UT to South Fork Creek (Stephens)
Stream and Wetland Restoration Project
Alamance County, North Carolina
EEP Project #405

MY-04 Monitoring Report
Data Collected: March 29, 2011
Submitted: February, 2012

Prepared for:
North Carolina Department of Environment and Natural Resources
Ecosystem Enhancement Program
Parker Lincoln Building
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UT to South Fork Creek
Stream and Wetland Restoration
EEP Project #405
Liberty, North Carolina
Alamance County

MY-04 Monitoring Report
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APPENDICES

I. Executive Summary

The UT to South Fork Creek (Stephens) (UTSFC) stream and wetland restoration project comprises 3943 linear feet of stream restoration with approximately 0.77 acre of wetland restoration and 0.14 acre of wetland enhancement. Site construction was completed June 2007 and plantings were completed in December 2007. An integrated Baseline /Monitoring Year 1 Report year was combined as one report and submitted in May 2010 which contains only stream and vegetation baseline data. The monitoring year two report was submitted separately in May 2010 but contains monitoring year 1 stream and vegetation data. The monitoring year three report contains monitoring year two data, and this year's monitoring year four report contains monitoring year three data. The report title year only represents the post construction year as opposed to the post construction data collection year. The project is within USGS Hydrologic Cataloging Unit (HUC) 03030002050050 (NCDWQ sub basin 03-06-04) of the Cape Fear River Basin. This HUC has been identified as a Targeted Local Watershed (TLW) by EEP's *Cape Fear River Basin Priorities Plan 2009*. The project is in Alamance County approximately eight miles north of Siler City and one miles west of Snow Camp Road (SR 1004). The goals and objectives for UT to South Fork Creek (Stephens) stream restoration are:

Project Goals:

- Improving water quality to the receiving watershed though:
    - Cattle exclusion from the easement
    - Planting a native riparian buffer
    - Reduction of bank derived sediment losses through stabilization via:
        - Construction of a channel with a stable dimension, pattern and profile
        - Protection of banks from hoof shear
        - Integration of a stabilizing root mass as part of planting a native riparian buffer
- Providing wildlife habitat through the creation of a riparian zone
- Improving aquatic habitat with the use of natural material stabilization structures and a riparian buffer
- Increasing stream access to the floodplain
- Reducing erosion and sedimentation

Priority I and II stream restoration was performed along 4181 lf of UTSFC, including 2 cattle crossings exclusions and a 148 lf road crossing exclusion. Stream preservation of 2764 lf of a perennial unnamed tributary (UT) to UTSFC was obtained by establishing cattle fencing along the existing stream buffer. In the floodplain of UTSFC, 0.77 acre of riparian wetlands was restored. An additional 0.14 acre of riparian wetlands was enhanced. The stream is divided into three reaches A (Sta 6+00 – 18+75), B (Sta 18+75 – 25+00), and C (Sta 29+00 – 40+00 for monitoring purposes (Figure 2).

Currently the vegetation success criteria for the project site are being met with some exceptions to invasive species. Seven vegetation plots were monitored using the Version 4.2 of the CVS-EEP vegetation monitoring protocol. The average stem density for the project site is 2266 stems/acre including live stakes, planted stems, and natural stems. Counting only planted stems and excluding livestakes, the average stem density for the project site is 329 stems/acre. The

success criterion for planted woody species is 320 stems/acre after MY-03. A mortality rate of ten percent will be allowed after MY-04 (288 stems/acre), with another ten percent allowed after MY-05 (260 stems/acre). While all the vegetation plots combined meet the stem density criteria for total planted stems, vegetation plots 4, 5, 6, and 7 are low for planted stem counts. Since these same vegetation plots met the success criteria for total stems, this is a reflection of high recruitment of natural volunteer species. The vegetation problem areas consist of areas with low stem densities and some areas of invasive exotic plants. Invasive exotic species observed throughout the conservation easement include, multiflora rose (*Rosa multiflora*), Japanese honeysuckle (*Lonicera japonica*), Japanese stiltgrass (*Microstegium vimineum*), Chinese privet (*Ligustrum sinense*), tree of heaven (*Ailanthus altissima*), tall fescue (*Schedonurus arundinaceus*), and Johnson grass (*Sorghum halapense*). Some individuals of multiflora rose and Chinese privet were observed scattered mostly within Reach A, B, and C. Many dead individuals as a result of invasive treatment were observed. Some young individuals of tree of heaven were observed adjacent to the large dead stands that were treated within Reaches C and D. Japanese honeysuckle and Japanese stiltgrass was observed scattered throughout Reaches A and B. Japanese stiltgrass is very abundant within Reach A and B. Tall fescue is located throughout the easement in areas directly adjacent to the pastureland. Although these species have been given different ranks of severity, the functionality of the project is not expected to be impaired significantly. It is likely that all of these species were present in and adjacent to the conservation easement prior to construction. Treatment and removal of targeted invasive exotic plants within the project area was conducted in the 2010 and the 2011 with the last treatments conducted in October 2011. Multiflora rose, Chinese privet, and tree of heaven were successfully treated and are currently under control (See attached treatment report in Appendix F).

Six riparian wetlands occur within the conservation easement totaling 0.91 acre. Wetland 2-6, totaling 0.77 acre, are restored wetlands residing in the pre-construction channel alignment with each containing a groundwater monitoring gauge. Wetland 1, totaling 0.14 acre, is an enhanced wetland with one reference groundwater monitoring gauge. Groundwater levels are monitored to determine if levels are within 12 inches of the soil surface for at least 5% of the growing season. These areas will be considered wetlands if the groundwater is within 12 inches for at least 5% of the growing season, and the area supports hydrophytic vegetation, and meets the hydric soil requirements. According to the wetland groundwater gauges on site for MY-04, all wetlands met wetland hydrology criteria (Appendix E).

Overall, the stream is stable and functioning as designed. There has been little change in the stream pattern, profile or dimension between MY-03 and the present monitoring year MY-04. The stream had a normal level of stream flow during the data collection for MY-04 (March 2011) but lacked flowing water during MY-03 data collection. The stream profile in Reach A is holding grade and has exhibited little change in MY-04. Reach B longitudinal profile compares well to MY-03 with a slight increase in pool depth. Vegetation within the channel bottom continues to be present in all of Reach A and the upper portions of Reach B & C. The vegetation in the channel is trapping fines and has resulted in lower visual stability ratings for riffle and meander pool conditions on Table 5. The vegetation within the channel bed is also the major cause of low ratings for thalweg position in Reach A and B. In general the profile in Reach C

reflects a slight deepening of pools and a minor increase in substrate in the upper portion of the reach.

The bedform features of the entire stream appear to remain consistent as compared to the previous year's monitoring data with little change to pattern, profile or dimension. Comparison of the cross sections in Reaches A and B show little changes in geometry between MY-03 and MY-04 and are overall stable. A narrow low flow channel had previously developed within the bankfull channel in Reach A & B. Cross sections 4 & 5 in the lower end of reach A and the upper limits of Reach B reflect further development of this low flow channel in MY-04. The cross sections in Reach C, below the culvert stream crossing, appear stable and have not changed significantly.

The pebble counts cross sections 1, 4 and 6 trend finer as compared to previous years. This is largely due to the vegetation present in the channel trapping the finer particles. The trapped silt layer and vegetation creates difficulties in obtaining the sample, which may be a factor in determining the dominant particle sizes in these vegetated sample areas. All other cross sections remain similar or slightly coarser as compared to MY-03, which is typical of riffle sample areas.

Only one structure throughout the entire stream has been noted as an issue on the Current Condition Plan. The rock cross vane at station 20+80, in monitoring Reach B, shows signs of minor piping, but is not expected to create further degradation of the structure. The rock structure is continuing to form a sufficient pool and protect the adjacent banks. Bank erosion problems are only evident in 5% of Reach A and 1% Reach C. This erosion has been reported in previous monitoring reports and has not continued to severely degrade from the previous condition.

There is evidence of cattle encroachment in the vicinity of cross sections 8 and 9 in Reach C.

Summary information/data related to the occurrence of items such as beaver encroachment and statistics related to performance of various project and monitoring elements can be found in the tables and figures in the report appendices. Narrative background and supporting information formerly found in these reports can be found in the Baseline Monitoring Report (formerly Mitigation Plan) and in the Mitigation Plan (formerly Restoration Plan) documents available on EEP's website. All raw data supporting the tables and figures in the appendices are available from EEP upon request.

II. Methodology

Methodologies follow EEP monitoring report template Version 1.3 (1/15/2010) and guidelines (Lee et al 2008). Photos were taken with a digital camera. A Trimble Geo XT handheld unit with sub-meter accuracy was used to collect groundwater gauge locations, vegetation monitoring plot origins, and problem area locations. Cross sectional and longitudinal surveys were conducted using total station survey equipment. Data was entered into AutoCAD Civil3D to obtain dimensions of the cross sections and parameters applicable to the longitudinal profile. Reports were then generated to display summaries of the stream survey.

A. Vegetation Methodologies

Level II of the EEP/CVS protocol Version 4.2 was used to collect data for MY-04, which includes natural stems. Data collection for these plots was conducted on August 31, 2011 (Appendix C).

B. Wetland Methodologies

Five RDS groundwater monitoring gauges (1-5) were downloaded bi- monthly (02-01-11, 02-28-11, 04-16-2011, 06-02-11, 08-31-11, 10-28-11) to ensure proper function throughout the growing season. Data is provided in an Excel spreadsheet along with incorporation of local rainfall data provided by the State Climate Office.

C. Stream Methodologies

Stream profile and cross-sections were surveyed using total station equipment and methods. The survey data was plotted using AutoCAD Civil3D. The longitudinal profile was generated using the MY-00 alignment. Cross sectional data was extracted based on a linear alignment between the end pins. Cross section bankfull elevations for yearly comparisons are based on the baseline bankfull elevation established for each cross section. Data collection for the stream data was conducted on March 29, 2011.

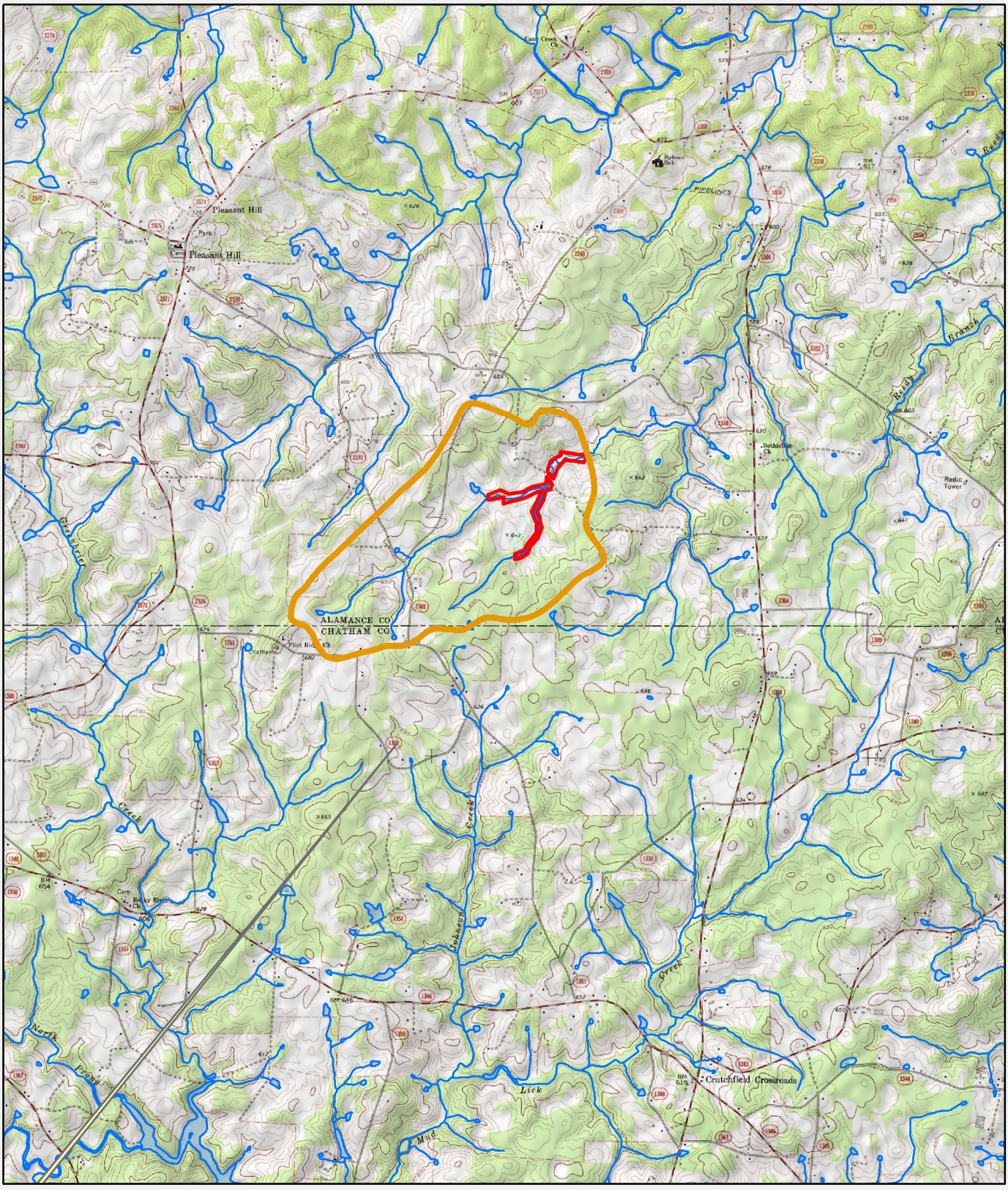
III. References

Lee, Michael T. Peet, Robert K. Roberts, Steven D., Wentworth, Thomas R. (2008). *CVS-EEP Protocol for Recording Vegetation Version 4.2.*

Weakley, Alan (2007). *Flora of the Carolinas, Virginia, Georgia, and Surrounding Areas.* http://www.herbarium.unc.edu/flora.htm.

Wolman, M.G., 1954. A Method of Sampling Coarse River-Bed Material, Transactions of American Geophysical Union 35:951-956.

Appendix A. Project Vicinity Map and Background Tables



The Catena Group

UT to South Fork Creek (EEP#405)

Vicinity Map

USGS Topographic Quadrangle Map
Alamance County, NC

Date: February 2012

Scale 0 1,600 3,200 Feet

Job No.: 4133

Figure 1

Table 1. Project Components UT to South Fork Creek (Stephens) No. 405									
Project Component or Reach ID	**Existing Feet/Acres**	**Restoration Level**	**Approach**	**Footage or Acreage**	**Stationing**	**Mitigation Ratio**	**Mitigation Units**	**BMP Elements1**	**Comment**
UT to South Fork Creek	**735**	**R**	**P2**	**690 lf**	**0+30 – 7+50**	**1:1**	**690**		**Instream Structure and Vegetated Buffers**
UT to South Fork Creek	**1430**	**R**	**P1**	**1420 lf**	**7+50 – 21+70**	**1:1**	**1420**		
UT to South Fork Creek	**1917**	**R**	**P2**	**1833 lf**	**23+18 – 41+81**	**1:1**	**1833**		
UT to UTSFC	**2764**	**P**	**Cattle Fencing**	**2734 lf**	**0+00 – 27+64**	**5:1**	**547**		**Cattle Fence Installed**
Wetlands	**0.77**	**R**	**Water table restored**	**0.77 Ac**	**0+00 – 15+50**	**1:1**	**0.77**		**Pre-construction channel location**
Wetlands	**0.14**	**E**	**Hardwood Plantings**	**0.14**	**13+00**	**2:1**	**0.07**		**Pre-construction wetland**

1 = BR = Bioretention Cell; SF = Sand Filter; SW = Stormwater Wetland; WDP = Wet Detention Pond; DDP = Dry Detention Pond; FS = Filter Strip; Grassed Swale = S; LS = Level Spreader; NI = Natural Infiltration Area, O = Other; CF = Cattle Fencing; WS = Watering System; CH = Livestock Housing

Cattle Crossings at Sta 0+00 to 0+30, Sta 6+00 to 6+30, Sta 28+85 to 29+15. 30 LF stream crossing on Preservation Reach of UT to UTSFC

Road Crossing at Sta 21+70 to 23+18

Stream crossing lengths are not included in Mitigation Unit calculated values

Table 1b. Component Summations UT to South Fork Creek (Stephens) No. 405							
Restoration Level	Stream (lf)	Riparian Wetland (Ac)		Non-Ripar (Ac)	Upland (Ac)	Buffer (Ac)	BMP
		Riverine	Non-Riverine				
Restoration	3943	0.77					
Enhancement		0.14					
Enhancement I							
Enhancement II							
Creation							
Preservation	2734						
HQ Preservation							
		0.91					
Totals (Feet/Acres)	**6677**	**0.91**		**0**	**0**		
MU Totals	**4490**	**0.84**		**0**	**0**		
	Non-Applicable						

Table 2. Project Activity and Reporting History
UT to South Fork Creek (Stephens) No. 405

Elapsed Time Since Grading Complete: 4 yrs 5 months
Elapsed Time Since Planting Complete: 4 yrs 0 Months
Number of Reporting Years[1]: 3

Activity or Deliverable	Data Collection Complete	Completion or Delivery
Restoration Plan	N/A	Sep-04
Final Design – 90%	N/A	N/A
Construction	N/A	June-07
Temporary S&E mix applied to entire project area	N/A	June-07
Permanent seed mix applied to entire project area	N/A	June-07
Containerized, B&B, and livestake planting	N/A	Dec-07
Monitoring Baseline Year 0/1	Apr-09	June-09
Year 2 Monitoring	Nov-09	Dec-09
Invasives treatment #1	N/A	May-10
Invasives treatment #2	N/A	Oct-10
Year 3 Monitoring	Sep-10	Dec-10
Invasives treatment #3	N/A	Apr-11
Invasives treatment #4	N/A	Oct-11
Year 4 Monitoring	Oct-11	Feb-12
Year 5 Monitoring		

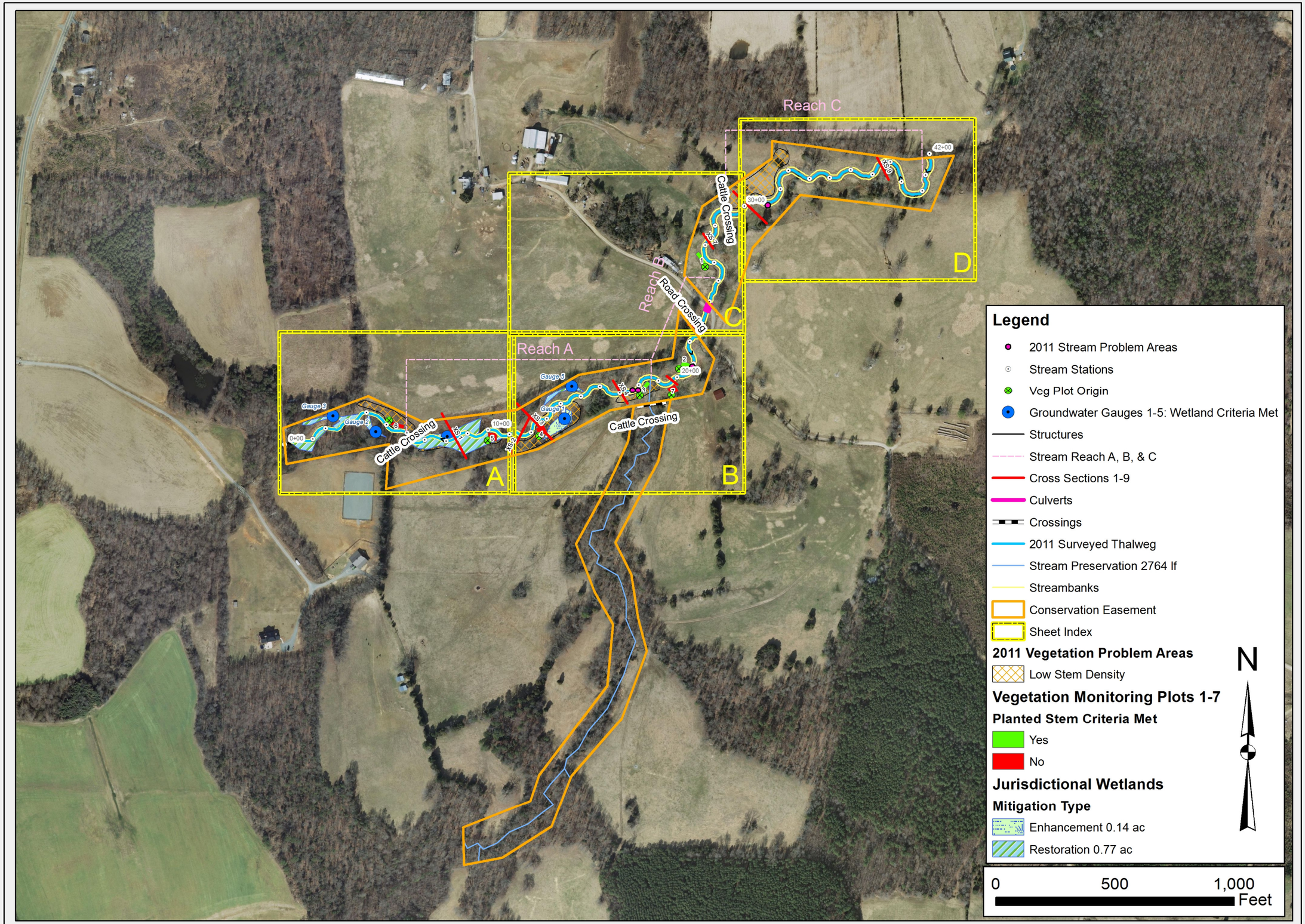
1 = Equals the number of reports or data points produced excluding the baseline

Table 3. Project Contacts Table UT to South Fork Creek (Stephens) No. 405	
Designer Primary project design POC	Dewberry & Dais, Inc. 2301 Rexwoods Dr., Ste. 200 Raleigh, NC, 27607-3366 Ph: 919-881-9939
Construction Contractor Construction contractor POC	N/A
Survey Contractor Survey contractor POC	N/A
Planting Contractor Planting contractor POC	N/A
Seeding Contractor Contractor point of contact	N/A
Seed Mix Sources	N/A
Nursery Stock Suppliers	Coastal Plain Conservation Nursery, Inc. Ph: 252-482-5707
Monitoring Performers	Ward Consulting Engineers, P.C. 8368 Six Forks Road Suite 104 Raleigh, NC 27615-5083
Stream Monitoring POC	Becky Ward 919-870-0526
Vegetation Monitoring POC	Chris Sheats - The Catena Group - 919-732-1300
Wetland Monitoring POC	Chris Sheats - The Catena Group - 919-732-1300

Table 4. Project Attribute Table UT to South Fork Creek (Stephens) No. 405	
Project County	Alamance
Physiographic Region	Piedmont
Ecoregion	Carolina Slate Belt
Project River Basin	Cape Fear River Basin
USGS HUC for Project (14 digit)	3030002050050
NCDWQ Sub-basin for Project	03-06-04
Within extent of EEP Watershed Plan?	Cape Fear River Basin Priorities Plan 2009
WRC Hab Class (Warm, Cool, Cold)	
% of project easement fenced or demarcated	100%
Beaver activity observed during design phase?	U
Restoration Component Attribute Table	
Drainage area	1.33 sq mi
Stream order	2nd
Restored length (feet)	4003
Perennial or Intermittent	Perennial
Watershed type (Rural, Urban, Developing etc.)	Rural
Watershed LULC Distribution (e.g.)	
Urban	51%
Ag-Row Crop	29%
Ag-Livestock	10%
Forested	7%
Water/Wetlands	3%
Watershed impervious cover (%)	<5%
NCDWQ AU/Index number	
NCDWQ classification	No classification; Haw River (C, NSW)
303d listed?	Yes
Upstream of a 303d listed segment?	Yes
Reasons for 303d listing or stressor	High pH
Total acreage of easement	22.58
Total vegetated acreage within the easement	21.86
Total planted acreage as part of the restoration	15.29
Rosgen classification of pre-existing	F4, G4c
Rosgen classification of As-built	E4
Valley type	-
Valley slope	-
Valley side slope range (e.g. 2-3.%)	-
Valley toe slope range (e.g. 2-3.%)	-
Cowardin classification	Riverine
Trout waters designation	-
Species of concern, endangered etc.? (Y/N)	Yes
Dominant soil series and characteristics	
Series	Herndon, Orange, Appling, and Colifax silty loams
Depth	-
Clay%	-
K	-
T	-

Use N/A for items that may not apply. Use "-" for items that are unavailable and "U" for items that are unknown

Appendix B. Visual Assessment Data



The Catena Group

Date: February 2012

Scale: As Shown

Job No.: 4133

Title:

UT to South Fork Creek

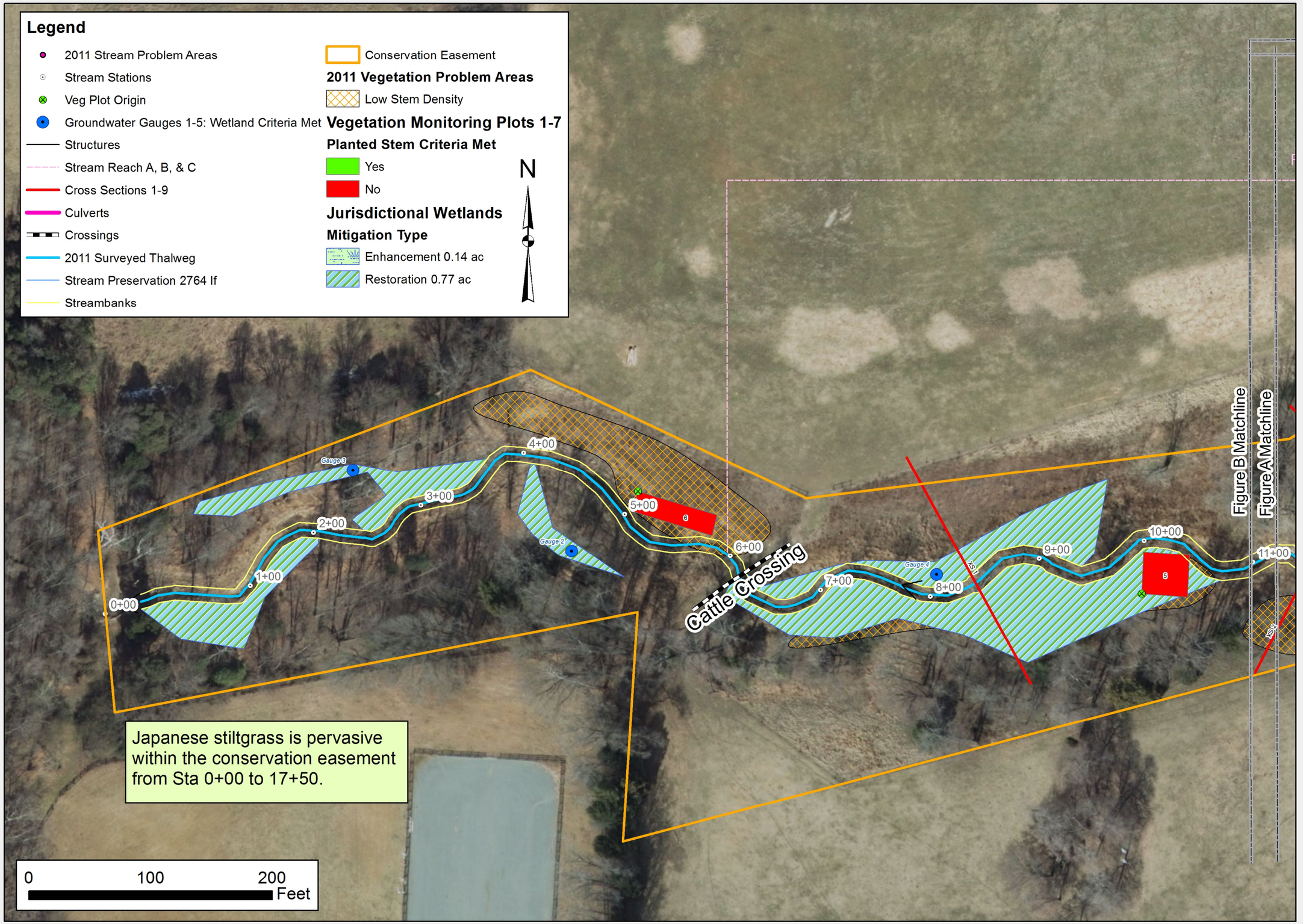
Current Conditions Plan View MY-04

2010 Aerial Orthophotography Source: NC One Maps

Client:

Ecosystem Enhancement Program

Figure 2



The Catena Group

Date: February 2012

Scale: As Shown

Job No.: 4133

Title:

