	95.1	15.8	95.2	11.4	96.6	8.9	97.0	21.0	96.7
19.0	96.3	21.8	96.9	17.8	95.9	12.0	96.4	10.5	96.8	24.7	97.2
21.1	96.9	25.5	97.0	19.2	96.4	13.3	95.8	11.4	96.6	29.2	97.4
26.1	97.0	31.3	97.4	21.3	96.9	13.9	95.7	13.1	95.7	31.9	97.4
31.9	97.5			24.2	97.1	14.4	95.4	13.6	95.6		
				26.8	97.1	15.0	95.0	14.7	95.1		
				30.8	97.3	16.0	95.2	15.1	95.1		
				31.9	97.5	17.0	95.5	16.8	95.5		
						18.0	95.8	17.2	95.6		
						19.0	96.2	17.6	95.8		
						21.1	96.7	18.4	95.9		
						22.7	97.0	20.9	96.8		
						25.4	97.1	23.1	97.0		
						28.0	97.2	26.0	97.0		
						31.9	97.5	27.4	97.2		
								30.0	97.3		
								32.0	97.3		



	As-built	2008	2009	2010	2011	2012
Area	8.5	10.9	10.2	9.5	9.6	9.1
Width	9.6	12.1	11.6	10.8	10.5	10.6
Mean Depth	0.9	0.9	0.9	0.9	0.9	0.9
Max Depth	1.7	1.8	1.8	1.8	1.7	1.6
W/D Ratio	NA	NA	NA	NA	NA	NA

Project Name	Cane Creek
Cross Section	R5-XS7
Feature	Pool
Date	3/8/12
Crew	Jernigan, Perkinson

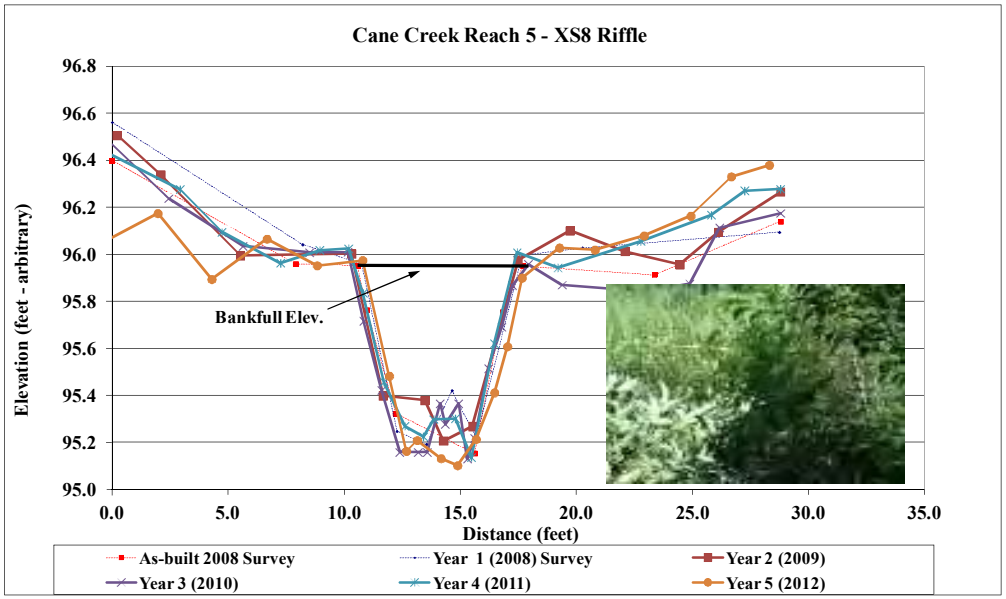
As-built 2008 Survey		Year 1 2008 Survey		Year 2 2009 Survey		Year 3 2010 Survey		Year 4 2011 Survey		Year 5 2012 Survey	
Sta	**Elev**	**Sta**	**Elev**	**Sta**	**Elev**	**Sta**	**Elev**	**Sta**	**Elev**	**Sta**	**Elev**
0.0	96.7	0.0	96.9	0.0	96.8	0.0	96.8	0.0	96.8	0.0	96.8
6.8	96.7	8.5	96.7	1.8	96.8	3.6	96.8	2.7	96.6	6.6	96.7
10.0	96.7	11.9	96.3	3.1	96.7	6.0	96.8	5.1	96.6	9.4	96.7
13.5	95.7	17.0	94.8	6.1	96.8	7.9	96.9	6.8	96.7	12.4	96.1
17.2	94.9	18.3	94.8	7.1	96.9	8.8	96.7	8.6	96.7	14.9	95.5
18.3	94.8	21.2	96.7	8.9	96.7	10.2	96.7	9.7	96.6	17.0	95.0
20.2	95.7	28.6	96.4	10.9	96.3	11.4	96.4	11.0	96.3	18.4	95.0
22.1	96.7	33.4	96.4	13.3	95.7	12.4	96.2	12.6	96.0	19.9	95.8
29.1	96.5			14.2	95.6	13.2	95.8	13.1	95.8	22.5	96.8
34.5	96.4			17.6	94.7	14.1	95.6	13.6	95.5	27.1	96.6
				21.6	96.6	14.7	95.5	14.6	95.4	31.0	96.5
				22.1	96.7	15.3	95.3	15.3	95.1	34.8	96.6
				23.9	96.7	15.9	95.2	16.3	95.0		
				26.0	96.6	16.3	95.1	17.0	94.8		
				29.6	96.5	17.2	94.9	17.5	94.8		
				34.6	96.6	18.0	95.0	18.3	94.7		
						18.9	95.3	18.9	95.1		
						19.8	95.8	21.7	96.5		
						20.7	96.3	22.6	96.7		
						21.4	96.7	24.4	96.6		
						22.8	96.8	27.2	96.5		
						24.3	96.8	30.2	96.5		
						26.5	96.6	32.2	96.5		
						29.9	96.6	34.6	96.5		
						34.4	96.5				



	As-built	2008	2009	2010	2011	2012
Area	12.3	11.2	12.5	10.9	11.0	11.3
Width	11.8	12.5	13.2	11.4	11.6	13.2
Mean Depth	1.0	0.9	1.0	1.0	1.0	0.9
Max Depth	1.9	1.9	2.0	1.8	1.8	1.7
W/D Ratio	N/A	NA	NA	NA	NA	NA

Project Name Cane Creek
Cross Section R5-XS8
Feature Riffle
Date 3/8/12
Crew Jernigan, Perkinson

As-built 2008 Survey		Year 1 2008 Survey		Year 2 2009 Survey		Year 3 2010 Survey		Year 4 2011 Survey		Year 5 2012 Survey	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0.0	96.4	0.0	96.6	0.2	96.5	-0.6	96.5	-0.6	96.5	-0.8	96.0
7.9	96.0	8.2	96.0	2.1	96.3	2.4	96.2	2.9	96.3	2.0	96.2
10.6	96.0	10.7	96.0	5.5	96.0	5.6	96.0	4.7	96.1	4.3	95.9
11.0	95.8	12.3	95.2	10.3	96.0	8.5	96.0	7.3	96.0	6.7	96.1
12.2	95.3	13.5	95.2	11.7	95.4	10.2	96.0	8.9	96.0	8.8	96.0
15.6	95.2	14.6	95.4	13.5	95.4	10.8	95.7	10.2	96.0	10.8	96.0
16.8	95.8	15.7	95.2	14.3	95.2	11.6	95.4	10.8	95.8	11.9	95.5
17.7	96.0	17.7	96.0	15.5	95.3	12.4	95.2	11.7	95.5	12.7	95.2
23.4	95.9	20.3	96.0	17.5	96.0	13.2	95.2	12.6	95.3	13.1	95.2
28.8	96.1	28.7	96.1	19.7	96.1	13.6	95.2	13.4	95.2	14.2	95.1
				22.1	96.0	14.1	95.4	13.8	95.3	14.9	95.1
				24.5	96.0	14.3	95.3	14.8	95.3	15.7	95.2
				26.1	96.1	14.9	95.4	15.5	95.1	16.5	95.4
				28.8	96.3	15.3	95.1	16.5	95.6	17.0	95.6
						15.6	95.2	17.4	96.0	17.7	95.9
						16.2	95.5	19.2	95.9	19.3	96.0
						16.8	95.7	22.8	96.1	20.8	96.0
						17.2	95.9	25.8	96.2	22.9	96.1
						17.9	96.0	27.3	96.3	24.9	96.2
						19.4	95.9	28.8	96.3	26.7	96.3
						22.9	95.8			28.3	96.4
						24.9	95.9				
						26.2	96.1				
						28.8	96.2				

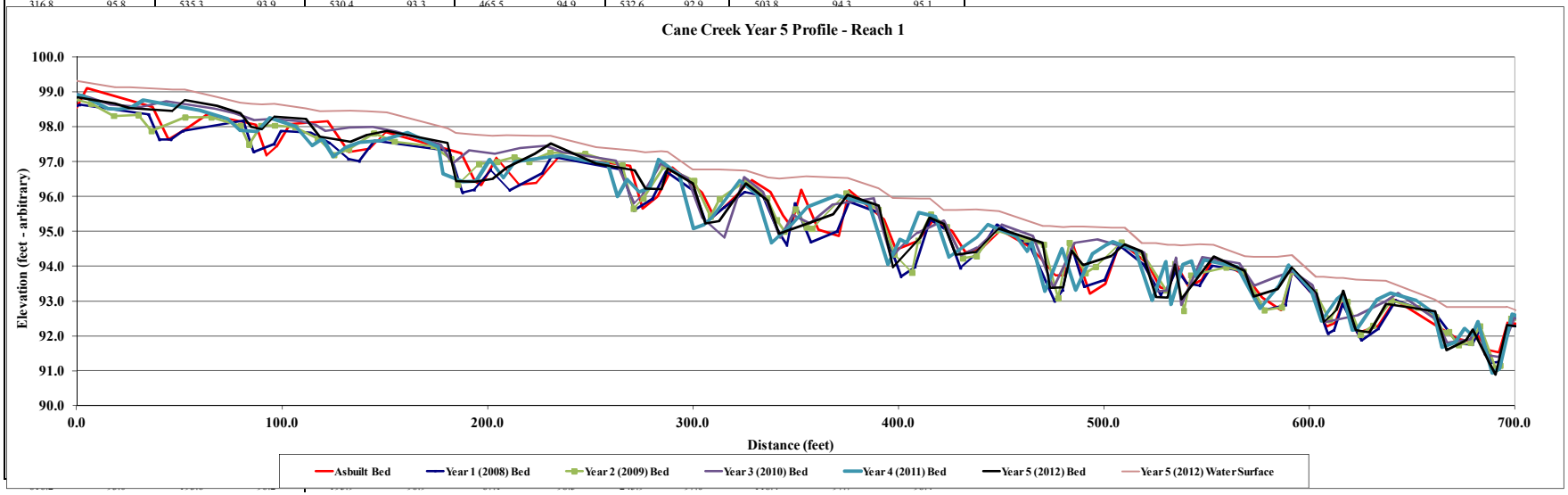


	As-built	2008	2009	2010	2011	2012
Area	3.6	3.6	3.8	3.8	3.9	3.6
Width	7.1	6.8	7.6	7.6	7.2	6.7
Mean Depth	0.5	0.5	0.5	0.5	0.5	0.5
Max Depth	0.8	0.8	0.8	0.8	0.9	0.8
W/D Ratio	13.9	13.1	15.2	14.9	13.3	12.3

