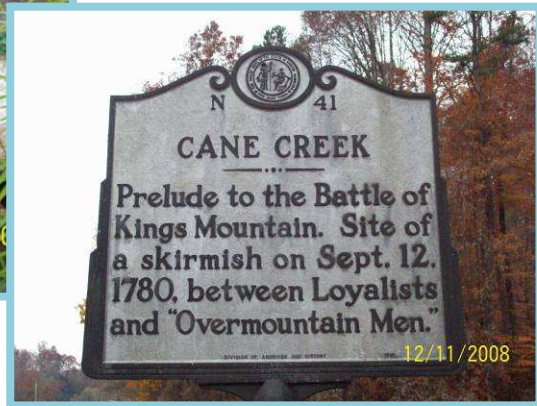


YEAR 1 (2008)
ANNUAL MONITORING REPORT
CANE CREEK RESTORATION SITE
RUTHERFORD COUNTY, NORTH CAROLINA

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



Prepared for:

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November 2008

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 (NCEEP) in fulfilling stream and wetland mitigation goals. The Site is located in north 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 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 1 (2008) 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 surveyed in September 2008 for the Year 1 (2008) monitoring season. Vegetation sampling across the Site was below the required average density with 213 planted stems per acre surviving; eleven of the fifteen plots had low densities for the Year 1 (2008) monitoring season. Rutherford County has been in an extreme drought for the entire growing season, which negatively affected the viability of planted stems. For the months of April to October the Site experienced only about 21 inches of rain, based on onsite rain gauge data and data collected at a nearby rain station, compared to the 30-year historic mean of 28 inches for the area. The southwestern region of North Carolina in which the Cane Creek Site is located has been under drought conditions ranging from Extreme (D-3) to Exceptional (D4) for more than a year. Restoration Systems has scheduled to have the entire Site replanted in early 2009 at a rate of 680 stems per acre to rectify the problem. In addition, kudzu has begun encroaching into the northern portion of the Site; however, active measures including spraying and manual removal to control this invasive species have been initiated and will continue as necessary.

Twenty cross-sections and longitudinal profiles within five 600-foot reaches were measured for the Year 1 (2008) monitoring. As a whole, monitoring measurements indicate that there have been minimal changes in both the 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. No stream problem areas were noted within the Site during the Year 1 (2008) monitoring year.

None of the five monitored gauges within restoration areas were 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). Rainfall for the Year 1 (2008) growing season was below normal; therefore, comparisons to the reference groundwater gauge were made. One of the five groundwater gauges should be considered successful for the Year 1 (2008) monitoring period.

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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 north 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 the 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

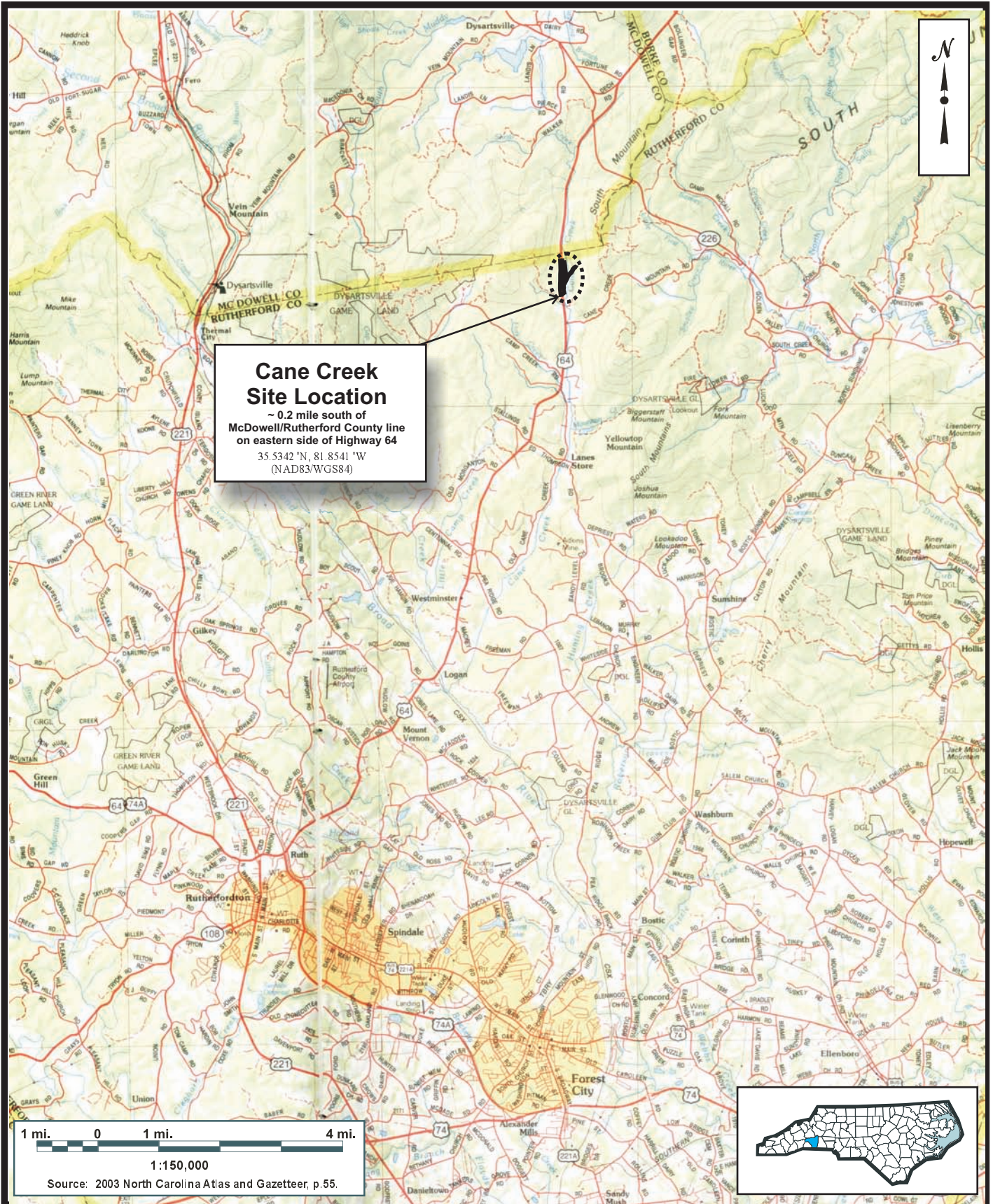
The primary components of the restoration project included 1) construction of a stable, riffle-pool stream channel; 2) enhancement of water quality functions within, upstream, and downstream of the Site; 3) creation of a natural vegetated buffer along restored stream channels; 4) restoration of jurisdictional 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.

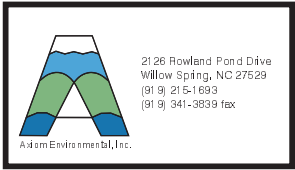
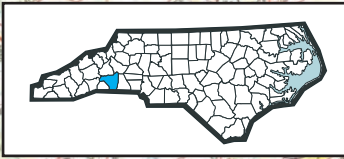
Restoration, enhancement, and preservation of Site streams and wetlands will result in positive benefits for water quality and biological diversity in the Cane Creek watershed. Targeted mitigation efforts focused on improving water quality, enhancing flood attenuation, and restoring aquatic and riparian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



**Cane Creek
Site Location**
 ~ 0.2 mile south of
 McDowell/Rutherford County line
 on eastern side of Highway 64
 35.5342°N, 81.8541°W
 (NAD83/WGS84)

1 mi. 0 1 mi. 4 mi.
 1:150,000
 Source: 2003 North Carolina Atlas and Gazetteer, p. 55.



SITE LOCATION		FIGURE 1
CANE CREEK RESTORATION SITE		
Rutherford County, North Carolina		
Dwn. by:	CLF	
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

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 (919) 523-4375
Designer and Monitoring Performer	Axiom Environmental, Inc. 2126 Rowland Pond Dr. Willow Spring, NC 27592 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 1 (2008).

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

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 below the required average density with 213 planted stems per acre surviving; eleven of the fifteen plots had low densities for the Year 1 (2008) monitoring season. Rutherford County has been in an extreme drought for the entire growing season negatively affecting the viability of planted stems (NCDWR 2008). For the months of April to October the Site experienced approximately 21 inches of rain, based on onsite rain gauge data and data collected at a nearby rain station, compared to the 30-year historic mean of 28 inches for the area (Weather Underground 2008, NOAA 2004). The region where the Site is located has experienced drought conditions ranging from Extreme (D-3) to Exceptional (D-4) from August, 2007 through the present (<http://www.drought.unl.edu/dm/monitor.html>). Restoration Systems has scheduled to replanted in early 2009 at a rate of 680 stems per acre to rectify the problem.

In addition, kudzu (*Pueraria montana*) has begun encroaching from an adjacent field into the northern portion of the Site and several stems of multiflora rose (*Rosa multiflora*) and privet (*Ligustrum sinense*) were observed at the southern end. All three invasive species were treated with the herbicide Milestone VM (aminopyralid) at a rate of seven ounces per acre. The treated areas will be monitored and treatments continued as necessary.

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

No bankfull events were documented during the Year 1 (2008) monitoring period.

Table 6. Verification of Bankfull Events

Date of Data Collection	Date of Occurrence	Method	Photo (if available)
No bankfull events were documented during the Year 1 (2008) monitoring period.			

2.2.3 Stream Problem Areas

No stream problem areas were noted within the Site during the Year 1 (2008) monitoring year.

2.2.4 Categorical Stream Feature Visual Stability Assessment

Each stream reach was visually inspected during the Year 1 (2008) 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 percentage of performance for features within each reach are summarized in the tables below.

Structures within Reaches 1 and 2 appear to have sunk slightly lowering the structure elevation within the channel; however, no instability has occurred upstream or downstream of the structures. In addition, one structure within Reach 3 has a minor amount of observed scour/piping; however, the scour/piping is minimal and is not causing any channel instability. Structures will continued to be monitored; however, no proactive measures are recommended at this time. The issues 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%				
B. Pools	100%				
C. Thalweg	100%				
D. Meanders	100%				
E. Bed General	100%				
F. Banks	99%				
G. Vanes / J. Hooks, Etc.	75%				
H. Wads and Boulders	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%				
B. Pools	97%				
C. Thalweg	100%				
D. Meanders	100%				
E. Bed General	100%				
F. Banks	100%				
G. Vanes / J. Hooks, Etc.	75%				
H. Wads and Boulders	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%				
B. Pools	100%				
C. Thalweg	100%				
D. Meanders	100%				
E. Bed General	100%				
F. Banks	100%				
G. Vanes / J. Hooks, Etc.	75%				
H. Wads and Boulders	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%				
B. Pools	100%				
C. Thalweg	100%				
D. Meanders	100%				
E. Bed General	100%				
F. Banks	100%				
G. Vanes / J. Hooks, Etc.	100%				
H. Wads and Boulders	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%				
B. Pools	100%				
C. Thalweg	100%				
D. Meanders	100%				
E. Bed General	100%				
F. Banks	100%				
G. Vanes / J. Hooks, Etc.	100%				
H. Wads and Boulders	NA				

2.2.5 Quantitative Stream Measurements

During the Year 1 (2008) 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 1 (2008) 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 1 (2008) growing season. Graphs of groundwater hydrology and precipitation from a nearby rain station for April to June (Weather Underground 2008) and an onsite rain gauge for the remainder of the growing season are included in Appendix C.

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

Parameter	USGS Gage Data			Pre-Existing Condition			Project Reference Stream			Design			As-built		
	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med
Dimension															
BF Width (ft)	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 (ft ²)			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)				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															
Rifle length (ft)						===			===			8	36	16	
Rifle 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			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		
	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med
Dimension																		
BF Width (ft)	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 (ft ²)			4.8			3.2			8.5				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)							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)									===			===			===			===
Riffle slope (ft/ft)							1.48%	4.92%	2.84%	0.49%	1.47%	0.78%	NA*	NA*	NA*			NA*
Pool length (ft)									===			===			===			===
Pool spacing (ft)							23.2	89.3	42.3	15	50	25	15	50	25			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			1.3
Water Surface Slope (ft/ft)			2.43%			2.44%			1.61%			0.49%			0.49%			NA*
BF slope (ft/ft)			===			===			===			===			===			===
Rosgen Classification			G4			Eg4			E4			C/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									
	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+	
Dimension																									
BF Width (ft)	10.1						10.4						12.2						13.9						
Floodprone Width (ft) (approx)	150.0																								
BF Cross Sectional Area (ft ²)	10.9						9.3						11.3					16.3							
BF Mean Depth (ft)	1.1						0.9						0.9					1.2							
BF Max Depth (ft)	2.3						1.4						1.5					2.6							
Width/Depth Ratio	NA						11.7						13.2					NA							
Entrenchment Ratio	NA						14.4						12.3					NA							
Bank Height Ratio	NA						1.0						1.0					NA							
Wetted Perimeter(ft)	11.4						10.9						12.7					15.0							
Hydraulic radius (ft)	1.0						0.8						0.9					1.1							
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)																									
d84 (mm)																									
Parameter	MY-01 (2008)					MY-02 (2009)					MY-03 (2010)					MY-04 (2011)					MY-05 (2012)				
Pattern	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	
Channel Beltwidth (ft)	21	74	42																						
Radius of Curvature (ft)	21	42	23																						
Meander Wavelength (ft)	53	117	74																						
Meander Width ratio	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	Min	Max	Med	Min	Max	Med	
Riffle length (ft)	8	36	16																						
Riffle slope (ft/ft)	0.8%	5.6%	2.4%																						
Pool length (ft)	8	58	33																						
Pool spacing (ft)	31	106	53																						
Additional Reach Parameters	MY-01 (2008)					MY-02 (2009)					MY-03 (2010)					MY-04 (2011)					MY-05 (2012)				
Valley Length (ft)	551																								
Channel Length (ft)	716																								
Sinuosity	1.3																								
Water Surface Slope (ft/ft)	0.92%																								
BF slope (ft/ft)	---																								
Roegen Classification	C/E type																								
Number of Bankfull Events	0																								

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									
	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						9.3						11.2						10.5						
Floodprone Width (ft) (approx)	150.0																								
BF Cross Sectional Area (ft ²)	8.6						6.3						9.8						5.0						
BF Mean Depth (ft)	0.7						0.7						0.9						0.5						
BF Max Depth (ft)	1.4						1.5						2.0						0.9						
Width/Depth Ratio	NA						13.7						NA						21.9						
Entrenchment Ratio	NA						16.2						NA						14.3						
Bank Height Ratio	NA						1.0						NA						1.0						
Wetted Perimeter(ft)	13.4						9.8						12.0						10.7						
Hydraulic radius (ft)	0.6						0.6						0.8						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)																									
d84 (mm)																									
Parameter	MY-01 (2008)					MY-02 (2009)					MY-03 (2010)					MY-04 (2011)					MY-05 (2012)				
Pattern	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	
Channel Beltwidth (ft)	10	35	20																						
Radius of Curvature (ft)	10	20	11																						
Meander Wavelength (ft)	25	55	35																						
Meander Width ratio	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	Min	Max	Med	Min	Max	Med	
Riffle length (ft)	8	26	15																						
Riffle slope (ft/ft)	NA*	NA*	NA*																						
Pool length (ft)	15	23	18																						
Pool spacing (ft)	15	50	25																						
Additional Reach Parameters	MY-01 (2008)					MY-02 (2009)					MY-03 (2010)					MY-04 (2011)					MY-05 (2012)				
Valley Length (ft)	415																								
Channel Length (ft)	540																								
Sinuosity	1.3																								
Water Surface Slope (ft/ft)	NA*																								
BF slope (ft/ft)	---																								
Rosgen Classification	C type																								
Number of Bankfull Events	0																								

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									
	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+	
Dimension																									
BF Width (ft)	7.8						4.8						7.4						11.8						
Floodprone Width (ft) (approx)	150.0																								
BF Cross Sectional Area (ft ²)	5.8						2.1						3.5						11.2						
BF Mean Depth (ft)	0.7						0.4						0.5						0.9						
BF Max Depth (ft)	1.3						0.8						0.9						1.7						
Width/Depth Ratio	NA						11.0						15.6						NA						
Entrenchment Ratio	NA						31.2						20.1						NA						
Bank Height Ratio	NA						1.0						1.0						NA						
Wetted Perimeter (ft)	8.5						5.1						7.7						12.3						
Hydraulic radius (ft)	0.7						0.8						0.4						0.9						
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+	
Parameter	MY-01 (2008)					MY-02 (2009)					MY-03 (2010)					MY-04 (2011)					MY-05 (2012)				
Pattern	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	
Channel/Beltwidth (ft)	10	35	20																						
Radius of Curvature (ft)	10	20	11																						
Meander Wavelength (ft)	25	55	35																						
Meander Width ratio	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	Min	Max	Med	Min	Max	Med	
Riffle length (ft)	12	27	15																						
Riffle slope (ft/ft)	NA*	NA*	NA*																						
Pool length (ft)	18	33	21																						
Pool spacing (ft)	15	50	25																						
Additional Reach Parameters	MY-01 (2008)					MY-02 (2009)					MY-03 (2010)					MY-04 (2011)					MY-05 (2012)				
Valley Length (ft)	482																								
Channel Length (ft)	626																								
Sinuosity	1.3																								
Water Surface Slope (ft/ft)	NA*																								
BF slope (ft/ft)	---																								
Rosgen Classification	C/E type																								
Number of Bankfull Events	0																								

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																			
	MY1	MY2	MY3	MY4	MY5	MY+	MY+	MY+	MY+	MY+	MY1	MY2	MY3	MY4	MY5	MY+	MY+	MY+	MY+	MY+	MY1	MY2	MY3	MY4	MY5	MY+	MY+	MY+	MY+	MY+					
Dimension	9.1					150.0					7.5					150.0					11.8					150.0					9.1				
Floodprone Width (ft) (approx)																																			
BF Cross Sectional Area (ft ²)	5.2										3.1										10.3										8.3				
BF Mean Depth (ft)	0.6										0.4										0.9										0.9				
BF Max Depth (ft)	1.1										0.6										1.7										1.8				
Width/Depth Ratio	16.1										18.5										NA										NA				
Entrenchment Ratio	16.5										19.9										NA										NA				
Bank Height Ratio	1.0										1.0										NA										NA				
Wetted Perimeter (ft)	9.4										7.7										12.4										9.8				
Hydraulic radius (ft)	0.5										0.4										0.8										0.8				
Substrate											MY1	MY2	MY3	MY4	MY5	MY+	MY+	MY+	MY+	MY1	MY2	MY3	MY4	MY5	MY+	MY+	MY+	MY+	MY+	MY1	MY2	MY3	MY4	MY5	
	d50 (mm)																																		
	d84 (mm)																																		
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			Min	Max	Med			
Channel/Beltwidth (ft)	10	35	20																																
Radius of Curvature (ft)	10	20	35																																
Meander Wavelength (ft)	25	55	35																																
Meander Width ratio	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			Min	Max	Med			
Riffle length (ft)	5	17	11																																
Riffle slope (ft/ft)	NA*	NA*	NA8																																
Pool length (ft)	9	33	21																																
Pool spacing (ft)	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)																																			
Channel Length (ft)																																			
Simosity																																			
Water Surface Slope (ft/ft)																																			
BF slope (ft/ft)																																			
Rosgen Classification																																			
Number of Bankfull Events																																			

* No water in channel due to drought conditions.

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 Problem Areas

No wetland problem areas were identified within the Site during Year 1 (2008) monitoring.

2.3.3 Wetland Criteria Attainment

None of the five monitored gauges within restoration areas were 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). However, rain fall for the Year 1 (2008) growing season was below normal with 21 inches of rain occurring from April to October 2008 compared to the 30-year historic mean rainfall of 28 inches occurring from March to October (Weather Underground 2008, NOAA 2004) (Figure 2). Since the Year 1 (2008) monitoring season rainfall was below normal, comparisons to the reference groundwater gauge was made. One of the five groundwater gauges should be considered successful for the Year 1 (2008) monitoring period. Hydrographs containing groundwater and precipitation data for each gauge can be found in Appendix B.