UT to South Fork Creek

Current Conditions Plan View MY-04

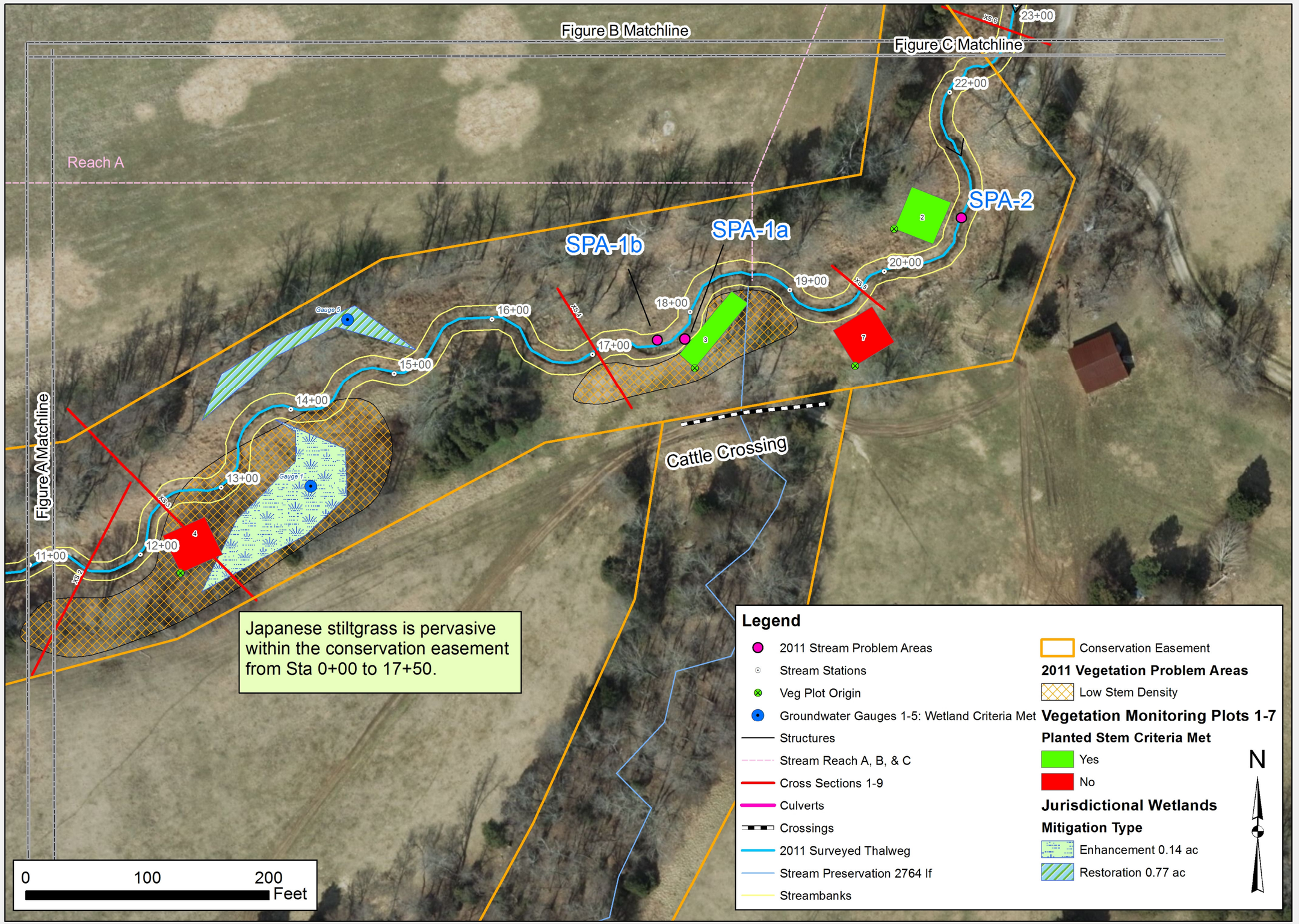
2010 Aerial Orthophotography Source: NC One Maps

Client:

Ecosystem Enhancement Program

Figure

2A



The Catena Group

Date: February 2012

Scale: As Shown

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UT to South Fork Creek

Current Conditions Plan View MY-04

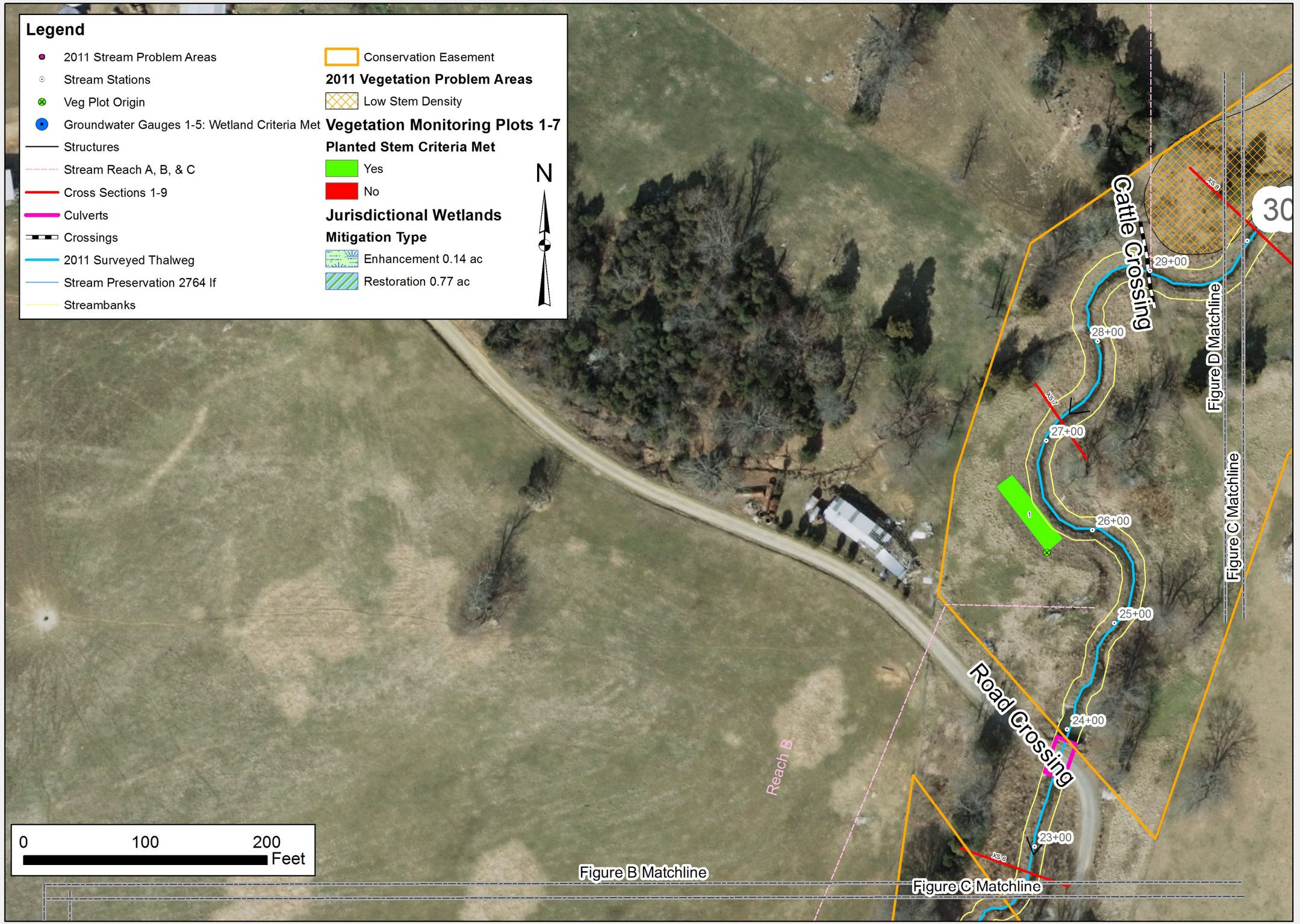
2010 Aerial Orthophotography Source: NC One Maps

Client:

Ecosystem Enhancement Program

Figure

2B



The Catena Group

Date: February 2012

Scale: As Shown

Job No.: 4133

Title:

UT to South Fork Creek

Current Conditions Plan View MY-04

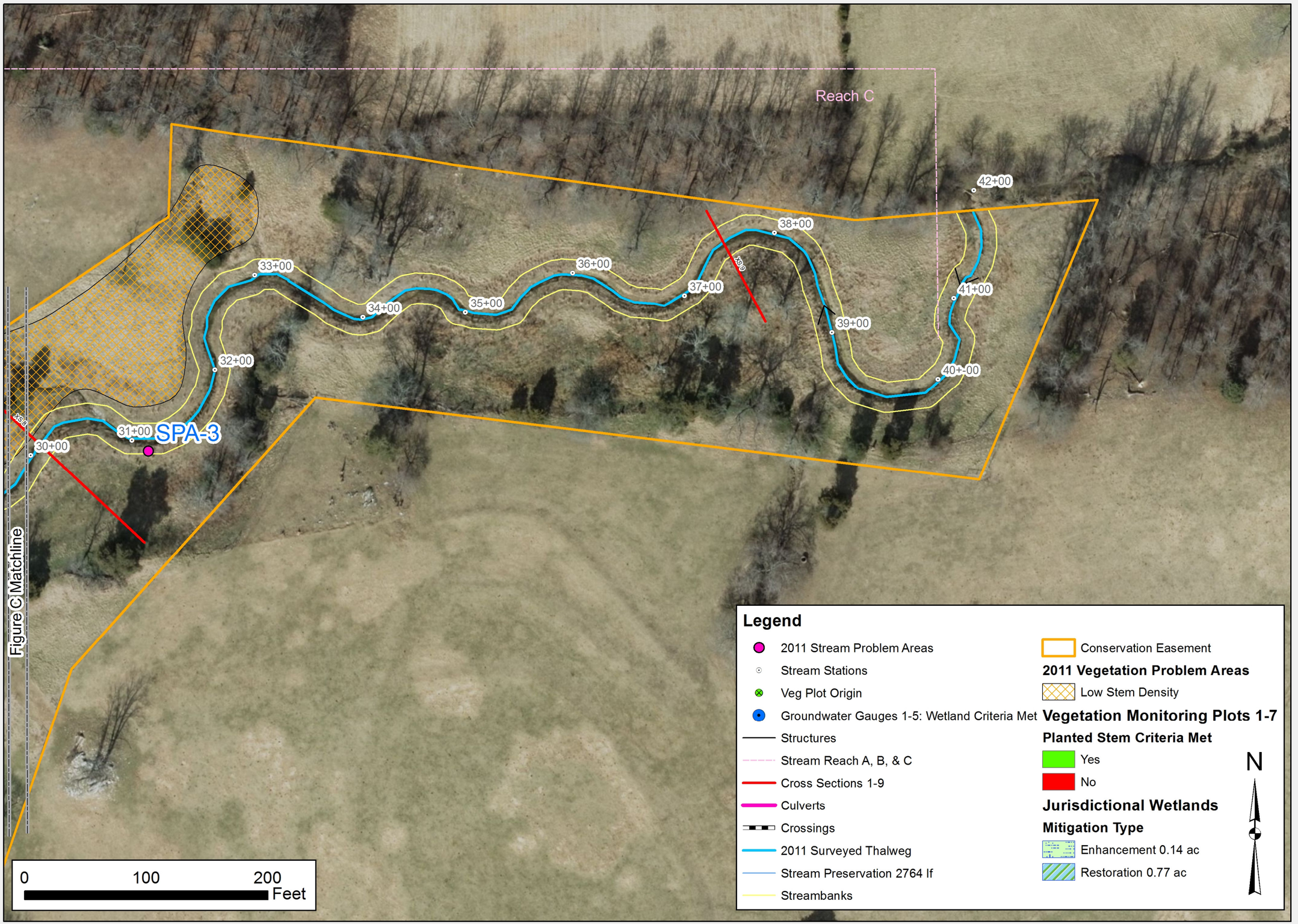
2010 Aerial Orthophotography Source: NC One Maps

Client:

Ecosystem Enhancement Program

Figure

2C



The Catena Group

Date: February 2012

Scale: As Shown

Job No.: 4133

Title:

UT to South Fork Creek

Current Conditions Plan View MY-04

2010 Aerial Orthophotography Source: NC One Maps

Client:

Ecosystem Enhancement Program

Figure

2D

Table 5 **Visual Stream Morphology Stability Assessment**
Reach ID **Reach A [Sta 6+00 - 18+75]**
Assessed Length **1275**

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bed	1. **Vertical Stability** (Riffle and Run units)	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)					100%			
		2. Degradation - Evidence of downcutting					100%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate	20	32			63%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)	25	32			78%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem riffle)	25	32			78%			
	4.**Thalweg Position**	1. Thalweg centering at upstream of meander bend (Run)	25	32			78%			
		2. Thalweg centering at downstream of meander (Glide)	25	31			81%			
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			1	20	99%			99%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.					100%			100%
	3. Mass Wasting	Bank slumping, calving, or collapse			1	50	98%			98%
				Totals	2	70	97%	0	0	97%
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	3	3			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	1	1			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	1	1			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in EEP monitoring guidance document)	3	3			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 1.6 Rootwads/logs providing some cover at base-flow.	1	1			100%			

Table 5 **Visual Stream Morphology Stability Assessment**
Reach ID **Reach B [Sta 18+75 - 25+00]**
Assessed Length **625**

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bed	1. **Vertical Stability** (Riffle and Run units)	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)					100%			
		2. Degradation - Evidence of downcutting					100%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate	8	10			80%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)	10	11			91%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem riffle)	11	11			100%			
	4.**Thalweg Position**	1. Thalweg centering at upstream of meander bend (Run)	8	10			80%			
		2. Thalweg centering at downstream of meander (Glide)	8	10			80%			
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion					100%			100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.					100%			100%
	3. Mass Wasting	Bank slumping, calving, or collapse					100%			100%
				Totals	0	0	100%	0	0	100%
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	2	2			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	2	2			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	1	2			50%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in EEP monitoring guidance document)	2	2			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 1.6 Rootwads/logs providing some cover at base-flow.	2	2			100%			

Table 5 **Visual Stream Morphology Stability Assessment**
Reach ID **Reach C [Sta 29+00 - 40+00]**
Assessed Length **1100**

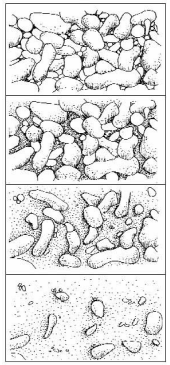
Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bed	1. **Vertical Stability** (Riffle and Run units)	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)					100%			
		2. Degradation - Evidence of downcutting					100%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate	20	25			80%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)	20	26			77%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem riffle)	20	26			77%			
	4.**Thalweg Position**	1. Thalweg centering at upstream of meander bend (Run)	25	26			96%			
		2. Thalweg centering at downstream of meander (Glide)	25	26			96%			
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			1	25	99%			99%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.					100%			100%
	3. Mass Wasting	Bank slumping, calving, or collapse					100%			100%
				Totals	1	25	99%	0	0	99%
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	1	1			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	1	1			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	1	1			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in EEP monitoring guidance document)	1	1			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 1.6 Rootwads/logs providing some cover at base-flow.	1	1			100%			

Criteria, Definitions and Thresholds for Visual Stream Morphology Assessments

Major Channel Category	Channel Sub-Category	Metric	Definitions	Cataloging Threshold	CCPV Depiction
1. Bed	1. **Vertical Stability** (Riffle and Run units)	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)	*Aggradation refers to at least moderate increases in reach stored sediment. It is NOT simply constituted by minor fining of riffles or filling of pools at or below baseflow elevations. An aggrading reach is often characterized by sand or gravel bar formation/growth with associated fining of reach substrate and smoothing of the reach long profile. Bars/aggraded areas significant enough to deflect flow against banks should be catalogued. Repeat channel photopoints are a key tool in assessing project aggradation. (See photo exhibit 1 below for range of example bar development/aggradation)	Catalog only if feature has most of the characteristics described to the left (cell E11) and is at least 15 feet in length or 20% of the riffle/run length, whichever is less.	NA
		2. Degradation - Number and size of evident downcuts within Riffle/Run units.	Where projects have regularly-spaced engineered grade control, degredation/downcutting is expected only in short, discreet lengths. *Indicators include perched sill structures, channel bed "steps" in clay-rich parent material, evidence of bed retreat at the bank toe (parent material may be exposed); mobilization of coarse riffle substrate in to pools downstream, and perhaps riffles with run morphology. Long-profile surveys should support an assessment of bed degradation where the visual assessment and survey overlap.	Catalog only if feature has most of the characteristics described to the left (cell E12) and is at least 15 feet in length or 20% of the riffle/run length, whichever is less.	Dark Red or Purple Color to be certain to distinguish from Mass Wasting Color Code
	2. Riffle Condition	1. Texture	Riffles should maintain a coarseness similar to the design distribution. Significant fining of the riffle surface indicates non-attainment for the riffle. Repeat pebble counts should support an assessment of riffle fining where overlap occurs (see exhibit graphic 2 below describing embedding for gravel-cobble systems).	NA	NA
	3. **Meander Pool Condition**	1. Depth Sufficient?	This metric is used to assess meander pools and also step-pools along a Rosgen B-type channel reaches. For stepped reaches the pools will be evaluated and tallied here and under the Habitat Sub-Category below. The max pool bankfull depth should be 1.6 times the mean bankfull depth (Max Pool Depth : Mean Bankfull Depth > 1.6). The mean bankfull depth from the As-built/baseline survey can be utilized to make this determination. Exhibit 3 provides residual pool depths using the 1.6 multiplier for a range of mean channel riffle depths that typify restoration projects.	NA	NA
		2. Length appropriate?	This metric will only be applied to meander pools. The meander pool length should be >30% of the ~ linear centerline distance between the tail of the upstream riffle and the head of the downstream rifle.	NA	NA
	4.**Thalweg Position**	1. Thalweg centering at upstream of meander bend (Run)?	This metric is used to characterize flow paths along riffle-run-pool transitions. The thalweg is expected to be against the outer bank in the bend apex, but vectors oriented towards the outer bank too far above the bend apex may indicate the potential for increased bank erosion. Similarly, the pool-glide-riffle transition is also expected to demonstrate flow path centering (Metric 4.2 below). The current-year thalweg rendered on the CCPV figure can assist in this assessment.	NA	NA
		2. Thalweg centering at downstream of meander bend (Glide)?	See Metric 4.1 above	NA	NA
2. Bank	**1. Scoured/Eroding Bank**	In order to better assess continued bank erosion risk, tallied bank segments are also characterized with respect to the proximity and integrated extent of stabilizing vegetation. Continued erosion risk for a given bank instability object is essentially adjusted downwards by adjacent mature vegetation and/or stabilizing roots. One or more mature trees in close proximity (e.g. 10 feet or less) or obvious integration of root mass within the bank failure are characteristics that would prompt the tallying of a given bank object into the additional sub-category related to risk of further instability (columns J-L of the actual data table). Essentially, the vegetative elements of rooting density and depth (e.g. from a BEHI assessment) need to be considered here.	Banks with evident scour /erosion	<table><tr><th>Bank Height</th><th>Minimum Length</th></tr><tr><td>>6</td><td>6</td></tr><tr><td>3-6</td><td>8</td></tr><tr><td><3</td><td>10</td></tr></table> See Footnote/Exhibit 5 below also This table provides a guide for working thresholds for bank erosion cataloging/mapping based on bank height. For the bank height ranges above, the minimum length of bank to be mapped and tallied is specified. For example, where banks are <3 feet high, only map an unstable segment if it is ≥ 10 feet.[5]	Yellow.
	2. Undercut		Banks undercut/overhanging to the extent that mass wasting appears likely? Does NOT include undercuts that modest, appear sustainable/stable and are providing habitat.		Orange.
	3. Mass Wasting		Bank slumping/calving/collapse?		Red.
3. Structures	**1. Overall Integrity**	The assessment of engineered structure performance should include all structures that provide grade control, bank protection, or habitat functions. These include Vanes, J-hooks, and rootwads, etc.	Bulk of structure physically intact with no dislodged boulders or logs?		Using callouts or some other means to maintain legibility, annotate structure with red "**S**" if structural failure has occurred
	2. Grade Control		Bed grade control maintained across the sill structure? No evident loss of bed elevation immediately upstream of structure? Some piping alone will not constitute a loss of grade control.		Using callouts or some other means to maintain legibility, annotate structure with red "**G**" if structure has lost grade control
	2a. Piping		Catalog structures lacking any substantial flow underneath sills or around arms?		Using callouts or some other means to maintain legibility, annotate structure with red "**P**" if significant piping has occurred
	3. Bank Protection		See exhibit 4 below for determining structural sphere of influence. If the amount of bank that is deemed to be actively eroding within the structures sphere of influence exceeds 15% of the total bank footage within the structures sphere of influence, then the structure should be classified as not providing adequate bank protection in the data table.		Using callouts or some other means to maintain legibility, annotate structure with red "**B**" if structure has failed to provide bank protection
	4. Habitat		Are pools maintained @ ~ Max Pool Depth : Mean Bankfull Depth > 1.6? For rootwads, habitat provision means interacting with baseflow and providing cover.		Using callouts or some other means to maintain legibility, annotate structure with red "**H**" if structure is not providing habitat

Exhibit 1. Examples of bar features warranting concerning related to cataloging item 1.1.1 of the assessment

Exhibit 2. Graphic depicting embedding of riffles with fine material



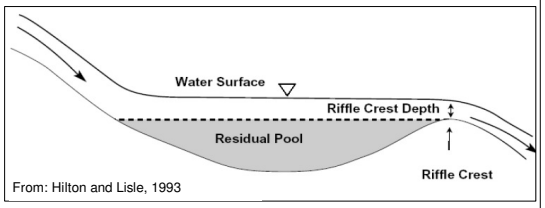
Progressing from top to bottom, the series of graphics to the left depicts the fining of interstial spaces between coarser particles. This describes increasing levels of embededness in riffles. The observer must have an understanding of the intended substrate distributions/texture of the bed for the projects riffles when assessing this. However, as a guideline for streams in the coarse gravel to cobble range, the 2nd panel from the top represents a visual guideline for the condition that would begin to elicit concern for this parameter, but still contains a good deal of coarse material. Progressing from that state to the conditions depicted in the the 3rd and 4th panel represents a visual que for significant emdedding.

From USEPA (EPA 841-B-97-003 - Nov 1997)

Exhibit 3. Residual Pool Depth Table - Relating 1.6 criterion for typical mean riffle depths to residual pool depths

This residual pool table was provided in the event the tracking of bankfull at each pool feature to estimate a Dmax was inconvenient. Estimating the residual pool depth by measuring the max pool depth to water surface and subtracting the water depth at the riffle head may provide a more convenient way under certain circumstances to estimate in the field. For this reason the exhibit table provides a relationship between the 1.6 criterion applied to mean riffle depth for the site and the resulting residual pool depths.

Mean Riffle Depth D_{bkf}	Multiplier	Target Bankfull Pool Max	Residual Pool Depth
1.0	1.6	1.6	0.6
1.5	1.6	2.4	0.9
2.0	1.6	3.2	1.2
2.5	1.6	4.0	1.5
3.0	1.6	4.8	1.8
3.5	1.6	5.6	2.1
4.0	1.6	6.4	2.4
4.5	1.6	7.2	2.7
5.0	1.6	8.0	3.0

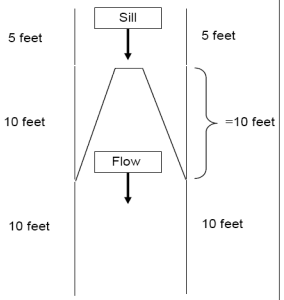


From: Hilton and Lisle, 1993

5 = The above was developed because of the need to have a threshold given the large number of performers and to avoid spending time trying to catalog and map small objects that if excluded would have minimal overall impacts on the performance percentages. It is a guide that tries to strike a balance between the obvious need to have a threshold, yet provide confidence that the site conditions are accurately represented. For example, a scenario where 1 object nearly exceeding the threshold were to occur every 100 feet of bank height (which would be a high frequency and unlikely) with a bank height of 5 feet, would yield an error of ~3%. However, if the observer is encountering a truly high number of objects just below the threshold in the above table (e.g. > 1 per 100 feet of bank channel on average) and is concerned that the exclsuion of such objects is going to misrepresent the site conditions, then judgement should be applied and objects below the threshold may be cataloged. If a rare condition as described does occur and the thresholds are not utilized then a table footnote explaining this should be included.

Lastly, given the increase in overall area and the implications to stability, greater banks heights required smaller threshold minimums.

Exhibit 4. Extent of Structural Influence for Bank Protection



The drawing is a guideline for the extent of influence vane arms exert on stream banks. The bracketed segment (10ft) immediately adjacent to the vane arm is multiplied by 5 to determine the total length of bank influenced by a cross vane. This includes the bank length adjacent to each vane arm, 1 length (10 feet) below each van arm, and ½ length (5 feet) on each bank above the uppermost structural element (in this case the vane sill), yielding 50 feet in this example case. In this example a single arm vane or j-hook would only influence 25ft of bank.

If the amount of recent bank erosion observed within the extent of influence exceeds 15% then the structure is deemed not to be providing adequate bank protection. In the above examples this would amount to ~ 8 and 4 feet, respectively.

If in an earlier assessment the structure failed the 15% bank protection criteria but the erosion has subsequently stabilized, then the observer can use best professional judgment to determine if the structure is currently meeting the bank protection criteria.

Table 6 Vegetation Condition Assessment

Planted Acreage[1] **10**

Vegetation Category	Definitions	Mapping Threshold	CCPV Depiction	Number of Polygons	Combined Acreage	% of Planted Acreage
1. Bare Areas	Very limited cover of both woody and herbaceous material.	0.1 acres	Pattern and Color	0	0.00	0.0%
2. Low Stem Density Areas	Woody stem densities clearly below target levels based on MY3, 4, or 5 stem count criteria.	0.1 acres	Yellow simple hatch	0	1.80	18.0%
			Total	0	0.00	18.0%
3. Areas of Poor Growth Rates or Vigor	Areas with woody stems of a size class that are obviously small given the monitoring year	0.25 acres	Pattern and Color	0	0.00	0.0%
			Cumulative Total	0	0.00	18.0%

Easement Acreage[2] **15**

Vegetation Category	Definitions	Mapping Threshold	CCPV Depiction	Number of Polygons	Combined Acreage	% of Easement Acreage
4. Invasive Areas of Concern[4]	*Microstegium vimineum*	1000 SF	Green cross hatch	3	3.96	6.6%
5. Easement Encroachment Areas[3]	Areas or points (if too small to render as polygons at map scale).	none	Pattern and Color	0	0.00	0.0%

High Concern:				Low/Moderate Concern:	
Vines	**Genus/Species**	**Shrubs/Herbs**	**Genus/Species**	**Shrubs/Herbs**	**Genus/Species**
Kudzu	*Pueraria lobata*	Japanese Knotweed	Polygonum cuspidatum	Japanese Privet	Ligustrum Japonicum
Porcelain Berry	Ampelopsis brevipeduncu	Oriental Bittersweet	Celastrus orbiculatus	Glossy Privet	Ligustrum lucidum
Japanese Honeysuckle	Lonicera japonica	Multiflora Rose	Rosa multiflora	Fescue	Festuca spp.
Japanese Hops	Humulus japonicus	Russian olive	Elaeagnus angustifolia	English Ivy	Hedera helix
Wisterias	Wisteria spp.	Chinese Privet	Ligustrum sinense	Microstegium	Microstegium vimineum
Winter Creeper	Euonymus fortunei	Chinese Silvergrass	Miscanthus sinensis	Burning Bush	Euonymus alatus
Bush Killer (Watch List)	Cayratia japonica	Phragmites	Phragmites australis	Johnson Grass	Sorghum halepense
		Bamboos	Phyllostachys spp	Bush Honeysuckles	Lonicera, spp.
Trees		Sericea Lespedeza	Sericea Lespedeza	Periwinkles	Vinca minor
Tree of Heaven	Ailanthus altissima	Garlic Mustard (Watch List)	Alliaria petiolata	Morning Glories	Morning Glories
Mimosa	Albizia julibrissin	Cogon Grass (Watch List)	Imperata cylindrica	Bicolor Lespedeza (Watch List)	Lespedeza bicolor
Princess Tree	Paulownia tomentosa	Giant Reed (Watch List)	Arundo donax	Chinese Yams (Watch List)	Dioscorea oppositifolia
China Berry	Melia azedarach	Tropical Soda Apple (Watch List)	Solanum viarum	Air Potato (Watch List)	Dioscorea bulbifera
Callery Pear	Pyrus calleryana	Japanese Spirea (Watch List)	Spiraea japonica	Japanese Climbing Fern (Watch List)	Lygodium japonicum
White Mulberry	Morus alba	Japanese Barberry (Watch List)	Berberis thunbergii		
Tallow Tree (Watch List)	Triadica sebifera				

Stream Station Photos

Photo 1. Looking downstream at XS-1

Photo 2. Looking downstream at XS-2

Photo 3. Looking downstream at XS-3

Photo 4. Looking downstream at XS-4

Photo 5. Looking downstream at XS-5

Photo 6. Looking downstream at XS-6

Photo 7. Looking downstream at XS-7

Photo 8. Looking downstream at XS-8

Photo 9. Looking downstream at XS-9

Vegetation Monitoring Plots Photos

Photo 10. Vegetation Plot 1 (August 31,2011)

Photo 11. Vegetation Plot 2 (August 31,2011)

Photo 12. Vegetation Plot 3 (August 31,2011)

Photo 13. Vegetation Plot 4 (August 31,2011)

Photo 14. Vegetation Plot 5 (August 31,2011)

Photo 15. Vegetation Plot 6 (August 31,2011)

Photo 16. Vegetation Plot 7 (August 31,2011)

Appendix C. Vegetation Plot Data

Table 7. Vegetation Plot Criteria Attainment		
Vegetation Plot ID	**Vegetation Survival Threshold Met?***	**Tract Mean**
VP 1	Yes	43%
VP 2	Yes	
VP 3	Yes	
VP 4	No	
VP 5	No	
VP 6	No	
VP 7	No	