Project Name Cane Creek Year 5
Reach 1
Feature Profile
Date 3/9/12
Crew Jernigan, Perkinson

As-built 2008 Survey		2008 2008 Survey		2009 2009 Survey		2010 2010 Survey		2011 2011 Survey		2012 2012 Survey		
Station	Bed Elevation	Station	Bed Elevation	Station	Bed Elevation	Station	Bed Elevation	Station	Bed Elevation	Station	Bed Elevation	Water Elevation
0.0	98.5	751.1	91.2	716.4	92.1	716.4	92.1	716.4	92.2	716.4	92.1	92.4
4.9	99.1	731.3	91.4	708.5	92.4	699.8	92.5	698.8	92.6	696.2	92.3	92.8
36.9	98.6	725.0	91.3	698.1	92.5	692.2	91.4	692.7	91.1	690.8	90.9	92.8
44.7	97.6	720.9	90.8	692.9	91.2	685.3	91.5	689.0	90.9	688.0	91.2	92.8
53.1	97.9	717.0	91.1	690.6	91.1	682.1	92.4	682.1	92.4	679.7	92.2	92.8
63.7	98.3	716.6	92.2	683.1	92.3	678.4	91.9	679.4	92.0	676.3	91.9	92.8
87.2	98.1	697.0	92.3	678.5	91.8	666.9	91.8	675.6	92.2	666.9	91.6	92.8
92.3	97.2	693.3	91.3	672.7	91.7	661.6	92.5	671.1	91.8	661.1	92.7	93.0
97.2	97.4	689.2	91.2	668.0	92.1	643.2	93.2	664.5	91.7	637.2	92.9	93.6
103.9	98.1	683.0	92.2	665.3	92.1	637.3	93.0	660.6	92.7	629.4	92.1	93.6
122.1	98.2	679.4	91.8	661.4	92.5	623.4	92.6	652.1	93.0	622.7	92.2	93.6
132.4	97.3	672.5	91.8	652.8	92.8	607.6	92.4	639.7	93.2	616.5	93.3	93.7
142.7	97.4	661.7	92.6	639.8	93.0	601.5	93.5	633.1	93.1	613.3	92.7	93.7
150.6	97.8	642.0	93.0	630.9	92.3	591.7	93.9	623.2	92.2	607.1	92.4	93.7
187.3	97.2	633.6	92.2	624.9	92.0	583.9	93.7	620.9	92.2	603.4	93.2	93.7
193.7	96.4	625.3	91.9	618.4	93.0	573.2	93.4	616.4	93.2	591.7	94.0	94.3
196.9	96.3	616.2	92.9	615.9	93.1	566.0	94.1	613.4	93.1	584.5	93.3	94.3
204.3	97.1	612.1	92.2	609.9	92.5	547.8	94.3	606.0	92.4	573.0	93.1	94.3
215.4	96.3	609.1	92.1	602.5	93.3	537.7	92.9	601.0	93.3	568.5	93.9	94.3
223.8	96.4	602.5	93.1	591.6	93.9	535.3	94.2	589.8	94.0	553.4	94.3	94.6
235.1	97.1	591.6	93.9	586.6	92.8	530.5	93.3	585.4	93.5	546.6	93.7	94.6
269.3	96.9	588.4	92.9	578.1	92.7	524.6	93.3	576.0	92.8	537.6	93.1	94.6
275.4	95.7	578.0	92.7	567.8	93.9	519.5	94.4	564.9	94.0	534.5	94.1	94.6
282.8	96.0	568.0	93.9	559.5	94.0	496.9	94.8	548.8	94.2	531.0	93.1	94.6
290.0	96.8	552.5	94.0	542.3	93.7	485.6	94.7	545.0	93.7	525.3	93.1	94.7
304.4	96.1	546.7	93.4	538.9	92.7	482.6	94.3	542.6	94.1	518.6	94.4	94.7
310.2	95.4	540.4	93.5	534.5	94.1	475.6	93.4	538.5	94.1	510.2	94.6	95.1
316.8	95.8	535.3	93.9	530.4	93.3	465.5	94.9	532.6	92.9	503.8	94.3	95.1

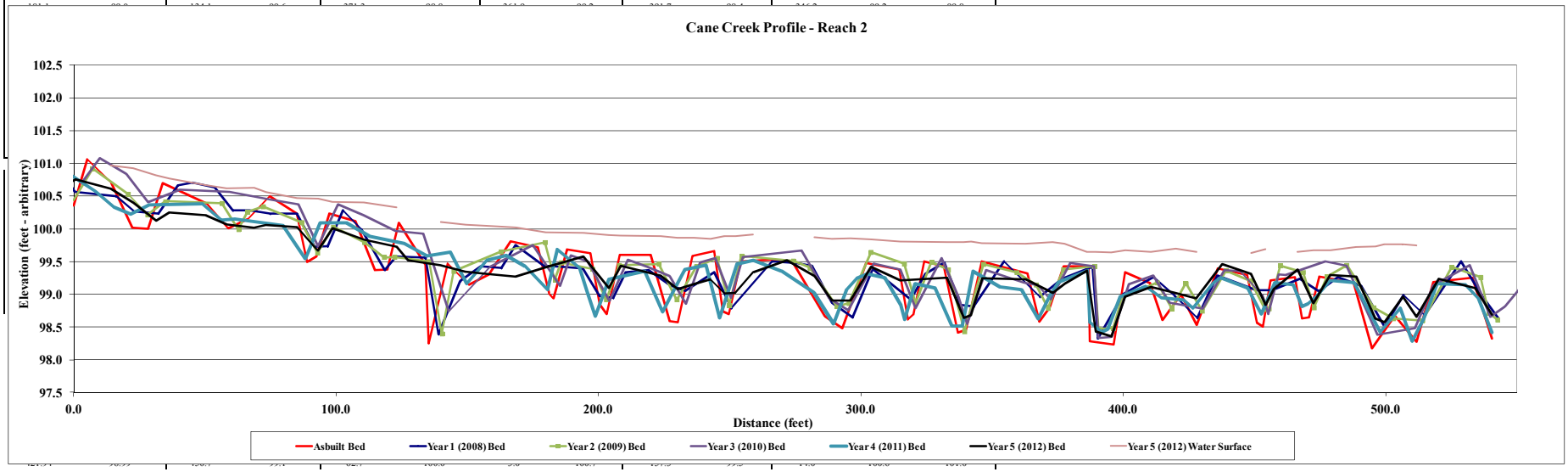
	AsBuilt	2008	2009	2010	2011	2012
Avg. Water Surface Slope	0.0092	0.0092	0.0092	0.0091	0.0089	0.0093
Riffle Length		20	20	18	19	19
Avg. Riffle Slope		0.0263	0.0220	0.0206	0.0197	0.0248
Pool Length		34	24	27	26	24
Avg. Pool Slope		0.0017	0.0018	0.0038	0.0023	0.0029



Project Name Cane Creek Year 5
Reach 2
Feature Profile
Date 3/9/12
Crew Jernigan, Perkinson

As-built 2008 Survey		2008 2008 Survey		2009 2009 Survey		2010 2010 Survey		2011 2011 Survey		2012 2012 Survey		
Station	Bed Elevation	Station	Bed Elevation	Station	Bed Elevation	Station	Bed Elevation	Station	Bed Elevation	Station	Bed Elevation	Water Elevation
0.0	100.4	-65.3	102.2	542.6	98.6	555.3	99.3	540.6	98.4	540.6	98.7	
5.1	101.1	-62.7	100.8	539.3	98.7	545.6	98.8	535.3	98.9	534.1	99.1	
14.2	100.7	-51.8	100.2	536.1	99.3	539.8	98.7	530.3	99.1	520.4	99.2	
22.3	100.0	-41.6	101.4	525.1	99.4	532.0	99.4	519.6	99.2	511.9	98.7	99.7
28.3	100.0	-34.2	100.7	514.0	98.6	518.2	99.1	514.5	98.6	506.5	99.0	99.8
33.9	100.7	-26.3	100.1	502.9	98.6	511.1	98.5	510.2	98.3	499.5	98.6	99.8
50.9	100.4	-18.4	101.1	495.4	98.8	496.8	98.4	505.5	98.8	496.1	98.6	99.7
58.9	100.0	-7.4	101.0	485.2	99.4	485.2	99.4	497.9	98.4	488.8	99.3	99.7
66.5	100.1	0.3	100.6	477.5	99.3	477.1	99.5	488.0	99.2	478.9	99.3	99.7
74.6	100.5	16.0	100.5	472.7	98.8	461.8	99.3	478.9	99.2	472.5	98.9	99.7
85.0	100.2	22.9	100.3	468.5	99.3	459.3	99.3	474.2	99.0	466.5	99.4	99.7
89.0	99.5	32.2	100.2	459.9	99.4	455.3	98.7	470.3	98.9	457.4	99.1	
92.4	99.6	39.7	100.7	455.5	98.8	453.0	99.0	468.2	98.8	454.2	98.8	99.7
97.4	100.2	45.3	100.7	454.0	98.8	444.5	99.4	464.9	99.1	448.8	99.3	99.6
107.3	100.1	53.8	100.6	448.5	99.2	438.6	99.4	457.8	99.2	437.8	99.5	
114.9	99.4	60.6	100.3	439.1	99.4	430.2	98.8	452.6	98.7	427.8	98.9	99.6
119.5	99.4	66.9	100.3	430.1	98.7	417.6	98.9	447.4	99.1	420.0	99.0	99.7
123.9	100.1	74.8	100.2	423.8	99.2	411.4	99.3	437.1	99.3	410.5	99.1	99.6
134.1	99.5	85.1	100.2	418.4	98.8	402.2	99.2	434.4	99.2	400.7	99.0	99.7
135.3	98.2	91.8	99.7	412.9	99.2	395.6	98.3	426.6	98.8	395.4	98.4	99.6
142.6	99.5	96.7	99.7	399.6	99.0	390.6	98.3	423.0	98.9	389.4	98.4	99.6
150.6	99.1	102.5	100.3	396.1	98.5	388.9	99.4	414.5	98.9	386.2	99.4	99.6
158.2	99.3	109.6	100.0	390.4	98.5	379.8	99.5	408.5	99.1	377.6	99.2	99.8
166.4	99.8	118.6	99.4	389.0	99.4	372.3	98.9	398.8	99.0	373.1	99.0	99.8
176.9	99.7	122.8	99.6	377.1	99.4	367.6	99.1	394.1	98.5	362.8	99.2	99.8

	As-built	2008	2009	2010	2011	2012
Avg. Water Surface Slope	0.0036	0.0058	0.0028	0.0029	0.0030	0.0026
Riffle Length		15	13	10	16	15
Avg. Riffle Slope		*NA	0.0036	0.0044	0.0043	0.0049
Pool Length		18	11	19	15	19
Avg. Pool Slope		*NA	0.0002	0.0007	0.0031	0.0022

