ANNUAL MONITORING REPORT
SMITH AND AUSTIN CREEKS

STREAM RESTORATION
WAKE COUNTY, NORTH CAROLINA
(EEP Project Number 343)
Monitoring Year 4 of 5 (2006)

North Carolina Department of Environment and Natural Resources
Ecosystem Enhancement Program
Raleigh, North Carolina

Ecosystem Enhancement PROGRAM

January 2007

EXECUTIVE SUMMARY/PROJECT ABSTRACT

The Smith and Austin Creeks Stream Restoration Site (Site) is located in northern Wake County, approximately 1 mile southeast of the Town of Wake Forest adjacent to the Heritage Development and Golf Course. The restored stream reaches extend upstream from Forestville Road near the intersection of Forestville Road and Rogers Road (Figure 1). The project is located within the Neuse River Basin in United States Geological Survey (USGS) 14-digit Hydrologic Unit and Targeted Local Watershed 03020201070070 (North Carolina Division of Water Quality [NCDWQ] subbasin 03-04-02).

The primary goals of the project included the following.

1. Establish stable dimension, pattern, and profile along approximately 11,000 linear feet of Smith and Austin Creeks.
2. Improve aquatic habitat with bed variability and the use of in-stream structures in Smith and Austin Creeks.
3. Provide a terrestrial wildlife corridor and refuge in an area that is highly developed for residential and commercial purposes.
4. Establish a forested riparian buffer adjacent to Smith and Austin Creeks.
5. Incorporate this project into a watershed management plan.

Sixteen vegetation plots (10 meters square) were established and permanently monumented. These plots were surveyed in late July and early September 2006 for the 2006 (year 4) monitoring season. Based on the number of stems counted, the average plot density monitored at this Site is greater than 260 stems per acre and is considered successful. The average plot density has been measured at 923 stems per acre, or 23 stems per plot for 2006 (year 4) monitoring. The dominant species identified at the Site were green ash (*Fraxinus pennsylvanica*), sycamore (*Platanus occidentalis*), loblolly pine (*Pinus taeda*), and river birch (*Betula nigra*). Each of the sixteen individual vegetation plots were well-above the success criteria with 445 to 2227 planted stems per acre.

No vegetation problem areas were noted during year 4 (2006) monitoring. The Site is characterized by planted seedlings exhibiting various degrees of vigor. Overall, vigor was noted as good or excellent, although a few seedlings appeared to be lacking vigor as the result of plastic mesh collars installed after planting or stems that were flatten as the result of flooding from Tropical Storm Alberto in June 2006. Several of the plastic collars were removed during vegetation sampling.

Twenty-three permanent cross-sections were established after construction was completed for the as-built mitigation plan. Longitudinal profiles were measured after construction and are scheduled to be completed in year 1 (2003), year 3 (2005), and year 5 (2007) for a total of four measurements; therefore, longitudinal profile measurements have not been completed for the year 4 (2006) monitoring report. In addition, channel substrate is not expected to coarsen over time and is not monitored for success at this Site. As a whole, the majority of Site riffle cross-sections have decreased in cross-sectional area. This may result from various factors including beaver activity, high sediment loads, and/or stream adjustments towards a stable, vegetated, natural channel. Width-depth ratios were similar to previous years with slightly elevated values in Austin Reach 3. This may result from sediment deposition in a stable, low shear stress reach with good vegetation establishment; width-depth values are expected to lower as the banks continue to colonize with vegetation and capture sediment. Pools and associated point bars have remained relatively stable.

The as-built channel geometry compares favorably with the emulated, stable E/C stream type stream reaches as set forth in the detailed mitigation plan and construction plans. The current monitoring has demonstrated dimension was stable over the course of the year 4 (2006) monitoring.

Approximately 85 percent (9300 linear feet) of onsite reaches are characterized by a moderate Bank Erosion Hazard Index (BEHI) and moderate Near Bank Stress (NBS) values for the year 4 (2006) monitoring period. All values of BEHI and NBS are higher than expected; however, elevated values result primarily from high levels of sand in the stream bed and banks, which significantly raises BEHI/NBS values.

Several stream problem areas noted in previous annual monitoring reports were no longer present. Beaver dams were removed in 2005 from Smith Reach 2; therefore, backwater effects resulting from the dams are no longer present. In addition, many of the mid-bars present in 2004 have shifted and are currently point bars. During the current site assessment several areas of bank erosion mostly around root wads, mid-point bars, and reduced structure integrity/compromised vane arms were noted. Erosion may be attributed to two bankfull events documented for the year 4 (2006) monitoring period.

In summary, the restoration site achieved success criteria for vegetation and stream attributes in the Fourth Monitoring Year (2006).

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1.0 PROJECT BACKGROUND

1.1 Location and Setting

The Smith and Austin Creeks Stream Restoration Site (Site) is located in northern Wake County, approximately 1 mile southeast of the Town of Wake Forest adjacent to the Heritage Development and Golf Course. The restored stream reaches extend upstream from Forestville Road near the intersection of Forestville Road and Rogers Road (Figure 1). The project is located within the Neuse River Basin in United States Geological Survey (USGS) 14-digit Hydrologic Unit and Targeted Local Watershed 03020201070070 (North Carolina Division of Water Quality [NCDWQ] subbasin 03-04-02).