* >288 planted stems/acre

Table 8. CVS Vegetation Plot Metadata	
UT to South Fork Creek (Stephens) No. 405	
Report Prepared By	Chris Sheats
database name	TheCatenaGroup-2010-E-UTtoSouthForkCreek.mdb
DESCRIPTION OF WORKSHEETS IN THIS DOCUMENT----------	
Metadata	Description of database file, the report worksheets, and a summary of project(s) and project data.
Proj, planted	Each project is listed with its PLANTED stems per acre, for each year. This excludes live stakes.
Proj, total stems	Each project is listed with its TOTAL stems per acre, for each year. This includes live stakes, all planted stems, and all natural/volunteer stems.
Plots	List of plots surveyed with location and summary data (live stems, dead stems, missing, etc.).
Vigor	Frequency distribution of vigor classes for stems for all plots.
Vigor by Spp	Frequency distribution of vigor classes listed by species.
Damage	List of most frequent damage classes with number of occurrences and percent of total stems impacted by each.
Damage by Spp	Damage values tallied by type for each species.
Damage by Plot	Damage values tallied by type for each plot.
Planted Stems by Plot and Spp	A matrix of the count of PLANTED living stems of each species for each plot; dead and missing stems are excluded.
All Stems by Plot and spp	A matrix of the count of total living stems of each species (planted and natural volunteers combined) for each plot; dead and missing stems are excluded.
PROJECT SUMMARY----------	
Project Code	405
project Name	UT to South Fork Creek (Stephens)
Description	South Fork of Cane Creek in Alamance County EEP Project # 405.
River Basin	
length(ft)	
stream-to-edge width (ft)	
area (sq m)	
Required Plots (calculated)	
Sampled Plots	7

EEP Project Code 405. Project Name: UT to South Fork Creek (Stephens)

			Current Plot Data (MY3 2011)																					Annual Means					
			E405-01-0001			E405-01-0002			E405-01-0003			E405-01-0004			E405-01-0005			E405-01-0006			E405-01-0007			MY3 (2011)			MY2 (2010)		
Scientific Name	Common Name	Species Type	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T
Acer rubrum	red maple	Tree															19			37			1			57			
Baccharis halimifolia	eastern baccharis	Shrub Tree									1															1			
Betula nigra	river birch	Tree										1	1	1	1	1	1							2	2	2	2	2	2
Callicarpa americana	American beautyberry	Shrub			2	2	2	3										4	4	4				6	6	9	5	5	5
Carya alba	mockernut hickory	Tree												1												1			
Cercis canadensis	eastern redbud	Shrub Tree									2															2			
Cercis canadensis var. cana	eastern redbud	Shrub Tree							6	6	6										1	1	1	7	7	7	7	7	7
Cornus amomum	silky dogwood	Shrub	6	6	7													1	1	1				7	7	8	7	7	7
Corylus americana	American hazelnut	Shrub	1	1	1							1	1	1	2	2	2							4	4	4	4	4	4
Diospyros virginiana	common persimmon	Tree				3	3	3												2				3	3	5	3	3	3
Fraxinus pennsylvanica	green ash	Tree	3	3	3	1	1	8	1	1	2			1			3			4	3	3	37	8	8	58	8	8	8
Gleditsia triacanthos	honeylocust	Shrub Tree						1			1															2			
Juglans nigra	black walnut	Tree				1	1	1			2			3			1						3	1	1	10			
Juniperus virginiana	eastern redcedar	Tree			4			4			2															10			
Liquidambar styraciflua	sweetgum	Tree						1			3			2			10			76			3			95			
Liriodendron tulipifera	tuliptree	Tree													1	1	2			2				1	1	4			
Liriodendron tulipifera var.	Tulip-tree, Yellow Pop	Tree				1	1	1				1	1	1										2	2	2	2	2	2
Morus rubra	red mulberry	Tree				1	1	1				1	1	1							1	1	1	3	3	3	3	3	3
Pinus taeda	loblolly pine	Tree			1																					1			
Platanus occidentalis	American sycamore	Tree															1			1						2			
Platanus occidentalis var. o	Sycamore, Plane-tree	Tree							1	1	1										1	1	1	2	2	2	5	5	5
Prunus serotina	black cherry	Shrub Tree									3															3			
Quercus michauxii	swamp chestnut oak	Tree	1	1	1				2	2	2													3	3	3	3	3	3
Sambucus canadensis	Common Elderberry	Shrub Tree															1									1			
Ulmus	elm	Tree				1	1	6			4			3										1	1	13	6	6	6
Ulmus alata	winged elm	Tree				2	2	11			4			7			3			6	1	1	27	3	3	58			
Ulmus rubra	slippery elm	Tree				2	2	5	1	1	3			5	1	1	5			11				4	4	29	2	2	2
Unknown		unknown																									1	1	1
		Stem count	11	11	19	14	14	45	11	11	36	4	4	26	5	5	48	5	5	144	7	7	74	57	57	392	58	58	58
		size (ares)	1			1			1			1			1			1			1			7			7		
		size (ACRES)	0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.17			0.17		
		Species count	4	4	7	9	9	12	5	5	14	4	4	11	4	4	11	2	2	10	5	5	8	16	16	27	14	14	14
		Stems per ACRE	445.2	445.2	768.9	566.6	566.6	1821	445.2	445.2	1457	161.9	161.9	1052	202.3	202.3	1942	202.3	202.3	5827	283.3	283.3	2995	329.5	329.5	2266	335.3	335.3	335.3

Color for Density

Exceeds requirements by 10%

Exceeds requirements, but by less than 10%

Fails to meet requirements, by less than 10%

Fails to meet requirements by more than 10%

Appendix D. Stream Survey Data

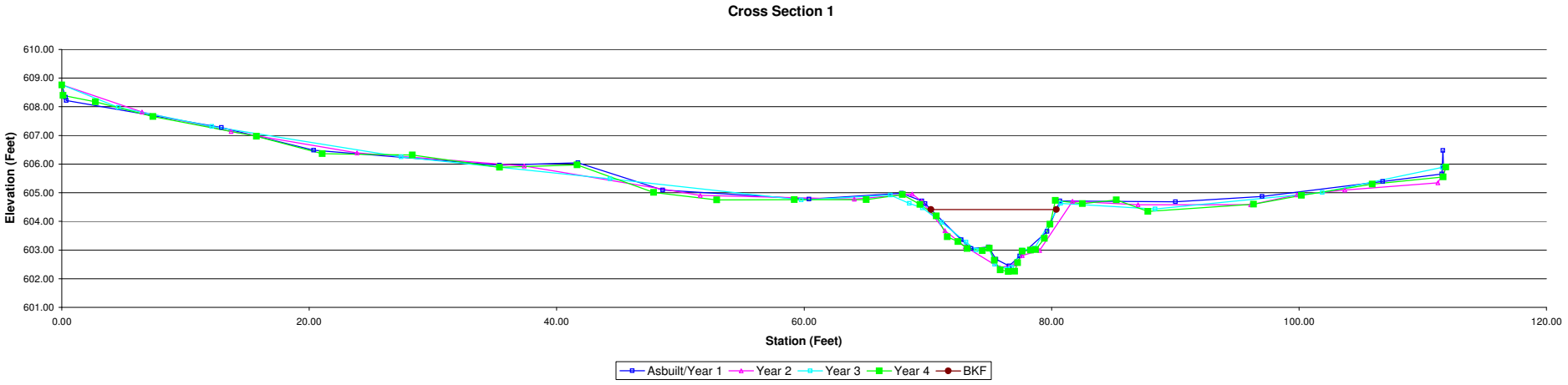
Project:	UT to South Fork Cane Creek
Cross Section:	Cross Section 1
Feature	Riffle
Station:	8+36
Date:	3/29/11
Crew:	SV, ZP

Summary (bankfull)

	MY0/1	MY2	MY3	MY4	MY5
A (BKF)	11.4	17.3	11.9	13.0	
W (BKF)	10.1	12.2	10.7	10.2	
Max d	2.0	2.3	2.1	2.2	
Mean d	1.1	1.4	1.1	1.3	
W/D	9.0	8.6	9.6	7.9	

MY00/01-2010			MY02-2010			MY03-2010			MY04-2011		
Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes
0.00	608.77	LPIN	0.00	608.77	LPIN	0.00	608.77	LPIN	0.00	608.76	LPIN
0.30	608.33		6.49	607.82		4.58	607.98		0.11	608.40	
0.37	608.22		13.68	607.14		12.13	607.31		2.73	608.17	
12.91	607.28		23.86	606.39		27.43	606.25		7.37	607.66	
20.37	606.48		37.37	605.93		44.32	605.49		15.73	606.97	
35.38	605.96		51.60	604.91		59.77	604.75		21.06	606.36	
41.72	606.05		64.06	604.78		66.97	604.92	TOBL	28.34	606.32	
48.58	605.09		68.75	604.95	TOBL	68.50	604.63	BKF L	35.39	605.89	
60.40	604.78		69.50	604.70	BKF L	69.56	604.47		41.66	605.97	
67.88	604.98	TOBL	71.39	603.68		71.13	603.97		47.84	605.01	
69.53	604.71	BKF L	73.03	603.12		73.08	603.28		52.95	604.75	
69.78	604.62		75.82	602.38	TW	73.92	603.00		59.21	604.76	
72.70	603.36		77.02	602.51		74.97	603.03		65.02	604.76	
73.50	603.05		77.62	602.81		75.40	602.50		67.95	604.94	TOBL
74.90	603.11		79.03	602.99		76.45	602.33	TW	69.37	604.59	
75.50	602.68		81.69	604.70	BKF R	76.78	602.40	TOE R	70.70	604.19	BKF L
76.56	602.45	TW	87.00	604.58		77.61	603.00		71.58	603.46	
77.43	602.79		96.08	604.58		78.63	603.06		72.44	603.29	
79.65	603.65		99.82	604.93		80.75	604.63	BKF R	73.18	603.05	TOE L
80.68	604.71	BKF R	103.71	605.09		88.38	604.43		74.40	602.98	
90.01	604.68		111.22	605.35		101.89	605.01		74.98	603.06	
97.02	604.87		111.88	605.88	RPIN	111.60	605.89	RPIN	75.38	602.64	
106.78	605.39								75.86	602.31	
111.54	605.65								76.50	602.25	TW
111.64	606.47								77.02	602.26	
111.67	605.90	RPIN							77.27	602.56	
									77.63	602.96	
									78.31	603.00	
									78.70	603.01	TOE R
									79.43	603.41	
									79.88	603.90	BKF R
									80.30	604.73	
									82.50	604.62	
									85.23	604.75	
									87.79	604.35	
									96.32	604.60	
									100.20	604.91	
									105.92	605.30	
									111.65	605.55	
									111.87	605.90	RPIN

Photo of XS-1, looking in the downstream direction



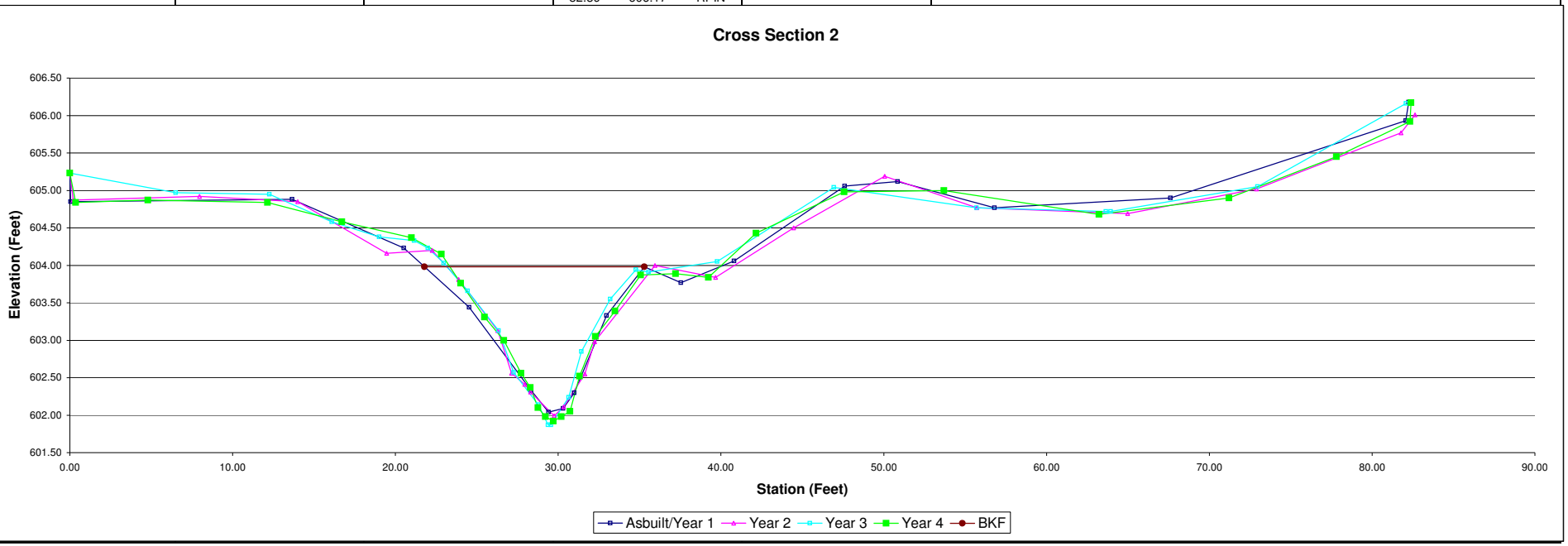
Project:	UT to South Fork Cane Creek
Cross Section:	Cross Section 2
Feature	Riffle
Station:	11+51
Date:	3/29/11
Crew:	SV, ZP

Summary (bankfull)

	MY0/1	MY2	MY3	MY4	MY5
A (BKF)	13.3	12.3	11.5	12.7	
W (BKF)	13.5	12.5	14.5	16.6	
Max d	1.9	2.0	2.1	2.1	
Mean d	1.0	1.0	0.8	0.8	
W/D	13.7	12.8	18.3	21.7	

MY00/01-2010			MY02-2010			MY03-2010			MY04-2011		
Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes
0.00	605.23	LPIN	0.00	605.23	LPIN	0.00	605.23	LPIN	0.00	605.23	LPIN
0.05	604.85		0.21	604.87		6.51	604.97		0.35	604.84	
13.66	604.88		7.96	604.92		12.26	604.95		4.80	604.87	
20.51	604.23	BKF L	14.00	604.85		16.10	604.58		12.14	604.84	
24.54	603.44		19.46	604.16	BKF L	19.00	604.38		16.71	604.58	
28.33	602.33		22.26	604.20		21.15	604.33		20.98	604.37	
29.41	602.04	TW	23.88	603.81		22.00	604.23	BKF L	22.82	604.15	
30.31	602.09		26.29	603.13		22.97	604.03		24.02	603.76	BKF L
30.99	602.30		27.13	602.56		24.44	603.66		25.47	603.31	
32.97	603.33		27.94	602.41		26.33	603.13		26.66	603.00	
35.29	603.98	BKF R	28.30	602.31		27.27	602.57		27.72	602.56	
37.54	603.77		29.75	601.99	TW	28.78	602.14	TOE	28.28	602.37	
40.80	604.06		30.34	602.11		29.38	601.87		28.76	602.10	TOE L
47.60	605.06		31.64	602.55		29.55	601.87	TW	29.22	601.98	
50.85	605.12		32.24	602.98		30.64	602.24	TOE	29.71	601.92	TW
56.81	604.77		35.95	604.00	BKF R	31.43	602.85		30.19	601.98	
67.62	604.90		39.66	603.84		33.19	603.55		30.72	602.05	TOE R
82.07	605.93		44.46	604.50		34.78	603.94	BKF R	31.31	602.52	
82.24	606.18	RPIN	50.05	605.19		35.55	603.91		32.28	603.05	
			55.72	604.77		39.77	604.05		33.49	603.39	BKF R
			64.98	604.69		46.94	605.04		35.06	603.87	
			72.90	605.02		55.70	604.77		37.21	603.89	
			81.78	605.77		63.64	604.72		39.23	603.84	
			82.63	606.01	RPIN	63.94	604.72		42.16	604.43	
						72.96	605.05		47.57	604.98	
						82.09	606.16	RPIN	53.69	605.00	
									63.22	604.68	
									71.21	604.90	
									77.80	605.45	
									82.33	605.92	
									82.39	606.17	RPIN

Photo of XS-2, looking in the downstream direction



Project:	UT to South Fork Cane Creek
Cross Section:	Cross Section 3
Feature	Riffle
Station:	14+05
Date:	3/29/11
Crew:	SV, ZP

Summary (bankfull)

	MY0/1	MY2	MY3	MY4	MY5
A (BKF)	17.0	17.0	16.6	16.0	
W (BKF)	20.5	19.8	22.7	15.7	
Max d	2.5	2.4	2.6	2.7	
Mean d	0.8	0.9	0.7	1.0	
W/D	24.7	23.1	31.1	15.5	

MY00/01-2010

Station	Elevation	Notes
0.00	604.06	LPIN
0.82	603.63	
6.32	603.45	
14.37	603.20	
19.20	603.13	BKF L
20.13	602.98	
24.32	601.84	
25.92	601.60	
26.72	600.63	
26.99	600.78	TW
27.97	601.09	
29.03	601.46	
29.02	601.46	
29.87	601.64	
31.53	602.25	
33.03	602.64	
35.19	603.13	BKF R
37.34	603.04	
40.85	603.25	
43.73	603.58	
50.31	604.05	RPIN

MY02-2010

Station	Elevation	Notes
0.00	604.06	LPIN
0.48	603.63	
5.70	603.43	
13.63	603.32	
19.10	603.13	BKF L
20.54	602.89	
21.81	602.50	
23.49	602.06	
25.15	601.66	
25.81	601.63	
27.34	600.78	TW
27.81	600.99	
27.94	601.05	
28.27	601.31	
28.92	601.56	
30.41	601.92	
32.96	602.67	
34.43	602.96	
36.75	603.00	
38.98	603.27	BKF R
41.77	603.34	
44.76	603.75	
50.46	603.88	
50.54	604.04	RPIN

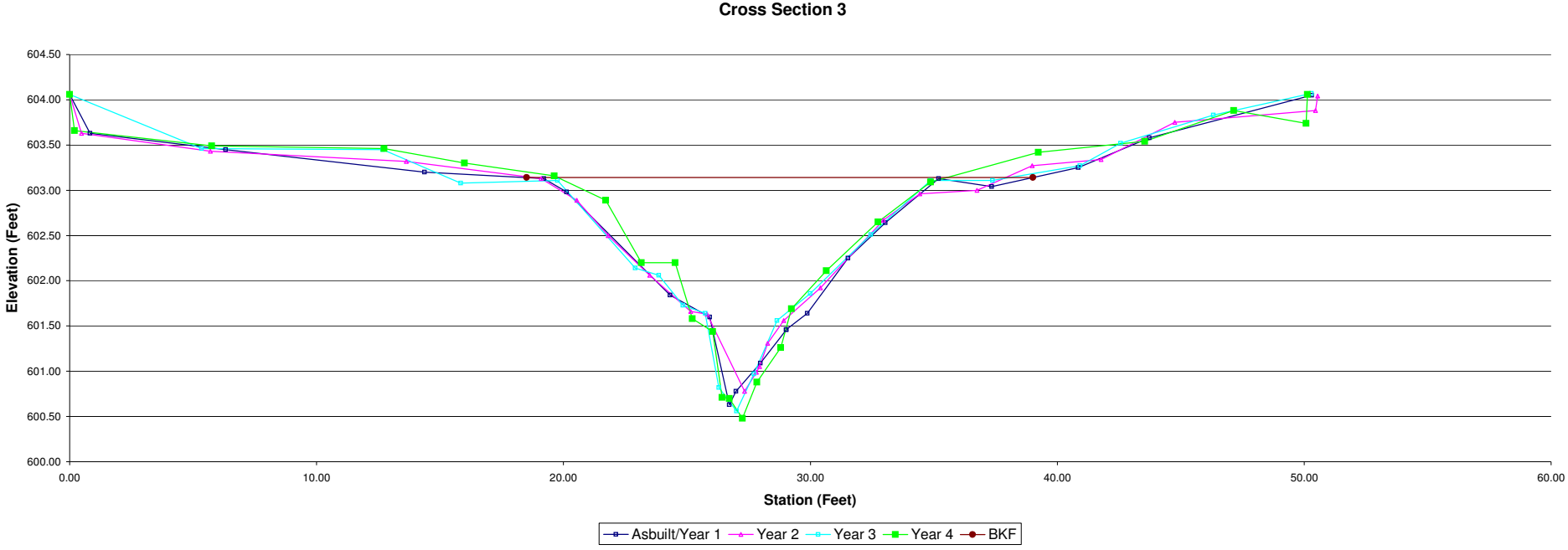
MY03-2010

Station	Elevation	Notes
0.00	604.06	LPIN
5.34	603.46	
12.68	603.45	
15.84	603.08	
19.76	603.11	BKF L
22.91	602.14	
23.86	602.06	
24.84	601.73	
25.74	601.64	
26.29	600.82	TOE L
27.01	600.56	TW
27.72	600.97	TOE R
28.65	601.56	
29.99	601.86	
32.45	602.51	
34.87	603.11	BKF R
37.38	603.11	
40.92	603.27	
42.57	603.52	
46.32	603.83	
50.30	604.07	RPIN

MY04-2011

Station	Elevation	Notes
0.00	604.06	LPIN
0.20	603.66	
5.75	603.49	
12.73	603.46	
15.99	603.30	
19.63	603.16	BKF L
21.71	602.89	
23.16	602.20	
24.52	602.20	
25.22	601.58	
26.04	601.44	
26.42	600.71	TOE L
26.72	600.70	
27.25	600.48	TW
27.83	600.88	TOE R
28.80	601.26	
29.24	601.69	
30.65	602.11	
32.74	602.65	
34.87	603.09	BKF R
39.23	603.42	
43.54	603.54	
47.15	603.88	
50.08	603.74	
50.13	604.06	RPIN

Photo of XS-3 looking in the downstream direction



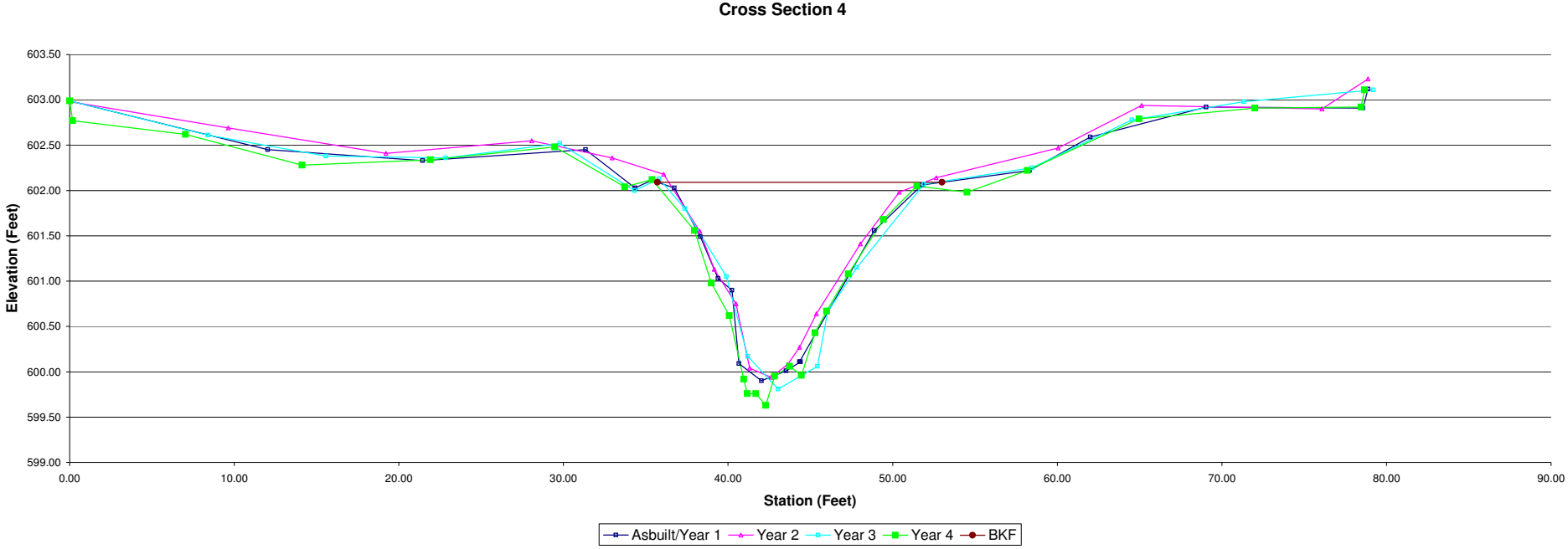
Project:	UT to South Fork Cane Creek
Cross Section:	Cross Section 4
Feature	Riffle
Station:	17+04
Date:	3/29/11
Crew:	SV, ZP

Summary (bankfull)

	MY0/1	MY2	MY3	MY4	MY5
A (BKF)	17.6	15.4	18.1	18.9	
W (BKF)	17.3	14.8	16.6	16.0	
Max d	2.2	2.1	2.3	2.5	
Mean d	1.0	1.0	1.1	1.2	
W/D	17.1	14.3	15.3	13.5	

MY00/01-2010			MY02-2010			MY03-2010			MY04-2011		
Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes
0.00	602.99	LPIN	0.00	602.99	LPIN	0.00	602.99	LPIN	0.00	602.99	LPIN
12.04	602.45		0.01	602.98		8.41	602.61		0.18	602.77	
21.44	602.33		9.64	602.69		15.57	602.38		7.03	602.62	
31.35	602.45		19.22	602.41		22.85	602.36		14.12	602.28	
34.34	602.03		28.07	602.55		29.78	602.52		21.92	602.34	
35.36	602.11	BKF L	32.96	602.36		34.33	602.00		29.47	602.48	
36.73	602.03		36.09	602.18	BKF L	35.81	602.13	BKF L	33.73	602.04	
38.32	601.49		38.29	601.55		37.37	601.80		35.38	602.12	BKF L
39.39	601.03		39.16	601.13		39.89	601.05		37.95	601.56	
40.24	600.90		40.48	600.75		41.19	600.17	TOE L	38.98	600.98	
40.66	600.09		41.31	600.04		43.04	599.81	TW	40.07	600.62	
42.03	599.90	TW	42.62	599.94	TW	45.43	600.06	TOE R	40.96	599.92	TOE L
43.52	600.01		43.63	600.08		46.05	600.66		41.17	599.76	
44.40	600.11		44.34	600.27		47.82	601.15		41.69	599.76	TW
44.34	600.11		45.37	600.64		51.90	602.07	BKF R	42.29	599.63	
48.89	601.56		48.03	601.41		58.46	602.25		42.82	599.95	
51.78	602.06	BKF R	50.39	601.98		64.53	602.78		43.74	600.06	
58.32	602.22		52.65	602.14	BKF R	71.34	602.98		44.46	599.96	TOE R
62.01	602.59		60.05	602.47		79.20	603.11	RPIN	45.28	600.43	
69.04	602.92		65.12	602.94					45.98	600.67	
78.57	602.91		76.07	602.90					47.30	601.08	
78.88	603.12	RPIN	78.88	603.23	RPIN				49.43	601.68	
									51.48	602.05	BKF R
									54.51	601.98	
									58.18	602.22	
									64.98	602.79	
									72.01	602.91	
									78.45	602.92	
									78.67	603.11	RPIN

Photo of XS-4, looking in the downstream direction



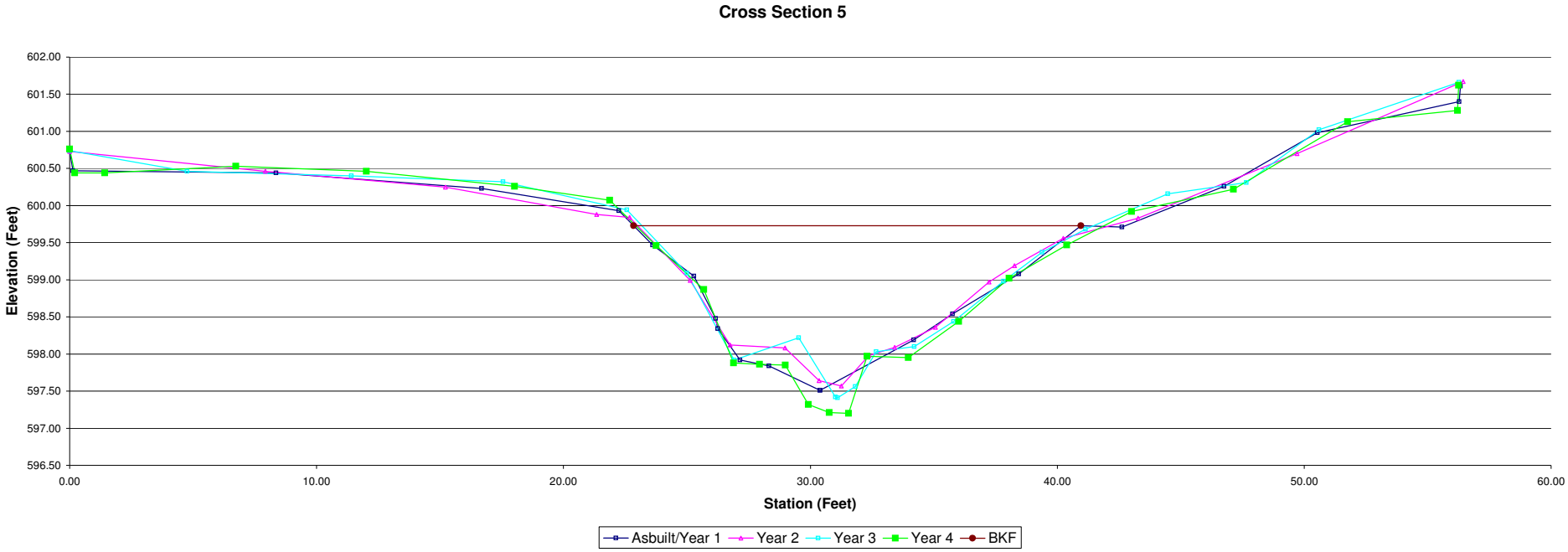
Project:	UT to South Fork Cane Creek
Cross Section:	Cross Section 5
Feature	Riffle
Station:	19+73
Date:	3/29/11
Crew:	SV, ZP