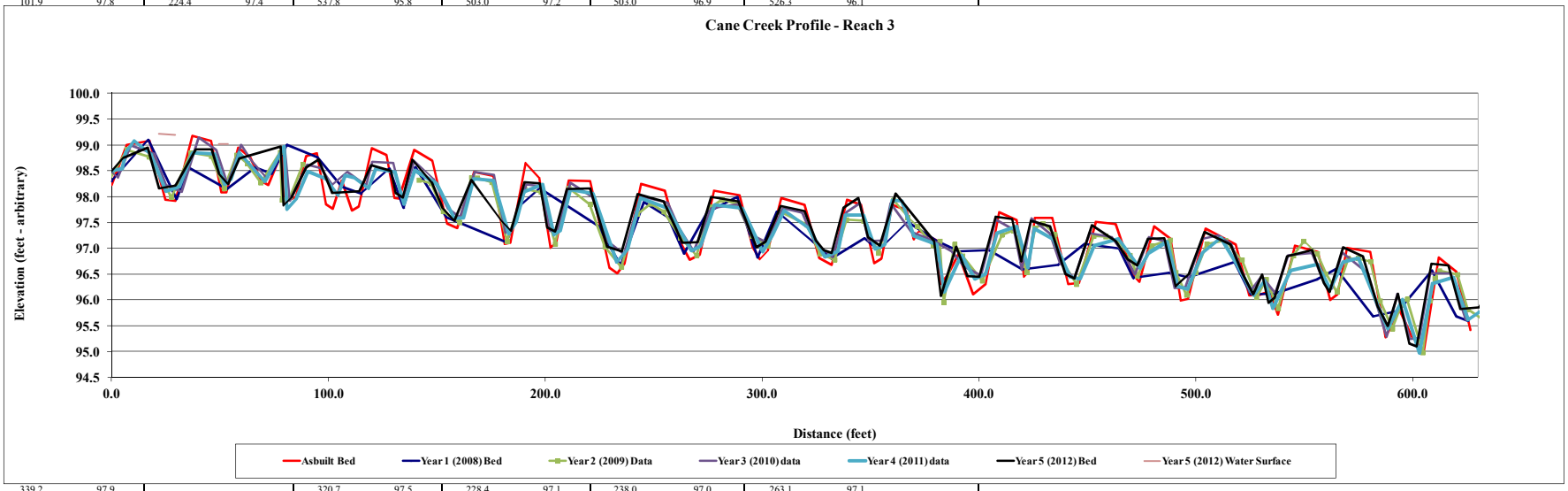


Project Name	Cane Creek Year 5
Reach	3
Feature	Profile
Date	3/9/12
Crew	Jernigan, Perkinson

As-built 2008 Survey		2008 2008 Survey		2009 2009 Survey		2010 2010 Survey		2011 2011 Survey		2012 2012 Survey		
Station	**Bed Elevation**	**Station**	**Bed Elevation**	**Station**	**Bed Elevation**	**Station**	**Bed Elevation**	**Station**	**Bed Elevation**	**Station**	**Bed Elevation**	**Water Elevation**
0.0	98.2	0.0	98.3	631.1	95.7	624.5	95.6	639.3	96.5	639.7	96.6	
6.9	99.0	16.8	99.1	625.2	95.8	617.4	96.5	632.3	95.8	630.9	95.9	
17.5	99.1	29.9	98.0	620.7	96.5	608.0	96.5	625.5	95.6	622.0	95.8	
24.7	97.9	35.6	98.6	612.2	96.6	603.2	95.3	618.8	96.4	616.4	96.7	
29.5	97.9	53.1	98.1	610.2	96.4	598.7	95.2	609.1	96.3	608.7	96.7	
37.4	99.2	66.2	98.6	607.9	96.0	592.8	96.1	603.2	95.0	601.7	95.1	
45.9	99.1	73.7	98.4	604.6	95.0	588.1	95.3	595.3	96.0	598.5	95.2	
50.5	98.1	80.7	99.0	597.4	96.0	583.9	95.9	588.6	95.4	593.2	96.1	
52.9	98.1	94.9	98.8	594.7	95.9	578.1	96.6	582.8	96.0	588.5	95.5	
58.4	98.9	106.2	98.2	590.7	95.4	567.5	96.9	575.0	96.8	583.8	95.9	
63.9	98.8	115.0	98.1	584.9	96.0	562.7	96.2	567.9	96.7	576.9	96.8	
69.0	98.3	128.1	98.5	580.5	96.7	558.3	96.4	562.0	96.2	567.8	97.0	
72.2	98.2	134.6	97.8	574.8	96.8	553.6	96.9	556.2	96.7	561.6	96.1	
78.9	98.9	140.2	98.6	570.2	96.8	542.5	96.9	543.6	96.6	559.0	96.3	
79.3	97.9	154.3	97.6	564.9	96.2	536.7	96.1	535.6	95.8	553.7	97.0	
85.1	98.0	182.2	97.1	559.9	96.5	530.4	96.5	531.5	96.4	542.1	96.8	
89.6	98.8	188.5	97.8	555.9	96.9	524.9	96.2	526.8	96.1	536.4	96.0	
94.6	98.8	197.4	98.2	549.8	97.1	516.1	97.1	518.1	96.7	533.4	95.9	
98.7	97.8	208.0	97.9	545.0	96.9	510.1	97.2	511.6	97.2	530.7	96.5	
101.9	97.8	224.4	97.4	537.8	95.8	503.0	97.2	503.0	96.9	526.3	96.1	
339.2	97.9			320.7	97.5	228.4	97.1	238.0	97.0	263.1	97.1	
345.6	97.8			308.8	97.7	221.7	98.0	232.9	96.7	254.6	97.9	

	As-built	2008	2009	2010	2011	2012
Avg. Water Surface Slope	0.0036	0.0043	0.0041	0.0044	0.0044	*NA
Riffle Length		15	10	9	11	10
Avg. Riffle Slope		*NA	*NA	0.0110	0.0082	*NA
Pool Length		21	18	18	16	17
Avg. Pool Slope		*NA	*NA	0.0007	0.0020	*NA

* No water in channel due to drought conditions

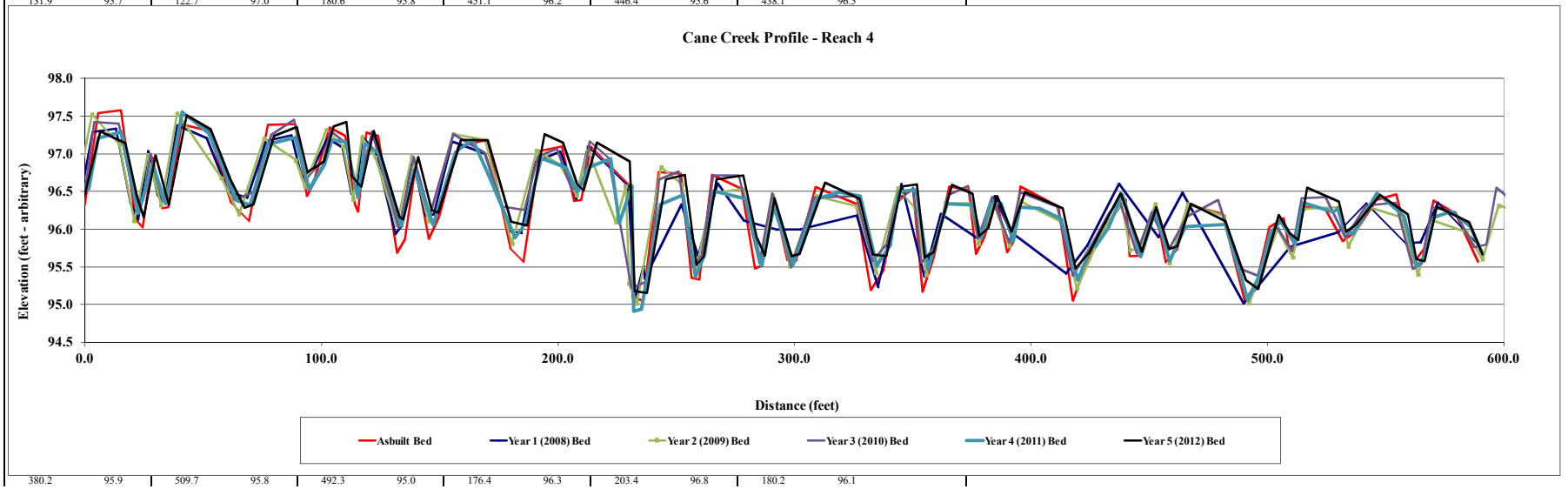


Project Name Cane Creek Year 5
Reach 4
Feature Profile
Date 3/9/12
Crew Jernigan, Perkinson

As-built 2008 Survey		2008 2008 Survey		2009 2009 Survey		2010 2010 Survey		2011 2011 Survey		2012 2012 Survey		
Station	Bed Elevation	Station	Bed Elevation	Station	Bed Elevation	Station	Bed Elevation	Station	Bed Elevation	Station	Bed Elevation	Water Elevation
0.0	96.3	-5.2	96.5	-4.4	96.4	614.5	96.3	590.8	95.7	590.9	95.7	
5.6	97.5	-1.6	96.5	3.0	97.5	609.1	96.0	585.7	96.0	585.3	96.1	
15.2	97.6	3.3	97.3	14.6	97.1	603.9	96.4	577.8	96.2	571.7	96.3	
21.2	96.1	13.0	97.3	20.9	96.1	596.9	96.6	570.6	96.2	566.4	95.6	
24.3	96.0	19.3	96.3	26.4	97.0	592.7	95.8	566.7	95.7	563.0	95.6	
28.6	97.0	22.5	96.1	32.1	96.3	587.4	95.8	563.2	95.5	559.4	96.2	
32.6	96.3	26.8	97.0	39.0	97.5	579.4	96.2	557.9	96.2	547.6	96.5	
35.3	96.3	30.7	96.4	57.7	96.7	569.5	96.3	546.6	96.5	537.4	96.1	
40.9	97.4	33.5	96.4	65.1	96.2	565.2	95.5	536.1	95.9	533.4	96.0	
52.4	97.3	38.9	97.4	75.8	97.2	561.6	95.5	532.6	96.0	530.2	96.4	
61.9	96.3	51.6	97.2	89.1	96.9	554.3	96.4	529.9	96.3	516.9	96.6	
69.3	96.1	60.7	96.5	92.9	96.6	541.7	96.3	527.8	96.2	513.0	95.9	
77.3	97.4	68.6	96.4	102.1	97.3	533.1	95.9	515.2	96.4	509.4	95.9	
88.9	97.4	76.6	97.2	109.0	97.1	524.5	96.4	511.5	95.8	504.8	96.2	
93.9	96.4	87.1	97.2	113.3	96.4	514.5	96.4	505.8	96.1	496.1	95.2	
96.4	96.6	91.7	96.7	117.2	97.2	510.5	95.7	501.3	96.0	491.0	95.3	
103.4	97.3	96.4	96.8	122.7	97.0	503.7	96.1	496.8	95.4	482.2	96.1	
110.1	97.2	102.5	97.2	131.8	96.1	495.8	95.4	491.6	95.1	467.6	96.3	
114.0	96.3	108.9	97.1	138.1	97.0	488.4	95.5	482.3	96.1	461.9	95.8	
115.4	96.2	112.6	96.5	145.3	96.1	479.1	96.4	465.2	96.0	458.4	95.7	
118.9	97.3	115.0	96.5	155.8	97.3	465.9	96.2	458.6	95.6	453.0	96.3	
123.8	97.2	117.4	97.2	169.2	97.2	458.3	95.7	452.5	96.2	447.0	95.7	
131.9	95.7	122.7	97.0	180.6	95.8	451.1	96.2	446.4	95.6	438.1	96.5	
380.2	95.9	509.7	95.8	492.3	95.0	176.4	96.3	203.4	96.8	180.2	96.1	