Directions to the Site:
From Raleigh, North Carolina

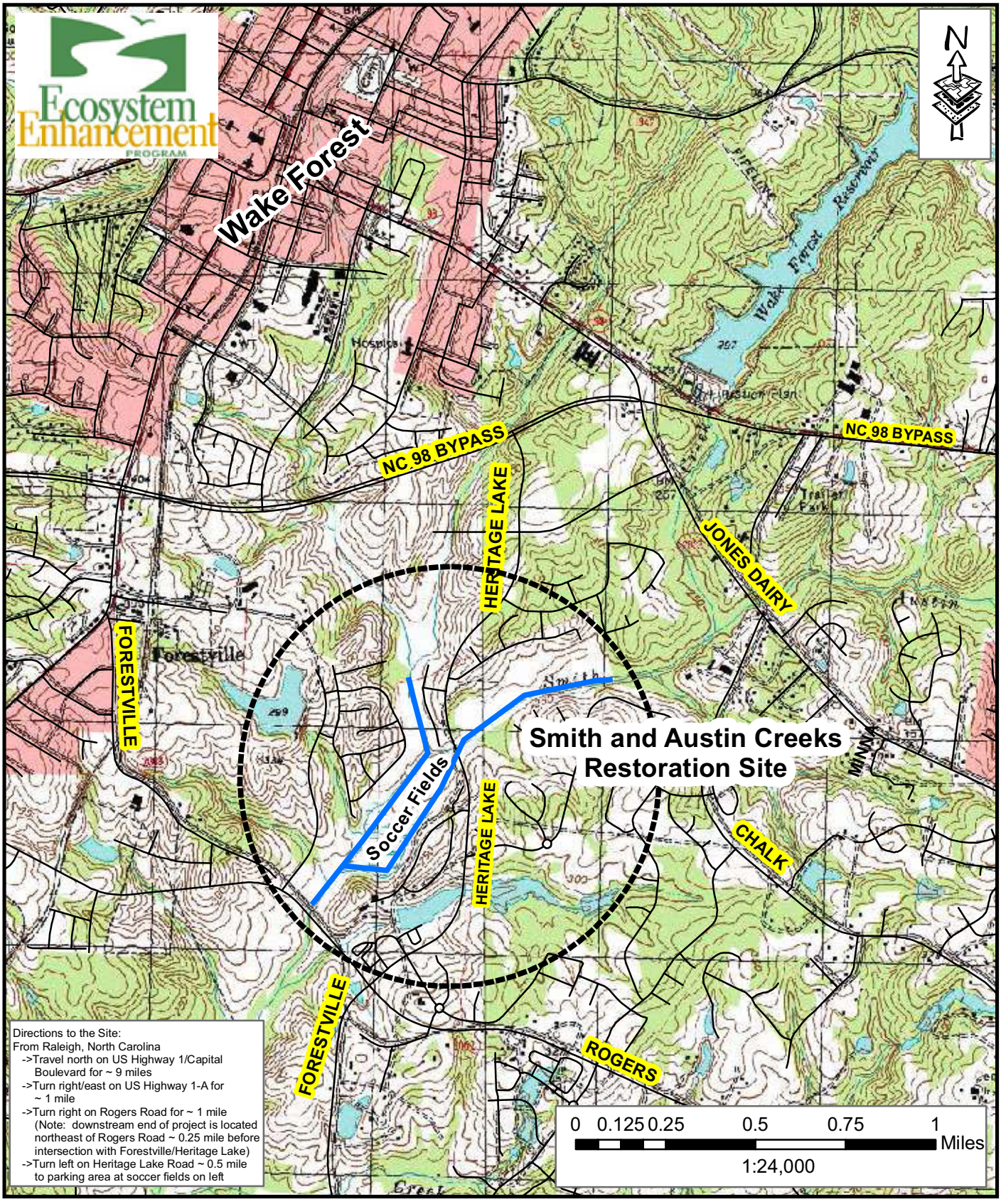
- Travel north on US Highway 1/Capital Boulevard for approximately 9 miles
- Turn right/northeast on US Highway 1-A for approximately 1 mile
- Turn right on Rogers Road for approximately 1 mile (Note: the downstream end of the project is located northeast of Rogers Road approximately 0.25 mile before the intersection with Forestville Road/Heritage Lake Road)
- Turn left on Heritage Lake Road approximately 0.5 mile to parking area at soccer fields on left

The Site is located in the Piedmont Physiographic Province, within the Northern Outer Piemont ecoregion. The Site is situated within a rapidly developing area on the outskirts of the Town of Wake Forest. Housing developments and new housing construction surrounds the Site; a golf course is located at the upstream end of the Site east of Heritage Lake Road, which bisects Austin Creek on the Site, and a park with soccer fields is located between Smith and Austin Creeks west of Heritage Lake Road.

1.2 Mitigation Structure and Objectives

Historically, the Site was characterized by agricultural land. Site streams were channelized in support of land uses, resulting in low-sinuosity, incised stream channels. Streambanks and bed features were unstable throughout the Site due to high shear stress and poor riparian vegetation. The location of the confluence of the two streams was altered as evidenced by old USGS topographic mapping and United States Department of Agriculture (USDA) soil survey maps, which show Austin Creek flowing into Smith Creek approximately 2500 linear feet upstream of the current confluence. A large flood in the early 1990s caused an avulsion to occur, which rerouted Austin Creek to its current downstream confluence with Smith Creek. A previous landowner completed the avulsion by excavating a channel and rerouting Austin Creek to the edge of the valley.

Smith and Austin Creeks were restored by traditional alterations to channel dimension, pattern, and profile, as outlined in *Applied River Morphology* (Rosgen 1996) with the establishment of a riparian zone adjacent to the creeks ranging from 15 to 100 feet in width from the top of bank. Stream implementation consisted primarily of stream restoration (Priority 1 and Priority 2) where feasible (i.e. the floodplain and easement widths allowed). Stream enhancement occurred on incised channel reaches where pattern alterations were not feasible due to a narrow valley and/or existing development. Stream enhancement consisted of excavation of a new floodplain bench at the bankfull stage and installation of structures to improve bed features and provide grade control. Structures were installed throughout restoration and enhancement reaches of Smith and Austin Creeks to maintain the restored channel profile (rock cross-vanes) and to maintain channel pattern (single vanes). In addition, stream banks were revegetated to provide bank stabilization.



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

SITE LOCATION
SMITH AND AUSTIN CREEKS RESTORATION SITE
EEP Project Number 343
Year 4 (2006) Monitoring Report
Wake County, North Carolina

Drawn by:	FIGURE
CLF	1
Date: Jan 2007	
Project: 06-002	

The primary goals of the project included 1) establishing stable dimension, pattern, and profile along Smith and Austin Creeks, 2) improving habitat, 3) establishing a forested riparian buffer, and 4) incorporating this project into a watershed management plan. Project structures and objectives are summarized below.