Summary (bankfull)

	MY0/1	MY2	MY3	MY4	MY5
A (BKF)	22.2	23.5	22.2	23.9	
W (BKF)	18.1	20.6	18.3	19.0	
Max d	2.2	2.3	2.3	2.5	
Mean d	1.2	1.1	1.2	1.3	
W/D	14.8	18.0	15.1	15.1	

MY00/01-2010			MY02-2010			MY03-2010			MY04-2011		
Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes
0.00	600.74	LPIN	0.00	600.73	LPIN	0.00	600.74	LPIN	0.00	600.76	LPIN
0.13	600.47		7.92	600.46		4.76	600.46		0.21	600.44	
8.36	600.44		15.22	600.25		11.41	600.40		1.42	600.44	
16.68	600.23		21.34	599.88	BKF L	17.55	600.32		6.73	600.53	
22.24	599.93	BKF L	22.68	599.84		22.57	599.94	BKF L	12.02	600.46	
23.61	599.47		25.13	598.99		25.00	599.09		18.02	600.26	
25.28	599.05		26.75	598.12		26.91	597.92		21.87	600.07	BKF L
26.16	598.48		28.97	598.08		29.53	598.22		23.75	599.46	
26.25	598.34		30.35	597.64		31.02	597.42	TOE L	25.68	598.87	
27.15	597.92		31.25	597.57	TW	31.10	597.41	TW	26.89	597.88	
28.32	597.84		32.37	597.98		31.82	597.56	TOE R	27.94	597.86	
30.39	597.51	TW	33.41	598.09		32.67	598.03		28.98	597.85	
30.40	597.51		35.06	598.36		34.21	598.10		29.92	597.32	TOE L
34.18	598.19		37.24	598.97		35.80	598.44		30.77	597.21	TW
35.76	598.54		38.27	599.19		37.82	598.98		31.55	597.20	TOE R
38.44	599.08		40.24	599.56		39.39	599.37		32.30	597.97	
40.96	599.73	BKF R	43.27	599.83	BKF R	41.14	599.68	BKF R	33.97	597.95	
42.62	599.71		49.71	600.70		44.48	600.16		36.01	598.44	
46.76	600.26		56.44	601.67	RPIN	47.66	600.31		38.05	599.02	
50.53	600.98					50.60	601.02		40.38	599.47	BKF R
56.28	601.40					56.27	601.66	RPIN	43.01	599.92	
56.33	601.61	RPIN							47.14	600.22	
									51.76	601.13	
									56.21	601.28	
									56.26	601.62	RPIN

Photo of XS-5, looking in the downstream direction



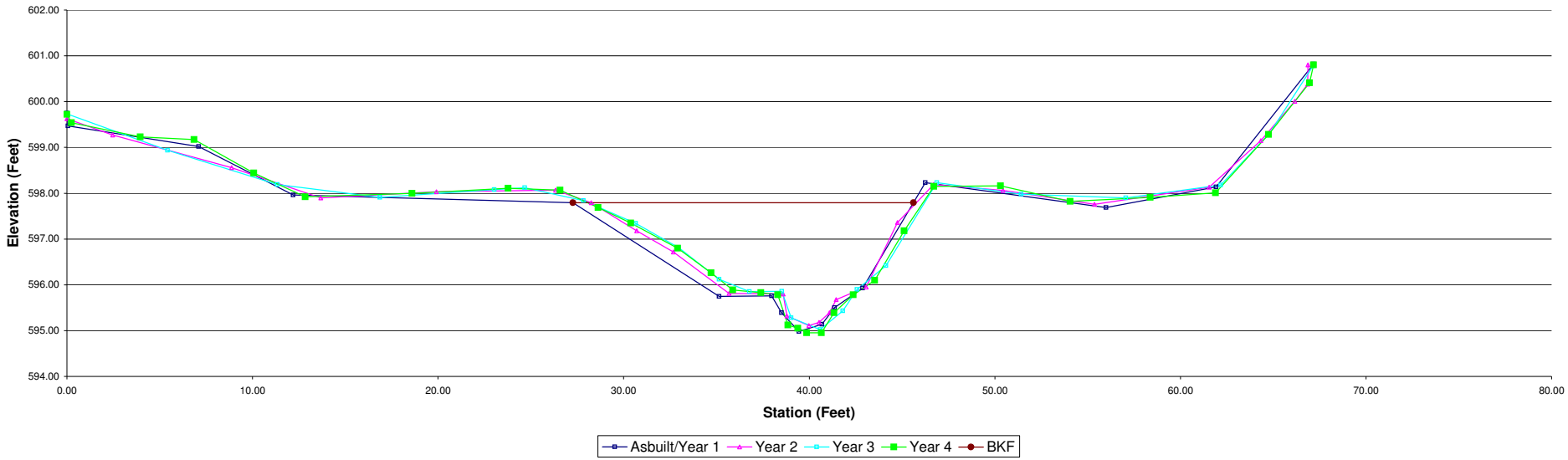
Project:	UT to South Fork Cane Creek
Cross Section:	Cross Section 6
Feature	Riffle
Station:	22+78
Date:	3/29/11
Crew:	SV, ZP

Summary (bankfull)

	MY0/1	MY2	MY3	MY4	MY5
A (BKF)	28.2	31.4	25.5	26.0	
W (BKF)	18.3	34.2	18.1	18.0	
Max d	2.8	3.0	2.8	2.8	
Mean d	1.5	0.9	1.4	1.4	
W/D	11.9	37.2	12.8	12.5	

MY00/01-2010			MY02-2010			MY03-2010			MY04-2011		
Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes
0.00	599.75	LPIN	0.00	599.63	LPIN	0.00	599.73	LPIN	0.00	599.72	LPIN
0.06	599.47		2.46	599.27		5.42	598.94		0.25	599.54	
7.10	599.02		8.87	598.56		11.34	598.19		3.95	599.23	
12.19	597.96		13.67	597.90		16.86	597.91		6.86	599.17	
27.27	597.79	BKF L	19.91	598.03		23.03	598.08		10.07	598.44	
35.14	595.75		26.33	598.07	BKF L	24.67	598.12		12.84	597.92	
37.98	595.76		28.25	597.79		27.83	597.84	BKF L	18.60	598.00	
38.50	595.39		30.70	597.18		30.64	597.34		23.78	598.11	
39.44	594.98	TW	32.68	596.72		32.96	596.81		26.58	598.07	
40.68	595.14		35.68	595.81		35.15	596.12		28.62	597.69	BKF L
41.36	595.50		38.60	595.80		36.77	595.85		30.38	597.35	
42.88	595.93		38.80	595.32		38.52	595.86		32.91	596.80	
46.26	598.23	BKF R	39.98	595.11	TW	39.03	595.28	TOE L	34.71	596.26	
55.99	597.69		40.53	595.18		40.58	595.02	TW	35.88	595.89	
61.92	598.14		41.09	595.39		41.81	595.43	TOE R	37.39	595.83	
67.18	600.82	RPIN	41.45	595.68		42.57	595.90		38.30	595.78	
			43.06	595.95		44.13	596.42		38.86	595.12	TOE L
			44.75	597.36		46.87	598.23	BKF R	39.38	595.05	
			46.70	598.19	BKF R	51.42	597.98		39.87	594.95	TW
			50.44	598.06		57.06	597.90		40.66	594.95	
			55.37	597.76		62.17	598.18		41.34	595.39	TOE R
			61.55	598.13		64.80	599.30		42.38	595.78	
			64.33	599.15		67.14	600.78	RPIN	43.53	596.10	
			66.16	600.01					45.12	597.18	BKF R
			66.86	600.38					46.71	598.15	
			66.87	600.80	RPIN				50.31	598.16	
									54.06	597.82	
									58.38	597.91	
									61.90	598.01	
									64.75	599.28	
									66.96	600.41	
									67.17	600.80	RPIN

Photo of XS-6, looking in the downstream direction



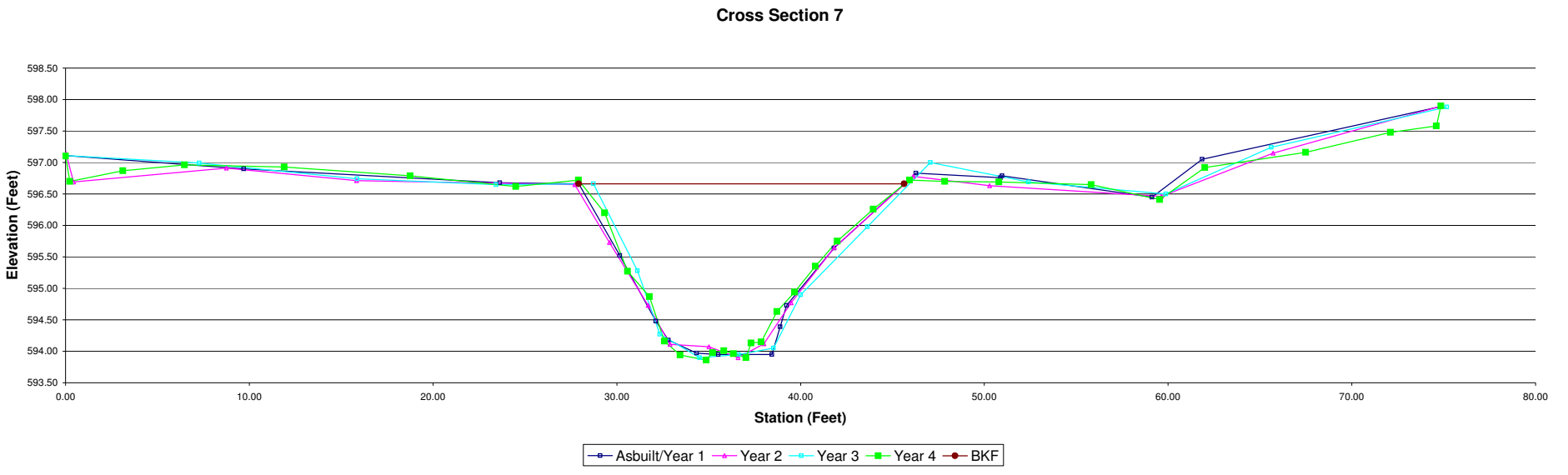
Project:	UT to South Fork Cane Creek
Cross Section:	Cross Section 7
Feature	Riffle
Station:	27+22
Date:	3/29/11
Crew:	SV, ZP

Summary (bankfull)

	MY0/1	MY2	MY3	MY4	MY5
A (BKF)	28.8	28.4	28.8	27.9	
W (BKF)	17.7	17.9	17.2	17.6	
Max d	2.7	2.8	2.8	2.8	
Mean d	1.6	1.6	1.7	1.6	
W/D	10.9	11.3	10.3	11.1	

MY00/01-2010			MY02-2010			MY03-2010			MY04-2011		
Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes
0.00	597.11	LPIN	0.03	597.14	LPIN	0.00	597.11	LPIN	0.00	597.10	LPIN
9.70	596.90		0.44	596.69		7.27	596.99		0.23	596.70	
23.63	596.68		8.75	596.91		15.87	596.74		3.12	596.87	
27.93	596.66	BKF L	15.84	596.71		23.43	596.65		6.48	596.96	
30.17	595.52		27.71	596.65	BKF L	28.73	596.66	BKF L	11.91	596.93	
32.12	594.48		29.60	595.73		31.12	595.28		18.75	596.79	
32.81	594.18		31.70	594.73		32.34	594.27	TOE L	24.51	596.62	
34.34	593.97		32.90	594.11		34.51	593.90	TW	27.92	596.72	BKF L
35.52	593.95	TW	35.01	594.07		36.62	593.95		29.34	596.20	
38.44	593.95		36.60	593.90	TW	38.52	594.05	TOE R	30.58	595.27	
38.89	594.39		38.01	594.12		40.01	594.90		31.77	594.87	
39.24	594.73		39.48	594.77		43.64	595.98		32.59	594.16	TOE L
41.82	595.64		41.83	595.65		47.06	597.00	BKF R	33.45	593.94	
46.28	596.83	BKF R	46.13	596.78	BKF R	52.40	596.69		34.87	593.86	TW
50.88	596.76		50.28	596.63		59.88	596.50		35.21	593.98	
50.97	596.79		59.64	596.46		65.61	597.24		35.83	594.01	
59.13	596.45		65.71	597.15		75.17	597.88	RPIN	36.35	593.96	
61.86	597.05		74.79	597.89	RPIN				37.03	593.90	
74.85	597.89	RPIN							37.30	594.13	
									37.86	594.15	TOE R
									38.71	594.63	
									39.67	594.94	
									40.80	595.35	
									42.00	595.75	
									43.96	596.26	
									45.93	596.72	BKF R
									47.84	596.70	
									50.80	596.69	
									55.82	596.65	
									59.55	596.41	
									62.00	596.92	
									67.48	597.16	
									72.11	597.48	
									74.60	597.58	
									74.85	597.90	RPIN

Photo of XS-7, looking in the downstream direction



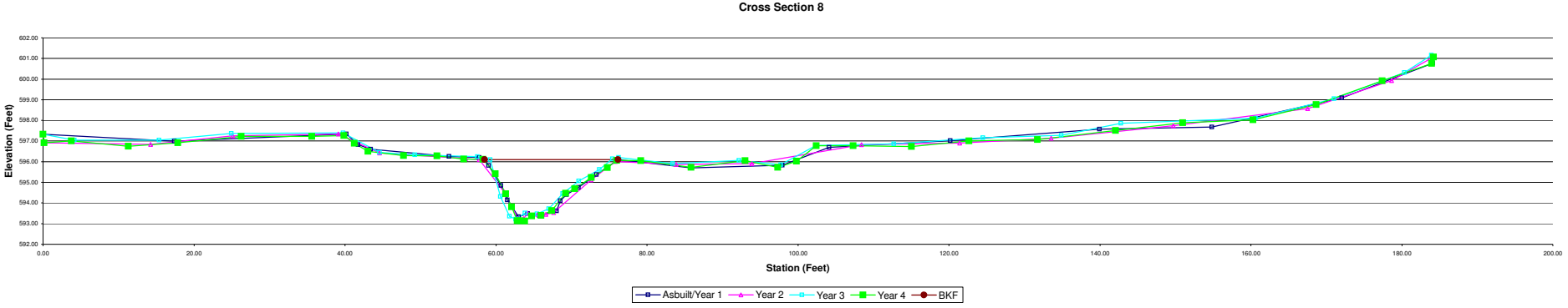
Project:	UT to South Fork Cane Creek
Cross Section:	Cross Section 8
Feature	Riffle
Station:	30+12
Date:	3/29/11
Crew:	SV, ZP

Summary (bankfull)

	MY0/1	MY2	MY3	MY4	MY5
A (BKF)	28.0	28.8	26.7	26.6	
W (BKF)	17.7	17.9	16.0	17.7	
Max d	2.8	2.8	2.9	3.0	
Mean d	1.6	1.6	1.7	1.5	
W/D	11.2	11.1	9.7	11.7	

MY00/01-2010			MY02-2010			MY03-2010			MY04-2011		
Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes
0.00	597.33	LPIN	0.00	597.32	LPIN	0.00	597.33	LPIN	0.00	597.33	LPIN
17.40	596.99		0.26	596.91		4.14	597.04		0.13	596.91	
40.17	597.34		14.24	596.84		15.38	597.04		3.77	597.01	
41.74	596.83		25.11	597.25		24.93	597.37		11.30	596.75	
43.40	596.60		39.12	597.34		39.74	597.39		17.85	596.91	
53.77	596.26		44.57	596.43		44.58	596.45		26.25	597.22	
57.79	596.20		55.99	596.15		49.23	596.33		35.62	597.22	
58.50	596.10	BKF L	57.79	596.10	BKF L	57.54	596.24		39.86	597.26	
59.02	595.82		61.08	594.54		59.25	596.10	BKF L	41.23	596.89	
60.67	594.84		62.88	593.24		60.59	594.32		43.03	596.50	
61.51	594.15		63.66	593.24	TW	61.79	593.36	TOE L	47.75	596.29	
63.00	593.33		64.17	593.51		62.60	593.22	TW	52.19	596.28	
64.21	593.49		65.50	593.45		63.86	593.51		55.72	596.13	
65.74	593.38	TW	66.62	593.45		65.45	593.48		58.28	596.12	BKF L
68.02	593.62		67.64	593.54		67.00	593.72	TOE R	59.90	595.42	
68.51	594.11		72.58	595.12		68.85	594.46		61.28	594.45	
69.32	594.41		75.83	596.01	BKF R	70.98	595.06		62.09	593.81	
70.92	594.75		83.87	595.87		73.71	595.62		62.82	593.14	TOE L
73.29	595.37		93.89	595.91		75.43	596.14	BKF R	63.14	593.14	
76.17	596.10	BKF R	108.40	596.82		76.26	596.20		63.81	593.13	TW
85.89	595.70		121.41	596.90		83.40	595.91		64.72	593.37	
97.91	595.83		133.54	597.13		92.20	596.06		65.98	593.40	
104.13	596.70		149.72	597.74		97.70	595.86		67.38	593.63	TOE R
120.17	597.02		167.50	598.57		102.40	596.79		69.23	594.47	
139.96	597.57		178.62	599.93		112.70	596.87		70.44	594.69	
154.83	597.68		184.16	601.07	RPIN	124.49	597.16		72.62	595.23	
172.05	599.09					134.87	597.28		74.76	595.71	
184.10	600.77					142.78	597.86		76.01	596.06	BKF R
184.31	601.07	RPIN				160.62	598.10		79.19	596.05	
						171.03	599.05		85.84	595.72	
						180.35	600.32		93.02	596.05	
						183.93	601.16	RPIN	97.32	595.72	
									99.79	596.02	
									102.43	596.78	
									107.33	596.77	
									115.05	596.74	
									122.67	597.01	
									131.71	597.07	
									142.09	597.51	
									150.95	597.88	
									160.28	598.03	
									168.66	598.77	
									177.38	599.92	
									183.95	600.76	
									184.19	601.07	RPIN

Photo of XS-8, looking in the downstream direction



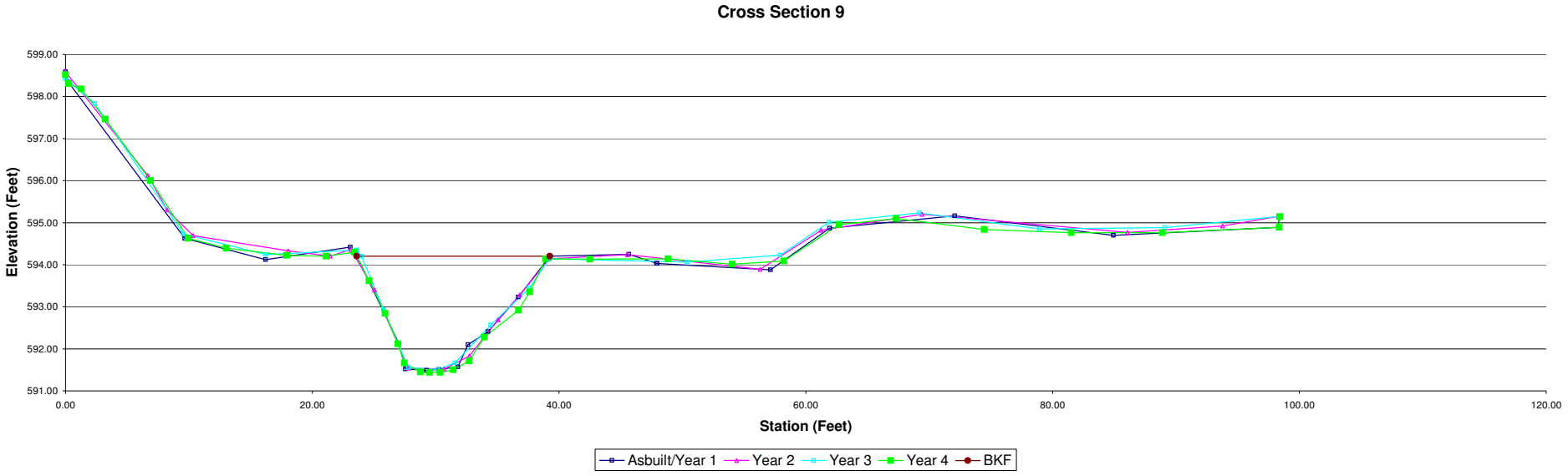
Project:	UT to South Fork Cane Creek
Cross Section:	Cross Section 9
Feature	Riffle
Station:	37+55
Date:	3/29/11
Crew:	SV, ZP

Summary (bankfull)

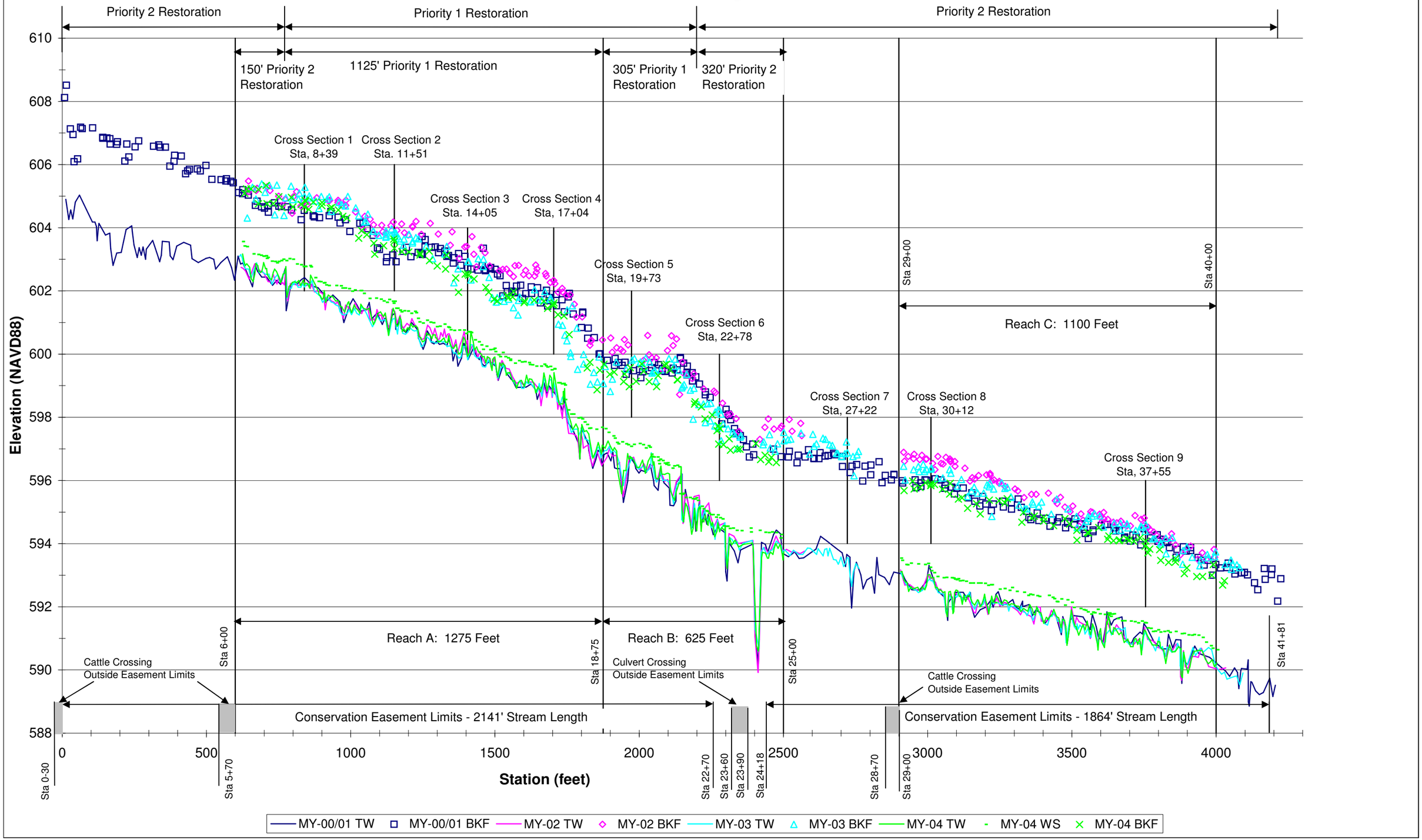
	MY0/1	MY2	MY3	MY4	MY5
A (BKF)	25.9	24.7	27.0	28.7	
W (BKF)	15.7	15.4	32.6	15.3	
Max d	2.7	2.6	2.7	2.8	
Mean d	1.7	1.6	0.8	1.9	
W/D	9.4	9.6	39.3	8.2	

MY00/01-2010			MY02-2010			MY03-2010			MY04-2011		
Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes
0.00	598.59	LPIN	0.00	598.59	LPIN	0.00	598.42	LPIN	0.00	598.52	LPIN
0.24	598.34		6.68	596.12		2.38	597.83		0.26	598.31	
9.66	594.63		8.22	595.31		9.57	594.73		1.26	598.18	
16.22	594.12		10.34	594.69		16.23	594.24		3.22	597.46	
23.09	594.42	BKF L	18.06	594.33		23.60	594.35	BKF L	6.90	596.00	
23.60	594.20		21.44	594.20	BKF L	24.00	594.20		9.96	594.63	
27.01	592.13		23.13	594.36		25.77	592.93		13.03	594.39	
27.56	591.52		25.04	593.40		27.79	591.55	TOE L	17.93	594.22	
29.26	591.49	TW	27.78	591.54		30.17	591.51	TW	21.14	594.20	
30.25	591.51		30.69	591.52	TW	31.55	591.67	TOE R	23.43	594.30	BKF L
31.80	591.57		32.74	591.83		34.46	592.57		24.60	593.62	
32.62	592.10		35.06	592.69		37.56	593.44		25.91	592.84	
34.25	592.41		36.80	593.28		39.22	594.14		26.94	592.12	
36.70	593.23		39.21	594.14		50.37	594.06		27.47	591.66	TOE L
39.25	594.20	BKF R	45.54	594.24	BKF R	57.91	594.23	BKF R	28.77	591.45	TW
45.66	594.25		56.29	593.89		61.89	595.01		29.52	591.44	
47.94	594.03		61.24	594.82		69.20	595.23		30.36	591.44	
47.90	594.03		69.41	595.20		78.95	594.85		31.43	591.50	
57.14	593.88		86.07	594.77		89.08	594.88		32.70	591.71	TOE R
61.93	594.87		93.78	594.92		98.41	595.15	RPIN	33.94	592.28	
72.07	595.16		98.29	595.15	RPIN				36.71	592.92	
84.92	594.70								37.62	593.36	
98.33	594.89								38.91	594.14	BKF R
98.34	595.15	RPIN							42.51	594.13	
									48.83	594.14	
									54.03	594.01	
									58.22	594.09	
									62.69	594.95	
									67.32	595.10	
									74.45	594.84	
									81.52	594.76	
									88.89	594.76	
									98.36	594.89	
									98.41	595.14	RPIN