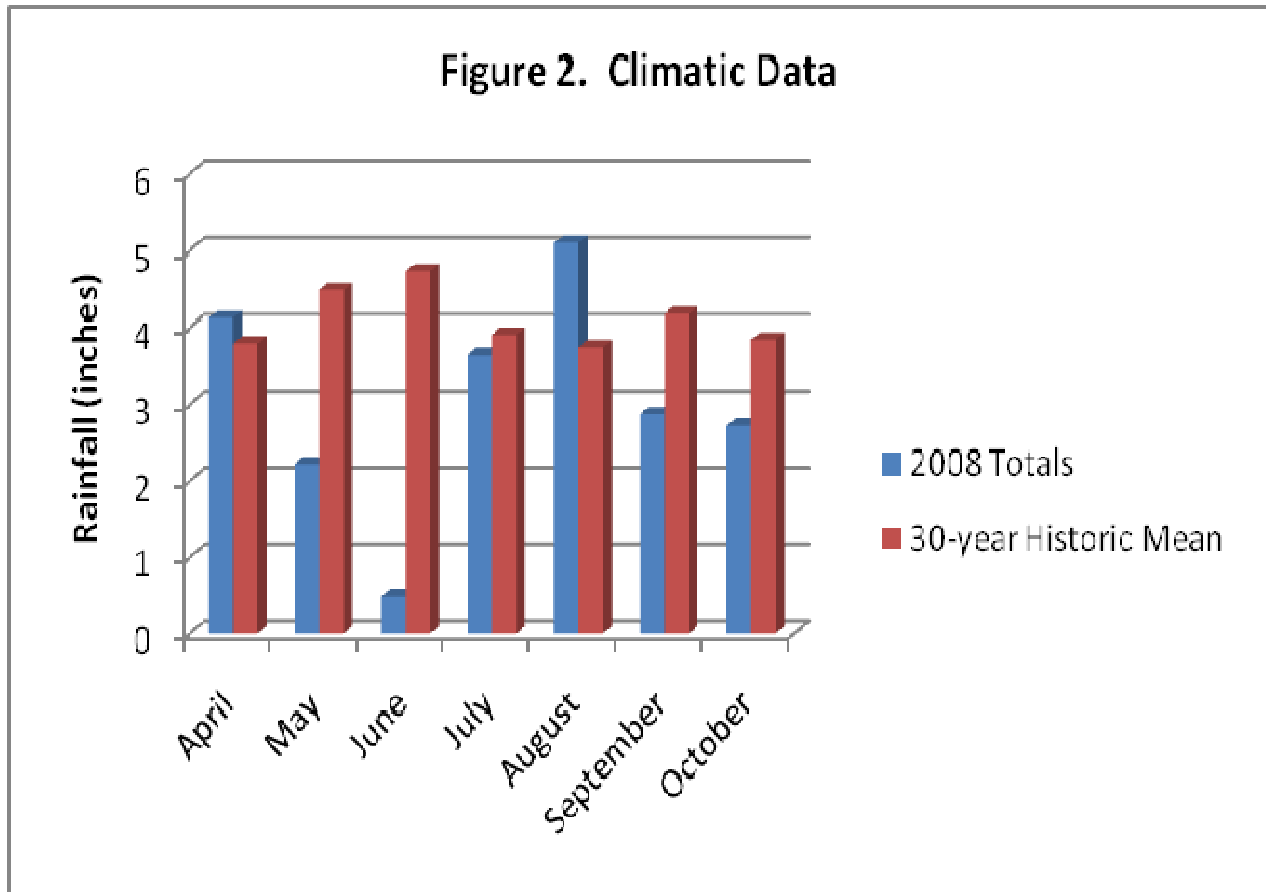


Table 10. Wetland Criteria Attainment for Year 1 (2008)

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	No	27 %
2	No	Yes		2	No	
3	No	Yes		3	Yes	
4	No	Yes		4	No	
5	Yes	No		5	No	
				6	No	
				7	Yes	
				8	Yes	
				9	No	
				10	No	
				11	No	
				12	Yes	
				13	No	
				14	No	
				15	No	

3.0 CONCLUSIONS

None of the five monitored gauges within restoration areas were inundated/saturated within 12 inches of the surface for greater than 5 percent of the growing season. However, rainfall for the Year 1 (2008) growing season was below normal with 21 inches of rain occurring from April to October 2008 compared to the 30-year historic mean rainfall of 28 inches occurring from March to October. Since the Year 1 (2008) monitoring season rainfall was below normal, comparisons to the reference groundwater gauge was made. One of the five groundwater gauges should be considered successful for the Year 1 (2008) monitoring period. A summary of groundwater gauge data for the Year 1 (2008) 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 percent)				
2	No/0 days (0 percent)				
3	No/0 days (0 percent)				
4	No/1 days (0.5 percent)				
5	Yes/4 days (1.8 percent)				
Ref 1	Yes/2 days (0.9 percent)				

Vegetation sampling across the Site was below the required average density with 213 planted stems per acre surviving; eleven of the fifteen plots had low densities for the Year 1 (2008) monitoring season (Table 12). Rutherford County has been in an extreme drought for the entire growing season negatively affecting the viability of planted stems. Restoration Systems has scheduled to replanted in late 2008 or early 2009 at a rate of 680 stems per acre to rectify the problem.

Table 12. Summary of Planted Vegetation Plot Results

Plot	Planted Stems/Acre Counting Towards Success Criteria				
	Year 1 (2008)	Year 2 (2009)	Year 3 (2010)	Year 4 (2011)	Year 5 (2012)
1	0				
2	0				
3	324				
4	0				
5	243				
6	162				
7	526				
8	486				
9	162				
10	202				
11	162				
12	486				
13	162				
14	243				
15	40				
Average of All Plots (1-15)	213				

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. Climatology 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.
- North Carolina Division of Water Resources (NCDWR). 2008. Drought, Current County Advisories (online). Available: <http://www.ncwater.org/drought/> [November 7, 2008]. North Carolina Division of Water Resources.
- Rosgen, D. 1996. Applied River Morphology. Wildland Hydrology (Publisher). Pagosa Springs, Colorado.
- 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. 2008. Station in Lumberton, North Carolina. (online). Available: <http://www.wunderground.com/cgi-bin/findweather/hdfForecast?query=morganton%2C+nc&searchType=WEATHER> [November 13, 2008]. Weather Underground.

**APPENDIX A
VEGETATION DATA**

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

Report Prepared By Corri Faquin
Date Prepared 10/22/2008 9:58

database name RestorationSystems-2008-AI-v2.2.5.mdb
database location C:\Business\CVS database
computer name AXIOM-0A9116A70

DESCRIPTION OF WORKSHEETS IN THIS DOCUMENT-----

Metadata Description of database file, the report worksheets, and a summary of project(s) and project data.
Proj, planted Each project is listed with its PLANTED stems per acre, for each year. This excludes live stakes.
Proj, total stems Each project is listed with its TOTAL stems per acre, for each year. This includes live stakes, all planted stems, and all natural/volunteer stems.
Plots List of plots surveyed with location and summary data (live stems, dead stems, missing, etc.).
Vigor Frequency distribution of vigor classes for stems for all plots.
Vigor by Spp Frequency distribution of vigor classes listed by species.
Damage List of most frequent damage classes with number of occurrences and percent of total stems impacted by each.
Damage by Spp Damage values tallied by type for each species.
Damage by Plot Damage values tallied by type for each plot.
ALL Stems by Plot and spp A matrix of the count of total living stems of each species (planted and natural volunteers combined) for each plot; dead and missing stems are excluded.

PROJECT SUMMARY-----

Project Code Cane
project Name Cane Creek Restoration Site
Description Stream and Wetland Restoration Site in Rutherford County
River Basin
length(ft)
stream-to-edge width (ft)
area (sq m)
Required Plots (calculated)
Sampled Plots

Living planted stems, excluding live stakes, per acre

Project Code	Project Name	River Basin	Year 1
Cane	Cane Creek Restoration Site		213.13

Plots

plot	Plot Level	Year	Latitude/ Northing	Longitude/ Easting	Datum	Date Sampled	Planted Living Stems	Planted Living Stems EXCLUDING Live Stakes	Dead/ Missing Stems	Planted Living Stems per ACRE	# species
Cane-AXE-0001	2	1	35.5393324	-81.855151	NAD83/WGS84	9/25/2008					0
Cane-AXE-0002	2	1	35.538196	-81.855381	NAD83/WGS84	9/25/2008					0
Cane-AXE-0003	2	1	35.536784	-81.855210	NAD83/WGS84	9/25/2008	8	8	0	324	3
Cane-AXE-0004	2	1	35.535790	-81.854678	NAD83/WGS84	9/25/2008					0
Cane-AXE-0005	2	1	35.534646	-81.855299	NAD83/WGS84	9/25/2008	6	6	0	243	2
Cane-AXE-0006	2	1	35.533794	-81.855261	NAD83/WGS84	9/25/2008	4	4	0	162	1
Cane-AXE-0007	2	1	35.533174	-81.855107	NAD83/WGS84	9/25/2008	13	13	0	526	5
Cane-AXE-0008	2	1	35.532462	-81.855102	NAD83/WGS84	9/25/2008	12	12	0	486	4
Cane-AXE-0009	2	1	35.53146	-81.855548	NAD83/WGS84	9/24/2008	4	4	0	162	3
Cane-AXE-0010	2	1	35.530742	-81.855395	NAD83/WGS84	9/24/2008	5	5	0	202	3
Cane-AXE-0011	2	1	35.529558	-81.855346	NAD83/WGS84	9/24/2008	4	4	0	162	3
Cane-AXE-0012	2	1	35.528784	-81.855327	NAD83/WGS84	9/24/2008	12	12	0	486	5
Cane-AXE-0013	2	1	35.529052	-81.854852	NAD83/WGS84	9/24/2008	4	4	0	162	1
Cane-AXE-0014	2	1	35.532373	-81.854268	NAD83/WGS84	9/25/2008	6	6	0	243	3
Cane-AXE-0015	2	1	35.533568	-81.853962	NAD83/WGS84	9/25/2008	1	1	0	40	1

Vigor

vigor	Count	Percent
2	11	13.9
3	50	63.3
4	18	22.8

Vigor by Species	4	3	2	1	0	Missing
Cornus amomum	7	12	1			
Fraxinus pennsylvanica	2	5				
Quercus alba		3				
Quercus pagoda		1	1			
Sambucus	2	6	2			
Cornus			1			
Quercus			1			
Quercus rubra	2	2	1			
Carya		1				
Nyssa		3				
Fraxinus	1	4				
Platanus	1	4	1			
Platanus occidentalis	1					
Cephalanthus		4	3			
Ulmus	2	5				
TOT: 15	18	50	11			

Damage	Count	Percent Of Stems
Damage (no damage)	65	82.3
Insects	5	6.3
(other damage)	5	6.3
Unknown	4	5.1

Damage by Plot	All Damage Categories	(no damage)	Insects	Unknown	(other damage)
Cane-AXE-0003	8	4	3	1	
Cane-AXE-0005	6	6			
Cane-AXE-0006	4	3	1		
Cane-AXE-0007	13	11		1	1
Cane-AXE-0008-	12	10	1	1	
Cane-AXE-0009	4	3		1	
Cane-AXE-0010	5	3			2
Cane-AXE-0011	4	3			1
Cane-AXE-0012	12	12			
Cane-AXE-0013	4	4			
Cane-AXE-0014	6	5			1
Cane-AXE-0015	1	1			
TOT: 12	79	65	5	4	5

Damage by Species

	Species	All Damage Categories	(no damage)	Insects	Unknown	(other damage)
	Carya	1	1			
	Cephalanthus	7	4	1	2	
	Cornus	1				1
	Cornus amomum	20	18	1		1
	Fraxinus	5	5			
	Fraxinus pennsylvanica	7	7			
	Nyssa	3	3			
	Platanus	6	5			1
	Platanus occidentalis	1	1			
	Quercus	1			1	
	Quercus alba	3	3			
	Quercus pagoda	2	1		1	
	Quercus rubra	5	2	3		
	Sambucus	10	8			2
	Ulmus	7	7			
TOT:	15	79	65	5	4	5

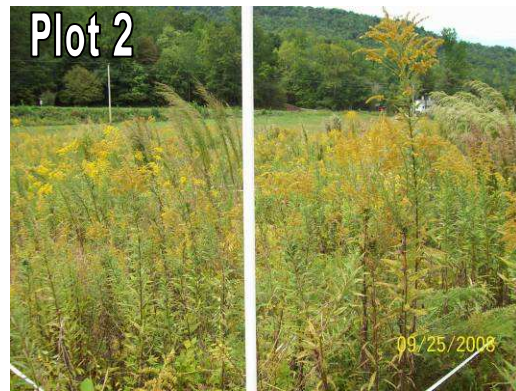
Planted Stems by Plot and Species

	Species	Total Planted Stems	# plots	avg# stems	plot Cane-AXE-0003-	plot Cane-AXE-0005-	plot Cane-AXE-0006-	plot Cane-AXE-0007-	plot Cane-AXE-0008-	plot Cane-AXE-0009-	plot Cane-AXE-0010-	plot Cane-AXE-0011-	plot Cane-AXE-0012-	plot Cane-AXE-0013-	plot Cane-AXE-0014-	plot Cane-AXE-0015-
	Carya	1	1	1											1	
	Cephalanthus	7	3	2.33				2	4							1
	Cornus	1	1	1						1						
	Cornus amomum	20	7	2.86		3	4		2	2	1		4	4		
	Fraxinus	5	2	2.5				4					1			
	Fraxinus pennsylvanica	7	3	2.33						1	3		3			
	Nyssa	3	1	3											3	
	Platanus	6	3	2				3				1			2	
	Platanus occidentalis	1	1	1												
	Quercus	1	1	1						1						
	Quercus alba	3	2	1.5								1	2			
	Quercus pagoda	2	1	2												
	Quercus rubra	5	1	5												
	Sambucus	10	5	2		3		1	2				2	2		
	Ulmus	7	2	3.5				3	4							
TOT:	15	79	15		8	6	4	13	12	4	5	4	12	4	6	1

All Stems by Plot and Species

Species	Total Stems	# plots	avg# stems	Cane-AXE-0001-	Cane-AXE-0002-	Cane-AXE-0003-	Cane-AXE-0004-	Cane-AXE-0005-	Cane-AXE-0006-	Cane-AXE-0007-	Cane-AXE-0008-	Cane-AXE-0009-	Cane-AXE-0010-	Cane-AXE-0011-	Cane-AXE-0012-	Cane-AXE-0013-	Cane-AXE-0014-	Cane-AXE-0015-
Albizia julibrissin	1	1	1													1		
Cornus amomum	20	7	2.86					3	4		2	2	1		4	4		
Fraxinus pennsylvanica	7	3	2.33									1	3		3			
Juglans nigra	30	1	30													30		
Quercus alba	3	2	1.5											1	2			
Quercus pagoda	2	1	2			2												
Rhus glabra	1	1	1	1														
Morus rubra	1	1	1													1		
Sambucus	12	6	2					3		1	3			2	2			1
Cornus	1	1	1										1					
Diospyros	16	2	8												1	15		
Albizia	4	3	1.33	1	1	2												
Quercus	1	1	1									1						
Quercus rubra	5	1	5			5												
Carya	1	1	1														1	
Liriodendron	1	1	1													1		
Nyssa	3	1	3														3	
Fraxinus	6	3	2				1			4					1			
Pinus	5	1	5			5												
Platanus	26	5	5.2		17	3				3				1				2
Platanus occidentalis	2	2	1	1		1												
Pennisetum	1	1	1		1													
Cephalanthus	7	3	2.33								2	4						1
Acer negundo	54	7	7.71			2	2	1		10	22				5	12		
Acer rubrum	1	1	1				1											
Ulmus	7	2	3.5							3	4							
TOT:	26	26		2	20	20	4	7	4	23	35	4	5	4	18	64	6	2

Cane Creek Stream and Wetland Restoration Site
Year 1 (2008) Annual Monitoring
Vegetation Plot Photos
Taken September 2008



Plot 7

No photograph available



Cane Creek Stream and Wetland Restoration Site
Year 1 (2008) Annual Monitoring
Vegetation Plot Photos
Taken September 2008
(continued)



**APPENDIX B
GEOMORPHOLOGIC DATA**

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

**Table B1. Visual Morphological Stability Assessment
Cane Creek
Reach 1 (Tributary 1 - Sta. 17+50 to 10+60) September 2008**

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
A. Riffles	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%	
	5. Length appropriate?	16	16	NA	100%	100%
B. Pools	1. Present? (e.g. not subject to severe aggrad. Or migrat.?)	21	21	NA	100%	
	2. Sufficiently deep (Max Pool D:Mean Bk \geq 1.6?)	21	21	NA	100%	
	3. Length appropriate?	21	21	NA	100%	100%
C. Thalweg	1. Upstream of meander bend (run/inflection) centering?	21	21	NA	100%	
	2. Downstream of meander (glide/inflection) centering?	21	21	NA	100%	100%
D. Meanders	1. Outer bend in state of limited/controlled erosion?	21	21	NA	100%	
	2. Of those eroding, # w/concomitant point bar formation?	NA	NA	NA	100%	
	3. Apparent Rc within spec?	21	21	NA	100%	
	4. Sufficient floodplain access and relief?	21	21	NA	100%	100%
E. Bed General	1. General channel bed aggradation areas (bar formation)	NA	NA	10	98.5%	
	2. Channel bed degradation – areas of increasing down-cutting or head cutting?	NA	NA	0	100%	99%
F. Vanes	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%	
	4. Free of piping or other structural failures?	2	2	NA	100%	75%
G. Wads / Boulders	1. Free of scour?	NA	NA	NA	NA	NA
	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) September 2008**

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
A. Riffles	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%	
	5. Length appropriate?	19	19	NA	100%	100%
B. Pools	1. Present? (e.g. not subject to severe aggrad. Or migrat.?)	23	23	NA	100%	
	2. Sufficiently deep (Max Pool D:Mean Bkt>1.6?)	21	23	NA	91%	
	3. Length appropriate?	23	23	NA	100%	97%
C. Thalweg	1. Upstream of meander bend (run/inflection) centering?	23	23	NA	100%	
	2. Downstream of meander (glide/inflection) centering?	23	23	NA	100%	100%
D. Meanders	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%	
	4. Sufficient floodplain access and relief?	23	23	NA	100%	100%
E. Bed General	1. General channel bed aggradation areas (bar formation)	NA	NA	0	100%	
	2. Channel bed degradation – areas of increasing down-cutting or head cutting?	NA	NA	0	100%	100%
F. Vanes	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%	
	4. Free of piping or other structural failures?	2	2	NA	100%	75%
G. Wads / Boulders	1. Free of scour?	NA	NA	NA	NA	
	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) September 2008**

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
A. Riffles	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%	
	5. Length appropriate?	20	20	NA	100%	100%
B. Pools	1. Present? (e.g. not subject to severe aggrad. Or migrat.?)	28	28	NA	100%	
	2. Sufficiently deep (Max Pool D:Mean Bkt>1.6?)	28	28	NA	100%	
	3. Length appropriate?	28	28	NA	100%	100%
C. Thalweg	1. Upstream of meander bend (run/inflection) centering?	28	28	NA	100%	
	2. Downstream of meander (glide/inflection) centering?	28	28	NA	100%	100%
D. Meanders	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%	
	4. Sufficient floodplain access and relief?	28	28	NA	100%	100%
E. Bed General	1. General channel bed aggradation areas (bar formation)	NA	NA	0	100%	
	2. Channel bed degradation – areas of increasing down-cutting or head cutting?	NA	NA	0	100%	100%
F. Vanes	1. Free of back or arm scour?	1	2	NA	50%	
	2. Height appropriate?	2	2	NA	100%	
	3. Angle and geometry appear appropriate?	2	2	NA	100%	
G. Wads / Boulders	4. Free of piping or other structural failures?	1	2	NA	50%	75%
	1. Free of scour?	NA	NA	NA	NA	NA
	2. Footing stable?	NA	NA	NA	NA	NA

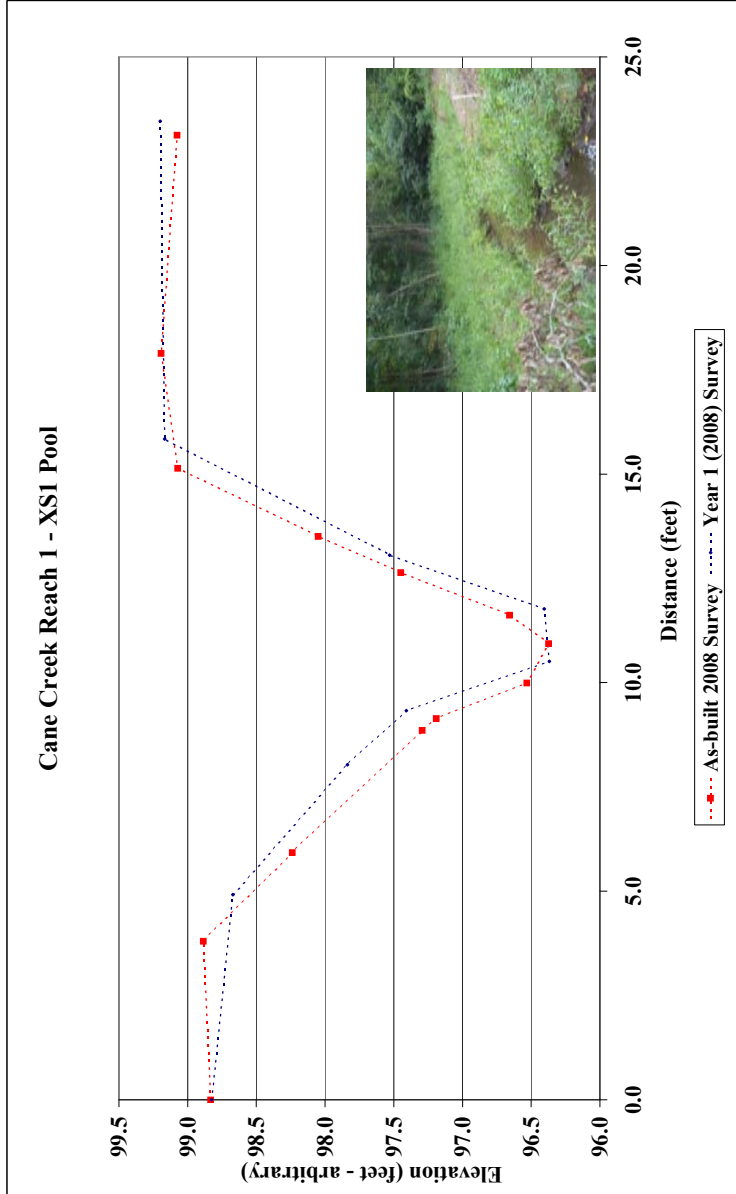
**Table B4. Visual Morphological Stability Assessment
Cane Creek
Reach 4 (Tributary 3 - Sta. 14+45 to 20+40) September 2008**