	As-built	2008	2009	2010	2011	2012
Avg. Water Surface Slope	0.0020	0.0011	0.0020	0.0019	0.0017	*NA
Riffle Length		11	13	10	11	18
Avg. Riffle Slope		*NA	*NA	0.0020	0.0025	*NA
Pool Length		21	17	17	17	16
Avg. Pool Slope		*NA	*NA	0.0010	0.0006	*NA

* No water in channel due to drought conditions

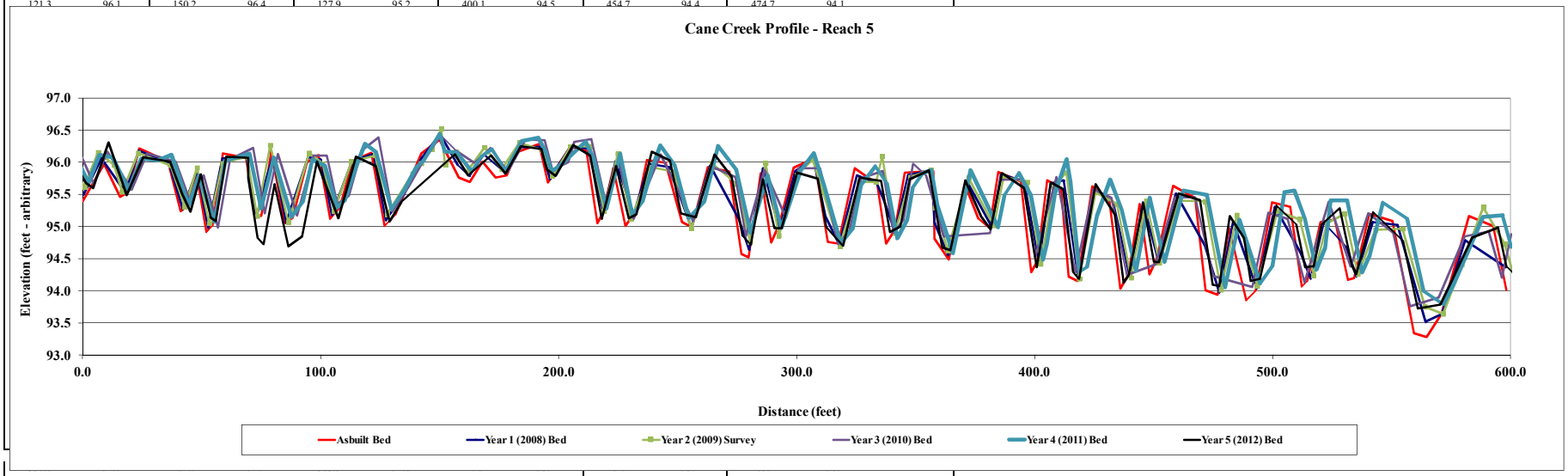


Project Name Cane Creek Year 5
Reach 5
Feature Profile
Date 3/9/12
Crew Jernigan, Perkinson

As-built 2008 Survey		2008 2008 Survey		2009 2009 Survey		2010 2010 Survey		2011 2011 Survey		2012 2012 Survey		
Station	Bed Elevation	Station	Bed Elevation	Station	Bed Elevation	Station	Bed Elevation	Station	Bed Elevation	Station	Bed Elevation	Water Elevation
0.0	95.4	0.4	95.5	-16.3	96.3	600.2	94.9	600.2	94.7	630.5	95.1	
8.9	96.0	7.7	96.1	-10.0	96.7	596.3	94.2	596.6	95.2	612.6	94.9	
15.7	95.5	14.5	95.7	-8.1	96.2	590.8	94.9	588.3	95.2	602.3	94.2	
19.0	95.5	17.8	95.5	0.7	95.6	580.7	94.8	575.8	94.1	598.3	94.4	
23.7	96.2	23.5	96.2	6.5	96.1	569.8	93.9	571.8	93.8	594.8	95.0	
35.8	96.0	36.3	96.0	13.2	96.0	557.7	93.8	563.5	94.0	583.8	94.8	
41.1	95.2	42.0	95.3	16.5	95.5	550.6	94.9	556.4	95.1	570.4	93.8	
44.1	95.3	47.9	95.9	23.3	96.1	540.1	95.2	546.3	95.4	560.9	93.7	
47.9	95.8	52.6	95.0	36.8	95.9	532.8	94.4	540.8	94.6	554.8	94.8	
52.0	94.9	58.7	96.1	42.8	95.3	523.6	95.4	537.5	94.3	542.3	95.2	
54.4	95.0	68.8	96.1	48.0	95.9	513.3	94.1	531.4	95.4	535.1	94.3	
58.8	96.1	72.9	95.1	53.1	95.1	506.3	95.1	524.3	95.4	533.1	94.4	
68.7	96.1	76.9	95.7	58.6	96.0	498.2	95.2	522.1	94.7	528.2	95.3	
72.5	95.1	79.8	96.1	69.0	96.1	491.4	94.1	518.4	94.3	520.5	95.0	
75.1	95.2	85.5	95.1	73.2	95.2	475.1	94.2	513.4	95.1	517.3	94.4	
79.2	96.2	94.6	96.1	78.8	96.3	467.4	95.5	509.0	95.6	513.5	94.4	
84.7	95.0	99.9	96.0	80.4	96.0	458.9	95.5	504.9	95.5	509.9	95.0	
88.3	95.1	104.7	95.2	86.2	95.1	450.8	94.4	499.9	94.4	501.6	95.3	
94.1	96.0	113.3	96.0	95.1	96.1	438.6	94.2	494.7	94.1	494.7	94.2	
99.1	96.1	122.1	96.1	100.6	96.0	432.2	95.4	485.9	95.1	490.8	94.1	
103.9	95.1	127.3	95.1	105.4	95.2	424.7	95.6	480.1	94.1	487.9	94.8	
107.7	95.3	134.9	95.5	112.8	96.0	417.0	94.3	472.4	95.5	482.0	95.2	
113.7	96.0	142.2	96.1	122.9	96.1	409.2	95.8	462.5	95.6	477.6	94.1	
121.3	96.1	150.2	96.4	127.9	95.2	400.1	94.5	454.7	94.4	474.7	94.1	
341.3	95.0	406.6	95.7	372.3	95.8	124.2	96.4	254.8	95.1	257.5	95.1	
345.4	95.8	412.2	95.7	382.8	95.0	117.0	96.2	248.6	96.0	251.4	95.2	

	As-built	2008	2009	2010	2011	2012
Avg. Water Surface Slope	0.0014	0.0030	0.0031	0.0029	NA	*NA
Riffle Length		18	9	9	9	9
Avg. Riffle Slope		*NA	*NA	0.0101	0.0059	*NA
Pool Length		24	16	25	17	15
Avg. Pool Slope		*NA	*NA	0.0043	0.0018	*NA

* No water in channel due to drought conditions

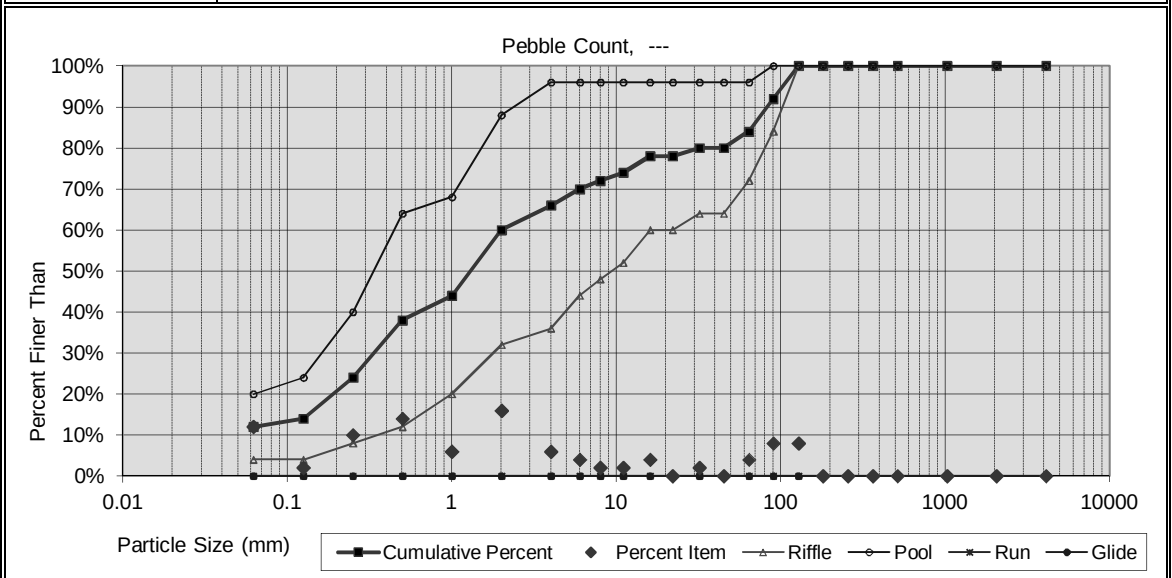


Weighted Pebble Count

Percent Riffle:	**50**	Percent Run:		Pebble Count,
Percent Pool:	**50**	Percent Glide:		

Material	Size Range (mm)		Total #	
silt/clay	0	0.062	12.0	# #
very fine sand	0.062	0.13	2.0	# #
fine sand	0.13	0.25	10.0	# #
medium sand	0.25	0.5	14.0	# #
coarse sand	0.5	1	6.0	# #
very coarse sand	1	2	16.0	# #
very fine gravel	2	4	6.0	# #
fine gravel	4	6	4.0	# #
fine gravel	6	8	2.0	# #
medium gravel	8	11	2.0	# #
medium gravel	11	16	4.0	# #
coarse gravel	16	22	0.0	# #
coarse gravel	22	32	2.0	# #
very coarse gravel	32	45	0.0	# #
very coarse gravel	45	64	4.0	# #
small cobble	64	90	8.0	# #
medium cobble	90	128	8.0	# #
large cobble	128	180	0.0	# #
very large cobble	180	256	0.0	# #
small boulder	256	362	0.0	# #
small boulder	362	512	0.0	# #
medium boulder	512	1024	0.0	# #
large boulder	1024	2048	0.0	# #
very large boulder	2048	4096	0.0	# #
bedrock			0.0	#
		Weighted Count:	100	
		True Total Particle Count:	50	