Table 1. Project Mitigation Structures and Objectives

Project Name/Number: Smith and Austin Creeks (EEP Project Number 343)

Project Segment or Reach ID	Mitigation Type*	Approach**	Linear Footage or Acreage	Stationing	Comment
SR1a	EI	P3	875	00+00 to 08+75	Reach SR1 includes a mix of P2 and P3, with a dominance of P2 as indicated in stationing
SR1b	R	P2	1080	08+75 to 19+55	
SR2	R	P1	2618	19+55 to 45+73	Includes 2618 feet of excavation of new channel at the existing floodplain elevation
SR3	S	SS	794	45+73 to 53+67	Erroding reaches were stabilized with root wads and instream structures
AR1	EI	P3	2581	00+00 to 25+81	Benching, instream structures, and planting banks
AR2	EI	P3	526	25+81 to 31+07	Benching, instream structures, and planting banks
AR3	R	P1	2480	31+07 to 55+87	Includes 2480 feet of excavation of new channel at the existing floodplain elevation

* R = Restoration
EI = Enhancement (Level I)
S = Stabilization

** P1 = Priority I
P2 = Priority II
P3 = Priority III
SS = Stream Bank Stabilization

1.3 Project History and Background

Completed project activities, reporting history, and completion dates are summarized in Table 2.

Table 2. Project Activity and Reporting History

Project Name/Number: Smith and Austin Creeks (EEP Project Number 343)

Activity or Report	Scheduled Completion	Data Collection Completion	Actual Completion or Delivery
Restoration Plan	*	*	*
Construction Completion	*	*	August 2002
Mitigation Plan/As-builts	Fall 2002	*	Fall 2002
Structural Maintenance	*	*	January 2003
Year 1 Monitoring (2003)	September 2003	*	July 2004
Beaver Removal	*	*	2005
Year 2 Monitoring (2004)	September 2004	*	April 2005
Year 3 Monitoring (2005)	*	*	*
Year 4 Monitoring (2006)	Dec 2006	Sept 2006	Nov 2006

* - Historical project documents necessary to provide this data were unavailable at the time of this report submission.

Contact information regarding project designer, construction, planting contractor, monitoring personnel, and relevant project background information are summarized in Tables 3 and 4.

Table 3. Project Contact Table

Project Name/Number: Smith and Austin Creeks (EEP Project Number 343)

Designer	Buck Engineering 8000 Regency Parkway, Suite 200 Cary, NC 27511 Will Pedersen (919) 463-5488
Construction Contractor	Shamrock Environmental Corporation PO Box 14987 Greensboro, NC 27415 Bill Wright (336) 375-1989
Riparian Restoration	Soil and Environmental Consultants, Inc. 11010 Raven Ridge Road Raleigh, NC 27614 Peter Jelenevsky (919) 846-5900
Monitoring Performer	Axiom Environmental, Inc. 2126 Rowland Pond Dr. Willow Spring, NC 27592 Grant Lewis (919) 215-1693

Table 4. Project Background Table

Project Name/Number: Smith and Austin Creeks (EEP Project Number 343)

Project County	Wake County, North Carolina
Drainage Area	12.6 square miles at Site outfall (Smith Reach ~ 3.6 square miles, Austin Reach ~8.4 square miles)
Drainage impervious cover estimate (%)	< 5
Stream Order	Smith (third and fourth), Austin (fourth)
Physiographic Region	Piedmont
Ecoregion	Northern Outer Piedmont
Rosgen Classification of As-built	E-/C-type
Cowardin Classification	R3UB2
Dominant Soil Types	Chewacla
Reference Site ID	*
USGS HUC for Project and Reference	Project – 03020201 Reference – *
NCDWQ Subbasin for Project and Reference	Project – 03-04-02 Reference – *
NCDWQ Classification for Project and Reference	Project – C NSW (Stream Index # 27-23-2 and 27-23-3) Reference - *
Any portion of any project segment 303d listed?	No
Any portion of any project segment upstream of a 303d listed segment?	No
Reasons for 303d listing or stressor	Not Applicable
% of project easement fenced	0

* - Available project documents consisting of the 2003 Mitigation Plan, 2004 (Year 2) Annual Monitoring Report, and the 2005 (Year 3) Annual Monitoring Report do not include this information.

1.4 Monitoring Plan View
Monitoring activities for the Site, including relevant structures and utilities, project features, specific project structures, and monitoring features are detailed in Figures 2A through 2H.

Site features including vegetation, stream dimension (cross-sections), evaluations of bank erosion and near bank stress, and photographic documentation were monitored in year 4 (2006). Sixteen vegetation plots were installed in year 4 (2006) and permanently monumented with five-foot metal fence posts, driven into each of the four corners of the plot, with PVC pipe attached to the origin for ease in plot location identification. Twenty-three cross-sections, which were installed after project construction and permanently monumented with PVC pipe were located and measured for year 4 (2006).

2.0 PROJECT CONDITION AND MONITORING RESULTS

2.1 Vegetation Assessment
Following Site construction three 25-foot by 100-foot vegetation plots were measured for the as-built mitigation plan. Monitoring plots were changed during the following years with eight 10-meter square plots measured in year 1 (2003), four 10 meter square plots measured in year 2 (2004), and fifty 10-meter square plots measured in year 3 (2005). Plots were not permanently marked.

During the 2006 (year 4) monitoring period, sixteen 10-meter by 10-meter plots were established and permanently marked with five-foot metal fence posts. Sampling was conducted as outlined in the *CVS-EEP Protocol for Recording Vegetation* (Lee et al. 2006). The locations of vegetation monitoring plots were placed to accurately represent the entire Site and are depicted on Figures 2A through 2H.