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
A. Riffles	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%	
	5. Length appropriate?	19	19	NA	100%	100%
B. Pools	1. Present? (e.g. not subject to severe aggrad. Or migrat.?)	26	26	NA	100%	
	2. Sufficiently deep (Max Pool D:Mean Bkt>1.6?)	26	26	NA	100%	
	3. Length appropriate?	26	26	NA	100%	100%
C. Thalweg	1. Upstream of meander bend (run/inflection) centering?	26	26	NA	100%	
	2. Downstream of meander (glide/inflection) centering?	26	26	NA	100%	100%
D. Meanders	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%	
E. Bed General	4. Sufficient floodplain access and relief?	26	26	NA	100%	100%
	1. General channel bed aggradation areas (bar formation)	NA	NA	0	100%	
F. Vanes	2. Channel bed degradation – areas of increasing down-cutting or head cutting?	NA	NA	0	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%	
G. Wads / Boulders	4. Free of piping or other structural failures?	2	2	NA	100%	100%
	1. Free of scour?	NA	NA	NA	NA	NA
	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) September 2008**

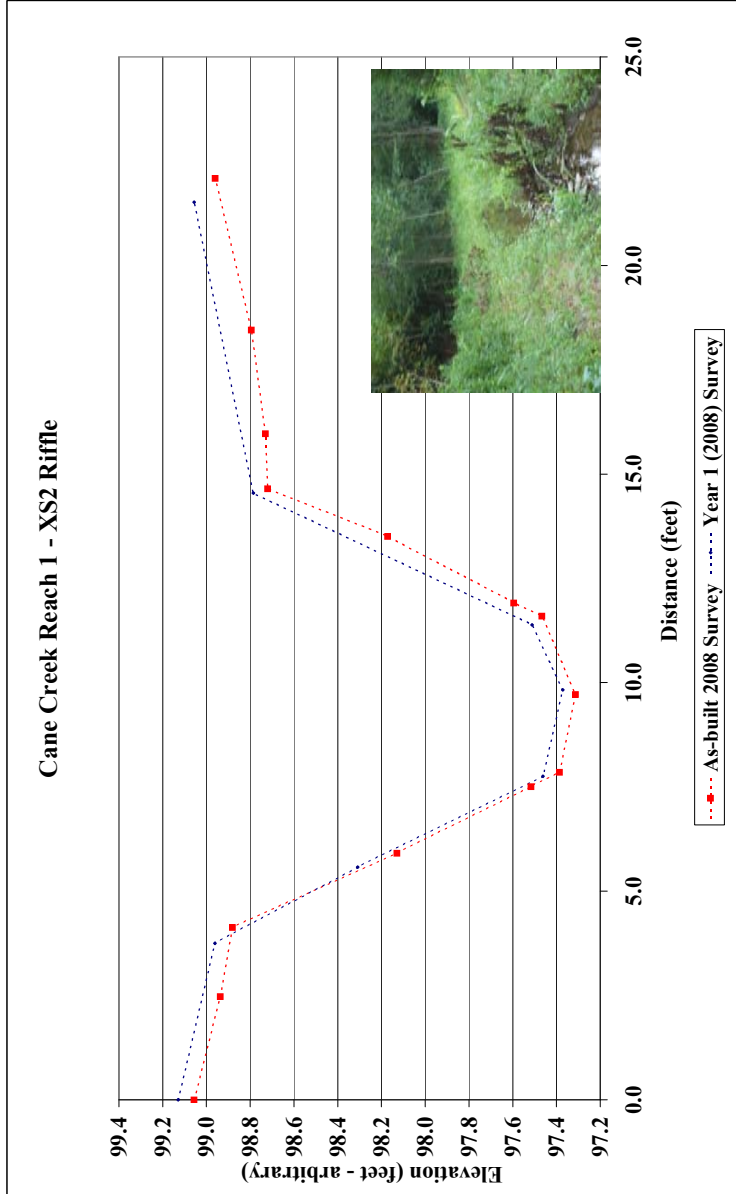
Feature Category	Metric (per As-built and reference baselines)	(# Stable) Number Performing as Intended	Total number	Total Number / feet in unstable state	% Perform in Stable Condition	Feature Perform. Mean or Total
A. Riffles	1. Present	20	20	NA	100%	
	2. Armor stable (e.g. no displacement)?	20	20	NA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

Project Name Cane Creek		2010 Survey	
Cross Section R1-XS1	2009 Survey		2010 Survey
Feature Pool	2008 Survey		2010 Survey
Date 10/21/08	Station Elevation		Station Elevation
Crew Adams, St.Clair	Station Elevation		Station Elevation
	0.0 98.8	0.0 98.8	
	3.8 98.9	4.9 98.7	
	5.9 98.2	8.0 97.8	
	8.9 97.3	9.3 97.4	
	9.1 97.2	10.5 96.4	
	10.0 96.5	11.8 96.4	
	10.9 96.4	13.1 97.5	
	11.6 96.7	15.8 99.2	
	12.6 97.4	23.5 99.2	
	13.5 98.0		
	15.1 99.1		
	17.9 99.2		
	23.1 99.1		



Area	As-built	2008	2009	2010
Width	13.5	10.9		
Mean Depth	11.0	10.1		
Max Depth	1.2	1.1		
W/D Ratio	2.5	2.3	NA	NA

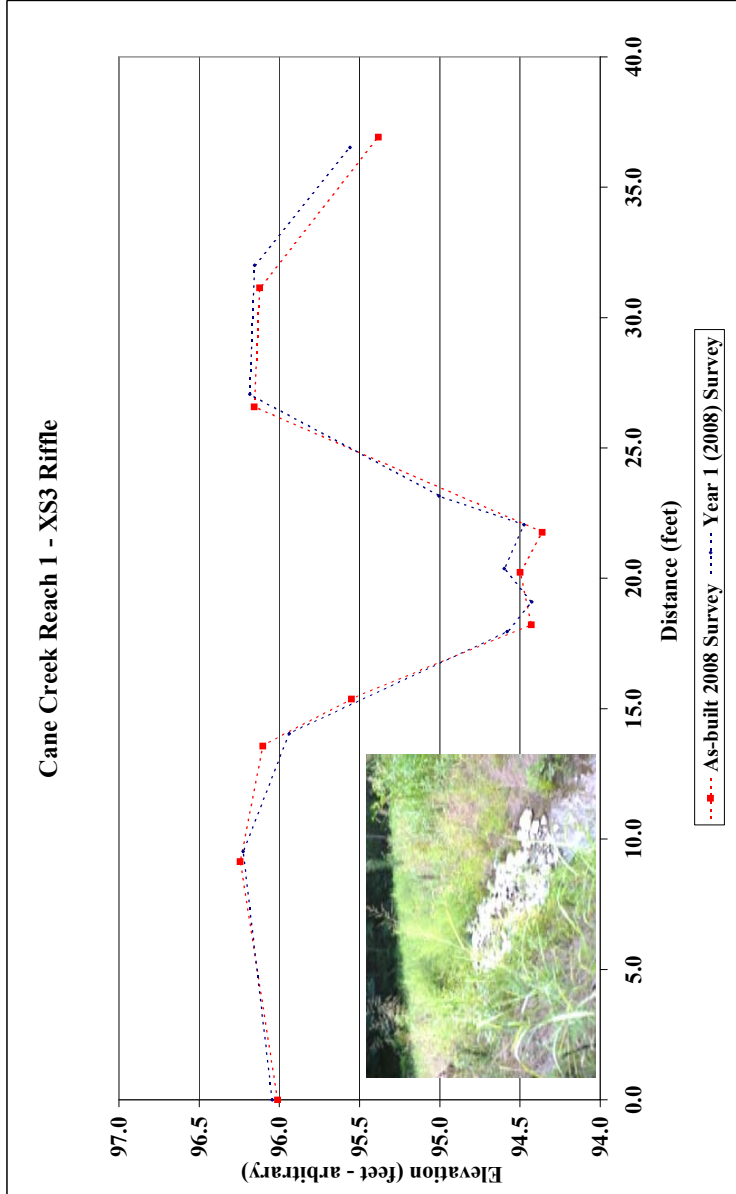
Project Name Cane Creek			
Cross Section R1-XS2			
Feature Riffle			
Date 10/21/08			
Crew Adams, St.Clair			
As-built	2008	2009	2010
2008 Survey	2008 Survey	2009 Survey	2010 Survey
Station	Station	Station	Station
Elevation	Elevation	Elevation	Elevation
0.0 99.1	0.0 99.1		
2.5 98.9	3.8 99.0		
4.1 98.9	5.6 98.3		
5.9 98.1	7.8 97.5		
7.5 97.5	9.8 97.4		
7.9 97.4	11.4 97.5		
9.7 97.3	14.5 98.8		
11.6 97.5	21.5 99.1		
11.9 97.6			
13.5 98.2			
14.7 98.7			
16.0 98.7			
18.5 98.8			
22.1 99.0			



..... As-built 2008 Survey Year 1 (2008) Survey

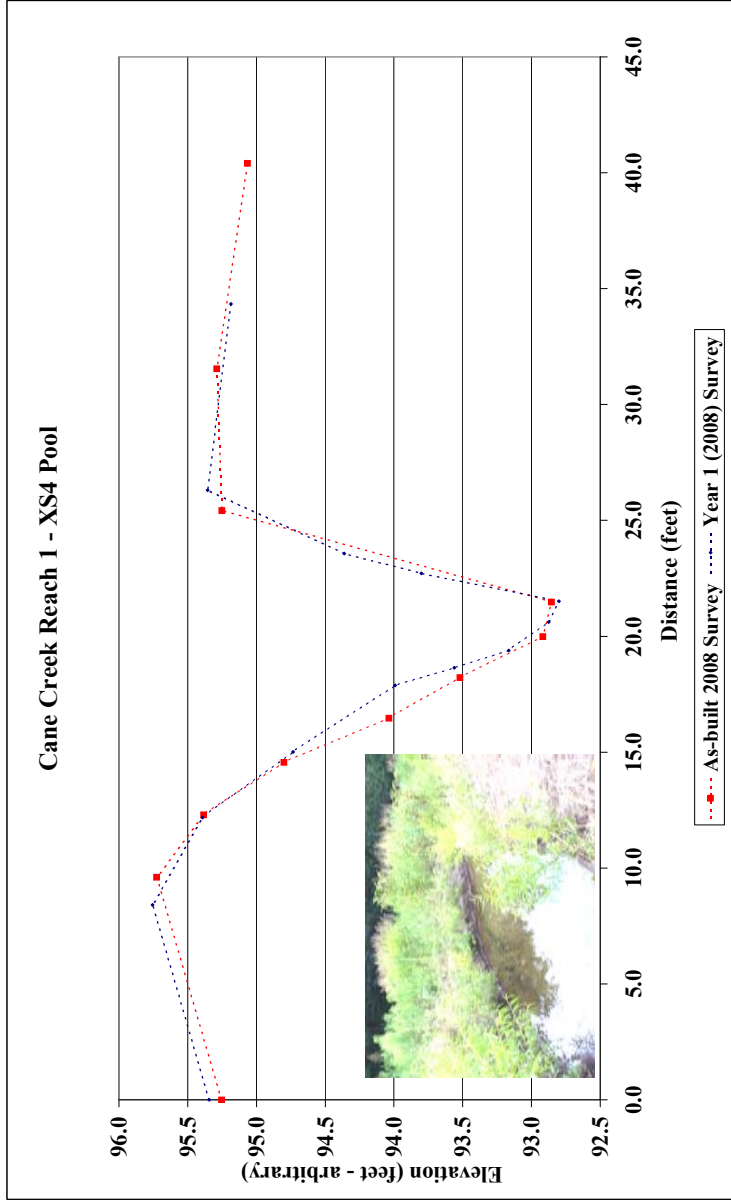
Area	As-built	2008	2009	2010
Width	9.4	9.3		
Mean Depth	10.1	10.4		
Max Depth	0.9	0.9		
W/D Ratio	1.4	1.4		
	11.0	11.7		

Project Name Cane Creek		2010 Survey	
Cross Section R1-XS3	2009 Survey		2010 Survey
Feature Riffle	Station Elevation		Station Elevation
Date 10/21/08	Station Elevation		Station Elevation
Crew Adams, St.Clair	Station Elevation		Station Elevation
	As-built	2008	2009
	2008 Survey	2008 Survey	2009 Survey
	Station Elevation	Station Elevation	Station Elevation
	0.0 96.0	0.0 96.0	
	9.1 96.2	9.5 96.2	
	13.6 96.1	14.0 95.9	
	15.4 95.5	18.0 94.6	
	18.2 94.4	19.1 94.4	
	20.2 94.5	20.4 94.6	
	21.8 94.4	22.1 94.5	
	26.6 96.2	23.2 95.0	
	31.1 96.1	27.1 96.2	
	36.9 95.4	32.0 96.2	
		36.5 95.6	



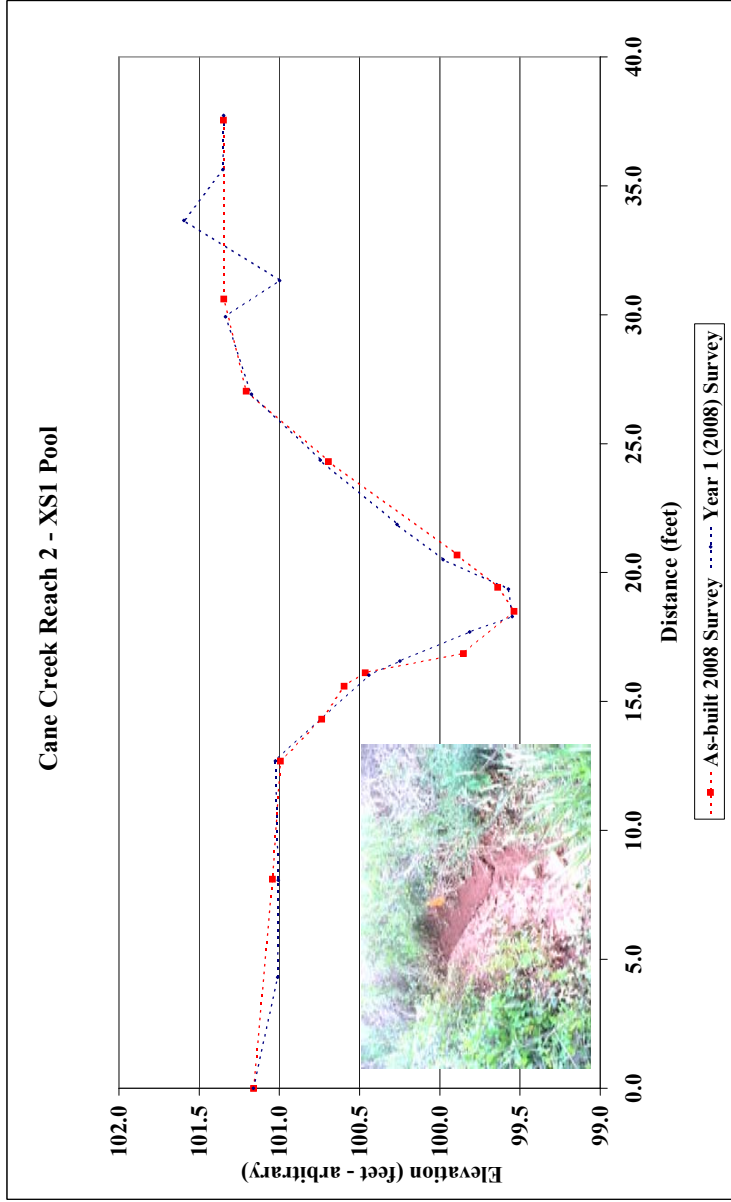
Area	As-built	2008	2009	2010
Width	13.6	11.3		
Mean Depth	12.9	12.2		
Max Depth	1.1	0.9		
W/D Ratio	1.7	1.5		
	12.2	13.3		

Project Name Cane Creek				
Cross Section R1-XS4				
Feature Pool				
Date 10/21/08				
Crew Adams, St.Clair				
	As-built	2008	2009	2010
	2008 Survey	2008 Survey	2009 Survey	2010 Survey
	Station	Station	Station	Station
	Elevation	Elevation	Elevation	Elevation
	0.0 95.3	0.0 95.3		
	9.6 95.7	8.4 95.8		
	12.3 95.4	12.2 95.4		
	14.6 94.8	15.0 94.7		
	16.5 94.0	17.9 94.0		
	18.2 93.5	18.6 93.6		
	20.0 92.9	19.4 93.2		
	21.5 92.9	20.6 92.9		
	25.4 95.3	21.5 92.8		
	31.5 95.3	22.7 93.8		
	40.4 95.1	23.6 94.4		
		26.3 95.4		
		34.3 95.2		



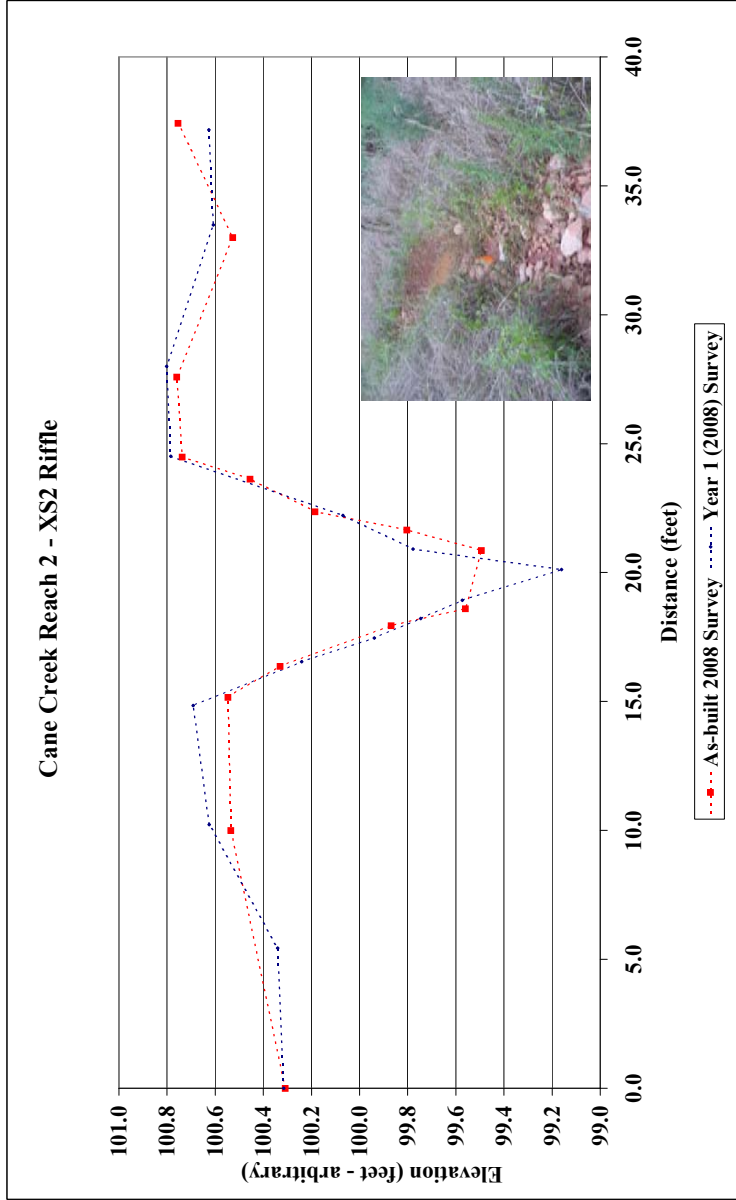
Area	As-built	2008	2009	2010
Width	16.4	16.3		
Mean Depth	12.6	13.9		
Max Depth	1.3	1.2		
W/D Ratio	2.4	2.6	NA	NA

Project Name Cane Creek		2010 Survey	
Cross Section R2-XS1	2009 Survey		2010 Survey
Feature Pool	Station Elevation		Station Elevation
Date 10/21/08	2008 Survey		2008 Survey
Crew Adams, St.Clair	Station Elevation		Station Elevation
As-built	2008 Survey	2009 Survey	2010 Survey
Station	Station	Station	Station
Elevation	Elevation	Elevation	Elevation
0.0	101.2	0.0	101.2
8.1	101.0	4.3	101.0
12.7	101.0	8.1	101.0
14.3	100.7	12.7	101.0
15.6	100.6	16.0	100.4
16.1	100.5	16.6	100.2
16.9	99.9	17.7	99.8
18.5	99.5	18.3	99.5
19.4	99.6	19.4	99.6
20.7	99.9	20.5	100.0
24.3	100.7	21.9	100.3
27.0	101.2	24.4	100.7
30.6	101.3	26.9	101.2
37.6	101.3	29.9	101.3
		31.3	101.0
		33.7	101.6
		35.6	101.4
		37.7	101.3