Photo of XS-9, looking in the downstream direction

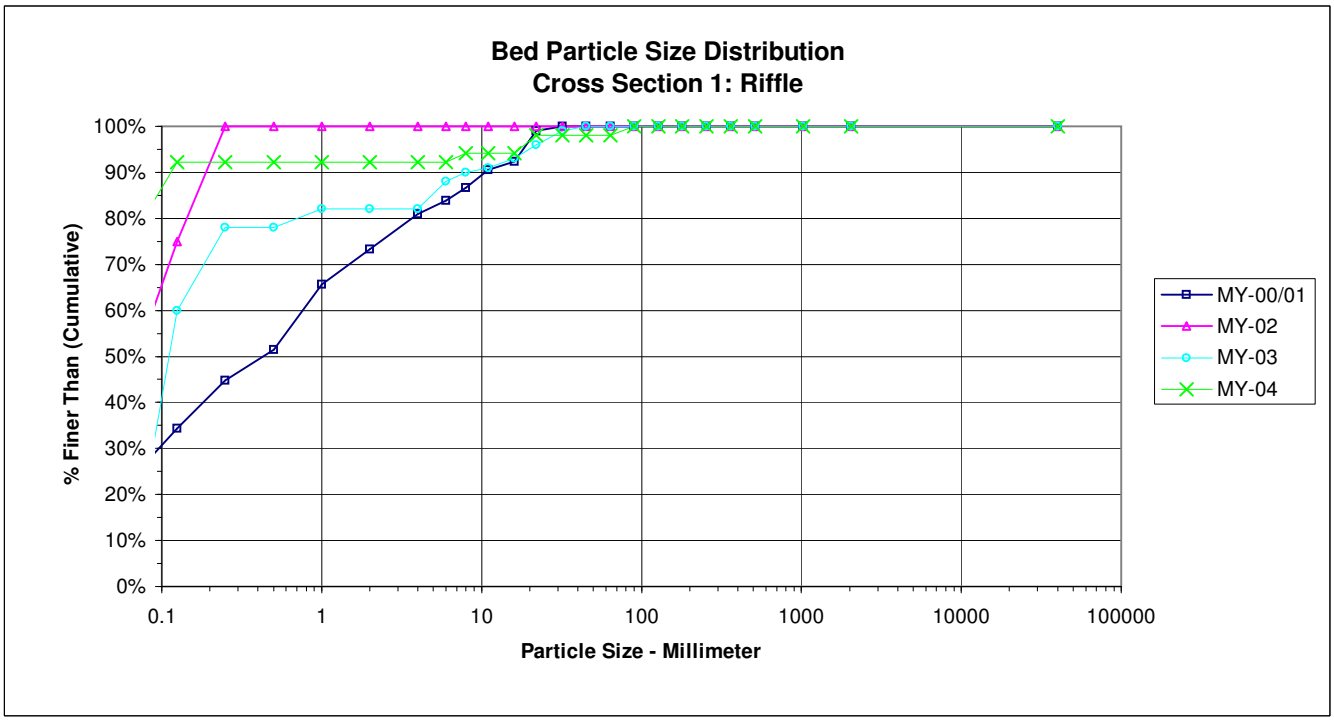


UT to South Fork Creek Longitudinal Profile MY-04



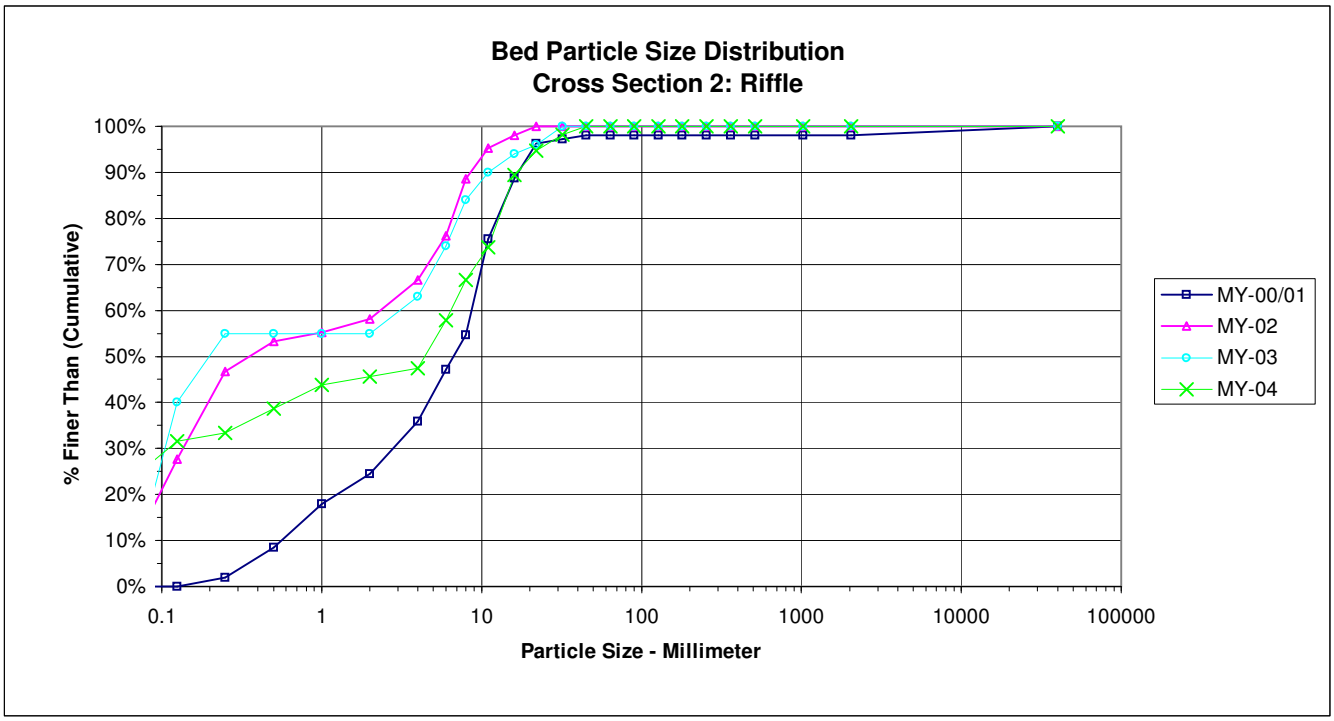
PEBBLE COUNT								
Project:	UT to South Fork Creek					**Date:**	10/20/2011	
Location:	Cross Section #1							
				Particle Counts				
Inches	Particle	Millimeter		Riffles	Pools	Total No.	Item %	% Cumulative
	Silt/Clay	< 0.062	S/C	76	0	76	75%	75%
	Very Fine	.062 - .125	S	18	0	18	18%	92%
	Fine	.125 - .25	A	0	0	0	0%	92%
	Medium	.25 - .50	N	0	0	0	0%	92%
	Coarse	.50 - 1.0	D	0	0	0	0%	92%
.04 -.08	Very Coarse	1.0 - 2.0	S	0	0	0	0%	92%
.08 - .16	Very Fine	2.0 - 4.0		0	0	0	0%	92%
.16 - .22	Fine	4.0 - 5.7	G	0	0	0	0%	92%
.22 - .31	Fine	5.7 - 8.0	R	2	0	2	2%	94%
.31 - .44	Medium	8.0 - 11.3	A	0	0	0	0%	94%
.44 - .63	Medium	11.3 - 16.0	V	0	0	0	0%	94%
.63 - .89	Coarse	16.0 - 22.6	E	4	0	4	4%	98%
.89 - 1.26	Coarse	22.6 - 32.0	L	0	0	0	0%	98%
1.26 - 1.77	Very Coarse	32.0 - 45.0	S	0	0	0	0%	98%
1.77 - 2.5	Very Coarse	45.0 - 64.0		0	0	0	0%	98%
2.5 - 3.5	Small	64 - 90	C	2	0	2	2%	100%
3.5 - 5.0	Small	90 - 128	O	0	0	0	0%	100%
5.0 - 7.1	Large	128 - 180	B	0	0	0	0%	100%
7.1 - 10.1	Large	180 - 256	L	0	0	0	0%	100%
10.1 - 14.3	Small	256 - 362	B	0	0	0	0%	100%
14.3 - 20	Small	362 - 512	L	0	0	0	0%	100%
20 - 40	Medium	512 - 1024	D	0	0	0	0%	100%
40 - 80	Lrg- Very Lrg	1024 - 2048	R	0	0	0	0%	100%
	Bedrock		BDRK	0	0	0	0%	100%
			Totals	**102**	**0**	**102**	**100%**	**100%**

d16	d35	d50	d84	d95
0.1	0.1	0.1	0.1	17.4



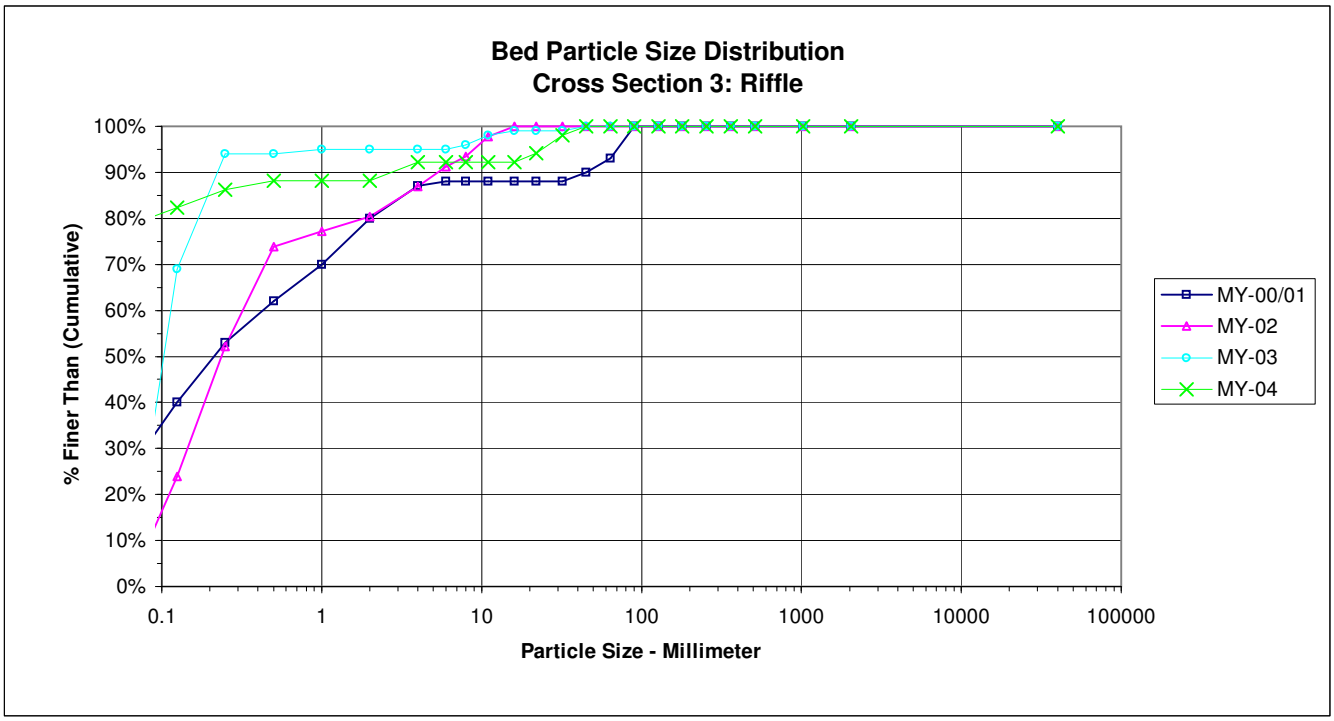
PEBBLE COUNT								
Project:	UT to South Fork Creek					**Date:**	10/20/2011	
Location:	Cross Section #2							
				Particle Counts				
Inches	Particle	Millimeter		Riffles	Pools	Total No.	Item %	% Cumulative
	Silt/Clay	< 0.062	S/C	26	0	26	23%	23%
	Very Fine	.062 - .125	S	10	0	10	9%	32%
	Fine	.125 - .25	A	2	0	2	2%	33%
	Medium	.25 - .50	N	6	0	6	5%	39%
	Coarse	.50 - 1.0	D	6	0	6	5%	44%
.04 -.08	Very Coarse	1.0 - 2.0	S	2	0	2	2%	46%
.08 - .16	Very Fine	2.0 - 4.0		2	0	2	2%	47%
.16 - .22	Fine	4.0 - 5.7	G	12	0	12	11%	58%
.22 - .31	Fine	5.7 - 8.0	R	10	0	10	9%	67%
.31 - .44	Medium	8.0 - 11.3	A	8	0	8	7%	74%
.44 - .63	Medium	11.3 - 16.0	V	18	0	18	16%	89%
.63 - .89	Coarse	16.0 - 22.6	E	6	0	6	5%	95%
.89 - 1.26	Coarse	22.6 - 32.0	L	4	0	4	4%	98%
1.26 - 1.77	Very Coarse	32.0 - 45.0	S	2	0	2	2%	100%
1.77 - 2.5	Very Coarse	45.0 - 64.0		0	0	0	0%	100%
2.5 - 3.5	Small	64 - 90	C	0	0	0	0%	100%
3.5 - 5.0	Small	90 - 128	O	0	0	0	0%	100%
5.0 - 7.1	Large	128 - 180	B	0	0	0	0%	100%
7.1 - 10.1	Large	180 - 256	L	0	0	0	0%	100%
10.1 - 14.3	Small	256 - 362	B	0	0	0	0%	100%
14.3 - 20	Small	362 - 512	L	0	0	0	0%	100%
20 - 40	Medium	512 - 1024	D	0	0	0	0%	100%
40 - 80	Lrg- Very Lrg	1024 - 2048	R	0	0	0	0%	100%
	Bedrock		BDRK	0	0	0	0%	100%
			Totals	**114**	**0**	**114**	**100%**	**100%**

d16	d35	d50	d84	d95
0.1	0.3	4.5	14.3	22.8



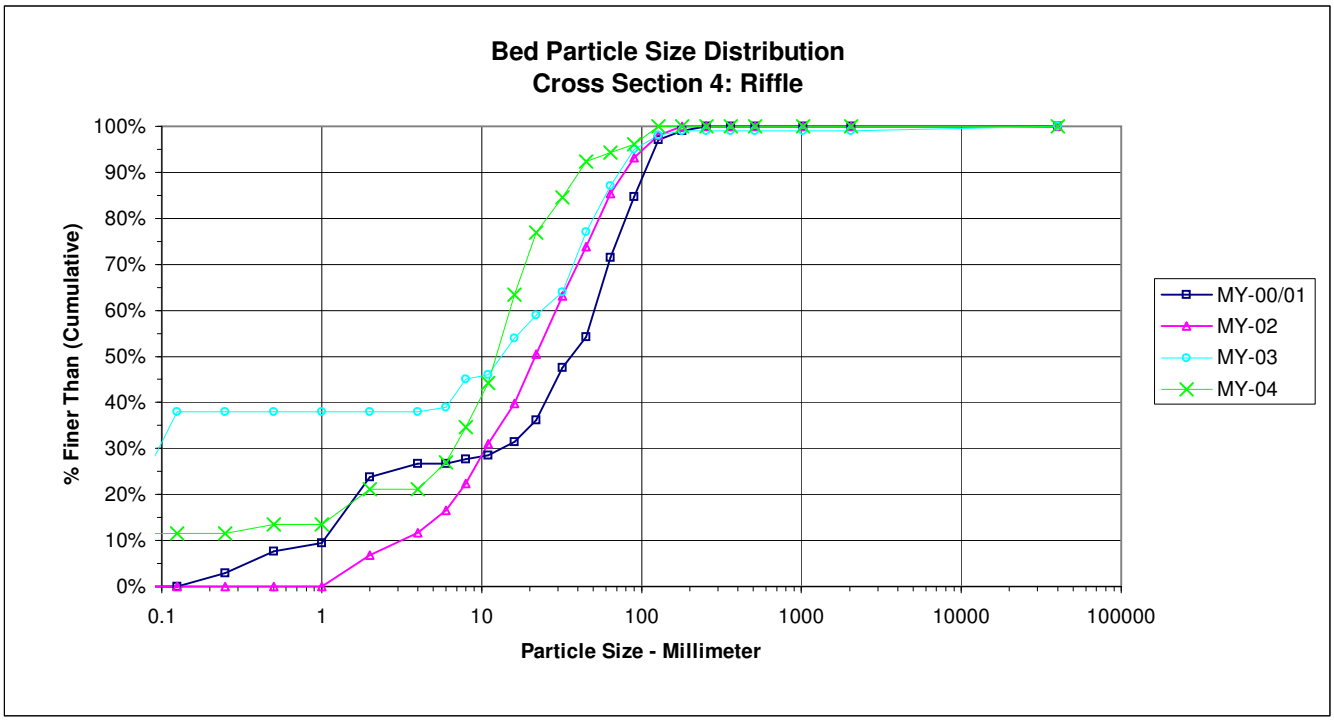
PEBBLE COUNT								
Project:	UT to South Fork Creek					**Date:**	10/20/2011	
Location:	Cross Section #3							
				Particle Counts				
Inches	Particle	Millimeter		Riffles	Pools	Total No.	Item %	% Cumulative
	Silt/Clay	< 0.062	S/C	80	0	80	78%	78%
	Very Fine	.062 - .125	S	4	0	4	4%	82%
	Fine	.125 - .25	A	4	0	4	4%	86%
	Medium	.25 - .50	N	2	0	2	2%	88%
	Coarse	.50 - 1.0	D	0	0	0	0%	88%
.04 -.08	Very Coarse	1.0 - 2.0	S	0	0	0	0%	88%
.08 - .16	Very Fine	2.0 - 4.0		4	0	4	4%	92%
.16 - .22	Fine	4.0 - 5.7	G	0	0	0	0%	92%
.22 - .31	Fine	5.7 - 8.0	R	0	0	0	0%	92%
.31 - .44	Medium	8.0 - 11.3	A	0	0	0	0%	92%
.44 - .63	Medium	11.3 - 16.0	V	0	0	0	0%	92%
.63 - .89	Coarse	16.0 - 22.6	E	2	0	2	2%	94%
.89 - 1.26	Coarse	22.6 - 32.0	L	4	0	4	4%	98%
1.26 - 1.77	Very Coarse	32.0 - 45.0	S	2	0	2	2%	100%
1.77 - 2.5	Very Coarse	45.0 - 64.0		0	0	0	0%	100%
2.5 - 3.5	Small	64 - 90	C	0	0	0	0%	100%
3.5 - 5.0	Small	90 - 128	O	0	0	0	0%	100%
5.0 - 7.1	Large	128 - 180	B	0	0	0	0%	100%
7.1 - 10.1	Large	180 - 256	L	0	0	0	0%	100%
10.1 - 14.3	Small	256 - 362	B	0	0	0	0%	100%
14.3 - 20	Small	362 - 512	L	0	0	0	0%	100%
20 - 40	Medium	512 - 1024	D	0	0	0	0%	100%
40 - 80	Lrg- Very Lrg	1024 - 2048	R	0	0	0	0%	100%
	Bedrock		BDRK	0	0	0	0%	100%
			Totals	**102**	**0**	**102**	**100%**	**100%**

d16	d35	d50	d84	d95
0.1	0.1	0.1	0.2	24.3



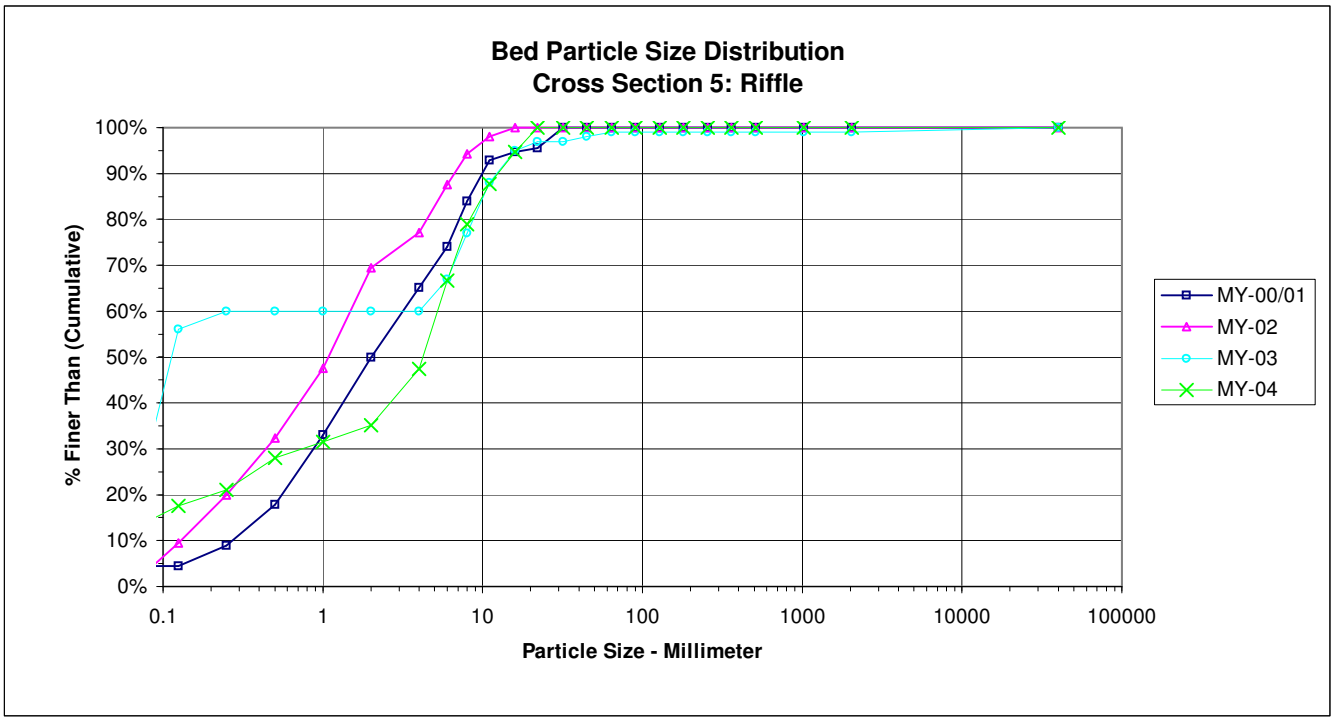
PEBBLE COUNT								
Project:	UT to South Fork Creek					**Date:**	10/20/2011	
Location:	Cross Section #4							
				Particle Counts				
Inches	Particle	Millimeter		Riffles	Pools	Total No.	Item %	% Cumulative
	Silt/Clay	< 0.062	S/C	12	0	12	12%	12%
	Very Fine	.062 - .125	S	0	0	0	0%	12%
	Fine	.125 - .25	A	0	0	0	0%	12%
	Medium	.25 - .50	N	2	0	2	2%	13%
	Coarse	.50 - 1.0	D	0	0	0	0%	13%
.04 -.08	Very Coarse	1.0 - 2.0	S	8	0	8	8%	21%
.08 - .16	Very Fine	2.0 - 4.0		0	0	0	0%	21%
.16 - .22	Fine	4.0 - 5.7	G	6	0	6	6%	27%
.22 - .31	Fine	5.7 - 8.0	R	8	0	8	8%	35%
.31 - .44	Medium	8.0 - 11.3	A	10	0	10	10%	44%
.44 - .63	Medium	11.3 - 16.0	V	20	0	20	19%	63%
.63 - .89	Coarse	16.0 - 22.6	E	14	0	14	13%	77%
.89 - 1.26	Coarse	22.6 - 32.0	L	8	0	8	8%	85%
1.26 - 1.77	Very Coarse	32.0 - 45.0	S	8	0	8	8%	92%
1.77 - 2.5	Very Coarse	45.0 - 64.0		2	0	2	2%	94%
2.5 - 3.5	Small	64 - 90	C	2	0	2	2%	96%
3.5 - 5.0	Small	90 - 128	O	4	0	4	4%	100%
5.0 - 7.1	Large	128 - 180	B	0	0	0	0%	100%
7.1 - 10.1	Large	180 - 256	L	0	0	0	0%	100%
10.1 - 14.3	Small	256 - 362	B	0	0	0	0%	100%
14.3 - 20	Small	362 - 512	L	0	0	0	0%	100%
20 - 40	Medium	512 - 1024	D	0	0	0	0%	100%
40 - 80	Lrg- Very Lrg	1024 - 2048	R	0	0	0	0%	100%
	Bedrock		BDRK	0	0	0	0%	100%
			Totals	**104**	**0**	**104**	**100%**	**100%**

d16	d35	d50	d84	d95
1.3	8.1	12.5	31.2	74.4



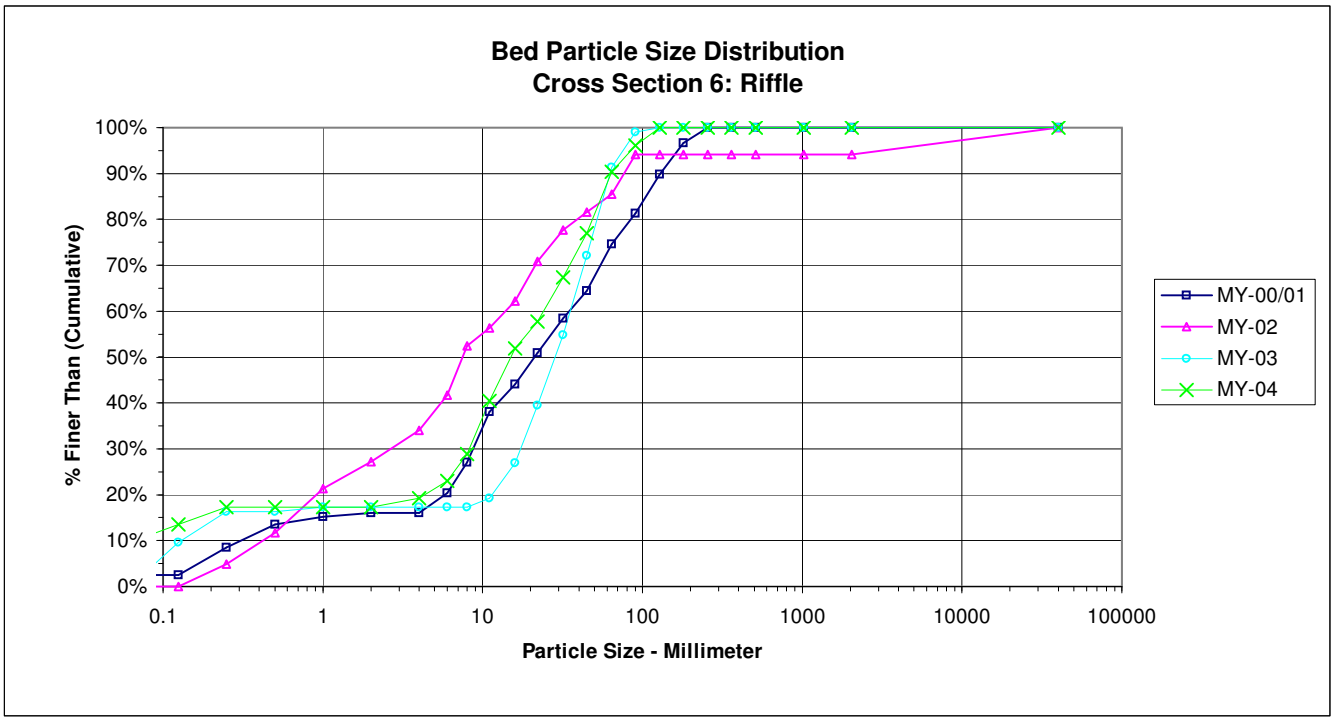
PEBBLE COUNT								
Project:	UT to South Fork Creek					**Date:**	10/20/2011	
Location:	Cross Section #5							
				Particle Counts				
Inches	Particle	Millimeter		Riffles	Pools	Total No.	Item %	% Cumulative
	Silt/Clay	< 0.062	S/C	14	0	14	12%	12%
	Very Fine	.062 - .125	S	6	0	6	5%	18%
	Fine	.125 - .25	A	4	0	4	4%	21%
	Medium	.25 - .50	N	8	0	8	7%	28%
	Coarse	.50 - 1.0	D	4	0	4	4%	32%
.04 -.08	Very Coarse	1.0 - 2.0	S	4	0	4	4%	35%
.08 - .16	Very Fine	2.0 - 4.0		14	0	14	12%	47%
.16 - .22	Fine	4.0 - 5.7	G	22	0	22	19%	67%
.22 - .31	Fine	5.7 - 8.0	R	14	0	14	12%	79%
.31 - .44	Medium	8.0 - 11.3	A	10	0	10	9%	88%
.44 - .63	Medium	11.3 - 16.0	V	8	0	8	7%	95%
.63 - .89	Coarse	16.0 - 22.6	E	6	0	6	5%	100%
.89 - 1.26	Coarse	22.6 - 32.0	L	0	0	0	0%	100%
1.26 - 1.77	Very Coarse	32.0 - 45.0	S	0	0	0	0%	100%
1.77 - 2.5	Very Coarse	45.0 - 64.0		0	0	0	0%	100%
2.5 - 3.5	Small	64 - 90	C	0	0	0	0%	100%
3.5 - 5.0	Small	90 - 128	O	0	0	0	0%	100%
5.0 - 7.1	Large	128 - 180	B	0	0	0	0%	100%
7.1 - 10.1	Large	180 - 256	L	0	0	0	0%	100%
10.1 - 14.3	Small	256 - 362	B	0	0	0	0%	100%
14.3 - 20	Small	362 - 512	L	0	0	0	0%	100%
20 - 40	Medium	512 - 1024	D	0	0	0	0%	100%
40 - 80	Lrg- Very Lrg	1024 - 2048	R	0	0	0	0%	100%
	Bedrock		BDRK	0	0	0	0%	100%
			Totals	**114**	**0**	**114**	**100%**	**100%**