2.1.1 Soil Data
Soils within the Site are composed of the Chewacla series. Soil data including percentage of clay on the surface, levels of erosion, and percentage of organic matter are not included in the soil survey for Wake County. Chewacla series (*Aquic Fluventic Dystrochrepts*) consists of nearly level, somewhat poorly drained, moderately permeable soils on floodplains of most streams in Wake County. The depth to the seasonal high water table is approximately 1.5 feet; the soils are frequently flooded for brief periods. Natural fertility and the content of organic matter are low (USDA 1970).

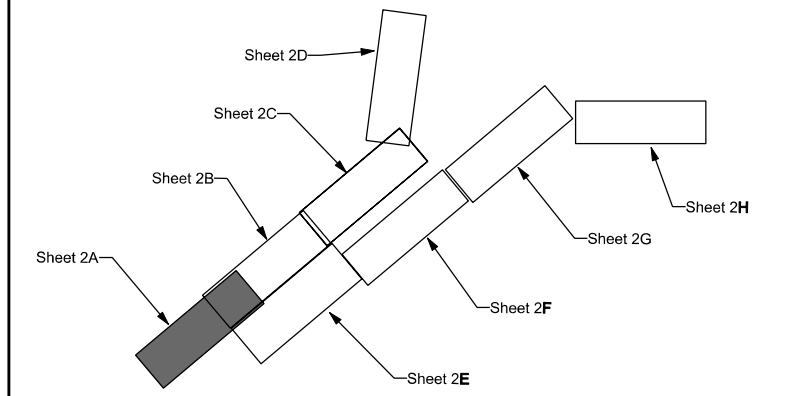
2.1.2 Vegetative Problem Areas
A plan view illustrating vegetative problem areas was not included in this report due to an absence of observed vegetative problems. The Site is characterized by planted seedlings exhibiting various degrees of vigor. Overall, vigor was noted as good or excellent, although a few seedlings appeared to be lacking vigor as the result of plastic mesh collars installed after planting or stems that were flatten as the result of flooding from Tropical Storm Alberto in June 2006. Several of the plastic collars were removed during vegetation sampling.

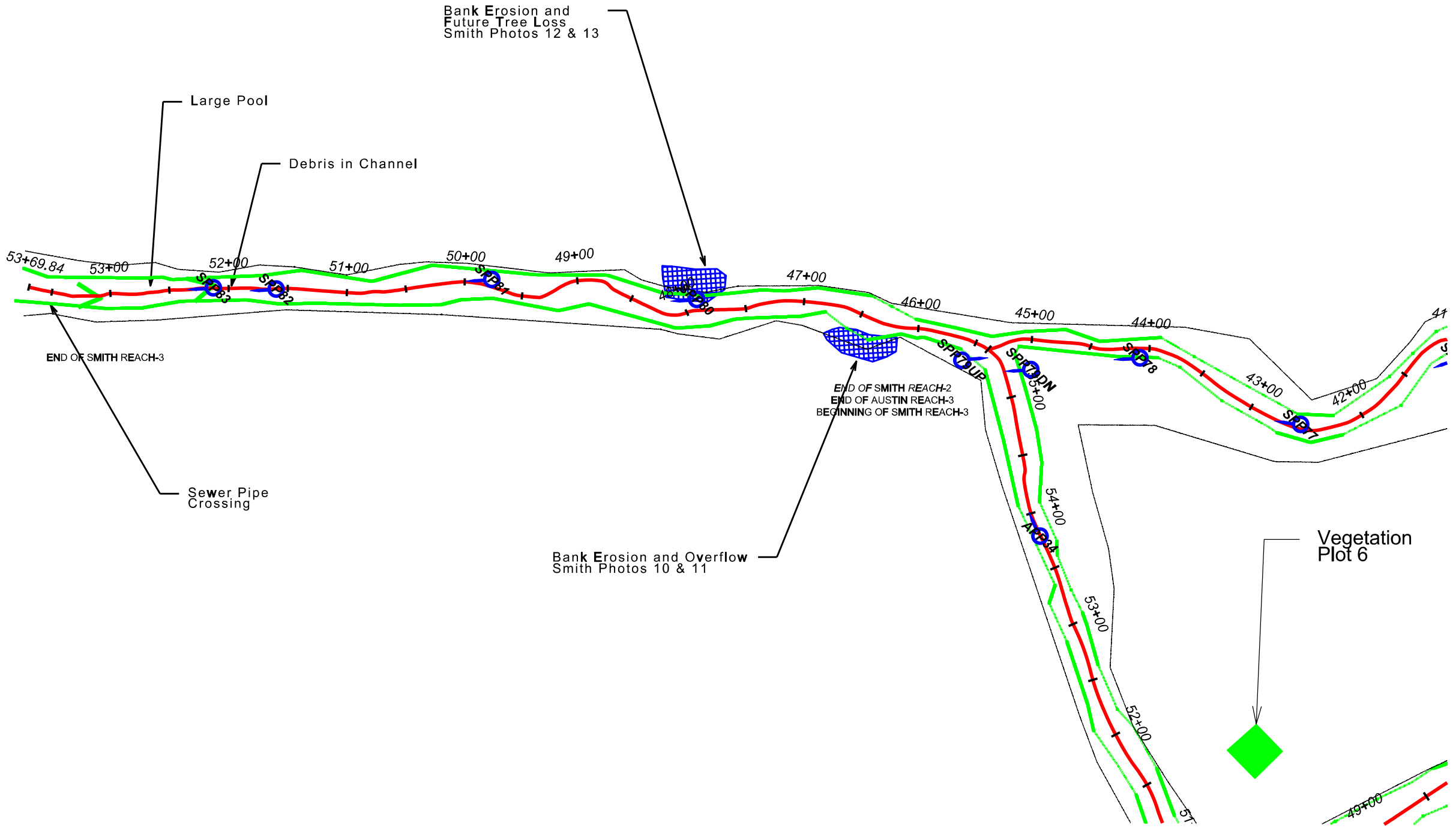
2.1.3 Stem Counts
Sixteen vegetation plots were established and permanently marked as depicted in Figures 2A through 2H. The plots are 10 meters square and are located randomly within the Site. These plots were surveyed in late July and early September 2006 for the 2006 (year 4) monitoring season; results are included in Table 5. No reference area was studied; therefore no comparisons could be made to reference conditions.