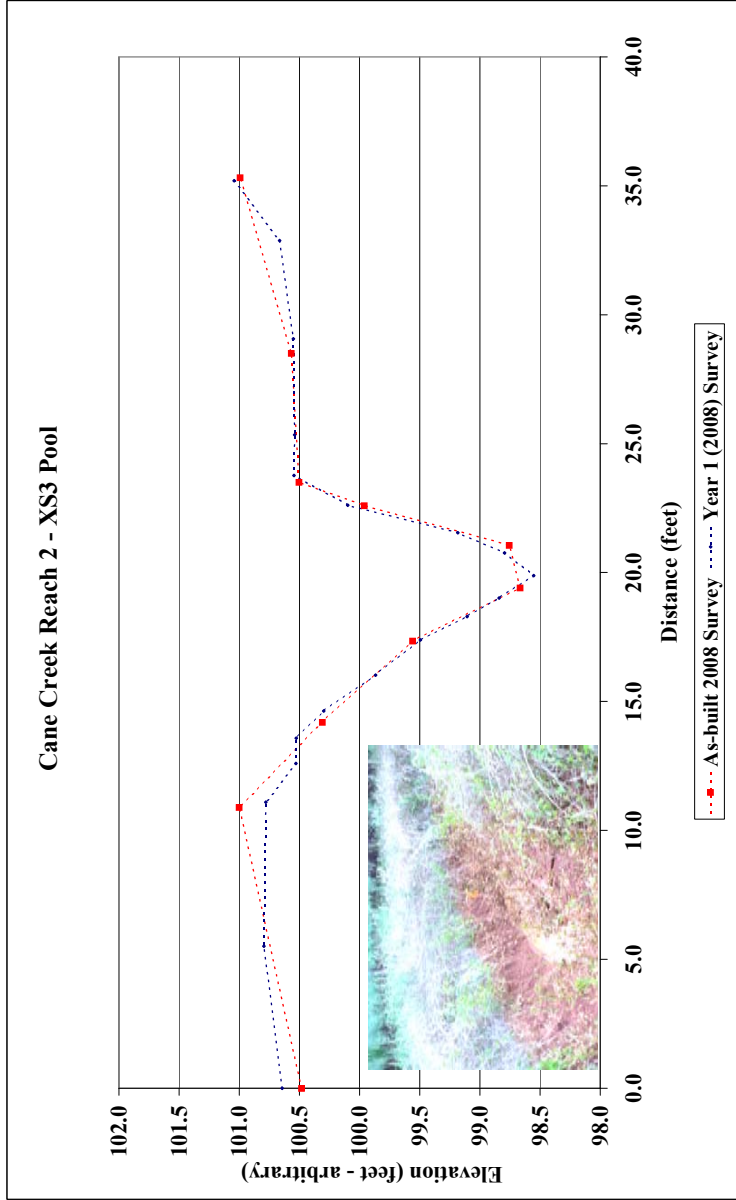
Area	As-built	2008	2009	2010
Width	9.3	8.6		
Mean Depth	13.4	13.0		
Max Depth	0.7	0.7		
W/D Ratio	1.5	1.4		
	N/A	NA		

Project Name Cane Creek		2010 Survey	
Cross Section R2-XS2	2009 Survey		2010 Survey
Feature Riffle	2008 Survey		2010 Survey
Date 10/21/08	2008 Survey		2010 Survey
Crew Adams, St.Clair	2008 Survey		2010 Survey
	As-built	2008 Survey	2010 Survey
	Station	Station	Station
	Elevation	Elevation	Elevation
	0.0	0.0	100.3
	10.0	100.5	5.4
	15.2	100.5	10.2
	16.4	100.3	14.8
	17.9	99.9	16.5
	18.6	99.6	17.5
	20.9	99.5	18.2
	21.7	99.8	18.9
	22.4	100.2	20.1
	23.6	100.5	20.9
	24.5	100.7	22.2
	27.6	100.8	24.5
	33.0	100.5	28.0
	37.4	100.8	33.5
			37.2
			100.6



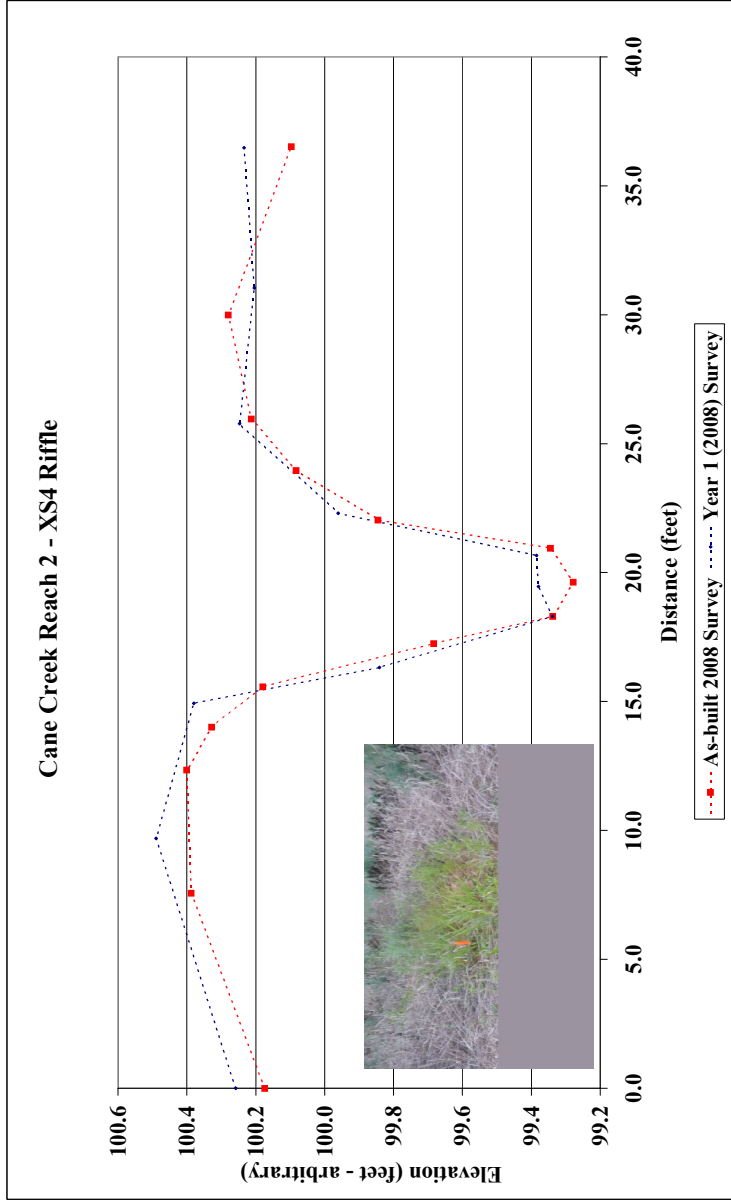
Area	As-built	2008	2009	2010
Width	5.1	6.3		
Mean Depth	9.2	9.3		
Max Depth	0.6	0.7		
W/D Ratio	1.1	1.5		
	16.5	13.6		

Project Name Cane Creek		2010 Survey	
Cross Section R2-XS3	2009 Survey		2010 Survey
Feature Pool	Station Elevation		Station Elevation
Date 10/21/08	2008 Survey		2008 Survey
Crew Adams, St.Clair	Station Elevation		Station Elevation
As-built	2008 Survey	2008 Survey	2010 Survey
Station	Elevation	Station	Elevation
0.0	100.5	0.0	100.6
10.9	101.0	5.5	100.8
14.2	100.3	11.1	100.8
17.3	99.6	12.6	100.5
19.4	98.7	13.6	100.5
21.1	98.8	14.6	100.3
22.6	100.0	16.0	99.9
23.5	100.5	17.4	99.5
28.5	100.6	18.3	99.1
35.3	101.0	19.0	98.8
		19.9	98.6
		20.8	98.8
		21.6	99.2
		22.6	100.1
		23.8	100.5
		25.3	100.5
		29.1	100.6
		32.9	100.7
		35.2	101.0



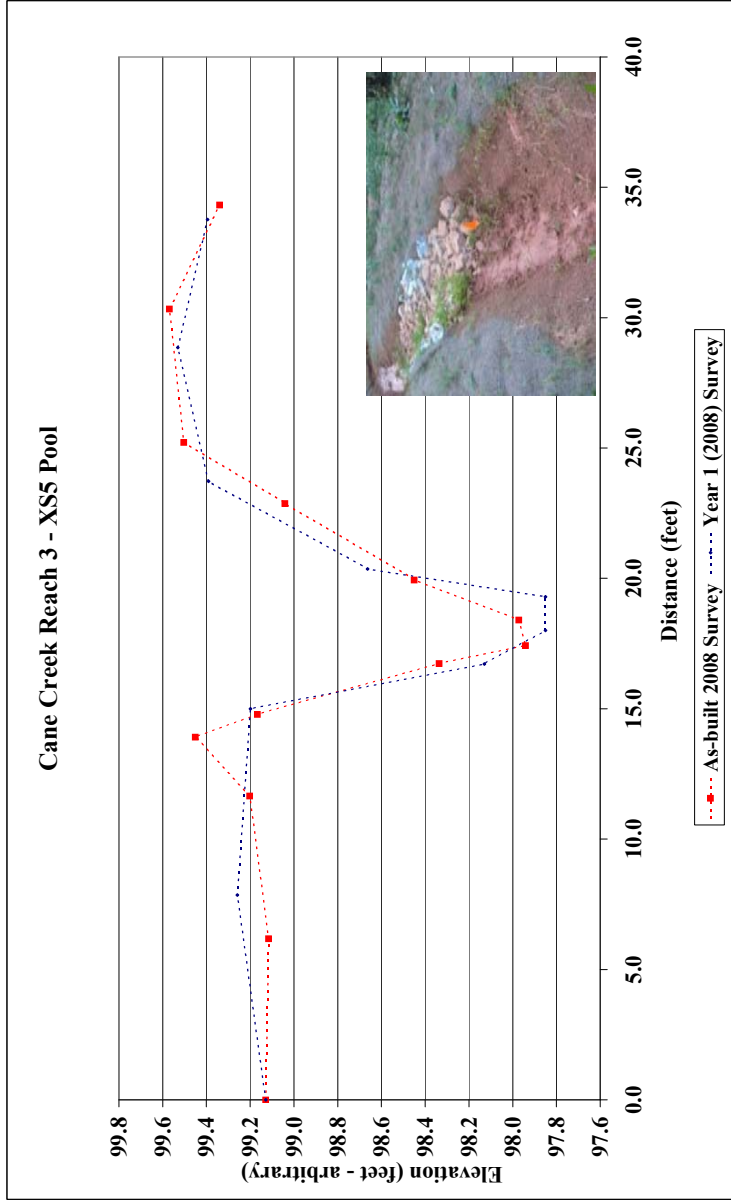
Area	As-built	2008	2009	2010
Width	9.7	9.8		
Mean Depth	10.2	11.2		
Max Depth	1.0	0.9		
W/D Ratio	1.8	2.0		
	N/A	NA		

Project Name Cane Creek		2010 Survey	
Cross Section R2-XS4	2009 Survey		2010 Survey
Feature Riffle	2008 Survey		2010 Survey
Date 10/21/08	2008 Survey		2010 Survey
Crew Adams, St.Clair	2008 Survey		2010 Survey
	As-built	2008 Survey	2010 Survey
	Station	Station	Station
	Elevation	Elevation	Elevation
	0.0	100.2	100.3
	7.6	100.4	100.5
	12.3	100.4	100.4
	14.0	100.3	99.8
	15.6	100.2	99.3
	17.3	99.7	99.4
	18.3	99.3	99.4
	19.6	99.3	100.0
	20.9	99.3	100.2
	22.0	99.8	100.2
	24.0	100.1	100.2
	26.0	100.2	
	30.0	100.3	
	36.5	100.1	



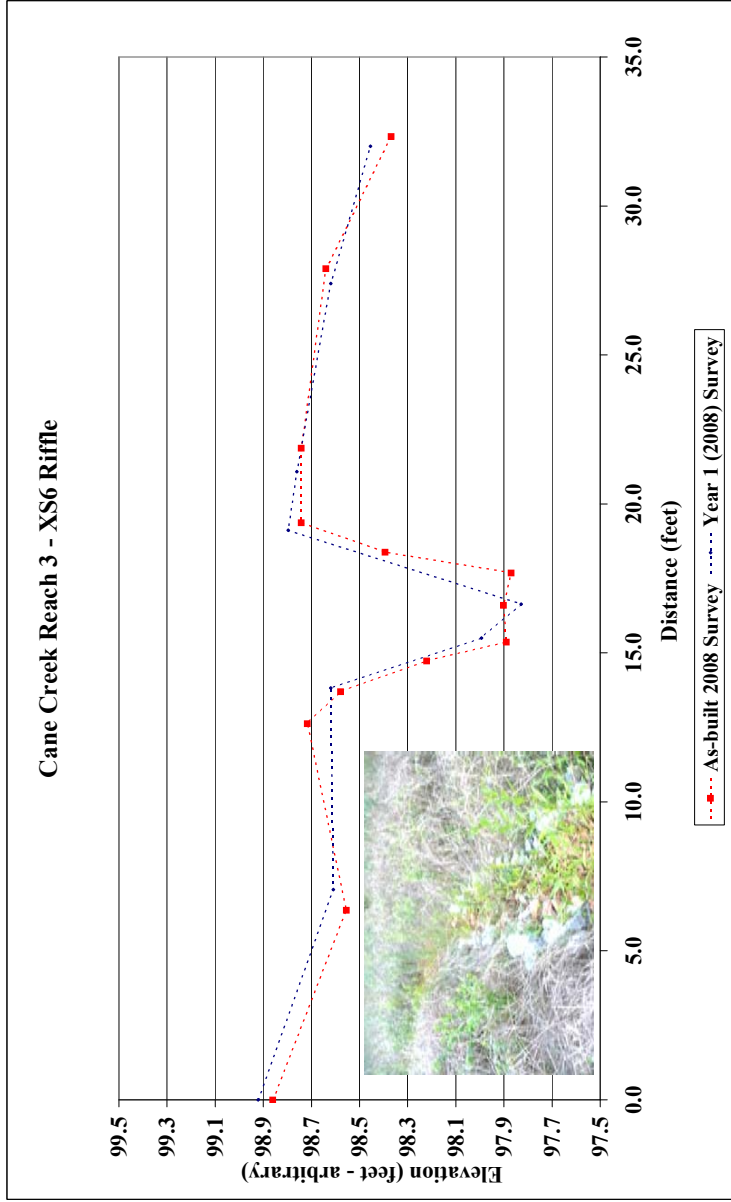
Area	As-built	2008	2009	2010
Width	3.7	5.0		
Mean Depth	8.1	10.5		
Max Depth	0.5	0.5		
W/D Ratio	0.8	0.9		
	17.8	21.9		

Project Name Cane Creek			
Cross Section R3-XS5			
Feature Pool			
Date 10/21/08			
Crew Adams, St.Clair			
As-built	2008	2009	2010
2008 Survey	2008 Survey	2009 Survey	2010 Survey
Station	Station	Station	Station
Elevation	Elevation	Elevation	Elevation
0.0 99.1	0.0 99.1		
6.2 99.1	7.9 99.3		
11.7 99.2	15.0 99.2		
13.9 99.5	16.7 98.1		
14.8 99.2	18.0 97.8		
16.7 98.3	19.3 97.9		
17.4 97.9	20.4 98.7		
18.4 98.0	23.7 99.4		
19.9 98.4	28.9 99.5		
22.9 99.0	33.8 99.4		
25.2 99.5			
30.3 99.6			
34.3 99.3			



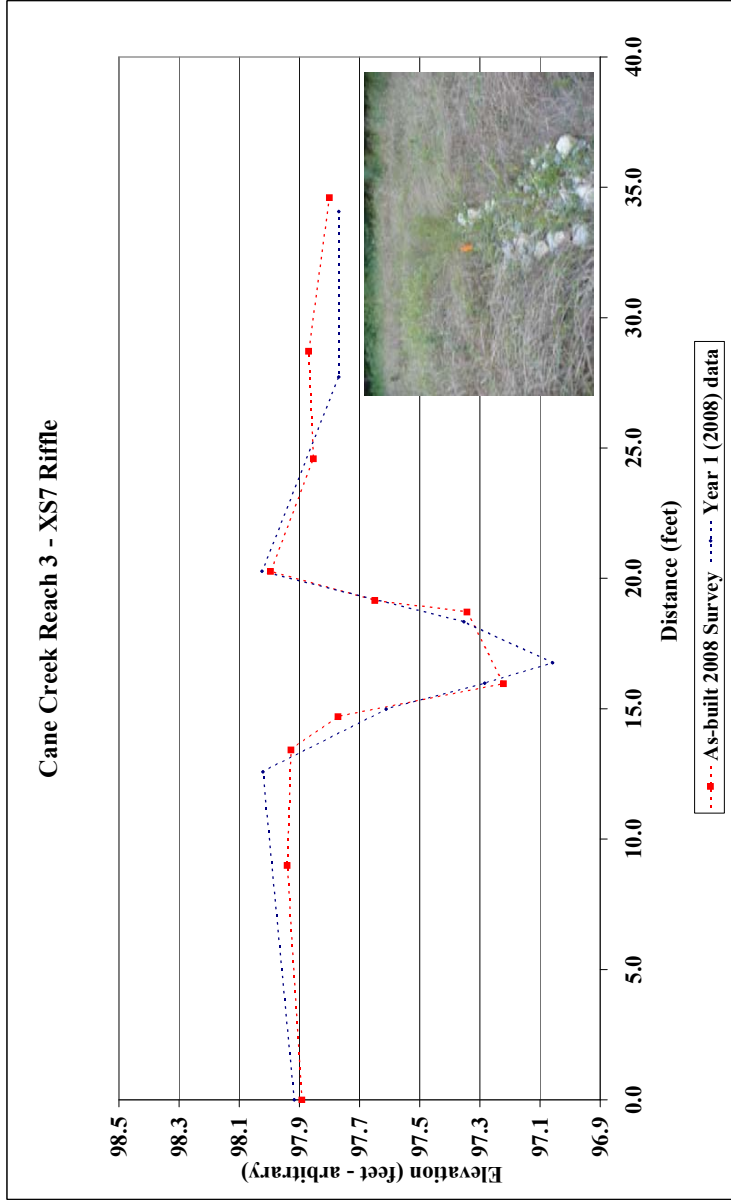
	As-built	2008	2009	2010
Area	5.4	5.8		
Width	8.7	7.8		
Mean Depth	0.6	0.7		
Max Depth	1.2	1.3		
W/D Ratio	N/A	NA		

Project Name Cane Creek			
Cross Section R3-XS6			
Feature Riffle			
Date 10/21/08			
Crew Adams, St.Clair			
As-built	2007 Survey	2008	2009
	Station	Station	Station
	Elevation	Elevation	Elevation
0.0	98.9	0.0	98.9
6.4	98.6	7.1	98.6
12.6	98.7	13.8	98.6
13.7	98.6	15.5	98.0
14.7	98.2	16.6	97.8
15.4	97.9	19.1	98.8
16.6	97.9	21.1	98.8
17.7	97.9	27.4	98.6
18.4	98.4	32.0	98.5
19.4	98.7		
21.9	98.7		
27.9	98.6		
32.3	98.4		



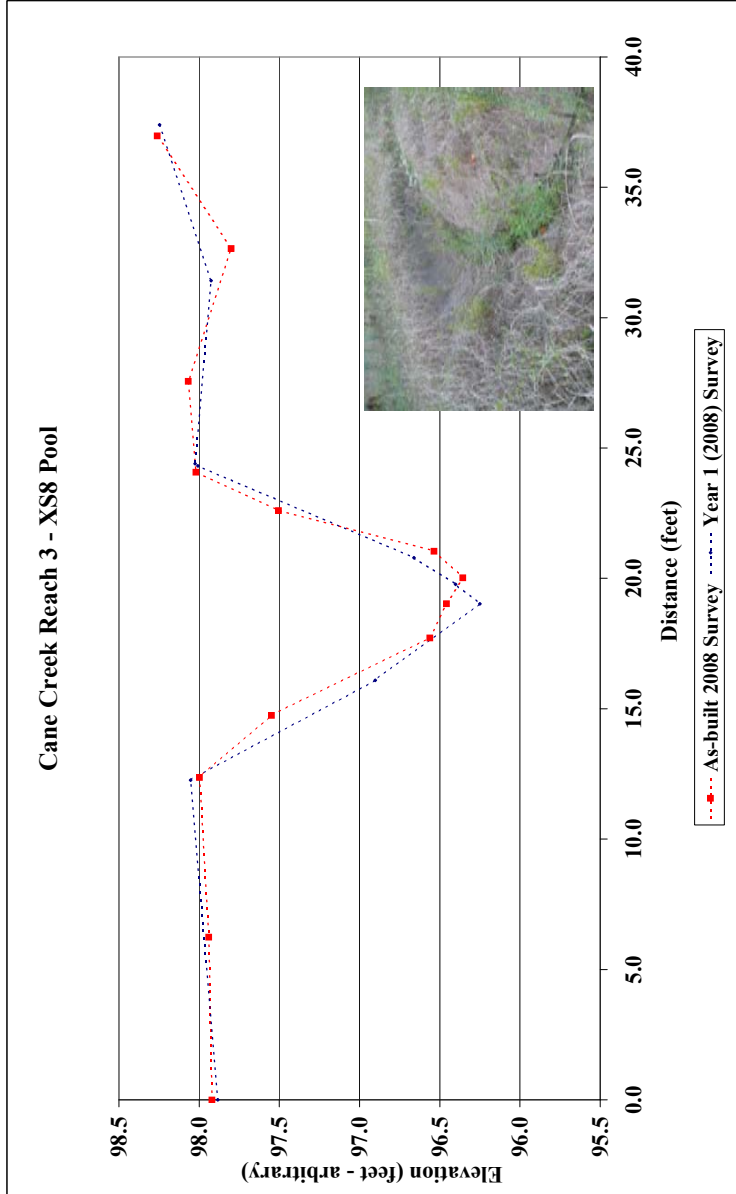
Area	As-built	2008	2009	2010
Width	3.3	2.1		
Mean Depth	6.6	4.8		
Max Depth	0.5	0.4		
W/D Ratio	13.5	11.0		