d16	d35	d50	d84	d95
0.1	2.0	4.3	9.7	16.3



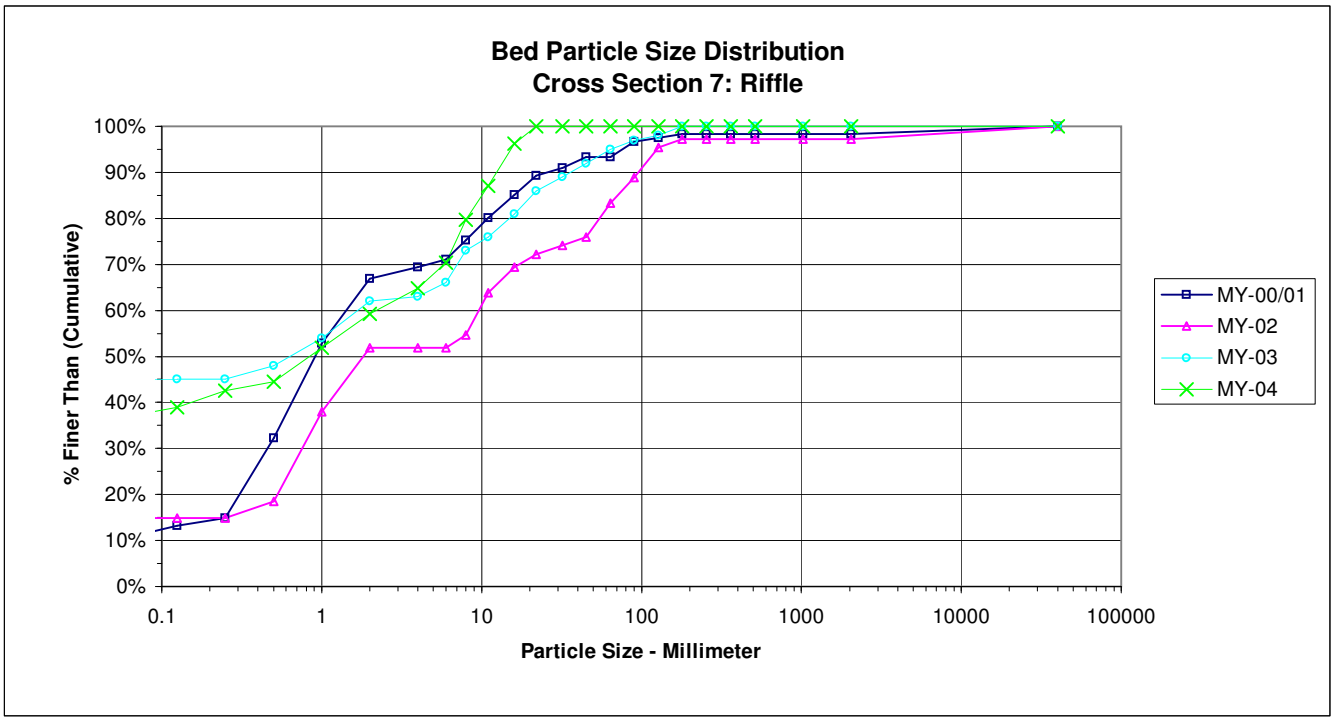
PEBBLE COUNT								
Project:	UT to South Fork Creek					**Date:**	10/20/2011	
Location:	Cross Section #6							
				Particle Counts				
Inches	Particle	Millimeter		Riffles	Pools	Total No.	Item %	% Cumulative
	Silt/Clay	< 0.062	S/C	10	0	10	10%	10%
	Very Fine	.062 - .125	S	4	0	4	4%	13%
	Fine	.125 - .25	A	4	0	4	4%	17%
	Medium	.25 - .50	N	0	0	0	0%	17%
	Coarse	.50 - 1.0	D	0	0	0	0%	17%
.04 -.08	Very Coarse	1.0 - 2.0	S	0	0	0	0%	17%
.08 - .16	Very Fine	2.0 - 4.0		2	0	2	2%	19%
.16 - .22	Fine	4.0 - 5.7	G	4	0	4	4%	23%
.22 - .31	Fine	5.7 - 8.0	R	6	0	6	6%	29%
.31 - .44	Medium	8.0 - 11.3	A	12	0	12	12%	40%
.44 - .63	Medium	11.3 - 16.0	V	12	0	12	12%	52%
.63 - .89	Coarse	16.0 - 22.6	E	6	0	6	6%	58%
.89 - 1.26	Coarse	22.6 - 32.0	L	10	0	10	10%	67%
1.26 - 1.77	Very Coarse	32.0 - 45.0	S	10	0	10	10%	77%
1.77 - 2.5	Very Coarse	45.0 - 64.0		14	0	14	13%	90%
2.5 - 3.5	Small	64 - 90	C	6	0	6	6%	96%
3.5 - 5.0	Small	90 - 128	O	4	0	4	4%	100%
5.0 - 7.1	Large	128 - 180	B	0	0	0	0%	100%
7.1 - 10.1	Large	180 - 256	L	0	0	0	0%	100%
10.1 - 14.3	Small	256 - 362	B	0	0	0	0%	100%
14.3 - 20	Small	362 - 512	L	0	0	0	0%	100%
20 - 40	Medium	512 - 1024	D	0	0	0	0%	100%
40 - 80	Lrg- Very Lrg	1024 - 2048	R	0	0	0	0%	100%
	Bedrock		BDRK	0	0	0	0%	100%
			Totals	**104**	**0**	**104**	**100%**	**100%**

d16	d35	d50	d84	d95
0.2	9.6	15.2	55.0	84.8



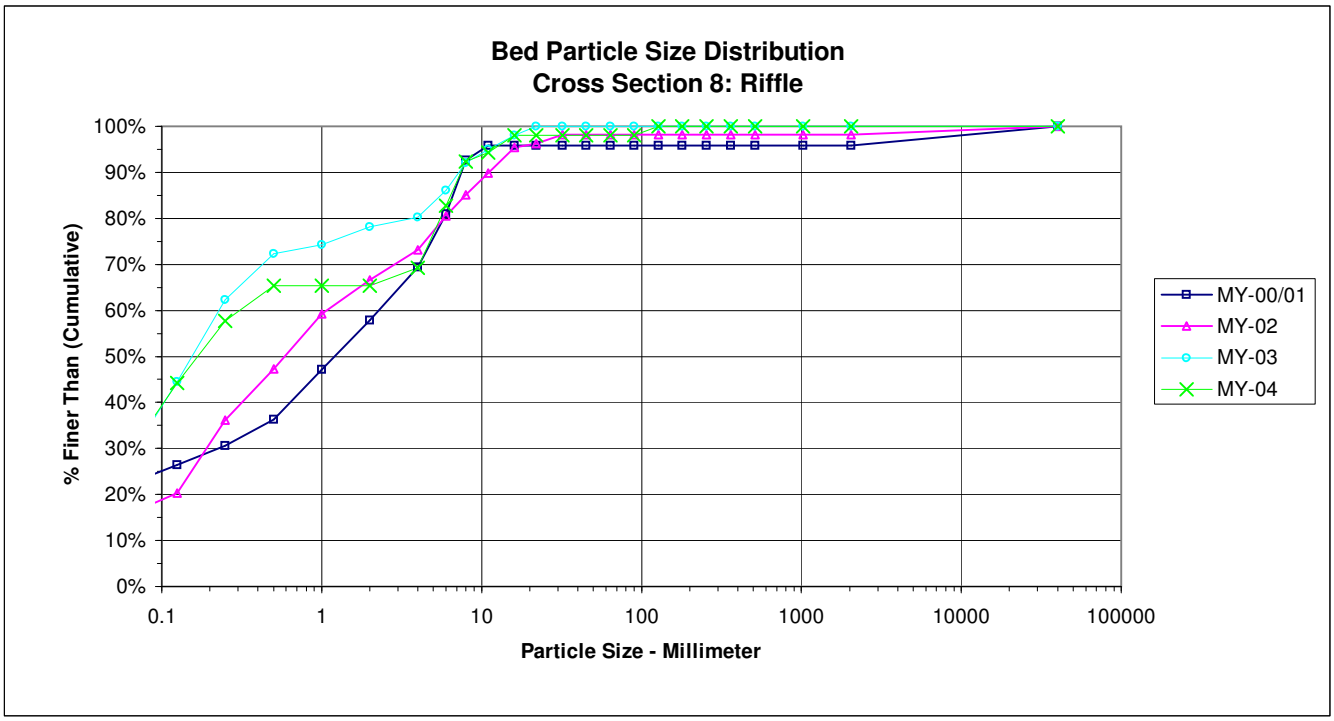
PEBBLE COUNT								
Project:	UT to South Fork Creek					**Date:**	10/20/2011	
Location:	Cross Section #7							
				Particle Counts				
Inches	Particle	Millimeter		Riffles	Pools	Total No.	Item %	% Cumulative
	Silt/Clay	< 0.062	S/C	40	0	40	37%	37%
	Very Fine	.062 - .125	S	2	0	2	2%	39%
	Fine	.125 - .25	A	4	0	4	4%	43%
	Medium	.25 - .50	N	2	0	2	2%	44%
	Coarse	.50 - 1.0	D	8	0	8	7%	52%
.04 -.08	Very Coarse	1.0 - 2.0	S	8	0	8	7%	59%
.08 - .16	Very Fine	2.0 - 4.0		6	0	6	6%	65%
.16 - .22	Fine	4.0 - 5.7	G	6	0	6	6%	70%
.22 - .31	Fine	5.7 - 8.0	R	10	0	10	9%	80%
.31 - .44	Medium	8.0 - 11.3	A	8	0	8	7%	87%
.44 - .63	Medium	11.3 - 16.0	V	10	0	10	9%	96%
.63 - .89	Coarse	16.0 - 22.6	E	4	0	4	4%	100%
.89 - 1.26	Coarse	22.6 - 32.0	L	0	0	0	0%	100%
1.26 - 1.77	Very Coarse	32.0 - 45.0	S	0	0	0	0%	100%
1.77 - 2.5	Very Coarse	45.0 - 64.0		0	0	0	0%	100%
2.5 - 3.5	Small	64 - 90	C	0	0	0	0%	100%
3.5 - 5.0	Small	90 - 128	O	0	0	0	0%	100%
5.0 - 7.1	Large	128 - 180	B	0	0	0	0%	100%
7.1 - 10.1	Large	180 - 256	L	0	0	0	0%	100%
10.1 - 14.3	Small	256 - 362	B	0	0	0	0%	100%
14.3 - 20	Small	362 - 512	L	0	0	0	0%	100%
20 - 40	Medium	512 - 1024	D	0	0	0	0%	100%
40 - 80	Lrg- Very Lrg	1024 - 2048	R	0	0	0	0%	100%
	Bedrock		BDRK	0	0	0	0%	100%
			Totals	**108**	**0**	**108**	**100%**	**100%**

d16	d35	d50	d84	d95
0.1	0.1	0.9	9.8	15.3



PEBBLE COUNT								
Project:	UT to South Fork Creek					**Date:**	10/20/2011	
Location:	Cross Section #8							
				Particle Counts				
Inches	Particle	Millimeter		Riffles	Pools	Total No.	Item %	% Cumulative
	Silt/Clay	< 0.062	S/C	30	0	30	29%	29%
	Very Fine	.062 - .125	S	16	0	16	15%	44%
	Fine	.125 - .25	A	14	0	14	13%	58%
	Medium	.25 - .50	N	8	0	8	8%	65%
	Coarse	.50 - 1.0	D	0	0	0	0%	65%
.04 -.08	Very Coarse	1.0 - 2.0	S	0	0	0	0%	65%
.08 - .16	Very Fine	2.0 - 4.0		4	0	4	4%	69%
.16 - .22	Fine	4.0 - 5.7	G	14	0	14	13%	83%
.22 - .31	Fine	5.7 - 8.0	R	10	0	10	10%	92%
.31 - .44	Medium	8.0 - 11.3	A	2	0	2	2%	94%
.44 - .63	Medium	11.3 - 16.0	V	4	0	4	4%	98%
.63 - .89	Coarse	16.0 - 22.6	E	0	0	0	0%	98%
.89 - 1.26	Coarse	22.6 - 32.0	L	0	0	0	0%	98%
1.26 - 1.77	Very Coarse	32.0 - 45.0	S	0	0	0	0%	98%
1.77 - 2.5	Very Coarse	45.0 - 64.0		0	0	0	0%	98%
2.5 - 3.5	Small	64 - 90	C	0	0	0	0%	98%
3.5 - 5.0	Small	90 - 128	O	2	0	2	2%	100%
5.0 - 7.1	Large	128 - 180	B	0	0	0	0%	100%
7.1 - 10.1	Large	180 - 256	L	0	0	0	0%	100%
10.1 - 14.3	Small	256 - 362	B	0	0	0	0%	100%
14.3 - 20	Small	362 - 512	L	0	0	0	0%	100%
20 - 40	Medium	512 - 1024	D	0	0	0	0%	100%
40 - 80	Lrg- Very Lrg	1024 - 2048	R	0	0	0	0%	100%
	Bedrock		BDRK	0	0	0	0%	100%
			Totals	**104**	**0**	**104**	**100%**	**100%**

d16	d35	d50	d84	d95
0.1	0.1	0.2	6.3	12.0



PEBBLE COUNT								
Project:	UT to South Fork Creek					**Date:**	10/20/2011	
Location:	Cross Section #9							
				Particle Counts				
Inches	Particle	Millimeter		Riffles	Pools	Total No.	Item %	% Cumulative
	Silt/Clay	< 0.062	S/C	10	0	10	9%	9%
	Very Fine	.062 - .125	S	0	0	0	0%	9%
	Fine	.125 - .25	A	2	0	2	2%	11%
	Medium	.25 - .50	N	4	0	4	4%	14%
	Coarse	.50 - 1.0	D	6	0	6	5%	19%
.04 -.08	Very Coarse	1.0 - 2.0	S	10	0	10	9%	28%
.08 - .16	Very Fine	2.0 - 4.0		2	0	2	2%	30%
.16 - .22	Fine	4.0 - 5.7	G	8	0	8	7%	37%
.22 - .31	Fine	5.7 - 8.0	R	10	0	10	9%	46%
.31 - .44	Medium	8.0 - 11.3	A	10	0	10	9%	54%
.44 - .63	Medium	11.3 - 16.0	V	18	0	18	16%	70%
.63 - .89	Coarse	16.0 - 22.6	E	4	0	4	4%	74%
.89 - 1.26	Coarse	22.6 - 32.0	L	6	0	6	5%	79%
1.26 - 1.77	Very Coarse	32.0 - 45.0	S	4	0	4	4%	82%
1.77 - 2.5	Very Coarse	45.0 - 64.0		14	0	14	12%	95%
2.5 - 3.5	Small	64 - 90	C	0	0	0	0%	95%
3.5 - 5.0	Small	90 - 128	O	4	0	4	4%	98%
5.0 - 7.1	Large	128 - 180	B	2	0	2	2%	100%
7.1 - 10.1	Large	180 - 256	L	0	0	0	0%	100%
10.1 - 14.3	Small	256 - 362	B	0	0	0	0%	100%
14.3 - 20	Small	362 - 512	L	0	0	0	0%	100%
20 - 40	Medium	512 - 1024	D	0	0	0	0%	100%
40 - 80	Lrg- Very Lrg	1024 - 2048	R	0	0	0	0%	100%
	Bedrock		BDRK	0	0	0	0%	100%
			Totals	**114**	**0**	**114**	**100%**	**100%**

d16	d35	d50	d84	d95
0.7	5.5	9.5	47.4	92.8

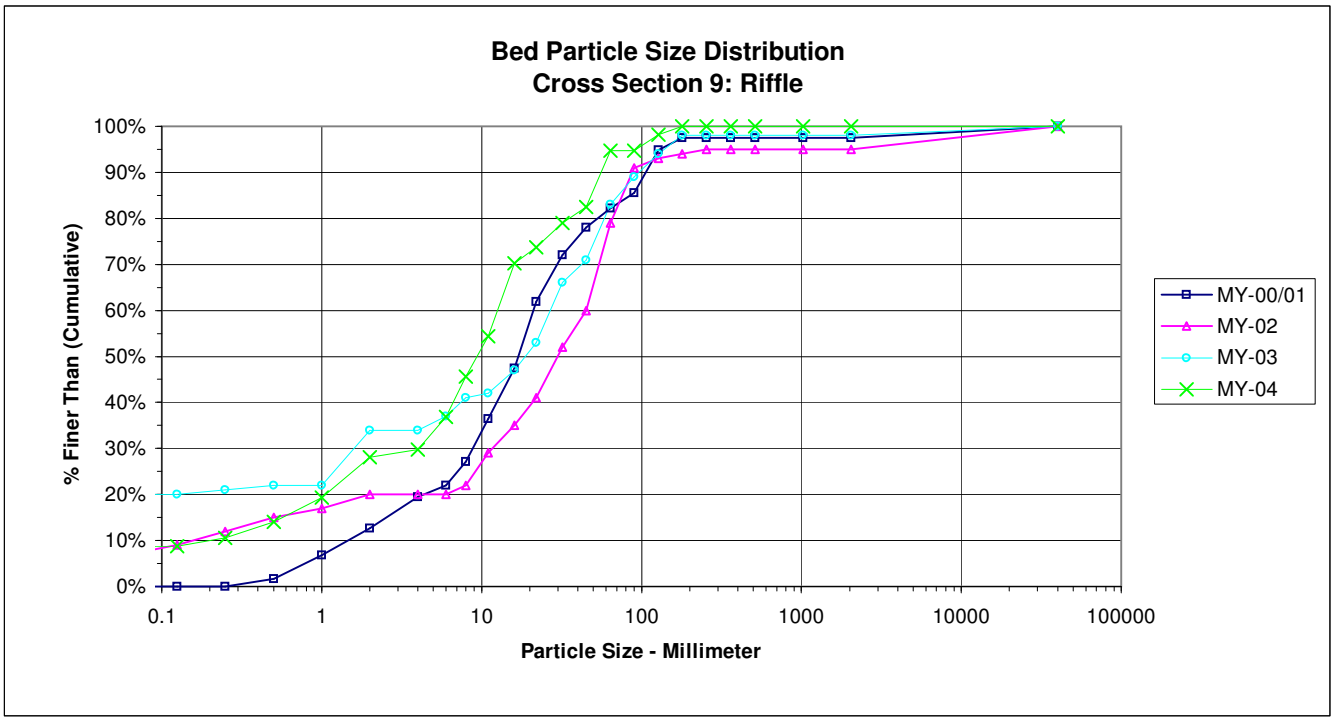


Table 10a. Baseline Stream Data Summary
UT to South Fork Creek (Stephens) No. 405 Reach: A [Sta 6+00 - 18+75] (1275 feet)

Parameter	Gauge[2]	Regional Curve			Pre-Existing Condition						Reference Reach(es) Data						Design			Monitoring Baseline					
Dimension and Substrate - Riffle Only		LL	UL	Eq.	Min	Mean	Med	Max	SD[5]	n	Min	Mean	Med	Max	SD[5]	n	Min	Med	Max	Min	Mean	Med	Max	SD[5]	n
Bankfull Width (ft)							11.4						11.6					12		13.37	15.76	15.76	18.15	2.75	4
Floodprone Width (ft)							14.9						41.3					≥ 36		78.21	106.5	113.64	120.5	19.27	4
Bankfull Mean Depth (ft)							1.3						1					1.2		2.07	2.54	2.67	2.77	0.32	4
[1]Bankfull Max Depth (ft)							1.6						1.4					1.9		2.07	2.57	2.7	2.81	0.34	4
Bankfull Cross Sectional Area (ft^2)							14.8						11.6					14.7		15.35	23.67	25.01	29.31	5.92	4
Width/Depth Ratio							8.7						11.6					9.8		4.76	6.17	6.55	6.79	0.95	4
Entrenchment Ratio							1.3						3.6					≥ 3.0		5.85	6.8	6.53	8.29	1.05	4
[1]Bank Height Ratio							2.7						1					1		1	1.02	1.02	1.03	0.01	4
Profile																									
Riffle Length (ft)					1.1			37.2			4			38.9			10		10	11.59	34.45	24.17	95.87	27.14	10
Riffle Slope (ft/ft)																				0.006	0.011	0.011	0.021	0.004	10
Pool Length (ft)					5			26.2			14.8			42.8			20		20	12.1	36.82	34.6	66.9	13.98	14
Pool Max depth (ft)																									
Pool Spacing (ft)					19			509			17			159			30		55	24	70.79	58.79	154.1	39.79	18
Pattern																									
Channel Beltwidth (ft)					2			36			19.1			41.2			25		65	32.967	46.967	45.467	66.967	8.8377	20
Radius of Curvature (ft)					3.7			69.4			9.4			81.2			40		60	28.99	40.139	38.995	64.66	7.7822	20
Rc:Bankfull width (ft/ft)					0.3			6.1			0.8			7			3.3		5						
Meander Wavelength (ft)					30			247			43.3			46.2			85		150	90	108.63	105	140	13.639	19
Meander Width Ratio					2.6			21.7			3.7			4			7.1		12.5	1.6511	2.3523	2.2771	3.3539	0.4426	20
Transport parameters																									
Reach Shear Stress (competency) lb/ft^2																									
Max part size (mm) mobilized at bankfull																									
Stream Power (transport capacity) W/m^2																									
Additional Reach Parameters																									
Rosgen Classification					G4c						E4b						E4			E4					
Bankfull Velocity (fps)					3.1						4.3						3.1								
Bankfull Discharge (cfs)					45						50														
Valley length (ft)											424.4														
Channel Thalweg length (ft)											459.5									1275					
Sinuosity (ft)					1.17						1.08						0.09			1.19					
Water Surface Slope (Channel) (ft/ft)					0.0031						0.022						0.0039			0.0044					
BF slope (ft/ft)					0.0043						0.023						0.0043			0.0041					
[3]Bankfull Floodplain Area (acres)																									
[4]% of Reach with Eroding Banks																									
Channel Stability or Habitat Metric																									
Biological or Other																									

Shaded cells indicate that these will typically not be filled in.

1 = The distributions for these parameters can include information from both the cross-section surveys and the longitudinal profile. 2 = For projects with a proximal USGS gauge in-line with the project reach (added bankfull verification - rare).

3. Utilizing survey data produce an estimate of the bankfull floodplain area in acres, which should be the area from the top of bank to the toe of the terrace riser/slope.

4 = Proportion of reach exhibiting banks that are eroding based on the visual survey for comparison to monitoring data; 5. Of value/needed only if the n exceeds 3

Table 10a. Baseline Stream Data Summary
UT to South Fork Creek (Stephens) No. 405 Reach: B [Sta 18+75 - 25+00] (625 feet)

Parameter	Gauge[2]	Regional Curve			Pre-Existing Condition						Reference Reach(es) Data						Design			Monitoring Baseline					
Dimension and Substrate - Riffle Only		LL	UL	Eq.	Min	Mean	Med	Max	SD[5]	n	Min	Mean	Med	Max	SD[5]	n	Min	Med	Max	Min	Mean	Med	Max	SD[5]	n
Bankfull Width (ft)							11.4						11.6					12		14.6	18.56	14.9	29.84	7.53	4
Floodprone Width (ft)							14.9						41.3					≥ 36		49.52	78.82	76.33	113.09	29.43	4
Bankfull Mean Depth (ft)							1.3						1					1.2		2.01	2.65	2.69	3.19	0.5	4
[1]Bankfull Max Depth (ft)							1.6						1.4					1.9		2.04	2.74	2.8	3.32	0.54	4
Bankfull Cross Sectional Area (ft^2)							14.8						11.6					14.7		21.85	30.41	27.39	45.01	10.15	4
Width/Depth Ratio							8.7						11.6					9.8		4.4	6.87	6.48	10.12	2.49	4
Entrenchment Ratio							1.3						3.6					≥ 3.0		3.12	4.55	3.67	7.75	2.17	4
[1]Bank Height Ratio							2.7						1					1		1.03	1.07	1.08	1.09	0.03	4
Profile																									
Riffle Length (ft)					1.1			37.2			4			38.9			10		10						
Riffle Slope (ft/ft)																									
Pool Length (ft)					5			26.2			14.5			42.8			20		20						
Pool Max depth (ft)																									
Pool Spacing (ft)					19			509			17			154			30		55						
Pattern																									
Channel Beltwidth (ft)					2			36			19.1			41.2			25		40	33.2	53.95	56.2	70.2	15.671	4
Radius of Curvature (ft)					3.7			69.4			9.4			81.2			40		100	34.58	37.078	35.83	40.52	2.4743	6
Rc:Bankfull width (ft/ft)					0.3			6.1			0.8			7			3.3		8.3						
Meander Wavelength (ft)					30			247			43.3			46.2			90		130	120	136.25	137.5	150	13.769	4
Meander Width Ratio					2.6			21.7			3.7			4			7.5		10.8	1.82	2.96	3.0879	3.8571	0.861	4
Transport parameters																									
Reach Shear Stress (competency) lb/ft^2																									
Max part size (mm) mobilized at bankfull																									
Stream Power (transport capacity) W/m^2																									
Additional Reach Parameters																									
Rosgen Classification					G4c						E4b						E4			E4					
Bankfull Velocity (fps)					3.1						4.3						3.1								
Bankfull Discharge (cfs)					45						50														
Valley length (ft)											424.4														
Channel Thalweg length (ft)											459.5									625					
Sinuosity (ft)					1.17						1.08						0.09			1.08					
Water Surface Slope (Channel) (ft/ft)					0.0031						0.022						0.0039			0.0057					
BF slope (ft/ft)					0.0043						0.023						0.0043			0.0049					
[3]Bankfull Floodplain Area (acres)																									
[4]% of Reach with Eroding Banks																									
Channel Stability or Habitat Metric																									
Biological or Other																									

Shaded cells indicate that these will typically not be filled in.

1 = The distributions for these parameters can include information from both the cross-section surveys and the longitudinal profile. 2 = For projects with a proximal USGS gauge in-line with the project reach (added bankfull verification - rare).

3. Utilizing survey data produce an estimate of the bankfull floodplain area in acres, which should be the area from the top of bank to the toe of the terrace riser/slope.

4 = Proportion of reach exhibiting banks that are eroding based on the visual survey for comparison to monitoring data; 5. Of value/needed only if the n exceeds 3

Table 10a. Baseline Stream Data Summary
UT to South Fork Creek (Stephens) No. 405 Reach: C [Sta 29+00 - 40+00] (1100 feet)

Parameter	Gauge[2]	Regional Curve			Pre-Existing Condition						Reference Reach(es) Data						Design			Monitoring Baseline					
Dimension and Substrate - Riffle Only		LL	UL	Eq.	Min	Mean	Med	Max	SD[5]	n	Min	Mean	Med	Max	SD[5]	n	Min	Med	Max	Min	Mean	Med	Max	SD[5]	n
Bankfull Width (ft)							11.4						11.6					12		16.98	18.44	18.19	20.19	1.39	7
Floodprone Width (ft)							14.9						41.3					≥ 36		80	103.11	100.9	134.45	22.9	7
Bankfull Mean Depth (ft)							1.3						1					1.2		2.84	3.27	3.18	3.77	0.36	7
[1]Bankfull Max Depth (ft)							1.6						1.4					1.9		2.86	3.36	3.18	4	0.42	7
Bankfull Cross Sectional Area (ft^2)							14.8						11.6					14.7		28.16	38.51	37.44	49.25	7.24	7
Width/Depth Ratio							8.7						11.6					9.8		4.8	5.55	5.46	6.83	0.8	7
Entrenchment Ratio							1.3						3.6					≥ 3.0		3.96	5.67	5.51	7.92	1.57	7
[1]Bank Height Ratio							2.7						1					1		1	1.05	1.05	1.13	0.05	7
Profile																									
Riffle Length (ft)					1.1			37.2			4			38.9			12		12						
Riffle Slope (ft/ft)																	2.1		9.3						
Pool Length (ft)					5			26.2			14.8			42.8			24		24						
Pool Max depth (ft)																									
Pool Spacing (ft)					19			509			17			159			31		50						
Pattern																									
Channel Beltwidth (ft)					2			36			19.1			41.2			25		40	45.967	68.167	58.967	114.97	23.957	10
Radius of Curvature (ft)					3.7			69.4			9.4			81.2			40		100	35.75	47.407	49.56	58.12	6.8513	11
Rc:Bankfull width (ft/ft)					0.3			6.1			0.8			7			3.3		8.3						
Meander Wavelength (ft)					30			247			43.3			46.2			90		130	105	147.5	160	170	24.296	10
Meander Width Ratio					2.6			21.7			3.7			4			7.5		10.8	2.3022	3.414	2.9533	5.7579	1.1999	10
Transport parameters																									
Reach Shear Stress (competency) lb/ft^2																									
Max part size (mm) mobilized at bankfull																									
Stream Power (transport capacity) W/m^2																									
Additional Reach Parameters																									
Rosgen Classification					G4c						E4b						E4			E4					
Bankfull Velocity (fps)					3.1						4.3						2.7								
Bankfull Discharge (cfs)					45						50														
Valley length (ft)											424.4														
Channel Thalweg length (ft)											459.5									1100					
Sinuosity (ft)					1.17						1.08									1.48					
Water Surface Slope (Channel) (ft/ft)					0.0031						0.022									0.0023					
BF slope (ft/ft)					0.0043						0.023									0.0025					
[3]Bankfull Floodplain Area (acres)																									
[4]% of Reach with Eroding Banks																									
Channel Stability or Habitat Metric																									
Biological or Other																									

Shaded cells indicate that these will typically not be filled in.

1 = The distributions for these parameters can include information from both the cross-section surveys and the longitudinal profile. 2 = For projects with a proximal USGS gauge in-line with the project reach (added bankfull verification - rare).

3. Utilizing survey data produce an estimate of the bankfull floodplain area in acres, which should be the area from the top of bank to the toe of the terrace riser/slope.

4 = Proportion of reach exhibiting banks that are eroding based on the visual survey for comparison to monitoring data; 5. Of value/needed only if the n exceeds 3

Table 10b. Baseline Stream Data Summary (Substrate, Bed, Bank, and Hydrologic Containment Parameter Distributions)
UT to South Fork Creek (Stephens) No. 405 Reach: A [Sta 6+00 - 18+75] (1275 feet)

Parameter	Pre-Existing Condition							Reference Reach(es) Data							Design							As-built/Baseline						
[1]Ri% / Ru% / P% / G% / S%																						27%		40%				
[1]SC% / Sa% / G% / C% / B% / Be%																												
[1]d16 / d35 / d50 / d84 / d95 / di^{p} / di^{sp} (mm)	Silt/Clay		4	22.6				Silt/Clay		4	128																	
[2]Entrenchment Class <1.5 / 1.5-1.99 / 2.0-4.9 / 5.0-9.9 / >10																												
[3]Incision Class <1.2 / 1.2-1.49 / 1.5-1.99 / >2.0																												

Shaded cells indicate that these will typically not be filled in.