Due to the revised monitoring protocol during each year of vegetation surveys, no comparisons of as-built to the subsequent monitoring years can accurately be made. Therefore, planted species have been based upon previous annual monitoring reports and percent survival is based on a comparison of as-built (year 0) total stems per acre. The number of "planted" species were based on the experience and judgment of the monitoring team, and counts for planted species may be influenced by naturally recruited stems.

Legend

- Functional Cross Vane
- Failing Cross Vane
- Stressed Cross Vane
- Bed or Bank Errosion
- Mid Channel Bar
- Photo Plot
- Vegetation Plot
- Cross Section
- Thalweg
- Top of Bank





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Project:

Smith & Austin Creeks Restoration Site

Project Number 343
Year 4 (2006) Monitoring Report
Wake County
North Carolina

Title:

Monitoring Plan and Problem Area Planview

Scale:	FIGURE NO.
1 in = 95 m	2A
Date: NOV 2006	
Project No.: 06-002.03	

Legend

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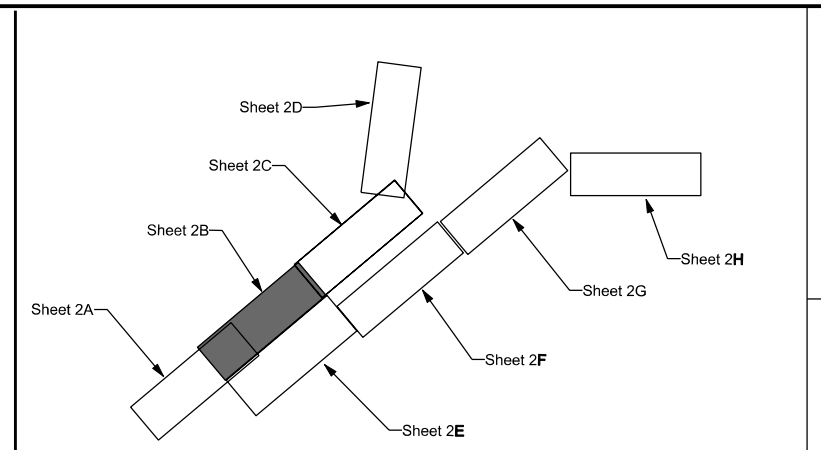

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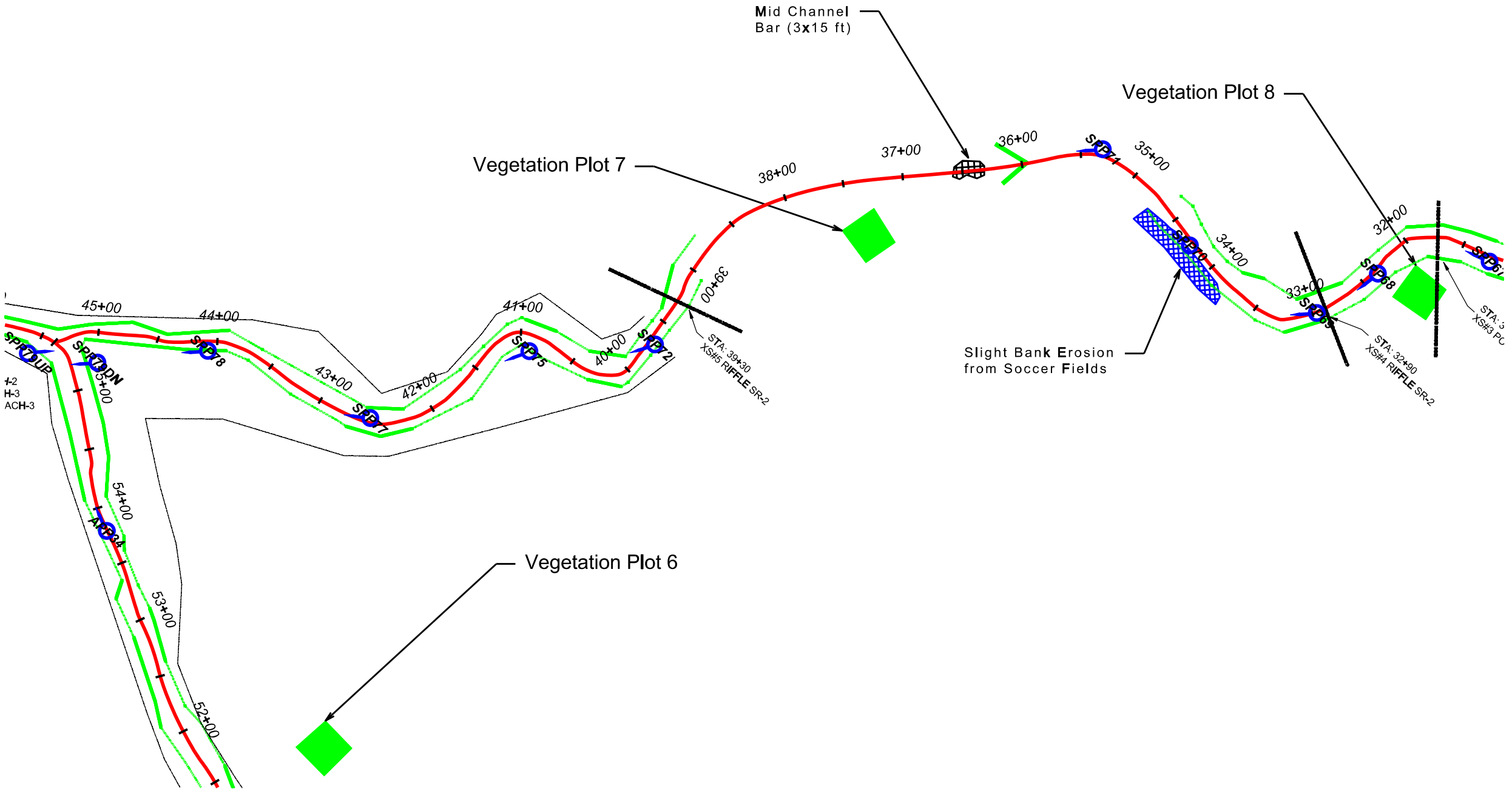