Project Name Cane Creek			
Cross Section R3-XS7			
Feature Riffle			
Date 10/21/08			
Crew Adams, St.Clair			
As-built	2008	2009	2010
2008 Survey	2008 Survey	2009 Survey	2010 Survey
Station	Station	Station	Station
Elevation	Elevation	Elevation	Elevation
0.0 97.9	0.0 97.9		
9.0 97.9	12.6 98.0		
13.4 97.9	15.0 97.6		
14.7 97.8	16.0 97.3		
16.0 97.2	16.8 97.1		
18.7 97.3	18.3 97.4		
19.2 97.6	20.3 98.0		
20.3 98.0	27.7 97.8		
24.6 97.9	34.1 97.8		
28.7 97.9			
34.6 97.8			



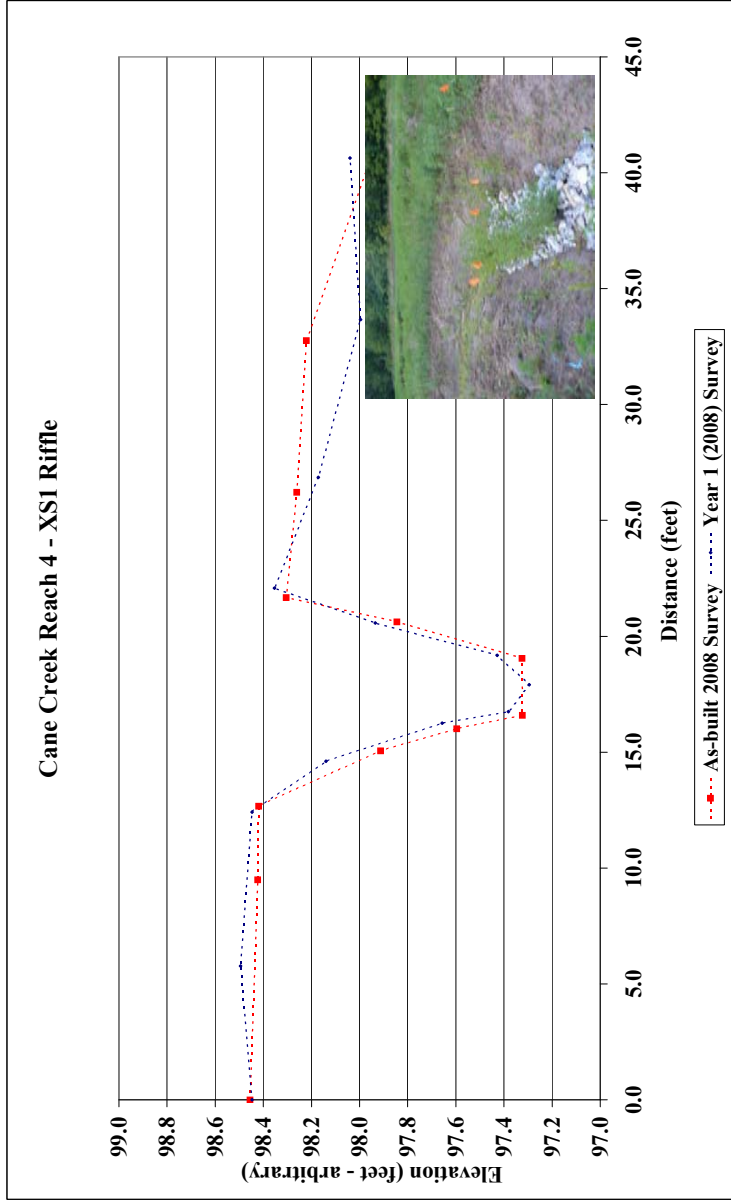
Area	As-built	2008	2009	2010
Width	2.7	3.5		
Mean Depth	6.6	7.4		
Max Depth	0.4	0.5		
W/D Ratio	0.7	0.9		
	16.0	16.1		

Project Name Cane Creek			
Cross Section R3-XS8			
Feature Pool			
Date 10/21/08			
Crew Adams, St.Clair			
As-built	2008	2009	2010
2008 Survey	2008 Survey	2009 Survey	2010 Survey
Station	Station	Station	Station
Elevation	Elevation	Elevation	Elevation
0.0 97.9	0.0 97.9		
6.3 97.9	12.3 98.1		
12.4 98.0	16.1 96.9		
14.8 97.5	19.0 96.3		
17.7 96.6	19.8 96.4		
19.0 96.5	20.8 96.7		
20.0 96.4	24.3 98.0		
21.1 96.5	24.4 98.0		
22.6 97.5	31.4 97.9		
24.1 98.0	37.4 98.2		
27.6 98.1			
32.7 97.8			
37.0 98.3			

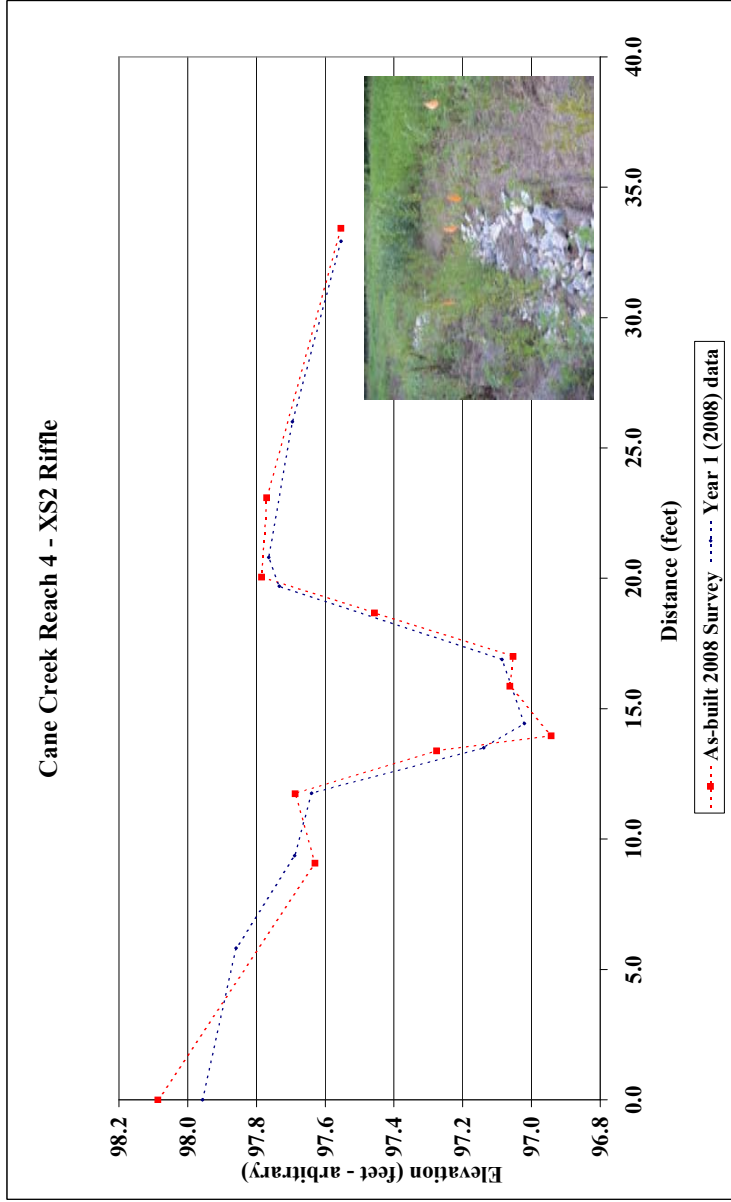


Area	As-built	2008	2009	2010
Width	10.3	11.2		
Mean Depth	11.6	11.8		
Max Depth	0.9	0.9		
W/D Ratio	1.6	1.7		
	N/A	NA		

Project Name Cane Creek			
Cross Section R4-XS1			
Feature Riffle			
Date 10/21/08			
Crew Adams, St.Clair			
As-built	2008	2009	2010
2008 Survey	2008 Survey	2009 Survey	2010 Survey
Station	Station	Station	Station
Elevation	Elevation	Elevation	Elevation
0.0 98.5	0.0 98.4		
9.5 98.4	5.8 98.5		
12.7 98.4	12.4 98.4		
15.1 97.9	14.6 98.1		
16.0 97.6	16.3 97.7		
16.6 97.3	16.7 97.4		
19.0 97.3	17.9 97.3		
20.6 97.8	19.2 97.4		
21.7 98.3	20.6 97.9		
26.2 98.3	22.1 98.4		
32.8 98.2	26.9 98.2		
40.7 98.0	33.7 98.0		
	40.6 98.0		

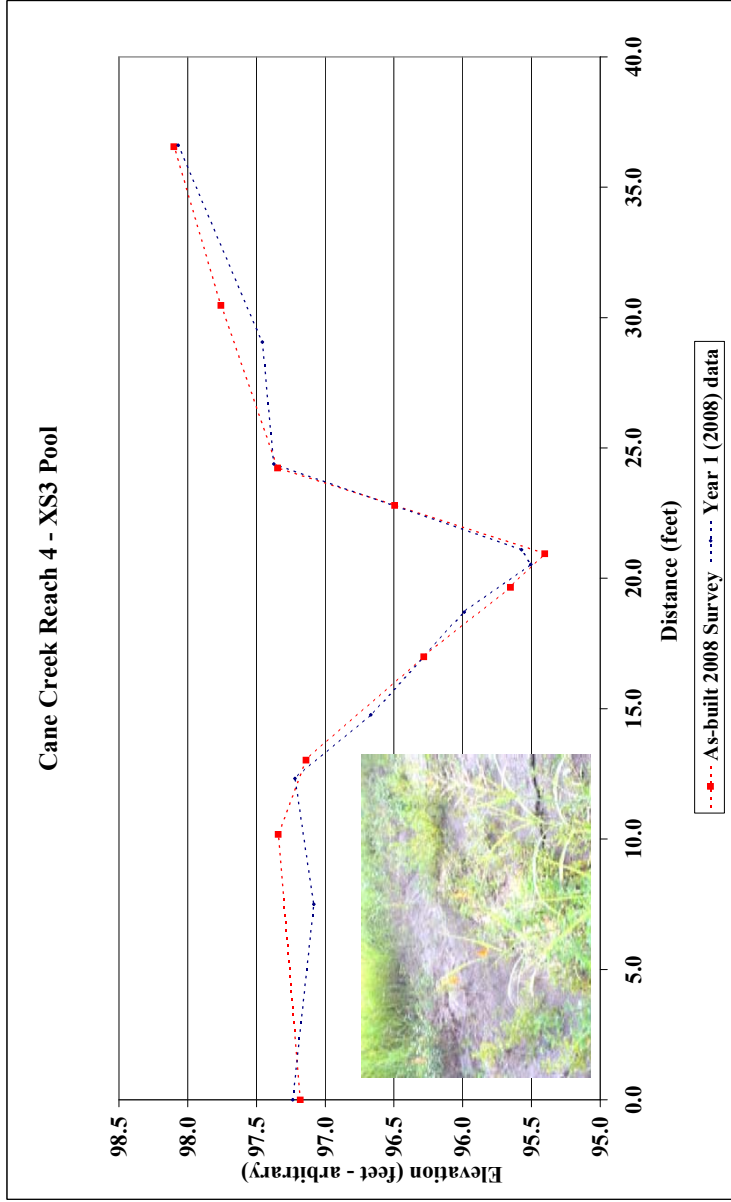


Project Name Cane Creek		2008		2009		2010	
Cross Section R4-XS2		2008 Survey		2009 Survey		2010 Survey	
Feature Riffle		Station	Elevation	Station	Elevation	Station	Elevation
Date 10/21/08		0.0	98.1	0.0	98.0		
Crew Adams, St.Clair		9.1	97.6	5.8	97.9		
		11.7	97.7	9.4	97.7		
		13.4	97.3	11.8	97.6		
		14.0	96.9	13.5	97.1		
		15.9	97.1	14.4	97.0		
		17.0	97.1	16.9	97.1		
		18.7	97.5	19.7	97.7		
		20.1	97.8	20.8	97.8		
		23.1	97.8	26.0	97.7		
		33.4	97.6	32.9	97.6		



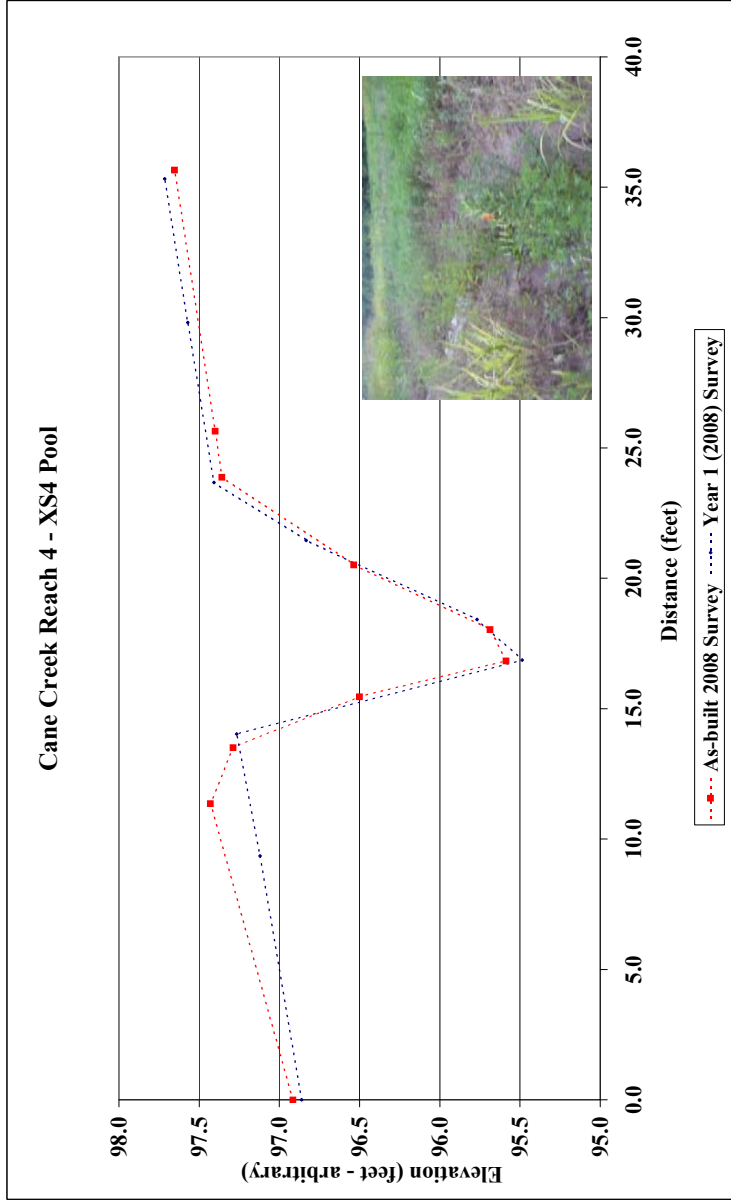
Area	As-built	2008	2009	2010
Width	3.5	3.1		
Mean Depth	7.9	7.5		
Max Depth	0.4	0.4		
W/D Ratio	0.7	0.6		
	17.7	18.5		

Project Name Cane Creek		2010 Survey	
Cross Section R4-XS3		Station Elevation	
Feature Pool		2009 Survey	
Date 10/21/08		Station Elevation	
Crew Adams, St.Clair		2008 Survey	
		Station Elevation	
As-built		2008	2009
2008 Survey	Station Elevation	Station Elevation	Station Elevation
0.0	97.2	0.0	97.2
10.2	97.3	7.5	97.1
13.0	97.1	12.3	97.2
17.0	96.3	14.8	96.7
19.7	95.7	18.7	96.0
21.0	95.4	20.5	95.5
22.8	96.5	21.1	95.6
24.2	97.3	24.4	97.4
30.5	97.8	29.1	97.5
36.6	98.1	36.6	98.1



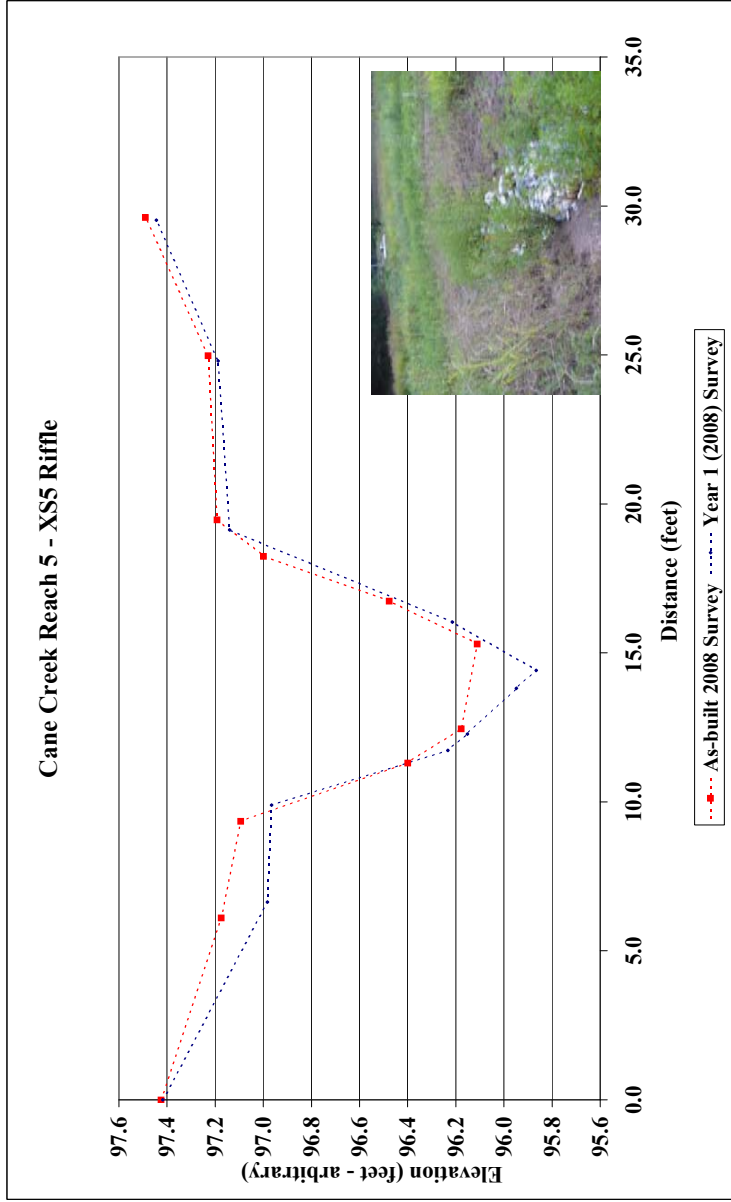
Area	As-built	2008	2009	2010
Width	9.5	10.3		
Mean Depth	10.9	11.8		
Max Depth	0.9	0.9		
W/D Ratio	1.7	1.7		
	N/A	NA		

Project Name Cane Creek		2008 Survey		2009 Survey		2010 Survey	
Cross Section R4-XS4		Station		Station		Station	
Feature Pool		Elevation		Elevation		Elevation	
Date 10/21/08		0.0 96.9		0.0 96.9		0.0 96.9	
Crew Adams, St.Clair		11.4 97.4		9.4 97.1		9.4 97.1	
		13.5 97.3		14.0 97.3		14.0 97.3	
		15.5 96.5		16.9 95.5		16.9 95.5	
		16.8 95.6		18.4 95.8		18.4 95.8	
		18.0 95.7		21.4 96.8		21.4 96.8	
		20.5 96.5		23.7 97.4		23.7 97.4	
		23.9 97.4		29.8 97.6		29.8 97.6	
		25.7 97.4		35.3 97.7		35.3 97.7	
		35.7 97.7					



	As-built	2008	2009	2010
Area	8.5	8.3		
Width	10.1	9.1		
Mean Depth	0.8	0.9		
Max Depth	1.7	1.8		
W/D Ratio	NA	NA		