Note:	**Cane Creek 2011 - Reach 1 Substrate**



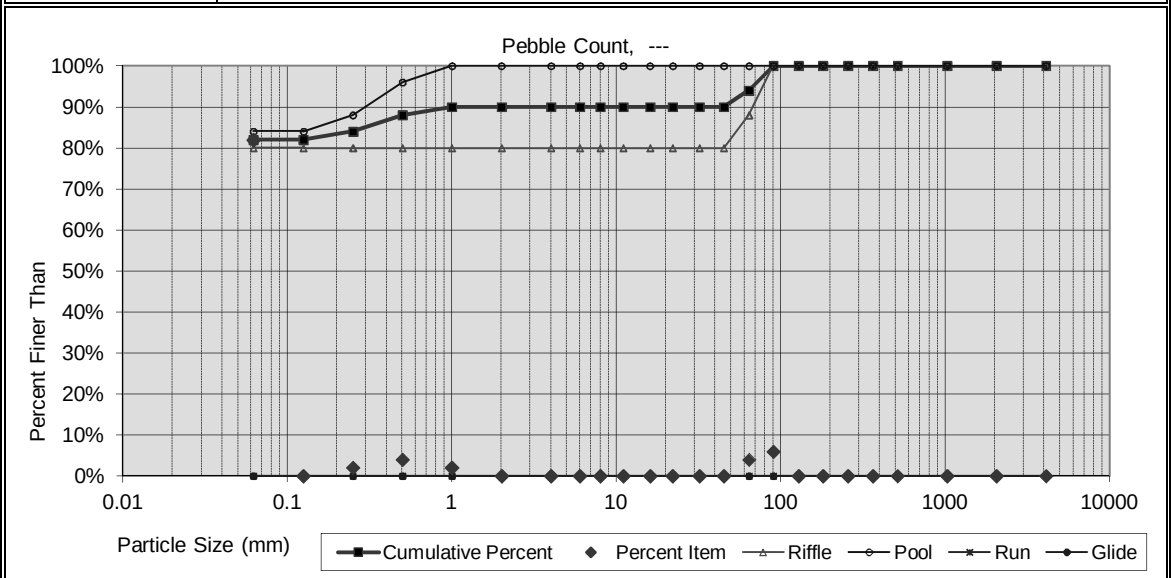
Size percent less than (mm)					Percent by substrate type					
D16	D35	D50	D84	D95	silt/clay	sand	gravel	cobble	boulder	bedrock
0.144	0.43	1.3	64	103	12%	48%	24%	16%	0%	0%

Weighted Pebble Count

Percent Riffle:	**50**	Percent Run:		Pebble Count,
Percent Pool:	**50**	Percent Glide:		

Material	Size Range (mm)		Total #	
silt/clay	0	0.062	82.0	# #
very fine sand	0.062	0.13	0.0	# #
fine sand	0.13	0.25	2.0	# #
medium sand	0.25	0.5	4.0	# #
coarse sand	0.5	1	2.0	# #
very coarse sand	1	2	0.0	# #
very fine gravel	2	4	0.0	# #
fine gravel	4	6	0.0	# #
fine gravel	6	8	0.0	# #
medium gravel	8	11	0.0	# #
medium gravel	11	16	0.0	# #
coarse gravel	16	22	0.0	# #
coarse gravel	22	32	0.0	# #
very coarse gravel	32	45	0.0	# #
very coarse gravel	45	64	4.0	# #
small cobble	64	90	6.0	# #
medium cobble	90	128	0.0	# #
large cobble	128	180	0.0	# #
very large cobble	180	256	0.0	# #
small boulder	256	362	0.0	# #
small boulder	362	512	0.0	# #
medium boulder	512	1024	0.0	# #
large boulder	1024	2048	0.0	# #
very large boulder	2048	4096	0.0	# #
bedrock			0.0	#
		Weighted Count:	100	
		True Total Particle Count:	50	

Note: **Cane Creek 2011 - Reach 2 Substrate**



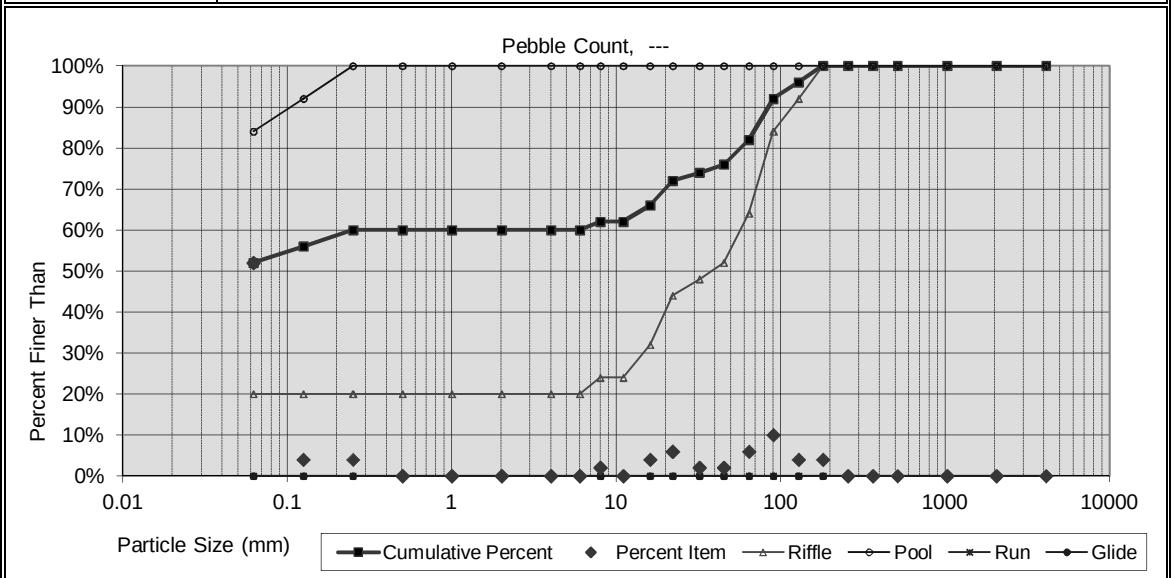
Size percent less than (mm)					Percent by substrate type					
D16	D35	D50	D84	D95	silt/clay	sand	gravel	cobble	boulder	bedrock
#N/A	#N/A	#N/A	0	68	82%	8%	4%	6%	0%	0%

Weighted Pebble Count

Percent Riffle:	**50**	Percent Run:		Pebble Count,
Percent Pool:	**50**	Percent Glide:		

Material	Size Range (mm)		Total #	
silt/clay	0	0.062	52.0	# #
very fine sand	0.062	0.13	4.0	# #
fine sand	0.13	0.25	4.0	# #
medium sand	0.25	0.5	0.0	# #
coarse sand	0.5	1	0.0	# #
very coarse sand	1	2	0.0	# #
very fine gravel	2	4	0.0	# #
fine gravel	4	6	0.0	# #
fine gravel	6	8	2.0	# #
medium gravel	8	11	0.0	# #
medium gravel	11	16	4.0	# #
coarse gravel	16	22	6.0	# #
coarse gravel	22	32	2.0	# #
very coarse gravel	32	45	2.0	# #
very coarse gravel	45	64	6.0	# #
small cobble	64	90	10.0	# #
medium cobble	90	128	4.0	# #
large cobble	128	180	4.0	# #
very large cobble	180	256	0.0	# #
small boulder	256	362	0.0	# #
small boulder	362	512	0.0	# #
medium boulder	512	1024	0.0	# #
large boulder	1024	2048	0.0	# #
very large boulder	2048	4096	0.0	# #
bedrock			0.0	#
		Weighted Count:	100	
		True Total Particle Count:	50	

Note: **Cane Creek 2011 - Reach 3 Substrate**



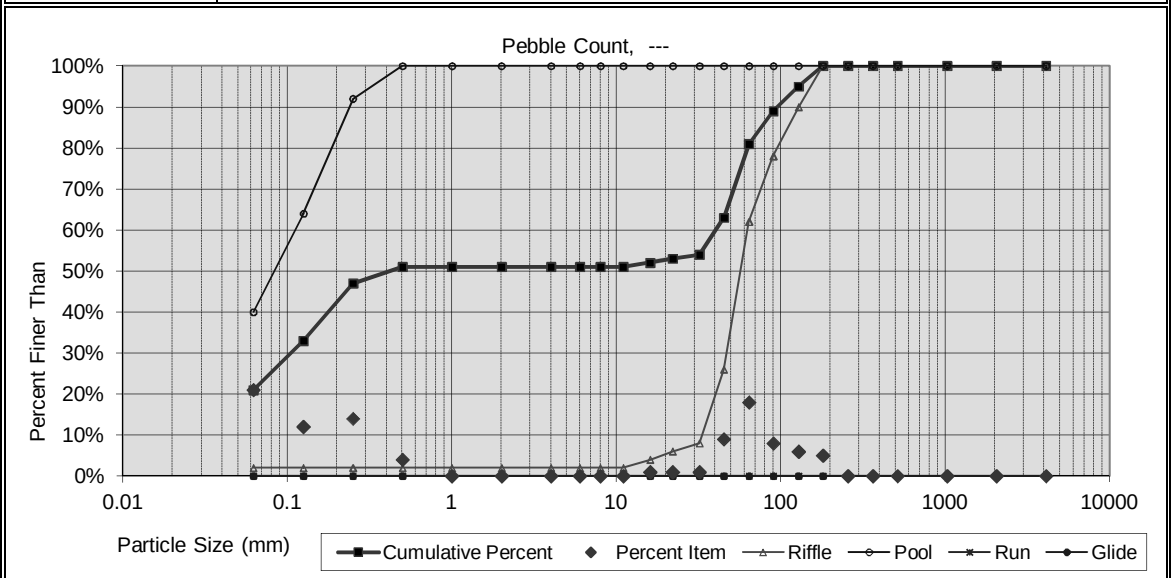
Size percent less than (mm)					Percent by substrate type					
D16	D35	D50	D84	D95	silt/clay	sand	gravel	cobble	boulder	bedrock
#N/A	#N/A	#N/A	69	117	52%	8%	22%	18%	0%	0%

Weighted Pebble Count

Percent Riffle:	**50**	Percent Run:		Pebble Count,
Percent Pool:	**50**	Percent Glide:		

Material	Size Range (mm)		Total #	
silt/clay	0	0.062	21.0	# #
very fine sand	0.062	0.13	12.0	# #
fine sand	0.13	0.25	14.0	# #
medium sand	0.25	0.5	4.0	# #
coarse sand	0.5	1	0.0	# #
very coarse sand	1	2	0.0	# #
very fine gravel	2	4	0.0	# #
fine gravel	4	6	0.0	# #
fine gravel	6	8	0.0	# #
medium gravel	8	11	0.0	# #
medium gravel	11	16	1.0	# #
coarse gravel	16	22	1.0	# #
coarse gravel	22	32	1.0	# #
very coarse gravel	32	45	9.0	# #
very coarse gravel	45	64	18.0	# #
small cobble	64	90	8.0	# #
medium cobble	90	128	6.0	# #
large cobble	128	180	5.0	# #
very large cobble	180	256	0.0	# #
small boulder	256	362	0.0	# #
small boulder	362	512	0.0	# #
medium boulder	512	1024	0.0	# #
large boulder	1024	2048	0.0	# #
very large boulder	2048	4096	0.0	# #
bedrock			0.0	#
		Weighted Count:	100	
		True Total Particle Count:	100	