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Scale:	FIGURE NO.
1 in = 95 m	2B
Date: NOV 2006	
Project No.: 06-002.03	

Legend

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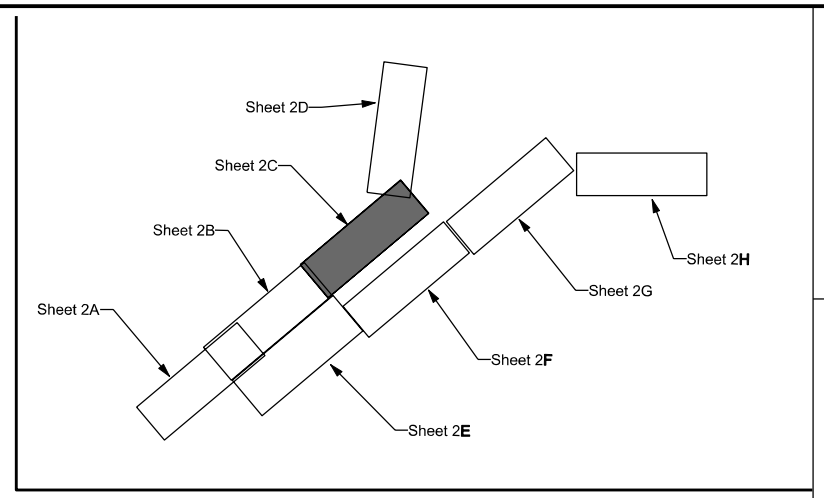

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Scale:	FIGURE NO.
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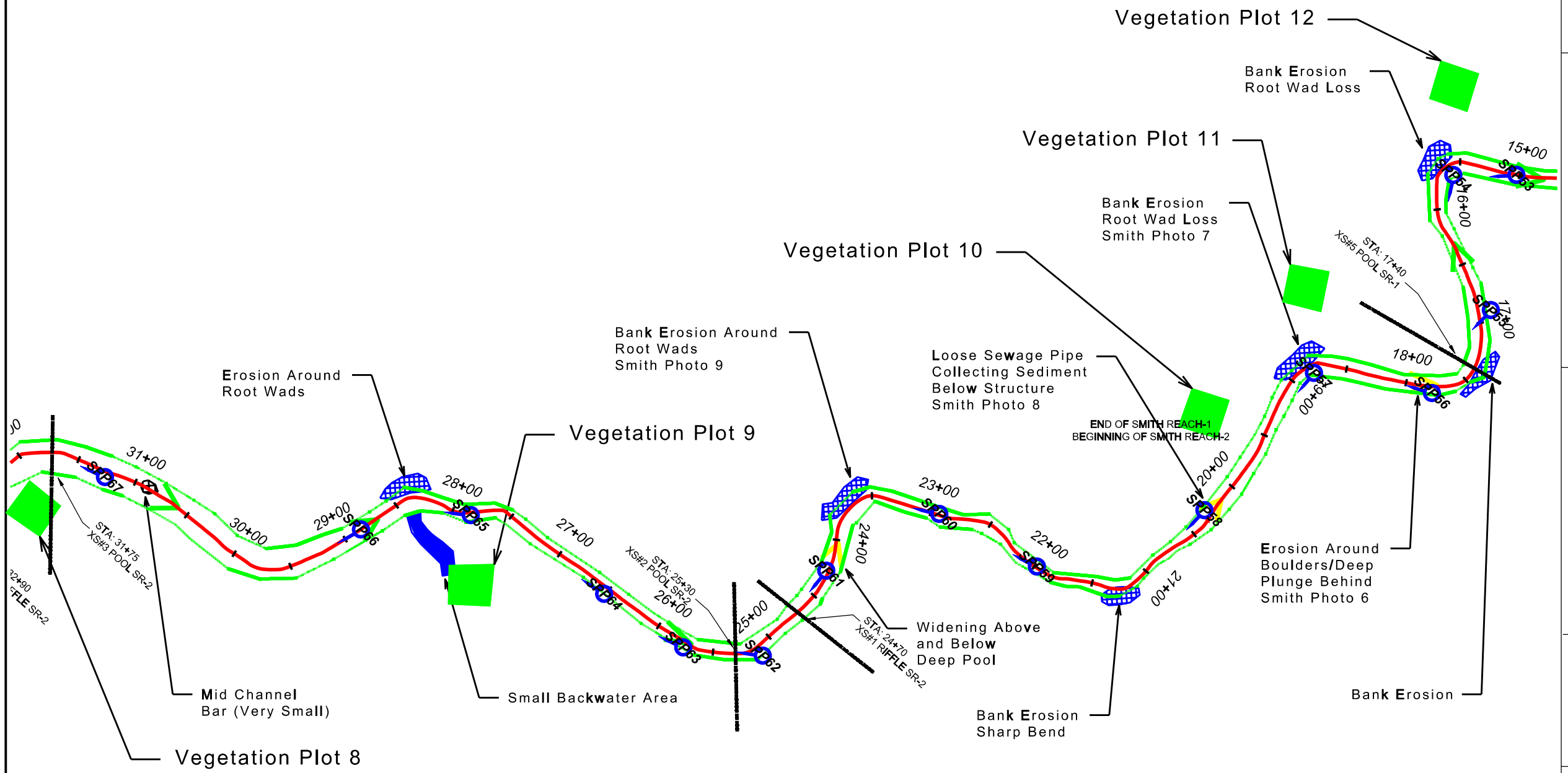
Date: NOV 2006	
Project No.: 06-002.03	