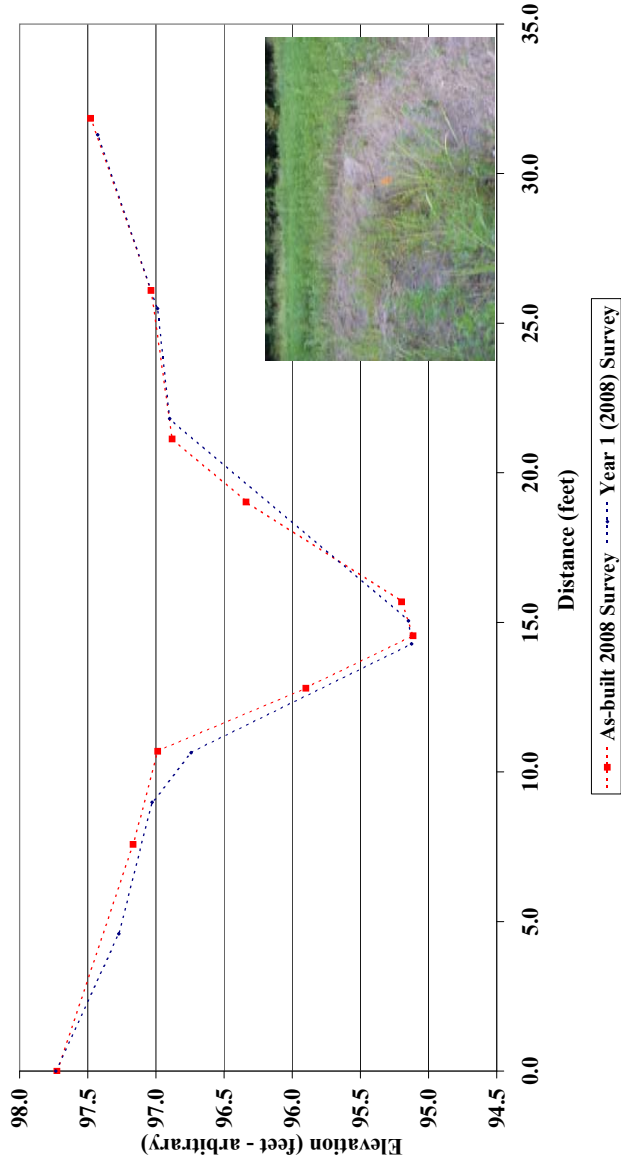
Project Name Cane Creek				
Cross Section R5-XS5				
Feature Riffle				
Date 10/21/08				
Crew Adams, St.Clair				
	As-built	2008	2009	2010
	2008 Survey	2008 Survey	2009 Survey	2010 Survey
	Station	Station	Station	Station
	Elevation	Elevation	Elevation	Elevation
	0.0 97.4	0.0 97.4		
	6.1 97.2	6.6 97.0		
	9.3 97.1	9.9 97.0		
	11.3 96.4	11.7 96.2		
	12.5 96.2	12.3 96.2		
	15.3 96.1	13.8 95.9		
	16.7 96.5	14.4 95.9		
	18.2 97.0	16.0 96.2		
	19.5 97.2	19.1 97.1		
	25.0 97.2	24.8 97.2		
	29.6 97.5	29.5 97.4		



Area	As-built	2008	2009	2010
Width	6.0	5.5		
Mean Depth	9.4	8.6		
Max Depth	0.6	0.6		
W/D Ratio	1.0	1.1		
	14.9	13.4		

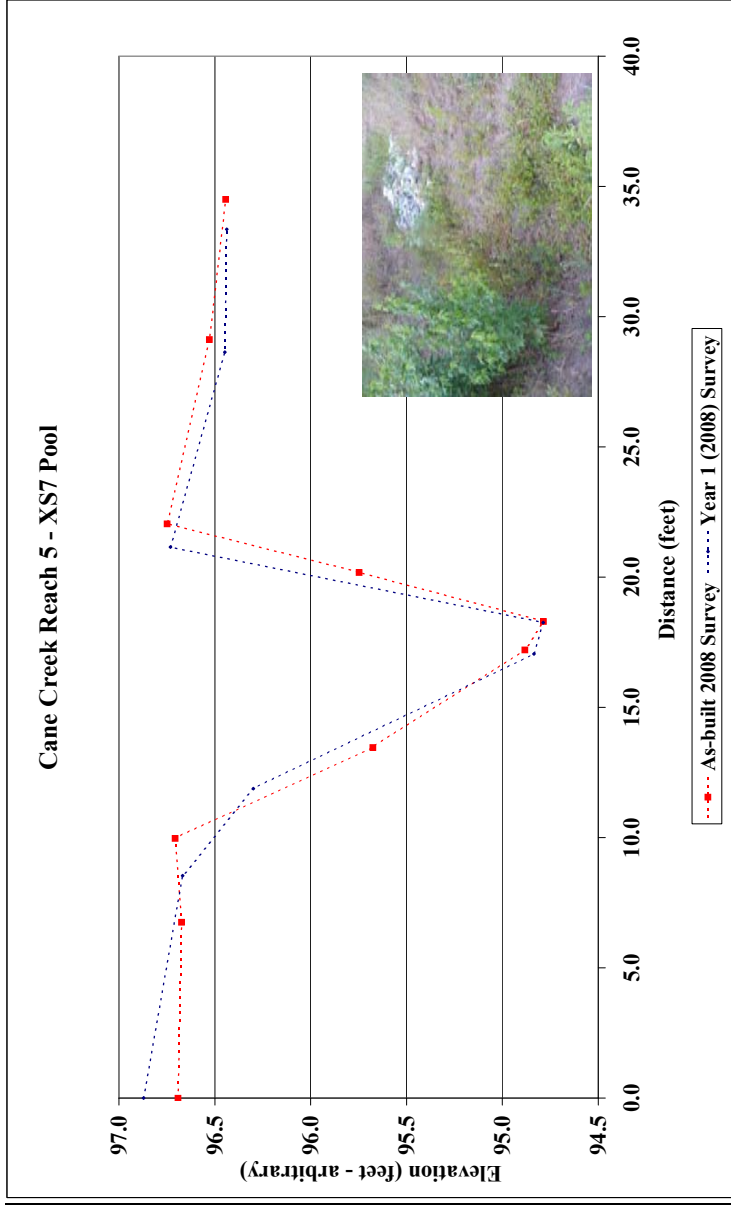
Project Name		Cane Creek	
Cross Section		R5-XS6	
Feature		Pool	
Date		10/21/08	
Crew		Adams, St.Clair	
As-built	2008	2009	2010
2008 Survey	2008 Survey	2009 Survey	2010 Survey
Station	Station	Station	Station
Elevation	Elevation	Elevation	Elevation
0.0	0.0	0.0	0.0
7.6	4.6	97.7	97.0
10.7	9.0	97.2	97.3
12.8	95.9	97.0	97.0
14.6	95.1	10.6	96.7
15.7	95.2	14.3	95.1
19.0	96.3	15.0	95.1
21.1	96.9	21.8	96.9
26.1	97.0	25.5	97.0
31.9	97.0	31.3	97.4
	97.5		

Cane Creek Reach 5 - XS6 Pool



	As-built	2008	2009	2010
Area	8.5	10.9		
Width	9.6	12.1		
Mean Depth	0.9	0.9		
Max Depth	1.7	1.8		
W/D Ratio	NA	NA		

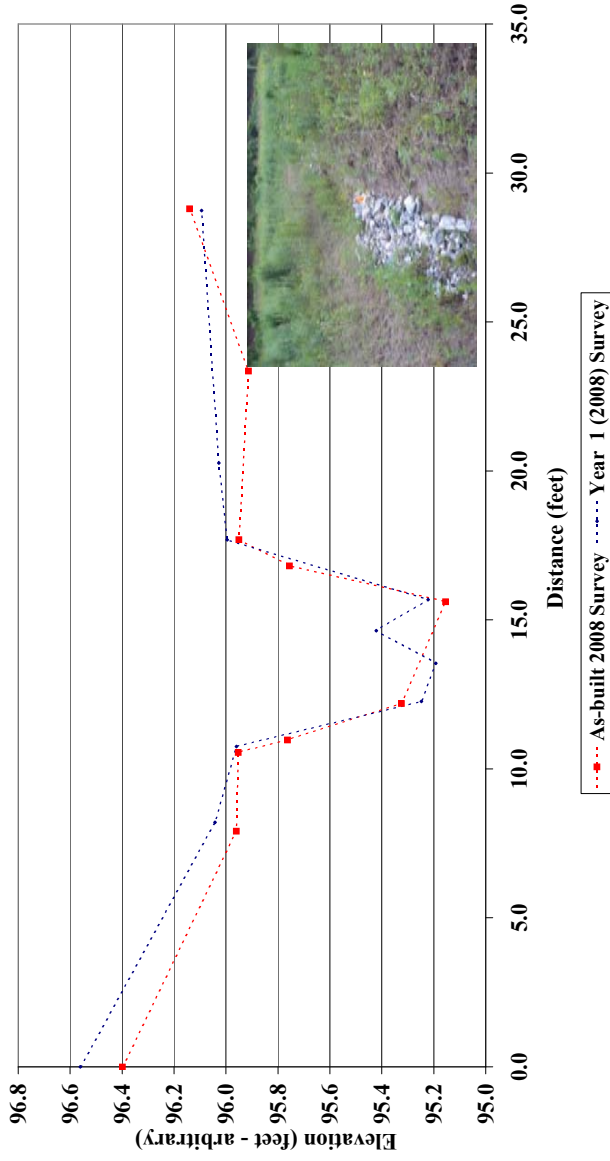
Project Name Cane Creek		2010 Survey	
Cross Section R5-XS7		2009 Survey	
Feature Pool		2008 Survey	
Date 10/21/08		Station	Elevation
Crew Adams, St.Clair		0.0	96.7
		6.8	96.7
		10.0	96.7
		13.5	95.7
		17.2	94.9
		18.3	94.8
		20.2	95.7
		22.1	96.7
		29.1	96.5
		34.5	96.4
		0.0	96.9
		8.5	96.3
		11.9	96.3
		17.0	94.8
		18.3	94.8
		21.2	96.7
		28.6	96.4
		33.4	96.4



Area Width Mean Depth Max Depth W/D Ratio	As-built	2008	2009	2010
	12.3	11.2		
	11.8	12.5		
	1.0	0.9		
	1.9	1.9		
	N/A	NA	NA	

Project Name Cane Creek Cross Section R5-XS8 Feature Riffle Date 10/21/08 Crew Adams, St.Clair		2008 <table border="1"> <thead> <tr> <th>2008 Survey Station</th> <th>2008 Survey Elevation</th> </tr> </thead> <tbody> <tr><td>0.0</td><td>96.4</td></tr> <tr><td>7.9</td><td>96.0</td></tr> <tr><td>8.2</td><td>96.6</td></tr> <tr><td>10.6</td><td>96.0</td></tr> <tr><td>10.7</td><td>96.0</td></tr> <tr><td>11.0</td><td>95.8</td></tr> <tr><td>12.3</td><td>95.2</td></tr> <tr><td>12.2</td><td>95.3</td></tr> <tr><td>13.5</td><td>95.2</td></tr> <tr><td>15.6</td><td>95.2</td></tr> <tr><td>14.6</td><td>95.4</td></tr> <tr><td>15.7</td><td>95.2</td></tr> <tr><td>16.8</td><td>95.8</td></tr> <tr><td>17.7</td><td>96.0</td></tr> <tr><td>17.7</td><td>96.0</td></tr> <tr><td>20.3</td><td>96.0</td></tr> <tr><td>23.4</td><td>95.9</td></tr> <tr><td>28.8</td><td>96.1</td></tr> </tbody> </table>	2008 Survey Station	2008 Survey Elevation	0.0	96.4	7.9	96.0	8.2	96.6	10.6	96.0	10.7	96.0	11.0	95.8	12.3	95.2	12.2	95.3	13.5	95.2	15.6	95.2	14.6	95.4	15.7	95.2	16.8	95.8	17.7	96.0	17.7	96.0	20.3	96.0	23.4	95.9	28.8	96.1	2009 <table border="1"> <thead> <tr> <th>2009 Survey Station</th> <th>2009 Survey Elevation</th> </tr> </thead> <tbody> <tr><td>0.0</td><td>96.6</td></tr> <tr><td>8.2</td><td>96.0</td></tr> <tr><td>10.7</td><td>96.0</td></tr> <tr><td>12.3</td><td>95.2</td></tr> <tr><td>13.5</td><td>95.2</td></tr> <tr><td>14.6</td><td>95.4</td></tr> <tr><td>15.7</td><td>95.2</td></tr> <tr><td>17.7</td><td>96.0</td></tr> <tr><td>20.3</td><td>96.0</td></tr> <tr><td>28.7</td><td>96.1</td></tr> </tbody> </table>	2009 Survey Station	2009 Survey Elevation	0.0	96.6	8.2	96.0	10.7	96.0	12.3	95.2	13.5	95.2	14.6	95.4	15.7	95.2	17.7	96.0	20.3	96.0	28.7	96.1	2010 <table border="1"> <thead> <tr> <th>2010 Survey Station</th> <th>2010 Survey Elevation</th> </tr> </thead> <tbody> <tr><td>0.0</td><td>96.6</td></tr> <tr><td>8.2</td><td>96.0</td></tr> <tr><td>10.7</td><td>96.0</td></tr> <tr><td>12.3</td><td>95.2</td></tr> <tr><td>13.5</td><td>95.2</td></tr> <tr><td>14.6</td><td>95.4</td></tr> <tr><td>15.7</td><td>95.2</td></tr> <tr><td>17.7</td><td>96.0</td></tr> <tr><td>20.3</td><td>96.0</td></tr> <tr><td>28.7</td><td>96.1</td></tr> </tbody> </table>	2010 Survey Station	2010 Survey Elevation	0.0	96.6	8.2	96.0	10.7	96.0	12.3	95.2	13.5	95.2	14.6	95.4	15.7	95.2	17.7	96.0	20.3	96.0	28.7	96.1
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14.6	95.4																																																																																					
15.7	95.2																																																																																					
17.7	96.0																																																																																					
20.3	96.0																																																																																					
28.7	96.1																																																																																					

Cane Creek Reach 5 - XS8 Riffle

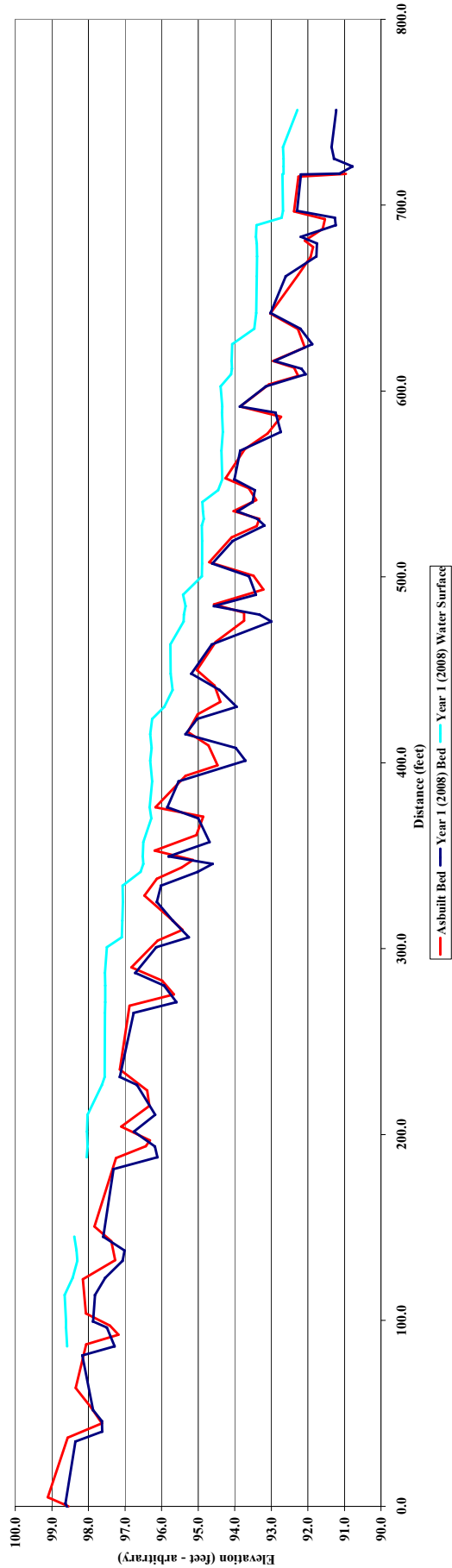


	As-built	2008	2009	2010
Area	3.6	3.6		
Width	7.1	6.8		
Mean Depth	0.5	0.5		
Max Depth	0.8	0.8		
W/D Ratio	13.9	13.1		

Cane Creek As-Built											
Reach 1											
Profile											
Date 10/21/08											
Crew Adams, S. Chair											
As-built			2008			2009			2010		
Station	Bed Elevation	Water Elevation	Station	Bed Elevation	Water Elevation	Station	Bed Elevation	Water Elevation	Station	Bed Elevation	Water Elevation
0.0	98.5	99.2	751.1	91.218091							
4.9	99.1	99.2	731.3	91.353937							
36.9	98.6	98.8	725.0	91.283216							
44.7	97.6	98.7	720.9	90.773187							
53.1	99.3	98.7	717.0	91.128378							
87.2	98.1	98.7	696.0	92.349168	92.3						
92.5	97.2	98.4	693.3	91.265752	92.7						
97.2	97.4	98.4	689.2	91.246319	92.7						
103.9	98.1	98.4	683.0	92.188082	92.7						
122.1	98.2	98.2	679.4	91.752028	92.7						
132.4	97.3	98.2	672.5	91.766258	92.7						
142.7	97.4	98.2	661.7	92.602691	92.7						
150.6	97.8	98.1	642.0	93.028665	93.4						
187.3	97.2	97.7	633.6	92.205385	93.4						
193.7	96.4	97.6	625.3	91.879143	93.4						
196.9	96.3	97.6	616.2	92.914578	93.4						
204.3	97.1	97.7	612.1	92.173662	93.4						
215.4	96.3	97.6	609.1	92.06128	93.4						
223.8	96.4	97.6	602.5	93.148882	93.5						
235.1	97.1	97.6	591.6	93.854825	94.1						
269.3	96.9	97.2	588.4	92.879869	94.1						
275.4	96.0	97.2	578.0	92.734512	94.1						
282.8	96.0	97.2	568.0	93.851672	94.1						
290.0	96.8	97.2	552.5	94.008568	94.4						
304.4	96.1	96.7	546.7	93.447631	94.3						
310.2	95.4	96.7	540.4	93.512331	94.3						

As-Built	0.0092	2008	0.0092	2009	0.0017	2010
Avg. Water Surface Slope						
Riffle Length	19.7					
Avg. Riffle Slope	0.0263					
Pool Length	33.9					
Avg. Pool Slope	-0.0017					

Cane Creek Year 1 Profile - Reach 1



616.2 93.0 93.6 193.6 96.183913 97.5 310.2 310.2

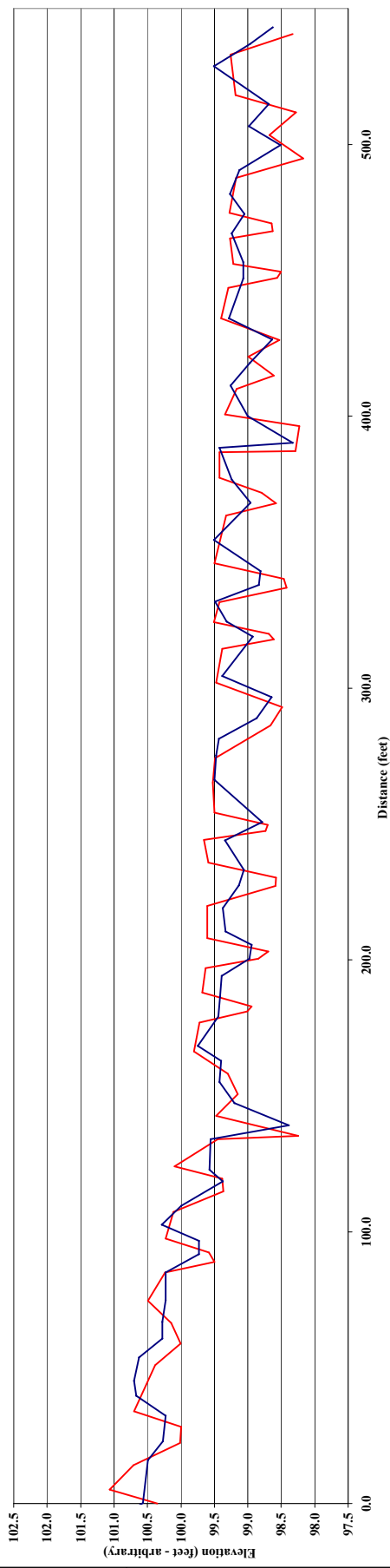
Project Name		Cane Creek As-Built	
Reach		2	
Profile			
Feature			
Date		10/21/08	
Crew		Adams, St. Clair	

Station	2008 Survey		2008 Survey		2009 Survey		2010 Survey			
	As-Built	Bed Elevation	Station	Water Elevation	Station	Bed Elevation	Water Elevation	Station	Bed Elevation	Water Elevation
0.0	100.4	102.2	-65.3							
5.1	101.1	100.8	-62.7							
14.2	100.7	100.2	-51.8							
22.3	100.0	100.4	-41.6							
30.4	100.7	100.1	-34.5							
33.9	100.7	100.1	-26.5							
50.9	100.4	100.1	-18.4							
58.9	100.0	100.0	-7.4							
66.5	100.1	100.6	0.3							
74.6	100.5	100.5	16.0							
85.0	100.2	100.3	22.9							
89.0	99.5	100.2	32.2							
92.4	99.6	100.7	39.7							
95.8	99.2	100.2	46.2							
107.3	100.2	100.6	53.8							
114.9	99.4	100.3	60.6							
119.5	99.4	100.3	66.9							
123.9	100.1	100.2	74.8							
134.1	99.5	100.2	85.1							
135.3	98.2	99.7	91.8							
142.6	99.5	99.7	96.7							
150.6	99.1	102.5	102.5							
158.2	99.3	100.0	109.6							
166.4	99.8	99.4	118.6							