1 = Riffle, Run, Pool, Glide, Step; Silt/Clay, Sand, Gravel, Cobble, Boulder, Bedrock; dip = max pave, disp = max subpave

2 = Entrenchment Class - Assign/bin the reach footage into the classes indicated and provide the percentage of the total reach footage in each class in the table. This will result from the measured cross-sections as well as visual estimates

3 = Assign/bin the reach footage into the classes indicated and provide the percentage of the total reach footage in each class in the table. This will result from the measured cross-sections as well as the longitudinal profile

Footnotes 2,3 - These classes are loosley built around the Rosgen classification and hazard ranking breaks, but were adjusted slightly to make for easier assignment to somewhat coarser bins based on visual estimates in the field such that measurement of every segment for ER would not be necessary.
The intent here is to provide the reader/consumer of design and monitoring information with a good general sense of the extent of hydrologic containment in the pre-existing and the rehabilitated states as well as comparisons to the reference distributions.
ER and BHR have been addressed in prior submissions as a subsample (cross-sections as part of the design survey), however, these subsamples have often focused entirely on facilitating design without providing a thorough pre-construtions distribution of these parameters, leaving the reader/consumer with a sample that is weighted heavily on the stable sections of the reach. This means that the distributions for these parameters should include data from both the cross-section surveys and the longitudinal profile and in the case of ER, visual estimates. For example, the typical longitudinal profile permits sampling of the BHR at riffles beyond those subject to cross-sections and therefore can be readily integrated and provide a more complete sample distribution for these parameters, thereby providing the distribution/coverage necessary to provide meaningful comparisons.

Table 10b. Baseline Stream Data Summary (Substrate, Bed, Bank, and Hydrologic Containment Parameter Distributions)
UT to South Fork Creek (Stephens) No. 405 Reach: B [Sta 18+75 - 25+00] (625 feet)

Parameter	Pre-Existing Condition							Reference Reach(es) Data							Design							As-built/Baseline						
[1]Ri% / Ru% / P% / G% / S%																						25%		39%				
[1]SC% / Sa% / G% / C% / B% / Be%																												
[1]d16 / d35 / d50 / d84 / d95 / di^{p} / di^{sp} (mm)	Silt/Clay		4	22.6				Silt/Clay		4	128																	
[2]Entrenchment Class <1.5 / 1.5-1.99 / 2.0-4.9 / 5.0-9.9 / >10																												
[3]Incision Class <1.2 / 1.2-1.49 / 1.5-1.99 / >2.0																												

Shaded cells indicate that these will typically not be filled in.

1 = Riffle, Run, Pool, Glide, Step; Silt/Clay, Sand, Gravel, Cobble, Boulder, Bedrock; dip = max pave, disp = max subpave

2 = Entrenchment Class - Assign/bin the reach footage into the classes indicated and provide the percentage of the total reach footage in each class in the table. This will result from the measured cross-sections as well as visual estimates

3 = Assign/bin the reach footage into the classes indicated and provide the percentage of the total reach footage in each class in the table. This will result from the measured cross-sections as well as the longitudinal profile

Footnotes 2,3 - These classes are loosley built around the Rosgen classification and hazard ranking breaks, but were adjusted slightly to make for easier assignment to somewhat coarser bins based on visual estimates in the field such that measurement of every segment for ER would not be necessary.

The intent here is to provide the reader/consumer of design and monitoring information with a good general sense of the extent of hydrologic containment in the pre-existing and the rehabilitated states as well as comparisons to the reference distributions.

ER and BHR have been addressed in prior submissions as a subsample (cross-sections as part of the design survey), however, these subsamples have often focused entirely on facilitating design without providing a thorough pre-construtions distribution of these parameters, leaving the reader/consumer with a sample that is weighted heavily on the stable sections of the reach. This means that the distributions for these parameters should include data from both the cross-section surveys and the longitudinal profile and in the case of ER, visual estimates. For example, the typical longitudinal profile permits sampling of the BHR at riffles beyond those subject to cross-sections and therefore can be readily integrated and provide a more complete sample distribution for these parameters, thereby providing the distribution/coverage necessary to provide meaningful comparisons.

Table 10b. Baseline Stream Data Summary (Substrate, Bed, Bank, and Hydrologic Containment Parameter Distributions)
UT to South Fork Creek (Stephens) No. 405 Reach: C [Sta 29+00 - 40+00] (1100 feet)

Parameter	Pre-Existing Condition							Reference Reach(es) Data							Design							As-built/Baseline						
[1]Ri% / Ru% / P% / G% / S%																						28%		50%				
[1]SC% / Sa% / G% / C% / B% / Be%																												
[1]d16 / d35 / d50 / d84 / d95 / di^{p} / di^{sp} (mm)	Silt/Clay		4	22.6				Silt/Clay		4	128																	
[2]Entrenchment Class <1.5 / 1.5-1.99 / 2.0-4.9 / 5.0-9.9 / >10																												
[3]Incision Class <1.2 / 1.2-1.49 / 1.5-1.99 / >2.0																												

Shaded cells indicate that these will typically not be filled in.

1 = Riffle, Run, Pool, Glide, Step; Silt/Clay, Sand, Gravel, Cobble, Boulder, Bedrock; dip = max pave, disp = max subpave

2 = Entrenchment Class - Assign/bin the reach footage into the classes indicated and provide the percentage of the total reach footage in each class in the table. This will result from the measured cross-sections as well as visual estimates

3 = Assign/bin the reach footage into the classes indicated and provide the percentage of the total reach footage in each class in the table. This will result from the measured cross-sections as well as the longitudinal profile

Footnotes 2,3 - These classes are loosley built around the Rosgen classification and hazard ranking breaks, but were adjusted slightly to make for easier assignment to somewhat coarser bins based on visual estimates in the field such that measurement of every segment for ER would not be necessary.
The intent here is to provide the reader/consumer of design and monitoring information with a good general sense of the extent of hydrologic containment in the pre-existing and the rehabilitated states as well as comparisons to the reference distributions.
ER and BHR have been addressed in prior submissions as a subsample (cross-sections as part of the design survey), however, these subsamples have often focused entirely on facilitating design without providing a thorough pre-construtions distribution of these parameters, leaving the reader/consumer with a sample that is weighted heavily on the stable sections of the reach. This means that the distributions for these parameters should include data from both the cross-section surveys and the longitudinal profile and in the case of ER, visual estimates. For example, the typical longitudinal profile permits sampling of the BHR at riffles beyond those subject to cross-sections and therefore can be readily integrated and provide a more complete sample distribution for these parameters, thereby providing the distribution/coverage necessary to provide meaningful comparisons.

Table 11a. Monitoring Data - Dimensional Morphology Summary (Dimensional Parameters – Cross Sections)

UT to South Fork Creek (Stephens) No. 405 Reach: A [Sta 6+00 - 18+75] (1275 feet)

	Cross Section 1 (Riffle)						Cross Section 2 (Riffle)						Cross Section 3 (Riffle)						Cross Section 4 (Riffle)					
Based on fixed baseline bankfull elevation[1]	Base/MY1	MY2	MY3	MY4	MY5	MY+	Base/MY1	MY2	MY3	MY4	MY5	MY+	Base/MY1	MY2	MY3	MY4	MY5	MY+	Base/MY1	MY2	MY3	MY4	MY5	MY+
Record elevation (datum) used	604.41	604.70	604.41	604.41			603.98	603.96	603.98	603.98			603.14	603.16	603.14	603.14			602.09	602.05	602.09	602.09		
Bankfull Width (ft)	11.38	12.42	12.25	10.17			17.01	12.86	19.07	16.58			19.70	21.32	15.11	15.75			17.01	16.94	18.28	15.96		
Floodprone Width (ft)	147	148	148	148			160	170	170	160			190	190	190	190			160	160	160	160		
Bankfull Mean Depth (ft)	1.30	1.38	1.18	1.28			1.03	1.00	0.83	0.76			0.86	0.84	1.06	1.02			1.03	1.01	1.02	1.18		
Bankfull Max Depth (ft)	2.26	2.32	2.30	2.16			2.19	2.01	2.36	2.06			2.51	2.42	2.55	2.66			2.19	2.22	2.32	2.46		
Bankfull Cross Sectional Area (ft^2)	14.81	17.15	14.41	13.01			17.45	12.82	15.80	12.68			17.02	17.94	16.00	16.04			17.45	17.15	18.67	18.87		
Bankfull Width/Depth Ratio	8.74	8.99	10.41	7.95			16.59	12.90	23.03	21.69			22.79	25.34	14.27	15.46			16.59	16.73	17.89	13.50		
Bankfull Entrenchment Ratio	12.88	11.88	12.08	14.55			9.40	13.22	8.91	10.25			9.65	8.91	12.57	12.07			9.40	9.45	8.75	10.02		
Bankfull Bank Height Ratio	1.00	1.00	1.00	1.15			0.99	0.91	0.86	0.95			0.94	0.97	1.00	0.98			0.99	0.99	0.97	0.93		
Cross Sectional Area between end pins (ft^2)			218.77	225.45					96.37	97.74					51.40	49.63					64.47	68.85		
d50 (mm)	0.45	silt	silt	0.10			36.34	0.38	0.21	4.50			0.22	0.24	0.09	0.10			36.34	21.70	13.50	12.50		

1 = Widths and depths for monitoring resurvey will be based on the baseline bankfull datum regardless of dimensional/depositional development. Input the elevation used as the datum, which should be consistent and based on the baseline datum established.
for prior years this must be discussed with EEP. If this cannot be resolved in time for a given years report submission a footnote in this should be included that states: "It is uncertain if the monitoring datum has been consistent over the monitoring history, which may influence calculated values.
Additional data from a prior performer is being acquired to provide confirmation. Values will be recalculated in a future submission based on a consistent datum if determined to be necessary."

Table 11a. Monitoring Data - Dimensional Morphology Summary (Dimensional Parameters – Cross Sections)

UT to South Fork Creek (Stephens) No. 405 Reach: B [Sta 18+75 - 25+00] (625 feet)

	Cross Section 5 (Riffle)						Cross Section 6 (Riffle)					
Based on fixed baseline bankfull elevation[1]	Base/MY1	MY2	MY3	MY4	MY5	MY+	Base/MY1	MY2	MY3	MY4	MY5	MY+
Record elevation (datum) used	599.73	599.83	599.73	599.73			597.79	598.09	597.79	597.79		
Bankfull Width (ft)	18.12	20.56	20.38	18.98			18.34	20.09	18.45	18.04		
Floodprone Width (ft)	170	170	170	170			83.5	83.5	83.5	83.5		
Bankfull Mean Depth (ft)	1.23	1.14	1.27	1.26			1.54	1.53	1.43	1.44		
Bankfull Max Depth (ft)	2.22	2.26	2.53	2.53			2.81	2.96	2.82	2.84		
Bankfull Cross Sectional Area (ft^2)	22.23	23.45	25.81	23.87			28.17	30.76	26.31	25.97		
Bankfull Width/Depth Ratio	14.78	18.03	16.09	15.09			11.95	13.12	12.94	12.53		
Bankfull Entrenchment Ratio	9.38	8.27	8.34	8.96			4.55	4.28	4.53	4.63		
Bankfull Bank Height Ratio	1	1	1	0.8933			1	1	1.0993	0.9648		
Cross Sectional Area between end pins (ft^2)			78.21	79.2					163.88	163.49		
d50 (mm)	2	1.1	11	4.27			21.3	7.6	28.88	15.166		

1 = Widths and depths for monitoring resurvey will be based on the baseline bankfull datum regardless of dimensional/depositional development. Input the elevation used as the datum, which sh
for prior years this must be discussed with EEP. If this cannot be resolved in time for a given years report submission a footnote in this should be included that states: "It is uncertain if the monito
Additional data from a prior performer is being acquired to provide confirmation. Values will be recalculated in a future submission based on a consistent datum if determined to be necessary."

Table 11a. Monitoring Data - Dimensional Morphology Summary (Dimensional Parameters – Cross Sections)

UT to South Fork Creek (Stephens) No. 405 Reach: C [Sta 29+00 - 40+00] (1100 feet)

	Cross Section 7 (Riffle)						Cross Section 8 (Riffle)						Cross Section 9 (Riffle)					
Based on fixed baseline bankfull elevation[1]	Base/MY1	MY2	MY3	MY4	MY5	MY+	Base/MY1	MY2	MY3	MY4	MY5	MY+	Base/MY1	MY2	MY3	MY4	MY5	MY+
Record elevation (datum) used	596.66	596.65	596.66	596.66			596.10	596.01	596.10	596.10			594.20	594.09	594.20	594.20		
Bankfull Width (ft)	17.71	17.93	17.19	17.59			17.97	17.74	16.05	17.68			15.78	15.64	32.58	15.31		
Floodprone Width (ft)	190	190	190	190			200	200	200	200			135	135	135	135		
Bankfull Mean Depth (ft)	1.63	1.59	1.68	2.11			1.57	1.62	1.66	1.51			1.68	1.63	0.83	1.87		
Bankfull Max Depth (ft)	2.71	2.75	2.76	2.80			2.77	2.77	2.88	2.97			2.71	2.62	2.69	2.76		
Bankfull Cross Sectional Area (ft^2)	28.79	28.42	28.82	37.17			28.21	28.68	26.67	26.63			26.59	25.53	27.03	28.69		
Bankfull Width/Depth Ratio	10.90	11.31	10.25	8.32			11.44	10.97	9.66	11.74			9.37	9.58	39.27	8.17		
Bankfull Entrenchment Ratio	10.73	10.60	11.05	10.80			11.13	11.28	12.46	11.31			8.55	8.63	4.14	8.82		
Bankfull Bank Height Ratio	1.00	1.00	1.00	1.02			0.98	1.00	1.03	0.99			1.00	1.00	0.98	0.97		
Cross Sectional Area between end pins (ft^2)			79.93	78.95					424.41	419.68					237.44	246.25		
d50 (mm)	0.93	1.87	0.70	0.88			1.27	0.62	0.20	0.18			17.06	30.20	19.00	9.50		

1 = Widths and depths for monitoring resurvey will be based on the baseline bankfull datum regardless of dimensional/depositional development. Input the elevation used as the datum, which should be consistent and based on the baseline datum establishec for prior years this must be discussed with EEP. If this cannot be resolved in time for a given years report submission a footnote in this should be included that states: "It is uncertain if the monitoring datum has been consistent over the monitoring history, whi Additional data from a prior performer is being acquired to provide confirmation. Values will be recalculated in a future submission based on a consistent datum if determined to be necessary."

Exhibit Table 11b. Monitoring Data - Stream Reach Data Summary
UT to South Fork Creek (Stephens) No. 405 Reach: A [Sta 6+00 - 18+75] (1275 feet)

Parameter	Baseline/MY-01 (2010)						MY-2 (2010)						MY-3 (2010)						MY-4 (2011)						MY-5 (2012)						MY-5+					
Dimension and Substrate - Riffle only	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n
Bankfull Width (ft)	11.38	16.28	17.01	19.7	3.504	4	12.42	15.88	14.9	21.32	4.154	4	12.25	16.18	16.69	19.07	3.128	4	10.17	14.62	15.85	16.58	2.985	4												
Floodprone Width (ft)	146.5	164.1	160	190	18.38	4	147.6	166.9	165	190	17.94	4	148	167	165	190	17.78	4	148	164.5	160	190	17.92	4												
Bankfull Mean Depth (ft)	0.864	1.054	1.026	1.302	0.182	4	0.841	1.058	1.004	1.381	0.229	4	0.828	1.021	1.04	1.176	0.145	4	0.765	1.061	1.1	1.28	0.225	4												
[1]Bankfull Max Depth (ft)	2.185	2.284	2.223	2.505	0.152	4	2.01	2.243	2.27	2.42	0.175	4	2.3	2.383	2.34	2.55	0.114	4	2.06	2.335	2.31	2.66	0.275	4												
Bankfull Cross Sectional Area (ft^2)	14.81	16.68	17.24	17.45	1.264	4	12.82	16.26	17.15	17.94	2.327	4	14.41	16.22	15.9	18.67	1.78	4	12.68	15.15	14.53	18.87	2.904	4												
Width/Depth Ratio	8.735	16.18	16.59	22.79	5.759	4	8.993	15.99	14.82	25.34	6.986	4	10.41	16.4	16.08	23.03	5.37	4	7.947	14.65	14.48	21.69	5.669	4												
Entrenchment Ratio	9.404	10.33	9.525	12.88	1.702	4	8.913	10.86	10.66	13.22	2.033	4	8.754	10.58	10.5	12.57	2.029	4	10.02	11.72	11.16	14.55	2.096	4												
[1]Bank Height Ratio	0.938	0.979	0.989	1	0.028	4	0.905	0.967	0.981	1	0.043	4	0.864	0.96	0.987	1	0.065	4	0.931	1.002	0.964	1.148	0.1	4												
Profile																																				
Riffle Length (ft)	11.59	34.45		95.87			5.26	35.64	25.13	107.7	33.96	14	4.62	38.51	25.22	101.4	30.9	16	2	21.66	9.605	155.5	33.02	20												
Riffle Slope (ft/ft)	0.006	0.000		0.021			0.002	0.013	0.011	0.031	0.010	14	0.001	0.014	0.007	0.080	0.022	12	0.001	0.018	0.017	0.053	0.015	17												
Pool Length (ft)	12.1	36.8		66.9			18.51	47.79	44.95	95.18	21.1	14	14.9	37.39	34.03	83.46	16.07	16	14.47	41.69	36.21	85.36	21.83	20												
Pool Max depth (ft)							2.13	2.4	2.39	2.87	0.55	14	2.58	3.19	3.13	4.51	0.47	16	2.28	2.741	2.753	3.81	0.33	20												
Pool Spacing (ft)	24	70.8		154			19.78	75.53	61.76	149.9	38.45	14	19.5	72.58	57.3	152.1	40.89	15	28.11	62	54.19	177.5	36.04	19												
Pattern																																				
Channel Beltwidth (ft)	33	47		67																																
Radius of Curvature (ft)	28.99	40.14		64.66																																
Rc:Bankfull width (ft/ft)	90	109		140																																
Meander Wavelength (ft)	1.65	2.35		3.35																																
Meander Width Ratio																																				

Pattern data will not typically be collected unless visual data, dimensional data or profile data indicate significant shifts from baseline

Additional Reach Parameters																																				
Rosgen Classification	E4						E4						E4						E4																	
Channel Thalweg length (ft)	1275						1275						1281						1275																	
Sinuosity (ft)	1.19						1.19						1.2						1.19																	
Water Surface Slope (Channel) (ft/ft)	0.0044						0.0044						N/A						0.0047																	
BF slope (ft/ft)	0.0041						0.004						0.0051						0.0040																	
[3]Ri% / Ru% / P% / G% / S%	27%		40%				39%		56%				48%		47%				34%		65%															
[3]SC% / Sa% / G% / C% / B% / Be%													4.3%	63.3%	29.3%	3.0%	0.0%	0.2%	46.8%	15.0%	36.3%	1.9%	0.0%	0.0%												
[3]d16 / d35 / d50 / d84 / d95 /													0.083	0.107	3.483	17.79	33.75		0.393	2.156	4.299	11.44	34.69													
[2]% of Reach with Eroding Banks							1%						3%						5%																	
Channel Stability or Habitat Metric																																				
Biological or Other																																				

Shaded cells indicate that these will typically not be filled in.
1 = The distributions for these parameters can include information from both the cross-section surveys and the longitudinal profile.
2 = Proportion of reach exhibiting banks that are eroding based on the visual survey from visual assessment table
3 = Riffle, Run, Pool, Glide, Step; Silt/Clay, Sand, Gravel, Cobble, Boulder, Bedrock; dip = max pave, disp = max subpave
4. = Of value/needed only if the n exceeds 3

Exhibit Table 11b. Monitoring Data - Stream Reach Data Summary
UT to South Fork Creek (Stephens) No. 405 Reach: B [Sta 18+75 - 25+00] (625 feet)

Parameter	Baseline/MY-01 (2010)						MY-2 (2010)						MY-3 (2010)						MY-4 (2011)						MY-5 (2012)						MY-5+					
Dimension and Substrate - Riffle only	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n
Bankfull Width (ft)	18.12	18.23	18.23	18.34	0.155	2	20.09	20.32	20.32	20.56	0.335	2	18.45	19.41	19.41	20.38	1.364	2	18.04	18.51	18.51	18.98	0.668	2												
Floodprone Width (ft)	83.54	126.8	126.8	170	61.13	2	83.5	126.8	126.8	170	61.16	2	83.5	126.8	126.8	170	61.16	2	83.5	126.8	126.8	170	61.16	2												
Bankfull Mean Depth (ft)	1.226	1.381	1.381	1.536	0.219	2	1.141	1.336	1.336	1.531	0.276	2	1.267	1.346	1.346	1.426	0.113	2	1.258	1.349	1.349	1.44	0.129	2												
[1]Bankfull Max Depth (ft)	2.22	2.515	2.515	2.81	0.417	2	2.26	2.61	2.61	2.96	0.495	2	2.53	2.675	2.675	2.82	0.205	2	2.53	2.685	2.685	2.84	0.219	2												
Bankfull Cross Sectional Area (ft^2)	22.23	25.2	25.2	28.17	4.201	2	23.45	27.1	27.1	30.76	5.166	2	25.81	26.06	26.06	26.31	0.351	2	23.87	24.92	24.92	25.97	1.483	2												
Width/Depth Ratio	11.95	13.36	13.36	14.78	2.003	2	13.12	15.57	15.57	18.03	3.47	2	12.94	14.51	14.51	16.09	2.228	2	12.53	13.81	13.81	15.09	1.814	2												
Entrenchment Ratio	4.554	6.967	6.967	9.38	3.412	2	4.282	6.275	6.275	8.268	2.819	2	4.526	6.434	6.434	8.342	2.698	2	4.629	6.793	6.793	8.956	3.059	2												
[1]Bank Height Ratio	1	10.27	10.27	19.54	13.11	2	1	11.26	11.26	21.53	14.51	2	1	1.05	1.05	1.099	0.07	2	0.893	0.929	0.929	0.965	0.051	2												
Profile																																				
Riffle Length (ft)	12.2	19.31		32.1			14.47	26.71	23.24	56.15	14.56	7	9.05	42.37	33.25	79.53	25.71	8	2	31.88	27.83	88.71	32.3	9												
Riffle Slope (ft/ft)	0.006	0.021		0.043			0.001	0.011	0.01	0.025	0.009	6	0.001	0.007	0.005	0.014	0.005	8	0.004	0.012	0.009	0.029	0.009	9												
Pool Length (ft)	10.7	27.37		53.8			14.03	33.96	32.15	51.74	12.09	8	14.79	35.34	32.34	83.87	22.17	8	14.38	39.3	38.12	78.21	22.99	8												
Pool Max depth (ft)							1.79	3.15	3.01	6.1	1.33	8	2.78	4.22	4	6.55	1.12	8	2.84	4.117	3.998	6.4	1.052	8												
Pool Spacing (ft)	54	77.29		118			33.5	70.07	59.03	132.5	31.88	7	34.68	78.19	77.4	114.7	29.12	7	28.87	66.62	52.29	122.1	35.86	7												
Pattern																																				
Channel Beltwidth (ft)	33.2	54		70.2																																
Radius of Curvature (ft)	34.6	37.1		40.5																																
Rc:Bankfull width (ft/ft)																																				
Meander Wavelength (ft)	120	136		150																																
Meander Width Ratio	1.82	2.96		3.86																																

Pattern data will not typically be collected unless visual data, dimensional data or profile data indicate significant shifts from baseline

Additional Reach Parameters																																				
Rosgen Classification	E4						E4						E4						E4																	
Channel Thalweg length (ft)	625						625						630						625																	
Sinuosity (ft)	1.08						1.08						1.09						1.08																	
Water Surface Slope (Channel) (ft/ft)	0.0057						0.007						N/A						0.0055																	
BF slope (ft/ft)	0.0049						0.005						0.0025						0.0045																	
[3]Ri% / Ru% / P% / G% / S%	25%		39%				30%		43%				54%		45%				46%		50%															
[3]SC% / Sa% / G% / C% / B% / Be%													6.5%	32.2%	56.5%	4.3%	0.0%	0.5%	10.9%	15.2%	69.0%	4.8%	0.0%	0.0%												
[3]d16 / d35 / d50 / d84 / d95 /													0.162	9.989	14.5	33.33	46.18		0.163	5.788	9.72	32.36	50.55													
[2]% of Reach with Eroding Banks							1%						1%						0%																	
Channel Stability or Habitat Metric																																				
Biological or Other																																				

Shaded cells indicate that these will typically not be filled in.
1 = The distributions for these parameters can include information from both the cross-section surveys and the longitudinal profile.
2 = Proportion of reach exhibiting banks that are eroding based on the visual survey from visual assessment table
3 = Riffle, Run, Pool, Glide, Step; Silt/Clay, Sand, Gravel, Cobble, Boulder, Bedrock; dip = max pave, disp = max subpave
4. = Of value/needed only if the n exceeds 3

Exhibit Table 11b. Monitoring Data - Stream Reach Data Summary
UT to South Fork Creek (Stephens) No. 405 Reach: C [Sta 29+00 - 40+00] (1100 feet)

Parameter	Baseline/MY-01 (2010)						MY-2 (2010)						MY-3 (2010)						MY-4 (2011)						MY-5 (2012)						MY-5+					
Dimension and Substrate - Riffle only	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n
Bankfull Width (ft)	15.78	17.07	17.71	17.71	1.114	3	15.64	17.16	17.93	17.93	1.318	3	16.05	21.94	17.19	32.58	9.233	3	15.31	16.86	17.59	17.68	1.345	3												
Floodprone Width (ft)	135	171.7	190	190	31.75	3	135	171.7	190	190	31.75	3	135	175	190	200	35	3	135	175	190	200	35	3												
Bankfull Mean Depth (ft)	1.625	1.645	1.625	1.685	0.034	3	1.585	1.601	1.585	1.632	0.027	3	0.83	1.389	1.662	1.677	0.485	3	1.506	1.831	1.874	2.113	0.306	3												
[1]Bankfull Max Depth (ft)	2.71	2.71	2.71	2.71	7E-14	3	2.62	2.707	2.75	2.75	0.075	3	2.69	2.777	2.76	2.88	0.096	3	2.76	2.843	2.8	2.97	0.112	3												
Bankfull Cross Sectional Area (ft^2)	26.59	28.05	28.79	28.79	1.268	3	25.53	27.46	28.42	28.42	1.666	3	26.67	27.51	27.03	28.82	1.152	3	26.63	30.83	28.69	37.17	5.586	3												
Width/Depth Ratio	9.369	10.39	10.9	10.9	0.884	3	9.583	10.73	11.31	11.31	0.995	3	9.655	19.73	10.25	39.27	16.93	3	8.169	9.411	8.324	11.74	2.02	3												
Entrenchment Ratio	8.553	10	10.73	10.73	1.255	3	8.63	9.943	10.6	10.6	1.137	3	4.144	9.22	11.05	12.46	4.452	3	8.819	10.31	10.8	11.31	1.316	3												
[1]Bank Height Ratio	1	1	1	1	-	3	1	1	1	1	-	3	0.978	1.004	1	1.035	0.029	3	0.975	0.994	0.987	1.021	0.024	3												
Profile																																				
Riffle Length (ft)	8.8	25.69		51.8			7.6	26.18	19.42	52.74	15.97	10	9.04	39.51	27.04	132.6	37.78	11	7.58	37.33	15.04	140.6	40.6	12												
Riffle Slope (ft/ft)	0	0.014		0.053			0.003	0.019	0.013	0.06	0.016	10	0.001	0.013	0.012	0.026	0.010	9	0.003	0.013	0.010	0.025	0.008	12												
Pool Length (ft)	27	49.82		92			27.44	70.05	73.88	103.8	27.52	11	25.2	62.73	61.13	108.8	28.05	12	11.79	57.03	51.21	112.2	29.76	11												
Pool Max depth (ft)							2.38	2.69	2.63	3.15	0.25	10	3.29	3.74	3.65	4.2	0.34	12	3.12	3.45	3.365	4.015	0.259	11												
Pool Spacing (ft)	20	78		148			30.64	90	82.31	202	49.72	10	32.24	97.24	95.73	201.3	51.14	12	29.51	90.95	89.47	161.4	44.85	10												
Pattern																																				
Channel Beltwidth (ft)	46	68.2		115																																
Radius of Curvature (ft)	35.8	47.4		58.1																																
Rc:Bankfull width (ft/ft)																																				
Meander Wavelength (ft)	105	148		170																																
Meander Width Ratio	2.3	3.41		5.76																																

Pattern data will not typically be collected unless visual data, dimensional data or profile data indicate significant shifts from baseline

Additional Reach Parameters																																				
Rosgen Classification	E4						E4						E4						E4																	
Channel Thalweg length (ft)	1100						1100						1111						1100																	
Sinuosity (ft)	1.48						1.48						1.49						1.48																	
Water Surface Slope (Channel) (ft/ft)	0.0023						0.003						N/A						0.0026																	
BF slope (ft/ft)	0.0025						0.0031						0.0026						0.0032																	
[3]Ri% / Ru% / P% / G% / S%	28%		50%				24%		70%				40%		68%				41%		57%															
[3]SC% / Sa% / G% / C% / B% / Be%													30.9%	27.2%	34.6%	6.7%	0.0%	0.7%	24.9%	26.0%	46.7%	2.4%	0.0%	0.0%												
[3]d16 / d35 / d50 / d84 / d95 /													0.094	1.556	6.556	31.07	71.98		0.286	1.902	3.518	21.14	40.05													
[2]% of Reach with Eroding Banks							1%						2%						1%																	
Channel Stability or Habitat Metric																																				
Biological or Other																																				

Shaded cells indicate that these will typically not be filled in.
1 = The distributions for these parameters can include information from both the cross-section surveys and the longitudinal profile.
2 = Proportion of reach exhibiting banks that are eroding based on the visual survey from visual assessment table
3 = Riffle, Run, Pool, Glide, Step; Silt/Clay, Sand, Gravel, Cobble, Boulder, Bedrock; dip = max pave, disp = max subpave
4. = Of value/needed only if the n exceeds 3

Appendix E. Hydrologic Data

Table 12. Verification of Bankfull Events

Table 12. Verification of Bankfull Events UT to South Fork Creek (Stephens) No. 405			
Date of Data Collection	**Date of Occurrence**	**Method**	**Photo #**
23-Jun-10	15-May-10	Visual Observation of Wrack Lines	N/A
12-Apr-11	31-Mar-11	Visual Observation of Wrack Lines	17

A rainfall event of 1.07 inches was observed at the NOAA Weather Station 0317924 at Siler City, NC on March 31, 2011.