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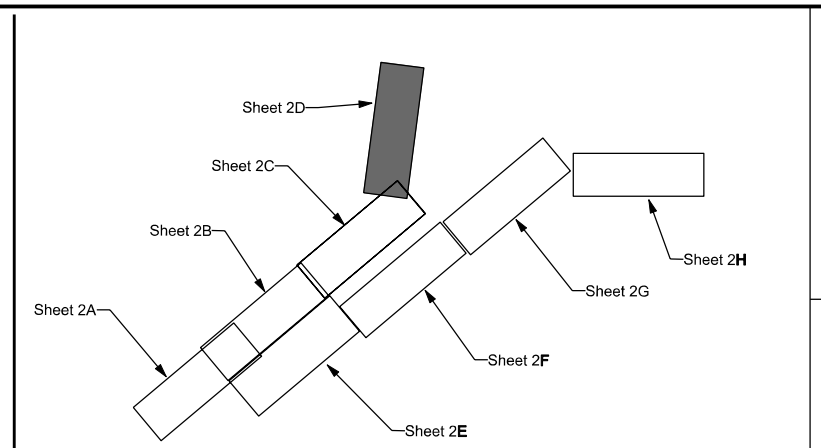

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Scale: 1 in = 95 m

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FIGURE NO.

2D

Vegetation Plot 12

Bank Erosion Root Wad Loss

Erosion Around Left Bank Arm

Vegetation Plot 13

Eroding Behind Right Bank Arm Smith Photo 3

Bank Erosion Root Wad Loss Smith Photo 4

Eroding Around Right Arm

Mid Channel Bar (5x10 ft)

Debris in Channel

Bank Erosion Smith Photo 1

Erosion On Left Bank

Erosion Behind Left Bank Arm Smith Photo 2

Mid Channel Bar (5x25 ft)

Bank Sloughing Root Wad Loss

Old Bank Sloughing

Bank Erosion

Erosion Around Structure Smith Photo 5

Erosion Around Boulders/ Deep Plunge Behind Smith Photo 6

Some Bank Erosion Sediment Input from Stormwater/Tight Meander Bend

STA: 17+40 XS#5 POOL SR-1

STA: 12+40 XS#4 POOL SR-1

STA: 11+70 XS#3 RIFFLE SR-1

STA: 9+75 XS#2 RIFFLE SR-1

STA: 4+10 XS#1 RIFFLE SR-1

BEGINNING OF SMITH REACH-1

Legend

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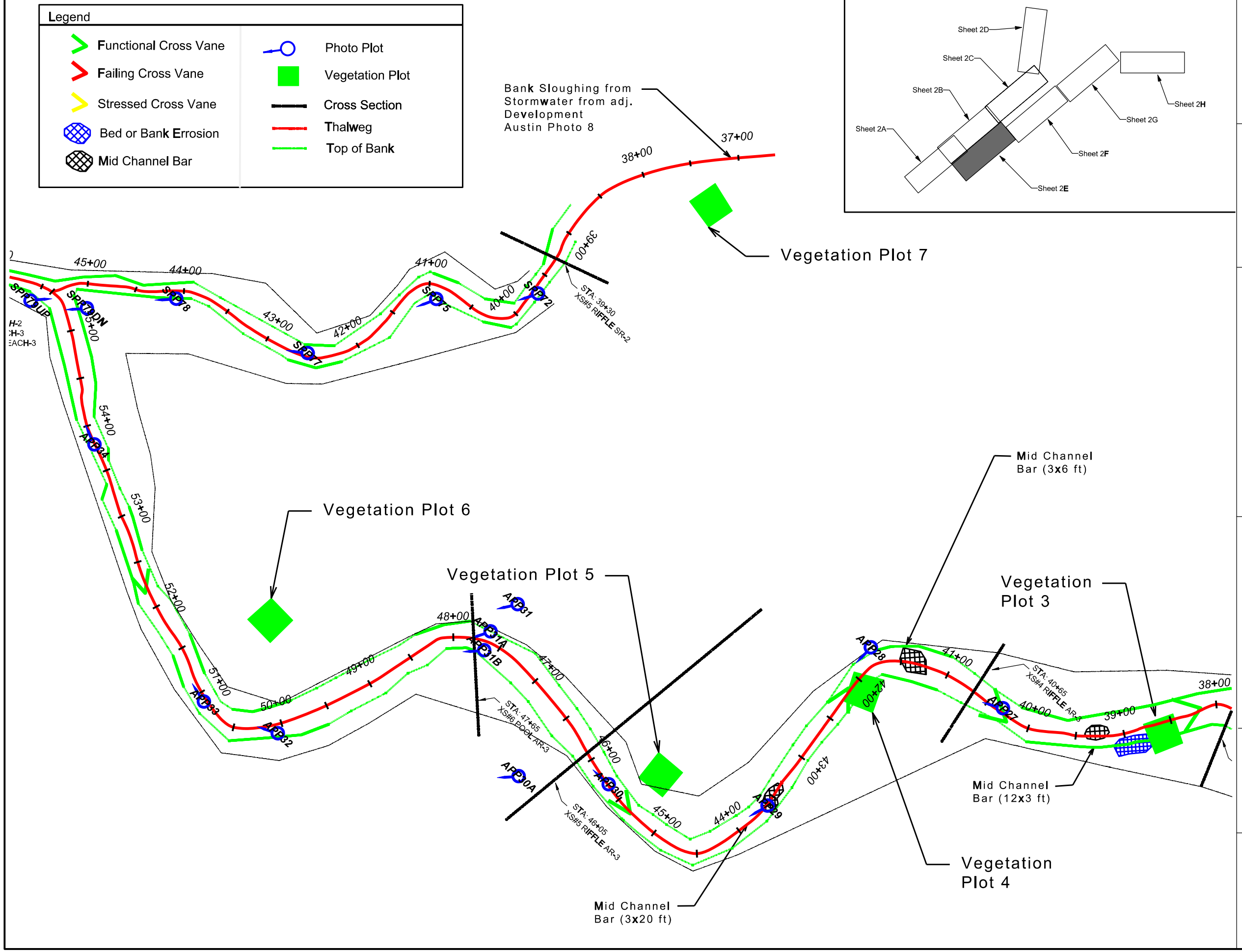
FIGURE NO.