As-Built	2008	2009	2010
Avg. Water Surface Slope	0.0036	0.0058	
Riffle Length		*NA	
Avg. Riffle Slope		*NA	
Pool Length		*NA	
Avg. Pool Slope		*NA	

* No water in channel due to drought conditions

Cane Creek Profile - Reach 2



Note: Channel was dry at the time Year 1 measurements were collected; therefore, no water surface elevation is shown

414.99	98.61	435.9	99.3
421.94	98.99	450.7	99.1

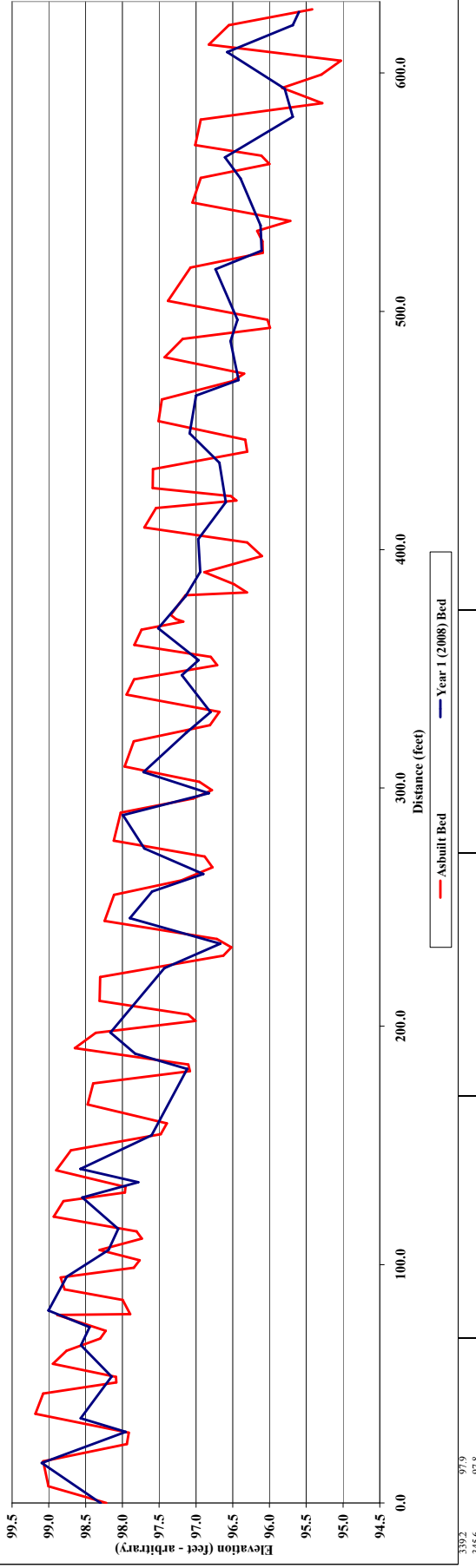
Project Name: Cane Creek As-Built		Reach: 3	
Profile		Date: 10/21/08	
Feature: Adams St Chair		Crew:	

Station	As-built		2008 Survey		2009 Survey		2010 Survey	
	Bed Elevation	Water Elevation	Bed Elevation	Water Elevation	Bed Elevation	Water Elevation	Bed Elevation	Water Elevation
0.0	98.2		98.3					
6.9	99.0		99.1					
17.5	99.1		99.0					
24.7	97.9		98.6					
29.5	97.9		98.1					
34.6	99.2		98.6					
45.6	99.1		98.4					
50.5	98.1		99.0					
52.9	98.1		98.8					
58.4	98.9		98.2					
63.9	98.8		98.1					
69.0	98.3		98.5					
72.2	98.2		97.8					
78.9	98.9		98.6					
79.3	97.9		97.6					
85.1	98.0		97.1					
89.6	98.8		98.5					
94.6	98.8		98.2					
98.7	97.8		97.9					
101.9	97.8		97.4					

	As-built	2008	2009	2010
Avg. Water Surface Slope	0.0036	0.0043		
Riffle Length		*NA		
Avg. Riffle Slope		*NA		
Pool Length		*NA		
Avg. Pool Slope		*NA		

* No water in channel due to drought conditions

Cane Creek Profile - Reach 3



339.2 97.9
345.6 97.8

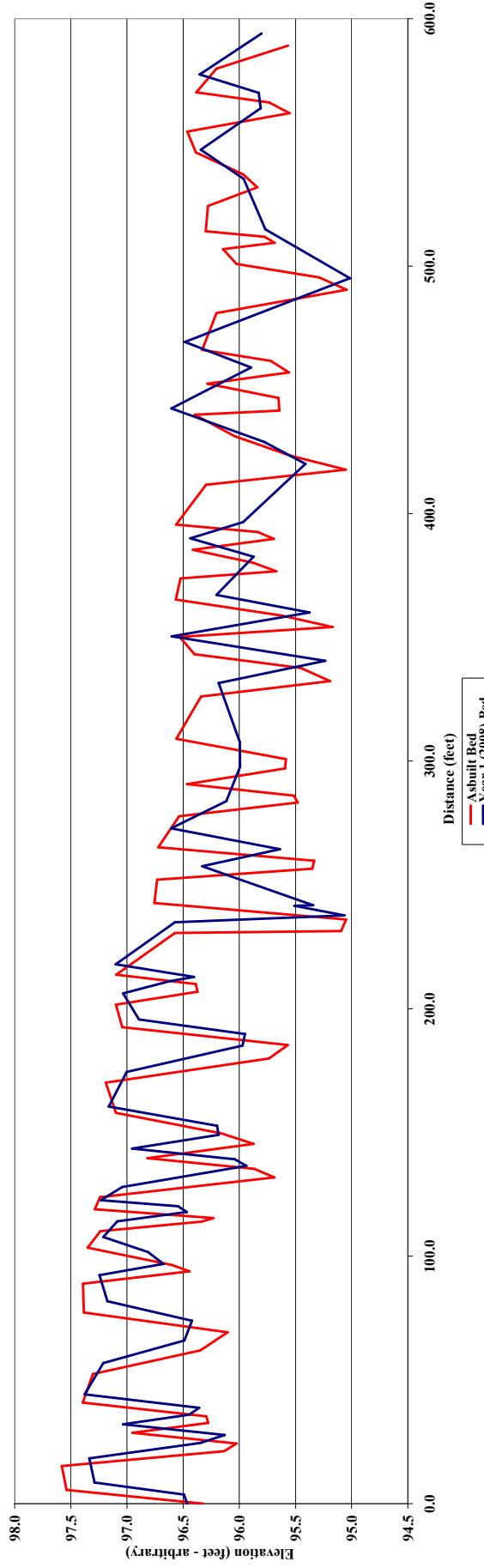
Project Name: Cane Creek AsBuilt	
Reach: 4	
Feature: Profile	
Date: 10/21/08	
Crew: Adams, St.Clair	

As-built		2008 Survey		2009 Survey		2010 Survey	
Station	Bed Elevation	Station	Bed Elevation	Station	Bed Elevation	Station	Bed Elevation
0.0	96.3	0.0	96.5				
3.6	97.5	3.6	96.5				
15.2	97.6	8.5	97.3				
21.2	96.1	18.3	97.3				
24.3	96.0	24.5	96.3				
28.6	97.0	27.7	96.1				
32.6	96.3	32.1	97.0				
35.3	96.3	36.0	96.4				
40.9	97.4	38.7	96.4				
52.4	97.3	44.1	97.4				
61.9	96.3	56.8	97.2				
77.3	97.4	66.0	96.5				
88.9	97.4	73.9	96.4				
93.9	96.4	81.8	97.2				
103.4	96.6	92.4	97.2				
110.1	97.2	96.9	96.7				
114.0	97.3	101.7	96.8				
115.4	96.2	107.2	97.2				
118.9	97.3	114.1	97.1				
		117.8	96.5				
		120.2	96.5				

	As-built	2008	2009	2010
Avg. Water Surface Slope	0.0020	0.0011	*NA	*NA
Riffle Length		*NA	*NA	*NA
Avg. Riffle Slope		*NA	*NA	*NA
Pool Length		*NA	*NA	*NA
Avg. Pool Slope		*NA	*NA	*NA

* No water in channel due to drought conditions

Cane Creek Profile - Reach 4



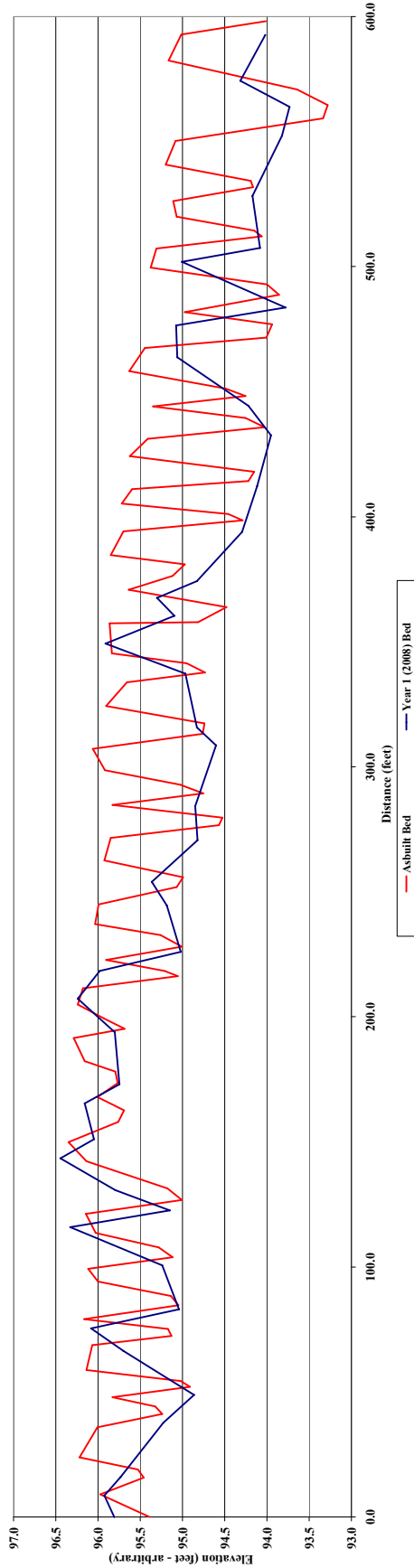
Station	Asbuilt Bed Elevation	Current Channel Bed Elevation
0.0	96.3	96.5
3.6	97.5	96.5
15.2	97.6	97.3
21.2	96.1	97.3
24.3	96.0	96.3
28.6	97.0	96.1
32.6	96.3	97.0
35.3	96.3	96.4
40.9	97.4	96.4
52.4	97.3	97.4
61.9	96.3	97.2
77.3	97.4	96.5
88.9	97.4	96.4
93.9	96.4	97.2
103.4	96.6	96.7
110.1	97.2	96.8
114.0	96.3	97.2
115.4	96.2	97.1
118.9	97.3	96.5
		96.5

Project Name: Cane Creek											
Reach: 5											
Profile: 100'											
Feature: 0'											
Crew: Adams, Jeffers											
As-built			2008 Survey			2009 Survey			2010 Survey		
Station	Bed Elevation	Water Elevation	Station	Bed Elevation	Water Elevation	Station	Bed Elevation	Water Elevation	Station	Bed Elevation	Water Elevation
89.0	96.4	94.0	92.0	94.0	94.0	94.0	94.0	94.0	94.0	94.0	94.0
89.5	96.4	94.0	92.5	94.0	94.0	94.5	94.0	94.0	94.5	94.0	94.0
15.7	95.5	93.8	52.3	93.8	93.8	52.3	93.8	93.8	52.3	93.8	93.8
19.0	95.5	93.8	52.3	93.8	93.8	52.3	93.8	93.8	52.3	93.8	93.8
23.7	96.2	94.2	528.4	94.2	94.2	528.4	94.2	94.2	528.4	94.2	94.2
35.8	96.0	94.1	507.5	94.1	94.1	507.5	94.1	94.1	507.5	94.1	94.1
41.1	95.2	93.0	401.9	95.0	95.0	401.9	95.0	95.0	401.9	95.0	95.0
41.1	95.2	93.0	401.9	95.0	95.0	401.9	95.0	95.0	401.9	95.0	95.0
47.9	95.8	95.1	476.6	95.1	95.1	476.6	95.1	95.1	476.6	95.1	95.1
52.0	94.9	94.9	463.8	95.1	95.1	463.8	95.1	95.1	463.8	95.1	95.1
54.4	95.0	94.2	444.3	94.2	94.2	444.3	94.2	94.2	444.3	94.2	94.2
58.8	96.1	94.0	432.6	94.0	94.0	432.6	94.0	94.0	432.6	94.0	94.0
68.7	96.1	94.1	412.3	94.1	94.1	412.3	94.1	94.1	412.3	94.1	94.1
71.4	95.2	93.4	375.4	95.2	95.2	375.4	95.2	95.2	375.4	95.2	95.2
73.1	95.2	93.4	373.3	94.8	94.8	373.3	94.8	94.8	373.3	94.8	94.8
79.2	96.2	95.3	367.5	95.3	95.3	367.5	95.3	95.3	367.5	95.3	95.3
84.7	95.0	95.1	360.4	95.1	95.1	360.4	95.1	95.1	360.4	95.1	95.1
88.3	95.1	95.9	349.2	95.9	95.9	349.2	95.9	95.9	349.2	95.9	95.9
94.1	96.0	95.0	337.3	95.0	95.0	337.3	95.0	95.0	337.3	95.0	95.0
99.4	96.1	94.8	317.4	94.8	94.8	317.4	94.8	94.8	317.4	94.8	94.8
103.9	95.1	94.8	308.7	94.8	94.8	308.7	94.8	94.8	308.7	94.8	94.8
107.7	95.3	94.9	284.4	94.9	94.9	284.4	94.9	94.9	284.4	94.9	94.9
113.7	96.0	94.8	270.6	94.8	94.8	270.6	94.8	94.8	270.6	94.8	94.8
121.3	96.1	95.4	254.0	95.4	95.4	254.0	95.4	95.4	254.0	95.4	95.4

	As-built	2008	2009	2010
Avg. Water Surface Slope	0.0014	0.0030	*NA	*NA
Riffle Length			*NA	*NA
Avg. Riffle Slope			*NA	*NA
Pool Length			*NA	*NA
Avg. Pool Slope			*NA	*NA

* No data returned due to drought conditions

Cane Creek Profile - Reach 5



341.3 95.0
345.4 95.8

Cane Creek Stream and Wetland Restoration Site
Year 1 (2008) Annual Monitoring
Representative Structure Photos
Taken November 2008



Cane Creek Stream and Wetland Restoration Site
Year 1 (2008) Annual Monitoring
Enhancement Reach Photos
Taken November 2008

Photo 1
Brush Mattress



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



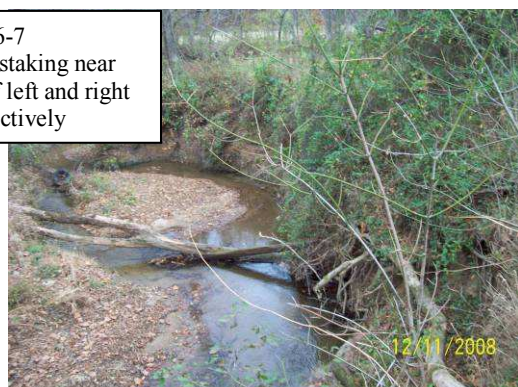
Photo 4
Stabilization and staking just
downstream of confluence



Photo 5
Removal of fallen tree
from Cane Creek

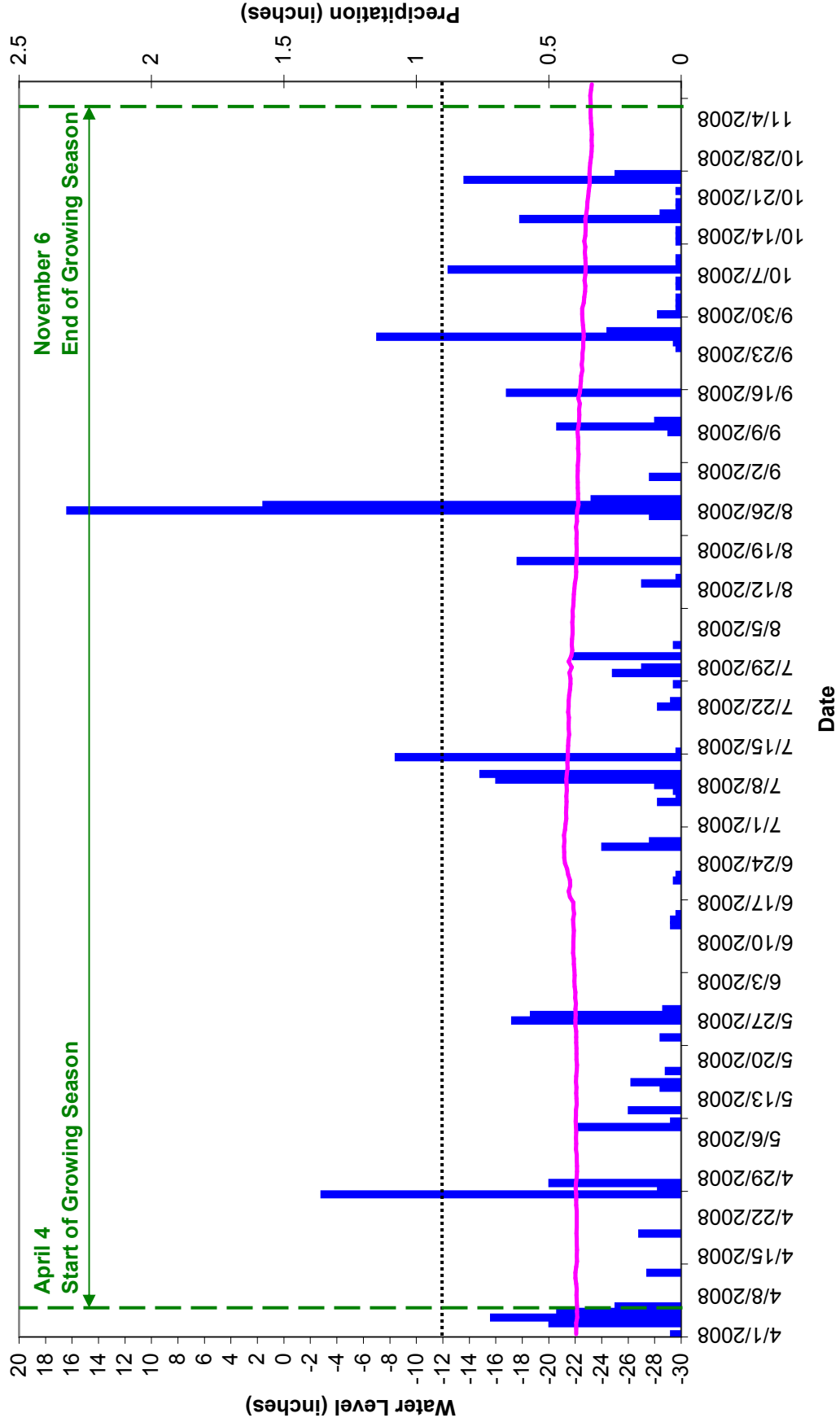


Photos 6-7
Stabilization and staking near
downstream end of left and right
banks, respectively