Note:	**Cane Creek 2011 - Reach 4 and 5 Substrate**



Size percent less than (mm)					Percent by substrate type					
D16	D35	D50	D84	D95	silt/clay	sand	gravel	cobble	boulder	bedrock
#N/A	0.14	0.4	73	128	21%	30%	30%	19%	0%	0%

Cane Creek Stream and Wetland Restoration Site
Year 5 (2012) Annual Monitoring
Representative Structure Photos
Taken July 2012

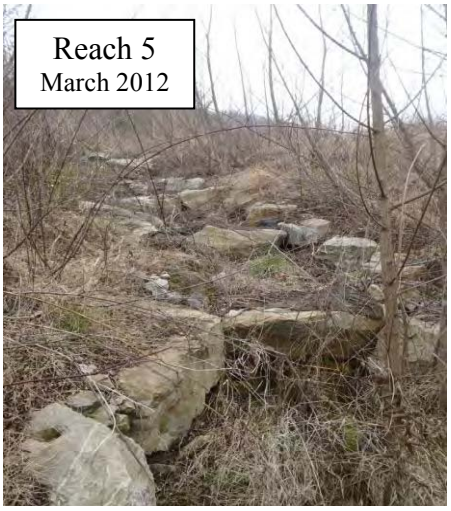
Reach 1

Reach 2

Reach 3: Outfall structure

Reach 4

Reach 5
March 2012



Cane Creek Stream and Wetland Restoration Site
Year 5 (2012) Annual Monitoring
Enhancement Reach Photos
Taken July 2012

Photo 1
Brush Mattress

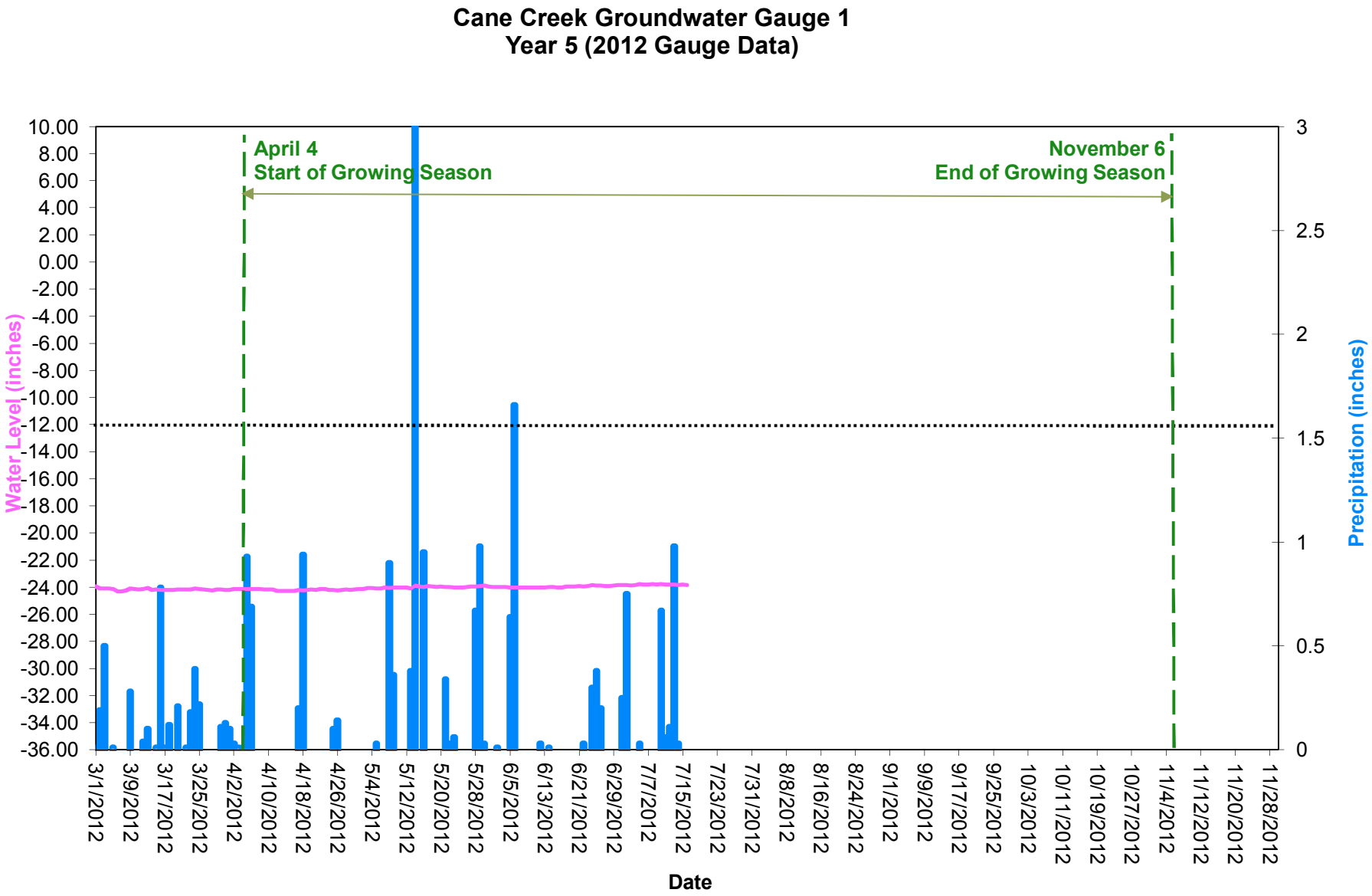
Photo 2-3
Stabilization and staking of left and right banks, respectively, adjacent to ford

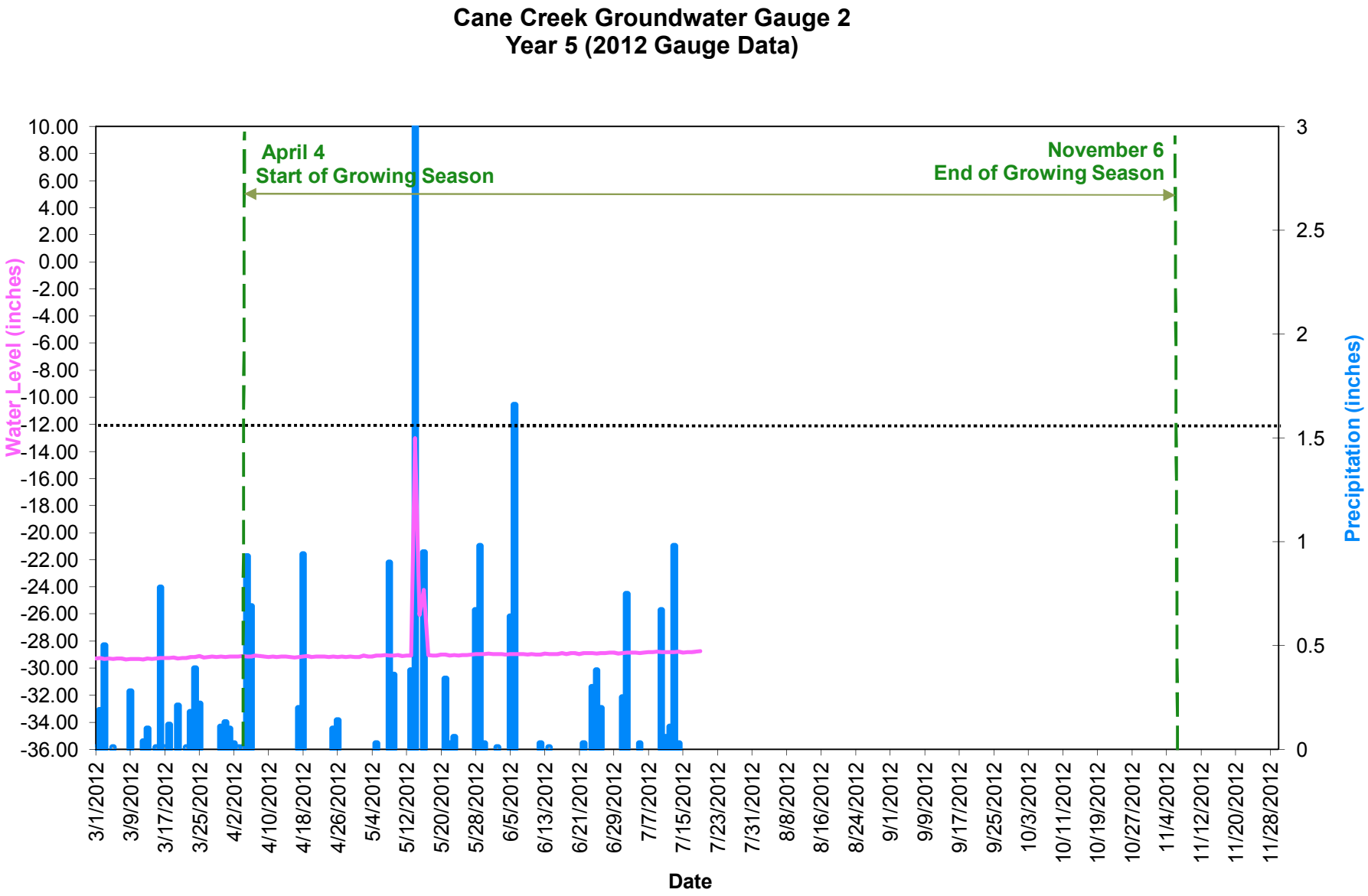
Photo 4
Stabilization and staking just downstream of confluence