Photo 17. Wrack line at the top of the left bank (April 12, 2011)

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Table 13. Wetland Criteria Attainment 2009-2011

	2009[a]			2010			2011		
Gauge #	**Max # Consecutive Days**	**% Growing Season [e]**	**Success Criteria Achieved [d]**	**Max # Consecutive Days**	**% Growing Season [e]**	**Success Criteria Achieved [d]**	**Max # Consecutive Days**	**% Growing Season [e]**	**Success Criteria Achieved [d]**
Reference	~	~	~	3	3	No	59[b]	27	Yes
2	8	19	Yes	20	9	Yes	10[c]	7	Yes
3	0	0	No	79	34	Yes	72[c]	33	Yes
4	0	0	No	24	10	Yes	34[c]	16	Yes
5	0	0	No	43	19	Yes	62[c]	28	Yes

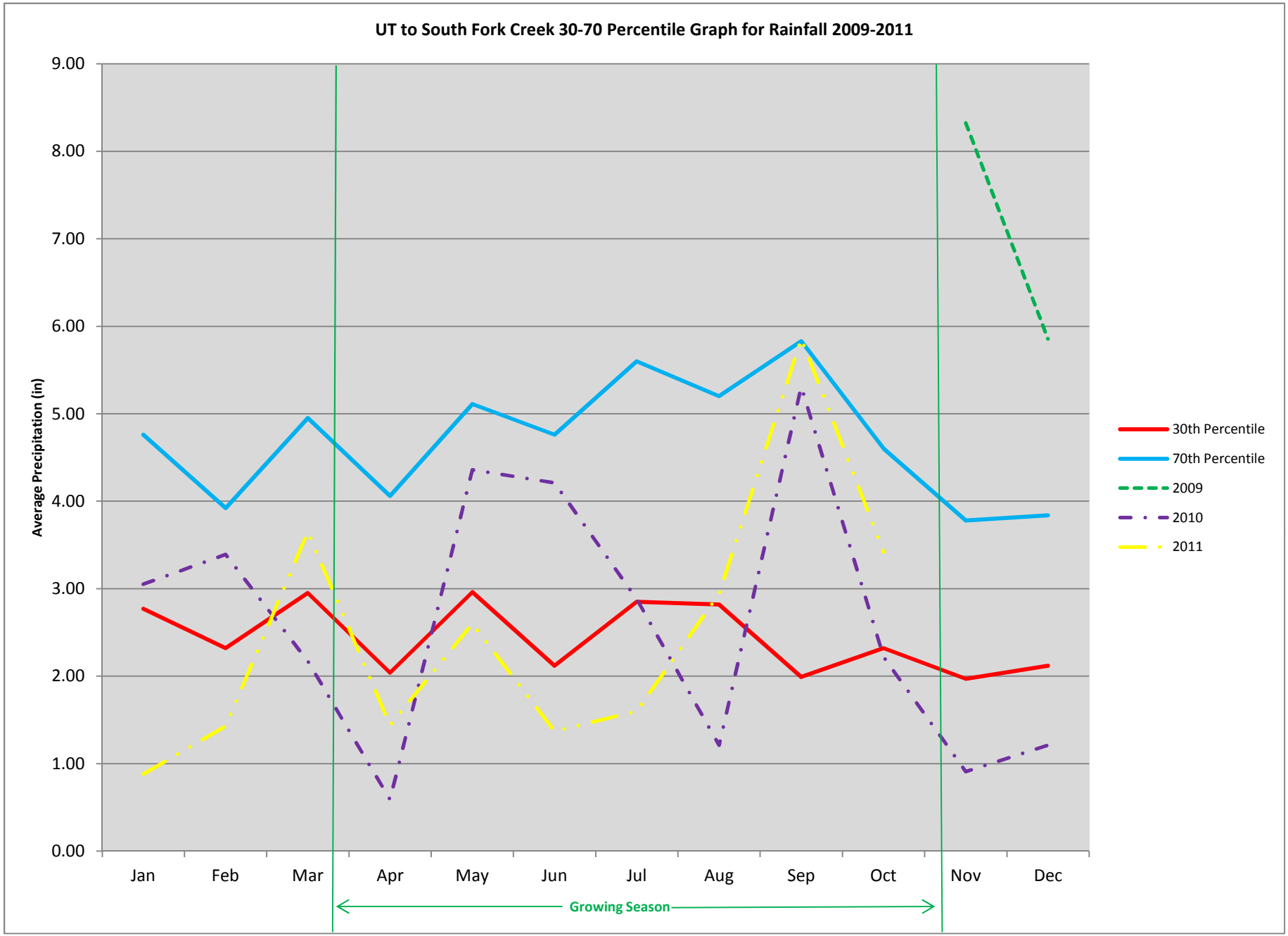
a - Gauges installed 9/28/2009 –42 days of growing season monitored

b - Data missing – groundwater level monitored for 148 days of growing season

c - Report produced prior to end of growing season –218 days monitored

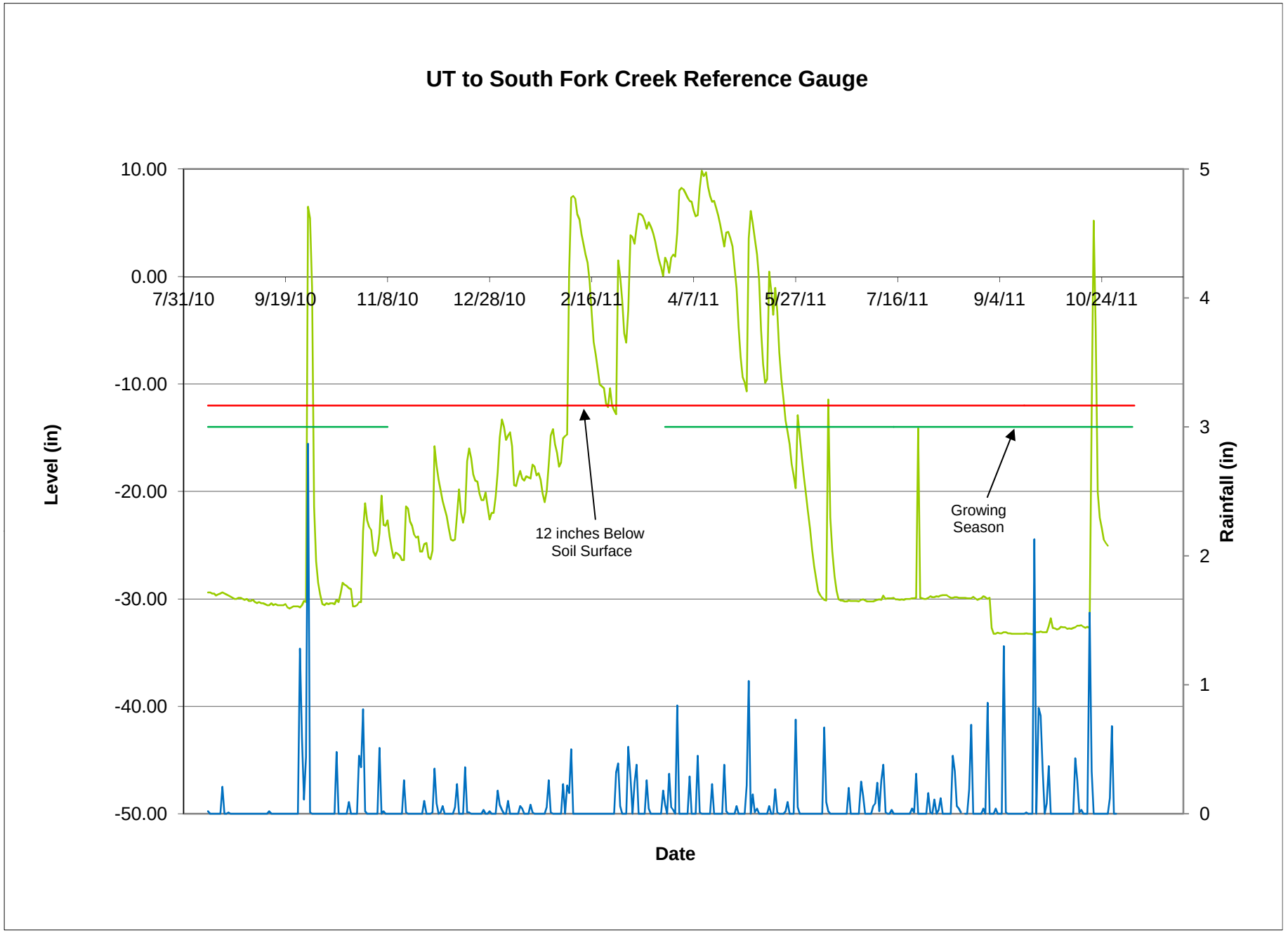
d- Groundwater levels are monitored to determine if levels are within 12 inches of the soil surface for at least 5% of the growing season. These areas will be considered wetlands if the groundwater is within 12 inches for at least 5% of the growing season, and the area supports hydrophytic vegetation, and meets the hydric soil requirements.

e- Growing Season: March 23 to November 3 (source: http://www.wcc.nrcs.usda.gov/cgibin/state.pl?state=nc)



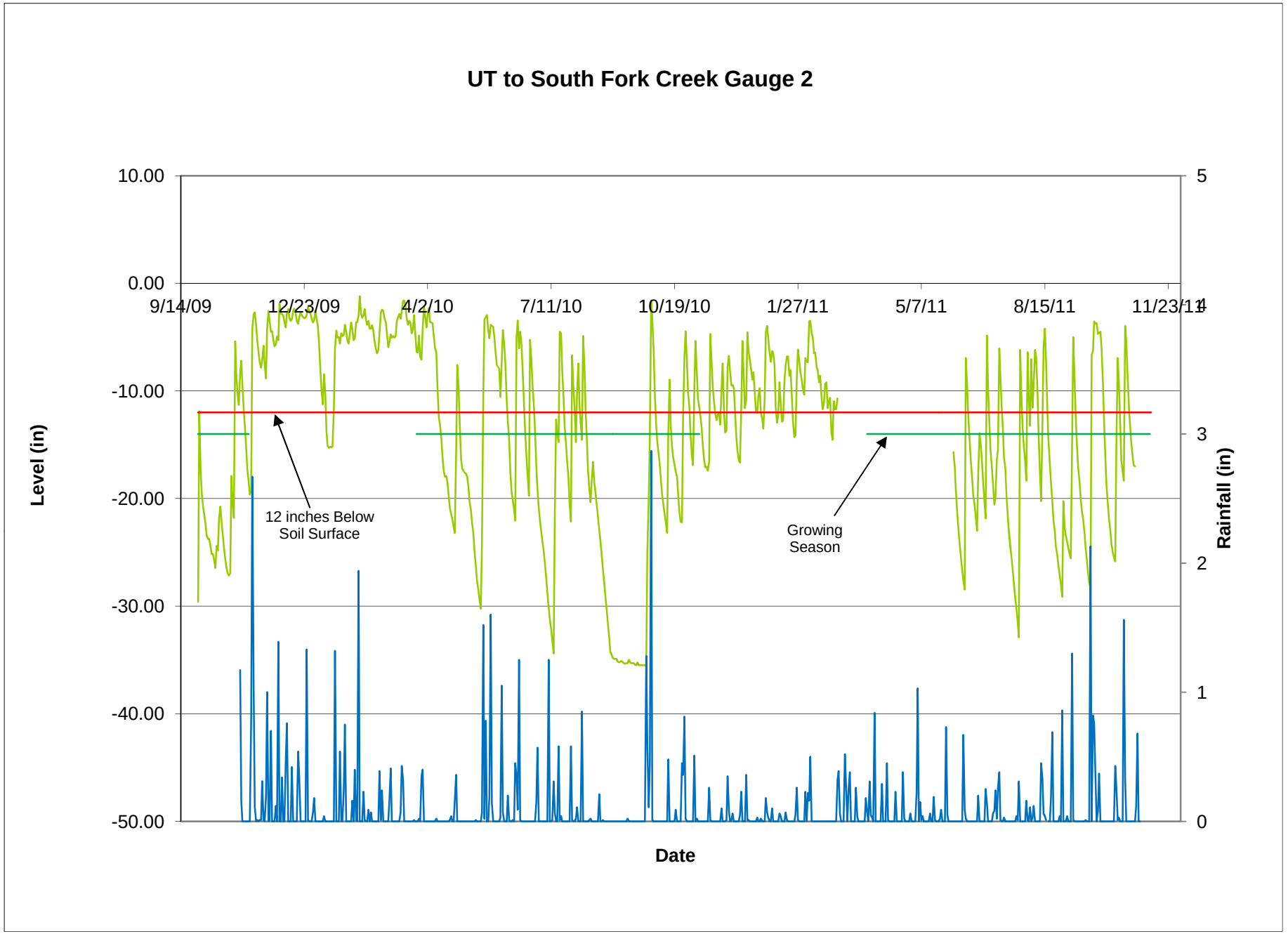
Growing Season: March 24 to November 9 (230 days)
(http://www.wcc.nrcs.usda.gov/cgibin/sate.pl?state=nc)

2009 Rain Data: Station KBUY; 2010-2011: Station SILR
(http://www.nc-climate.ncsu.edu/services/request.php)



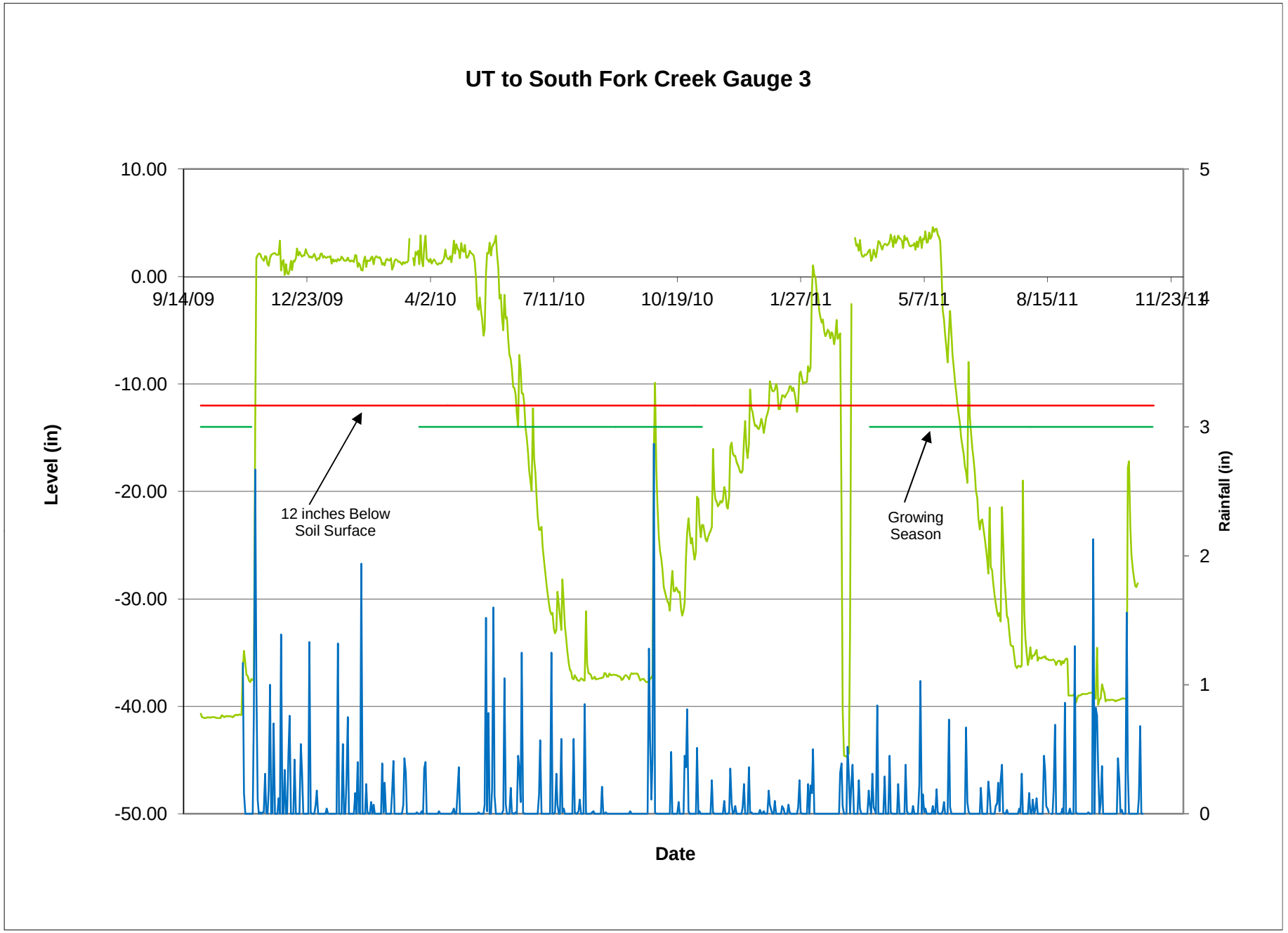
Growing Season: March 24 to November 9 (230 days)
(http://www.wcc.nrcs.usda.gov/cgibin/sate.pl?state=nc)

2009 Rain Data: Station KBUY; 2010-2011: Station SILR
(http://www.nc-climate.ncsu.edu/services/request.php)



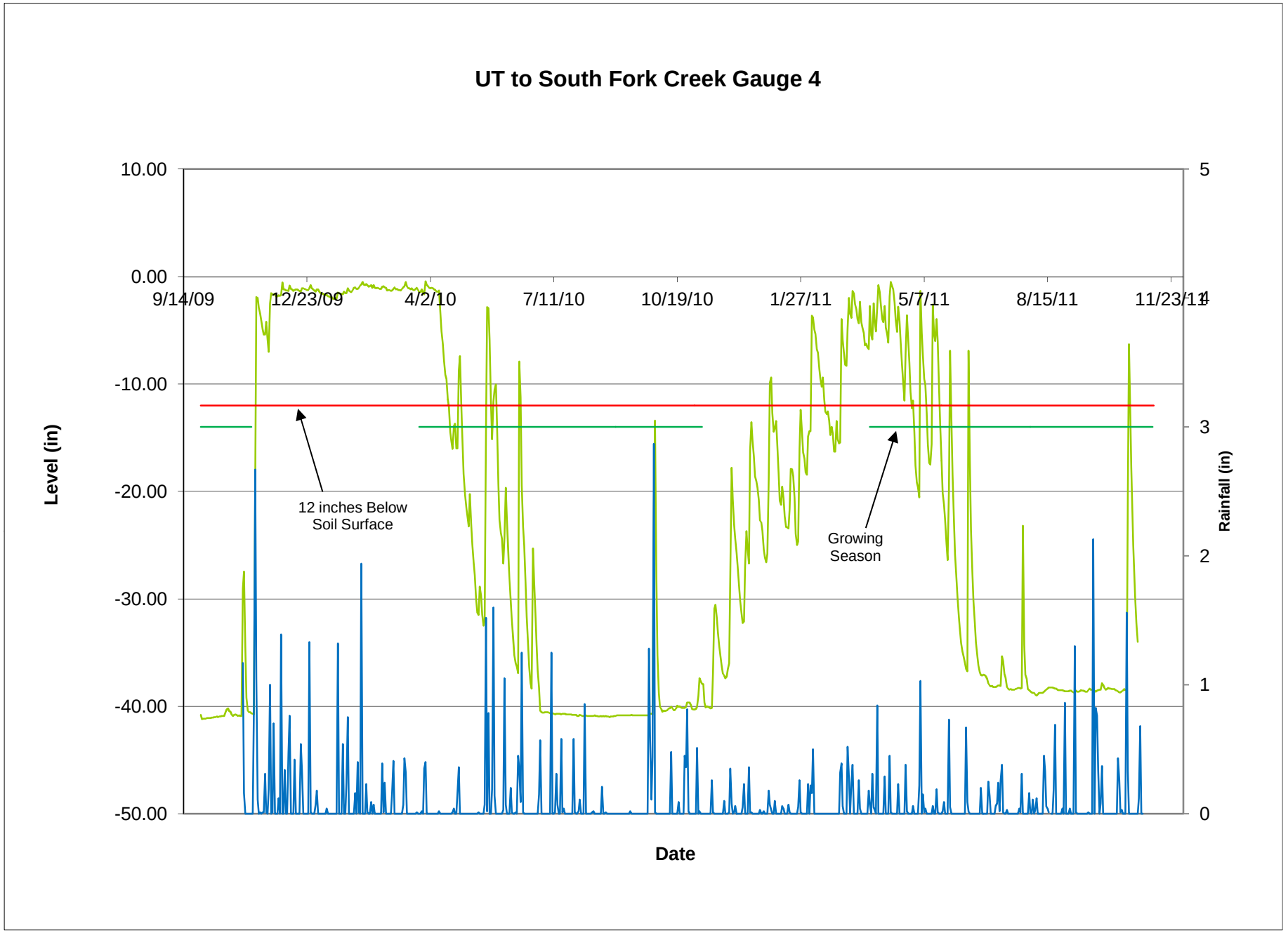
Growing Season: March 24 to November 9 (230 days)
(http://www.wcc.nrcs.usda.gov/cgibin/sate.pl?state=nc)

2009 Rain Data: Station KBUY; 2010-2011: Station SILR
(http://www.nc-climate.ncsu.edu/services/request.php)



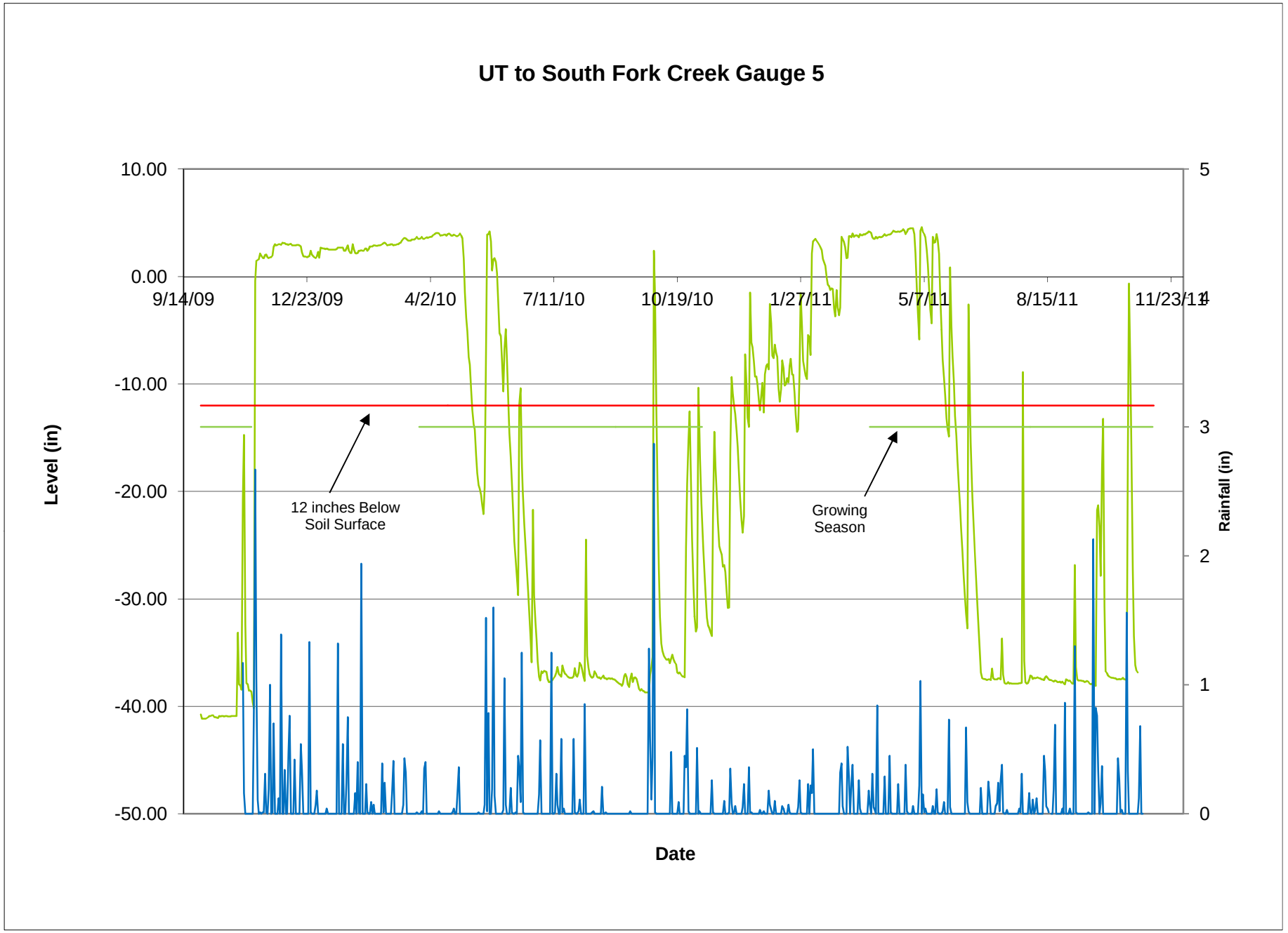
Growing Season: March 24 to November 9 (230 days)
(http://www.wcc.nrcs.usda.gov/cgibin/sate.pl?state=nc)

2009 Rain Data: Station KBUY; 2010-2011: Station SILR
(http://www.nc-climate.ncsu.edu/services/request.php)



Growing Season: March 24 to November 9 (230 days)
(http://www.wcc.nrcs.usda.gov/cgibin/sate.pl?state=nc)

2009 Rain Data: Station KBUY; 2010-2011: Station SILR
(http://www.nc-climate.ncsu.edu/services/request.php)



Growing Season: March 24 to November 9 (230 days)
(http://www.wcc.nrcs.usda.gov/cgibin/sate.pl?state=nc)

2009 Rain Data: Station KBUY; 2010-2011: Station SILR
(http://www.nc-climate.ncsu.edu/services/request.php)

Appendix F. Miscellaneous Data

EEP Piedmont EAST - Invasive Exotics Treatment Contract
Treatment III Summary - May 2011

Raymond Holtz, Restoration Systems Inc
DENR Contract # D09074s

Site Name: **UT to South Fork Cane Creek** EEP ID#: 405
Day on Site: 2
Total Hours: 24
Dates on Site: 03.02.2011
04.29.2011

Estimated % Completed: 90%

Description of Treatment + Additional Notes:

A foliar application was applied to the heavy infestation of *Ligustrum sinense* within the western half of the easement specifically at the far western edge. An additional sweep was made of the entire site, focusing on the previously applied areas of *Ligustrum sinense*, and through-out the easement itself. A check for how other *Ailanthus* stands faired from treatment I and II was also conducted, and re-treatment was applied when needed, however rarely. In Treatment IV we will monitor the areas previously treated while also systematically re-walking the site.

Results of Treatment II, *Ailanthus altissima*

Results of Treatment II, *Ligustrum sinense*

Results of Treatment II, *Ailanthus altissima*

Results of Treatment III, *Ligustrum sinense*

Results of Treatment III, *Ligustrum sinense*

Restoration Systems, LLC
Herbicide Daily Log Form

Date 3.02.2011 Site S. Fork Crane Creek

EEP # 405

Personnel	Name	Hours
	Reynel Nole	5.5
	Bryan Robins	5.5
	Jonathan A.	5.5

Herbicide/Adjuvant	Method	Amount Used
Accord	foliar	192 oz
Garlon 3a	foliar	160 oz

Weather and Notes (Species Treated, Methods, Any Other Items of Significance)
Weather Mid 60's 5-10 mph wind sunny & dry
Species Treated & Method Ligustrum sinense - foliar

Approved by: [signature]
License # 026-29183

Restoration Systems, LLC
Herbicide Daily Log Form

Date 4.29.2011 Site S. Fork – Crane Crk

EEI # 405

Personnel

Name	Hours
Raymond H.	2.5
Brian R.	2.5
Jonathan A	2.5

Herbicide/Adjuvant	Method	Amount Used
GARLON 4	BASAL	750z

Weather and Notes (Species Treated, Methods, Any Other Items of Significance)
Weather 70's windy low humidity.
Species Treated & Method Ligustrum sinense Ailanthus Altissima

Approved by: Raymond H.
License # 026-29183