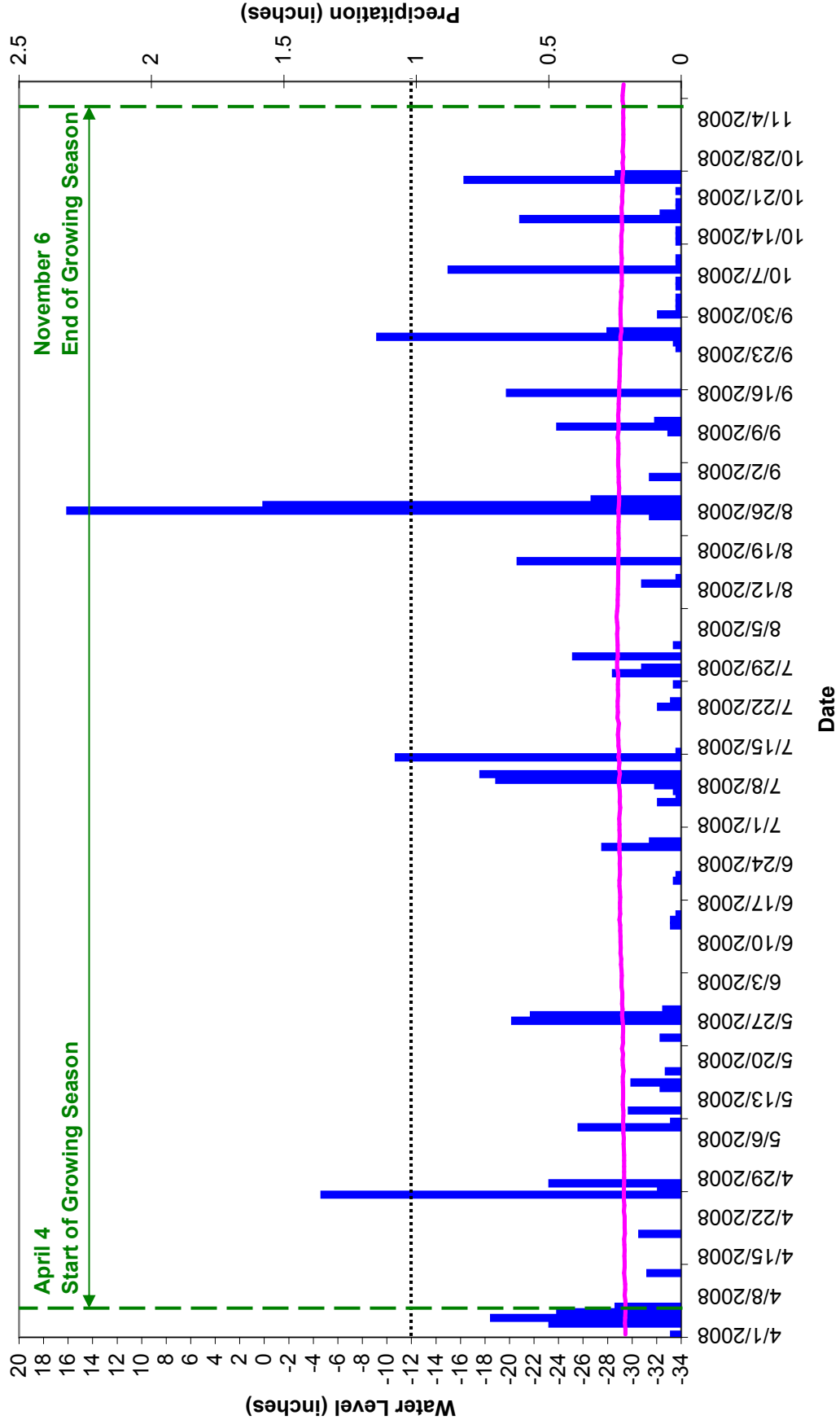


**APPENDIX C
HYDROLOGY DATA
2008 Groundwater Gauge Graphs**

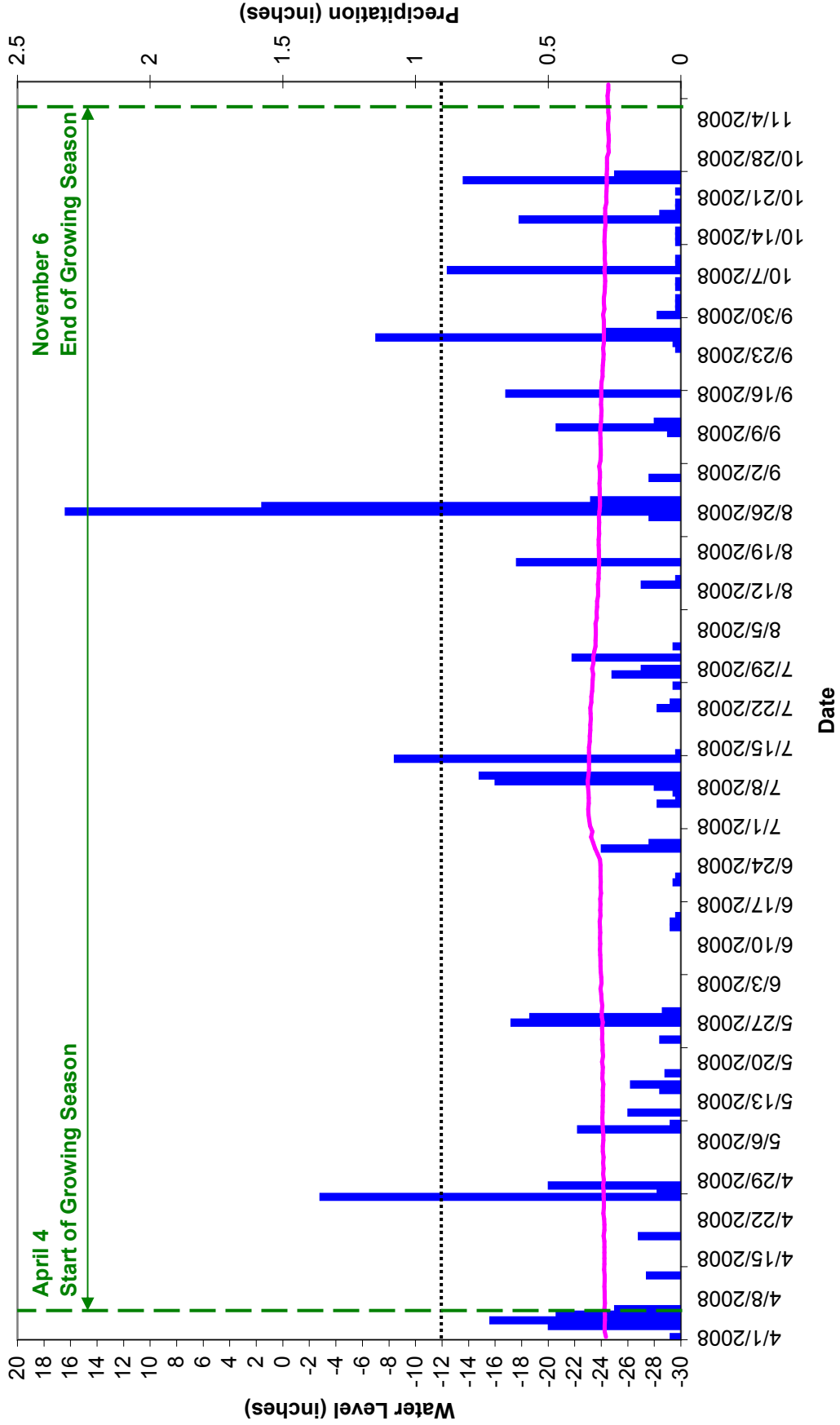
Cane Creek - Groundwater Gauge 1 Year 1 (2008 Data)



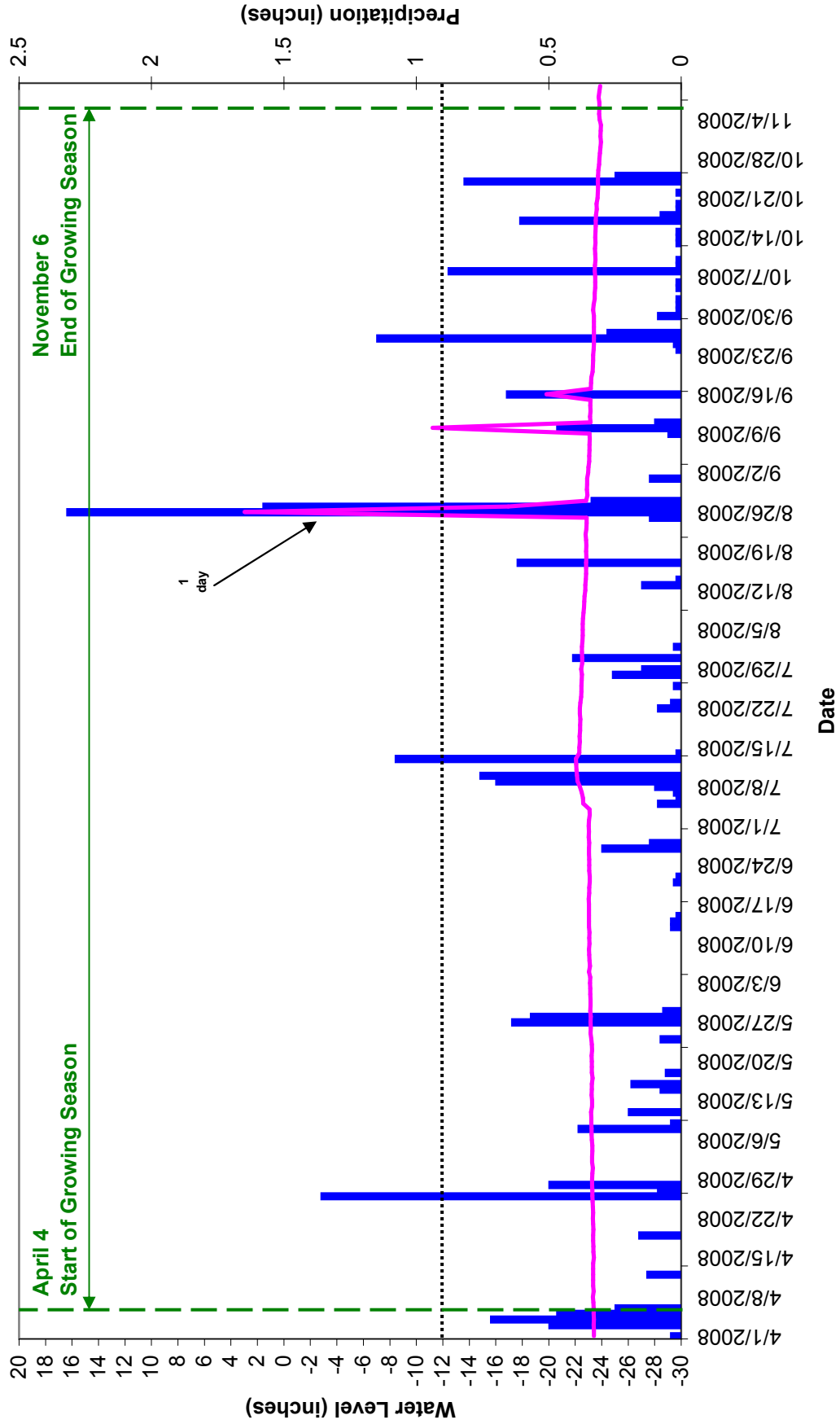
Cane Creek - Groundwater Gauge 2 Year 1 (2008 Data)



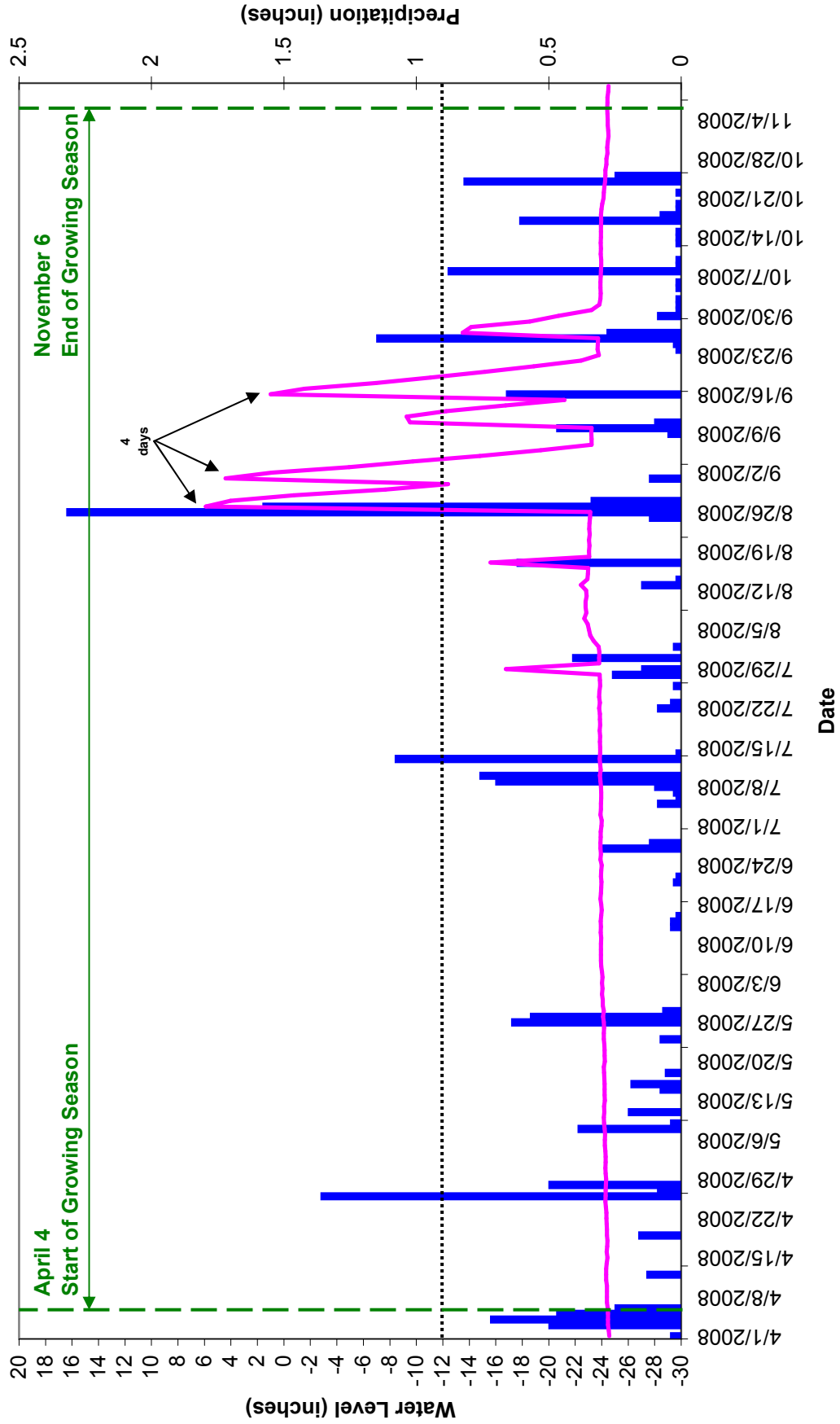
Cane Creek - Groundwater Gauge 3 Year 1 (2008 Data)



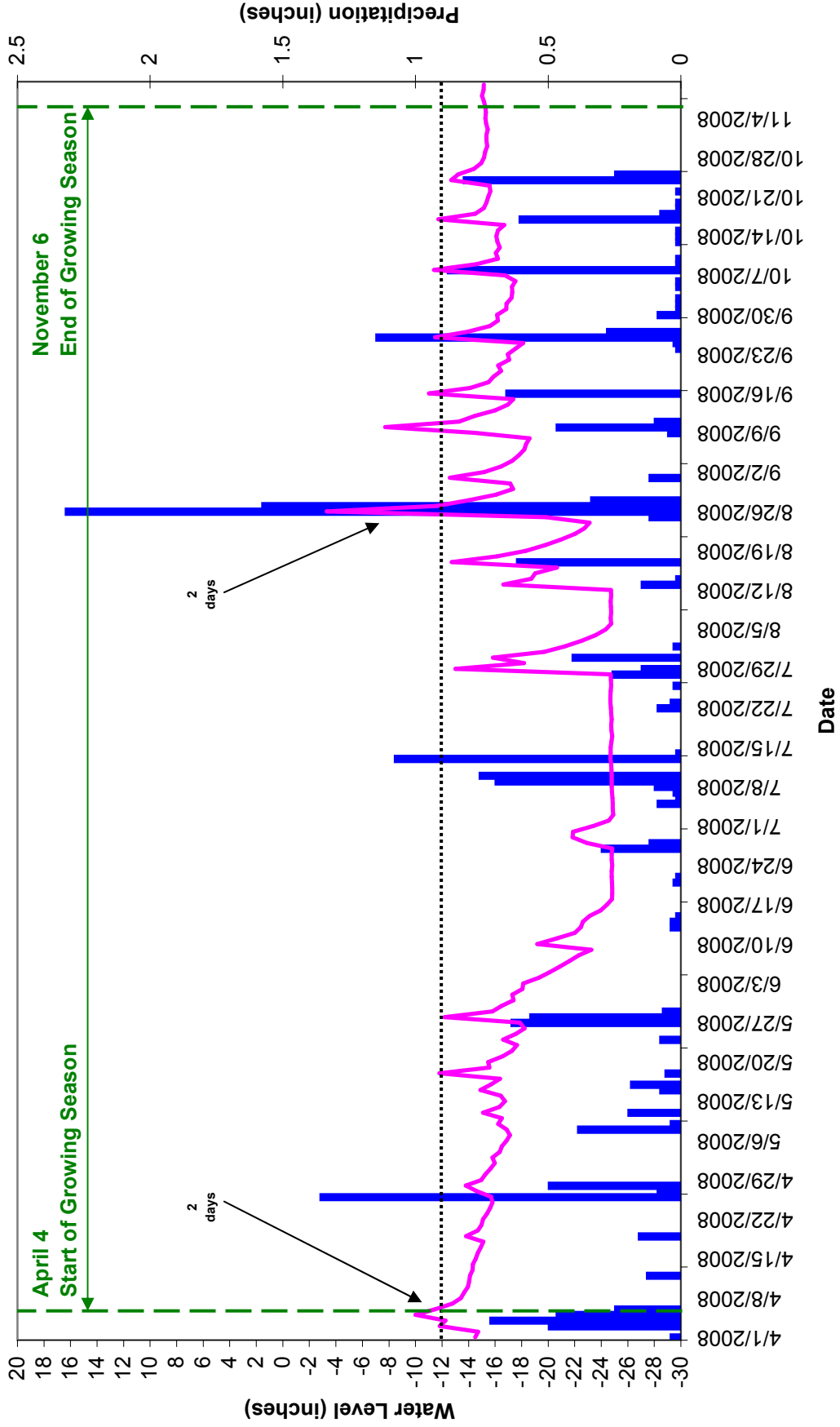
Cane Creek - Groundwater Gauge 4 Year 1 (2008 Data)



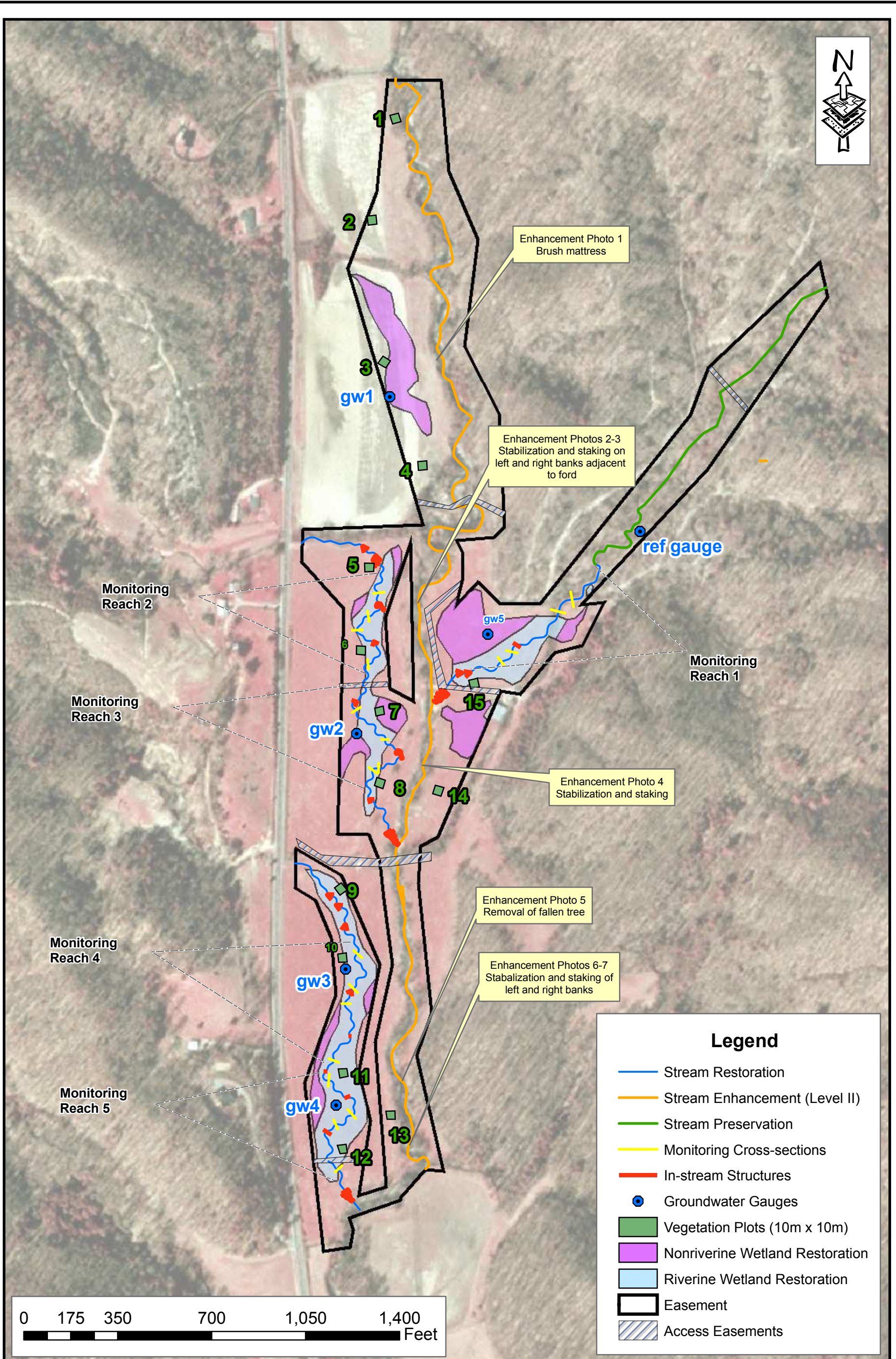
Cane Creek - Groundwater Gauge 5 Year 1 (2008 Data)



Cane Creek - Groundwater Reference Gauge Year 1 (2008 Data)



**APPENDIX D
MONITORING PLAN VIEW**



2126 Rowland Pond Drive
Willow Spring, NC 27592
'919) 215-1693
'919) 341-3839 fax

Axiom Environmental, Inc.

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

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

FIGURE
D-1