Photo 5
Removal of fallen tree from Cane Creek

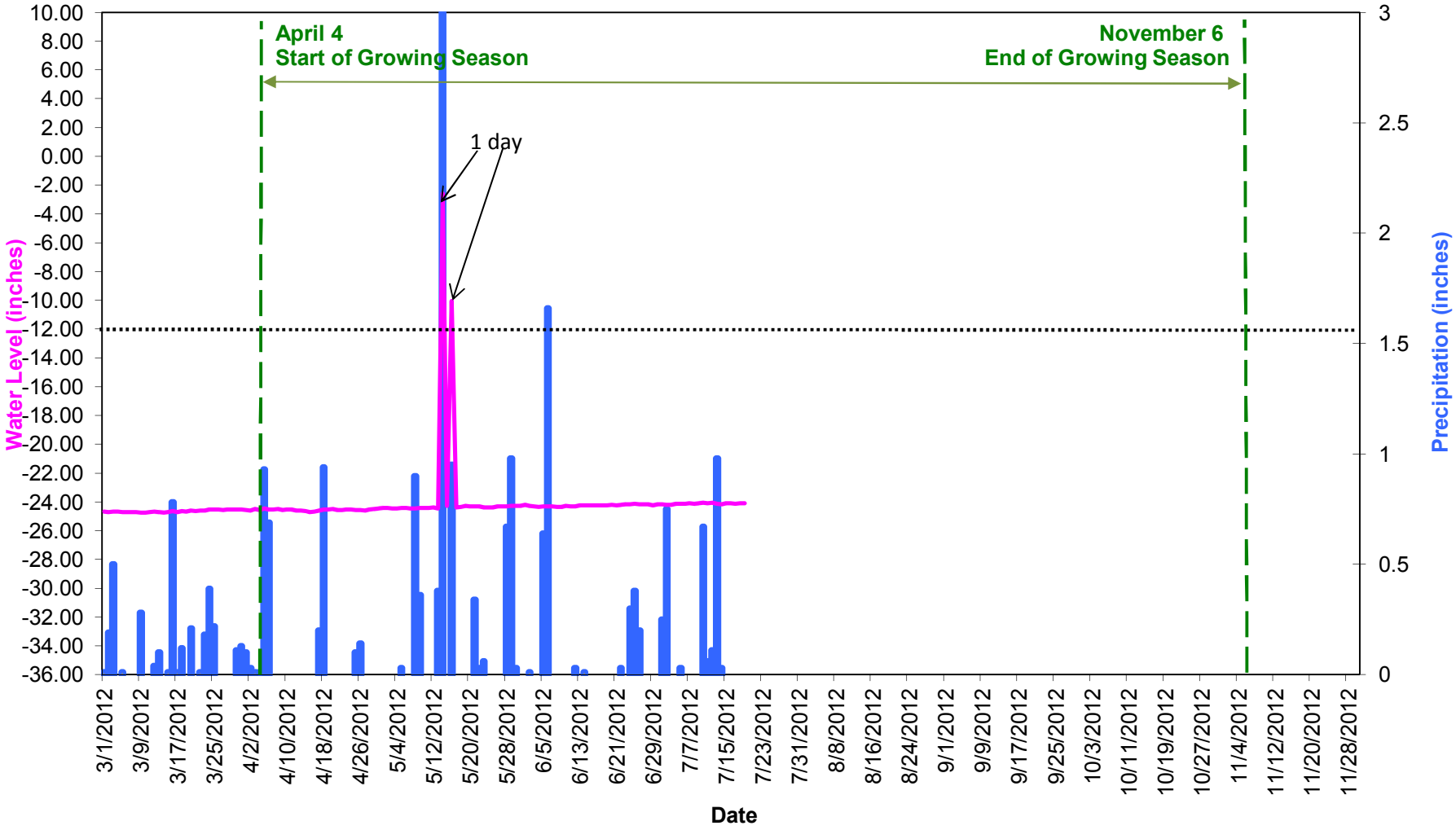
Photos 6-7
Stabilization and staking near downstream end of left and right banks, respectively

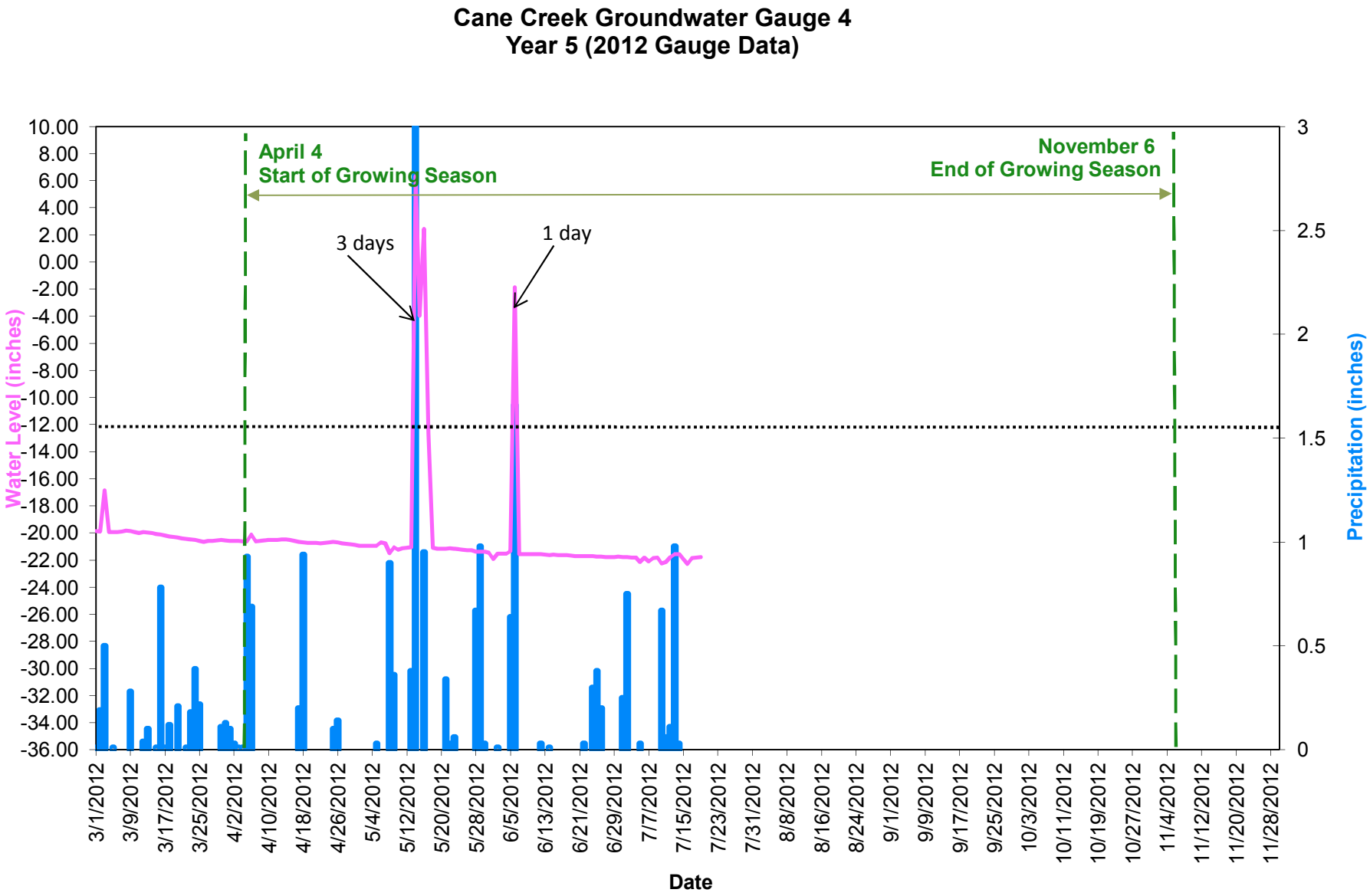
APPENDIX C
HYDROLOGY DATA
2012 Groundwater Gauge Graphs

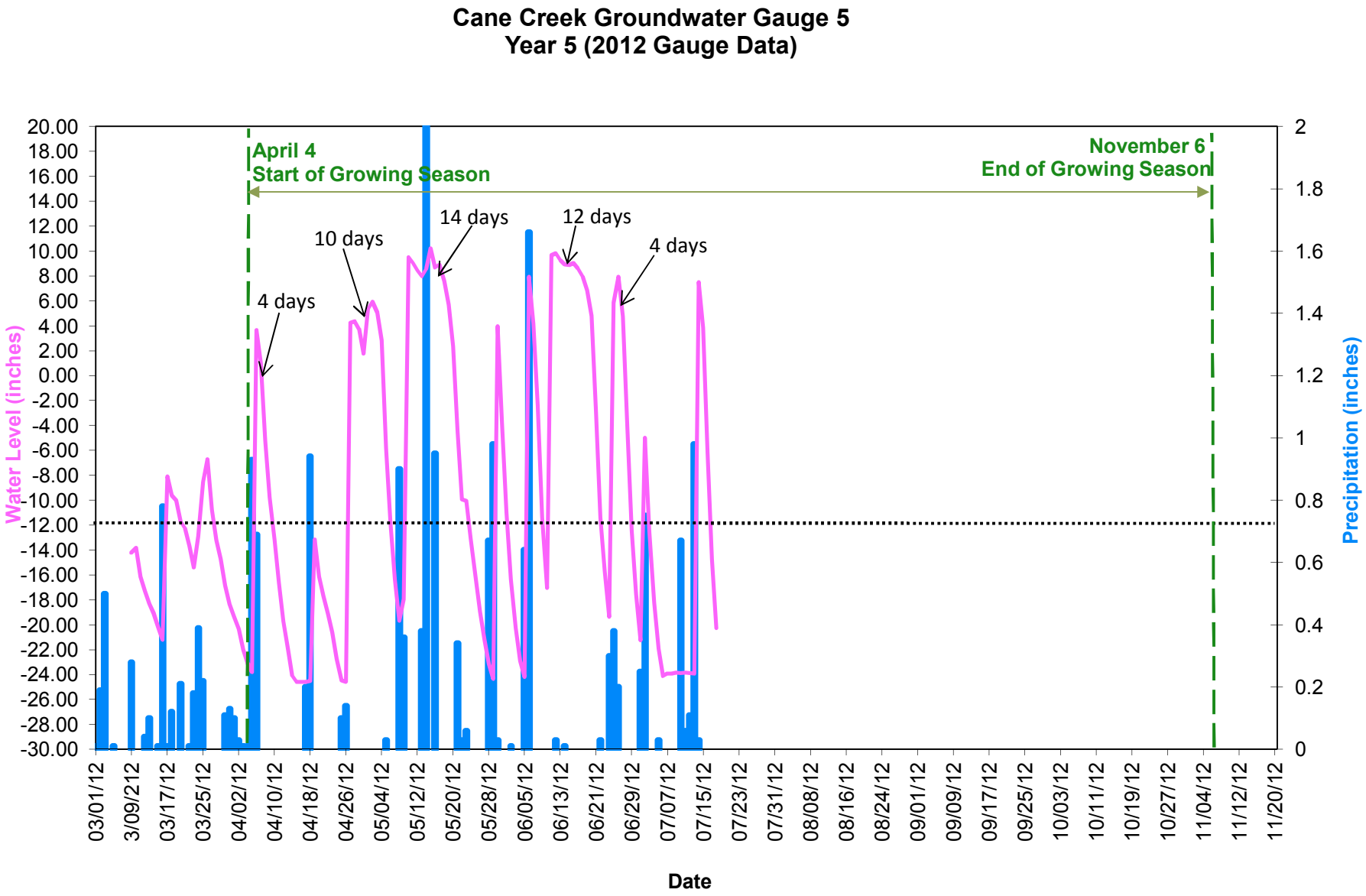

Cane Creek Groundwater Gauge 1
Year 5 (2012 Gauge Data)
April 4
Start of Growing Season
November 6
End of Growing Season
Water Level (inches)
Precipitation (inches)
Date
10.00
8.00
6.00
4.00
2.00
0.00
-2.00
-4.00
-6.00
-8.00
-10.00
-12.00
-14.00
-16.00
-18.00
-20.00
-22.00
-24.00
-26.00
-28.00
-30.00
-32.00
-34.00
-36.00
3
2.5
2
1.5
1
0.5
0
3/1/2012
3/9/2012
3/17/2012
3/25/2012
4/2/2012
4/10/2012
4/18/2012
4/26/2012
5/4/2012
5/12/2012
5/20/2012
5/28/2012
6/5/2012
6/13/2012
6/21/2012
6/29/2012
7/7/2012
7/15/2012
7/23/2012
7/31/2012
8/8/2012
8/16/2012
8/24/2012
9/1/2012
9/9/2012
9/17/2012
9/25/2012
10/3/2012
10/11/2012
10/19/2012
10/27/2012
11/4/2012
11/12/2012
11/20/2012
11/28/2012


Cane Creek Groundwater Gauge 2
Year 5 (2012 Gauge Data)
April 4
Start of Growing Season
November 6
End of Growing Season
Water Level (inches)
Precipitation (inches)
Date
10.00
8.00
6.00
4.00
2.00
0.00
-2.00
-4.00
-6.00
-8.00
-10.00
-12.00
-14.00
-16.00
-18.00
-20.00
-22.00
-24.00
-26.00
-28.00
-30.00
-32.00
-34.00
-36.00
3
2.5
2
1.5
1
0.5
0
3/1/2012
3/9/2012
3/17/2012
3/25/2012
4/2/2012
4/10/2012
4/18/2012
4/26/2012
5/4/2012
5/12/2012
5/20/2012
5/28/2012
6/5/2012
6/13/2012
6/21/2012
6/29/2012
7/7/2012
7/15/2012
7/23/2012
7/31/2012
8/8/2012
8/16/2012
8/24/2012
9/1/2012
9/9/2012
9/17/2012
9/25/2012
10/3/2012
10/11/2012
10/19/2012
10/27/2012
11/4/2012
11/12/2012
11/20/2012
11/28/2012

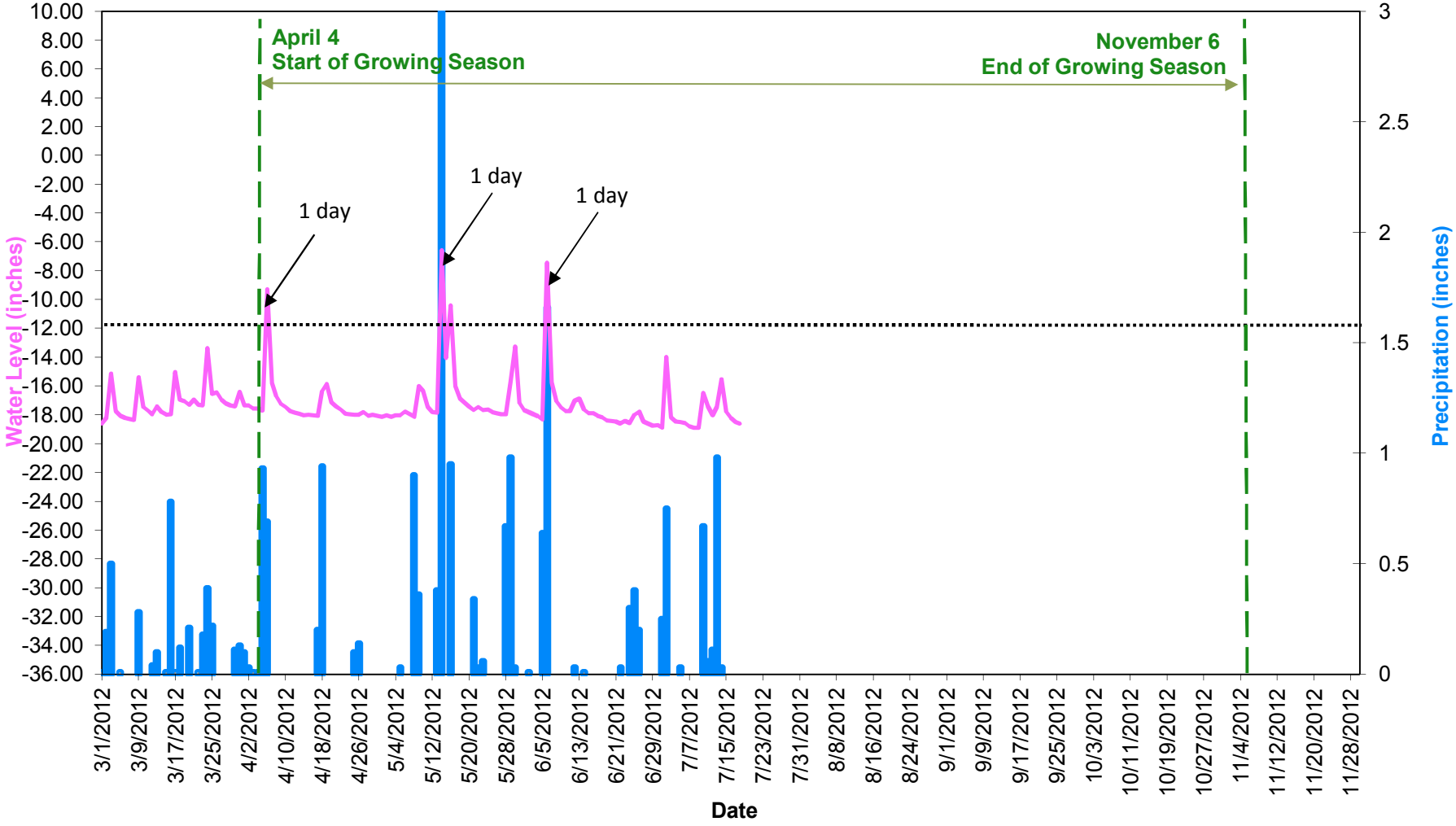
Cane Creek Groundwater Gauge 3
Year 5 (2012 Gauge Data)



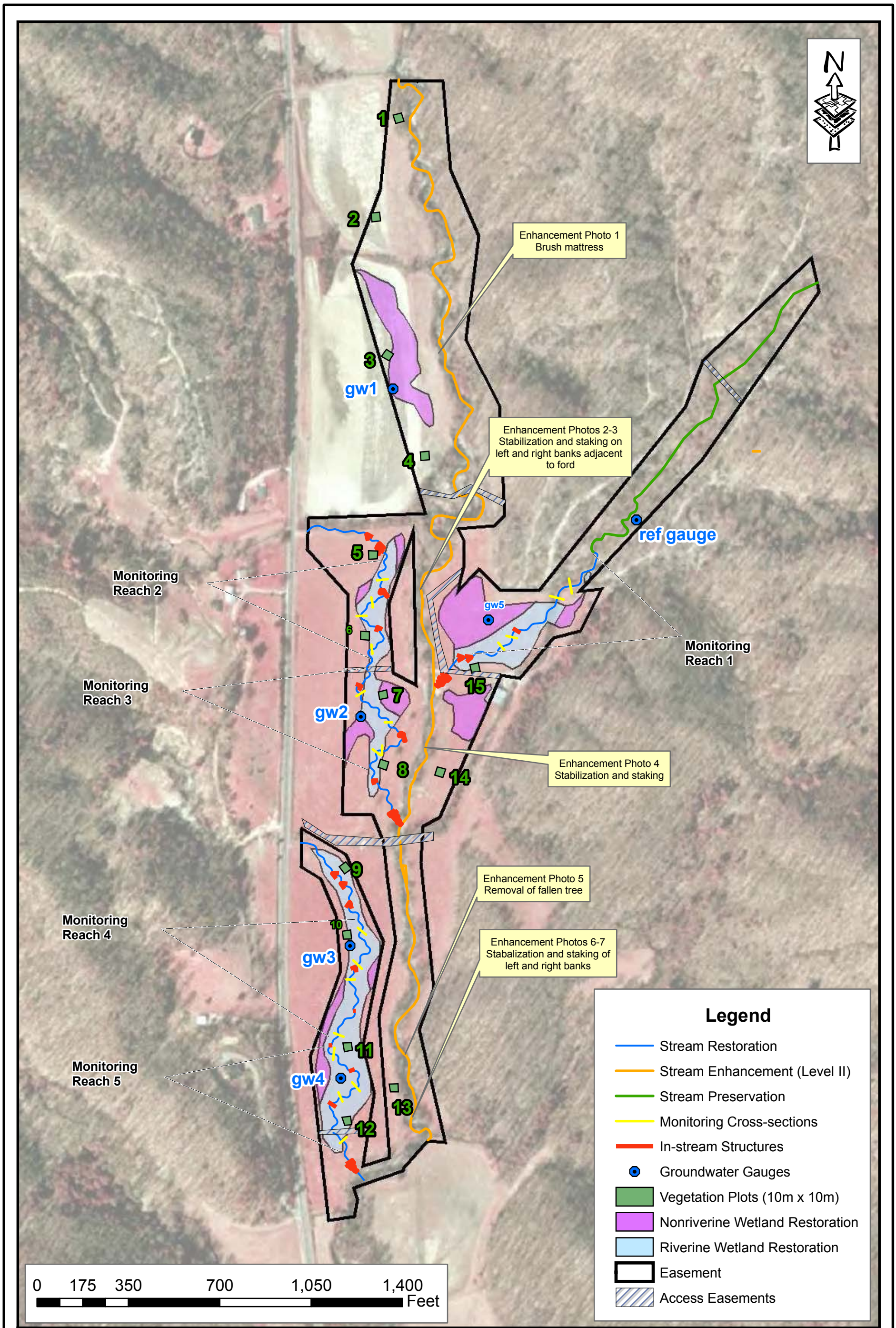

Cane Creek Groundwater Gauge 4
Year 5 (2012 Gauge Data)
April 4
Start of Growing Season
November 6
End of Growing Season
3 days
1 day
Water Level (inches)
Precipitation (inches)
Date
10.00
8.00
6.00
4.00
2.00
0.00
-2.00
-4.00
-6.00
-8.00
-10.00
-12.00
-14.00
-16.00
-18.00
-20.00
-22.00
-24.00
-26.00
-28.00
-30.00
-32.00
-34.00
-36.00
3
2.5
2
1.5
1
0.5
0
3/1/2012
3/9/2012
3/17/2012
3/25/2012
4/2/2012
4/10/2012
4/18/2012
4/26/2012
5/4/2012
5/12/2012
5/20/2012
5/28/2012
6/5/2012
6/13/2012
6/21/2012
6/29/2012
7/7/2012
7/15/2012
7/23/2012
7/31/2012
8/8/2012
8/16/2012
8/24/2012
9/1/2012
9/9/2012
9/17/2012
9/25/2012
10/3/2012
10/11/2012
10/19/2012
10/27/2012
11/4/2012
11/12/2012
11/20/2012
11/28/2012


Cane Creek Groundwater Gauge 5
Year 5 (2012 Gauge Data)
April 4
Start of Growing Season
November 6
End of Growing Season
4 days
10 days
14 days
12 days
4 days
Water Level (inches)
Precipitation (inches)
Date
20.00
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
-2.00
-4.00
-6.00
-8.00
-10.00
-12.00
-14.00
-16.00
-18.00
-20.00
-22.00
-24.00
-26.00
-28.00
-30.00
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
03/01/12
3/09/212
03/17/12
03/25/12
04/02/12
04/10/12
04/18/12
04/26/12
05/04/12
05/12/12
05/20/12
05/28/12
06/05/12
06/13/12
06/21/12
06/29/12
07/07/12
07/15/12
07/23/12
07/31/12
08/08/12
08/16/12
08/24/12
09/01/12
09/09/12
09/17/12
09/25/12
10/03/12
10/11/12
10/19/12
10/27/12
11/04/12
11/12/12
11/20/12

Cane Creek Groundwater Reference Gauge
Year 5 (2012 Gauge Data)



APPENDIX D
MONITORING PLAN VIEW



Axiom Environmental, Inc.
2126 Rowland Pond Drive
Willow Spring, NC 27592
(919) 215-1693
(919) 341-3839 fax

MONITORING PLAN VIEW
CANE CREEK RESTORATION SITE
Rutherford County, North Carolina

Dwn. by. CLF	FIGURE
Date: Nov 2008	D-1
Project: 06-022	