2E



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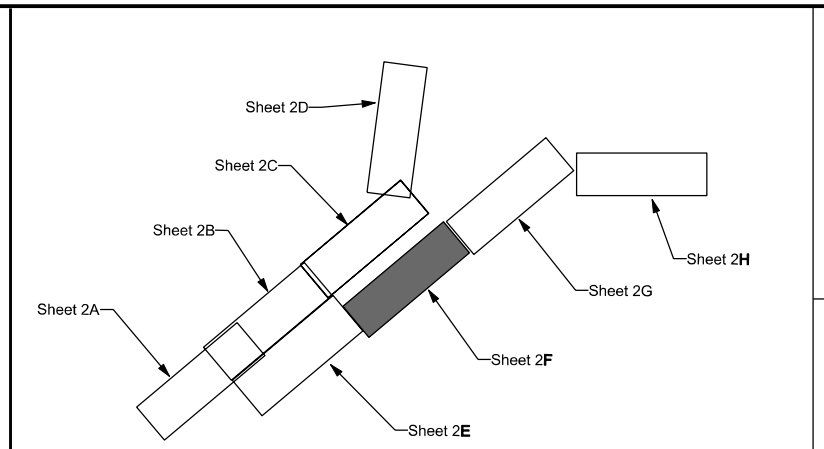

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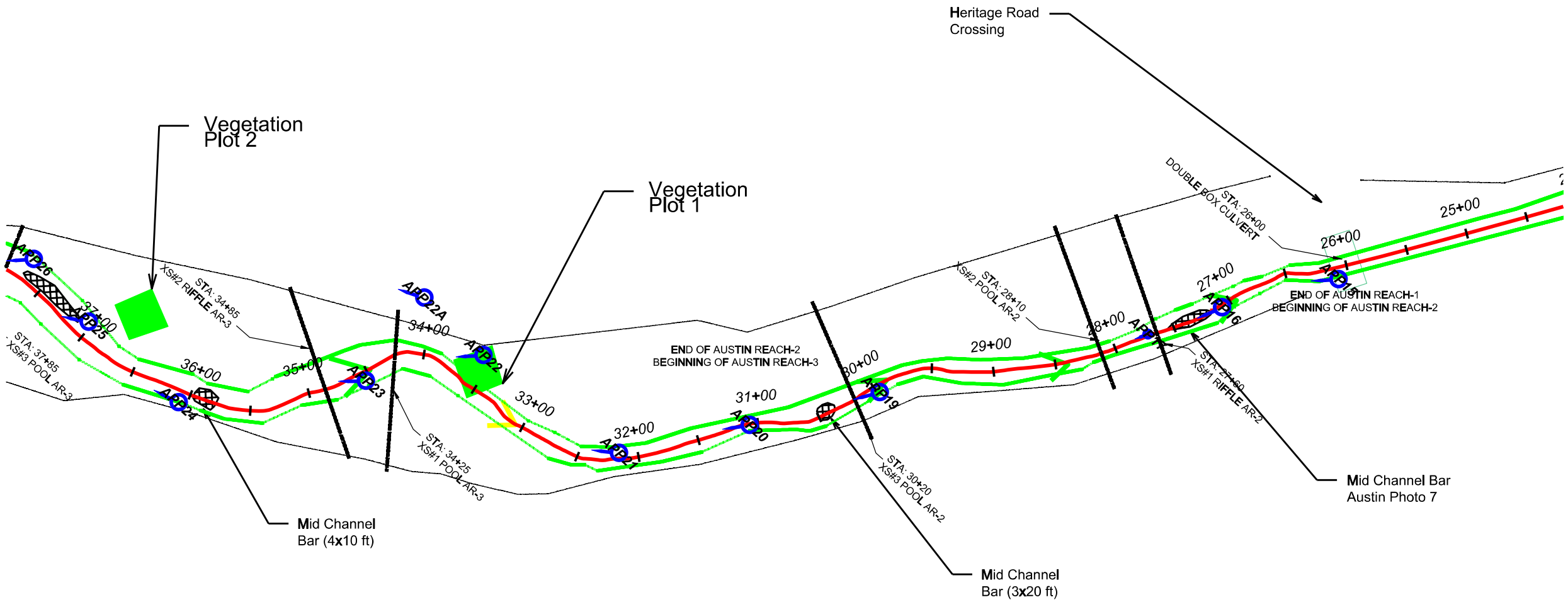

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Monitoring Plan and Problem Area Planview

Scale:	FIGURE NO.
1 in = 95 m	2F
Date: NOV 2006	
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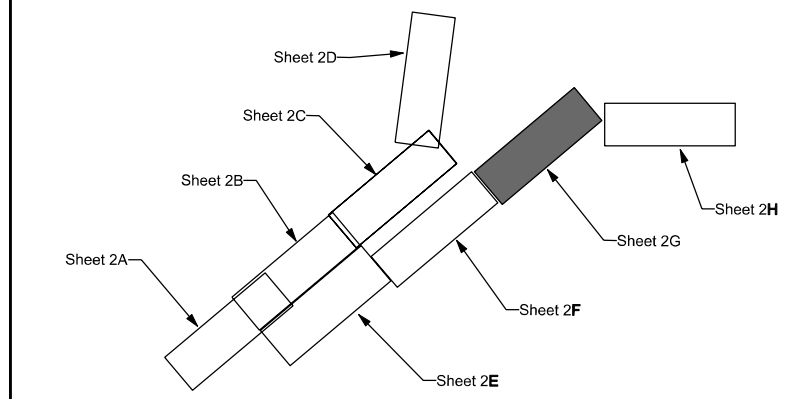

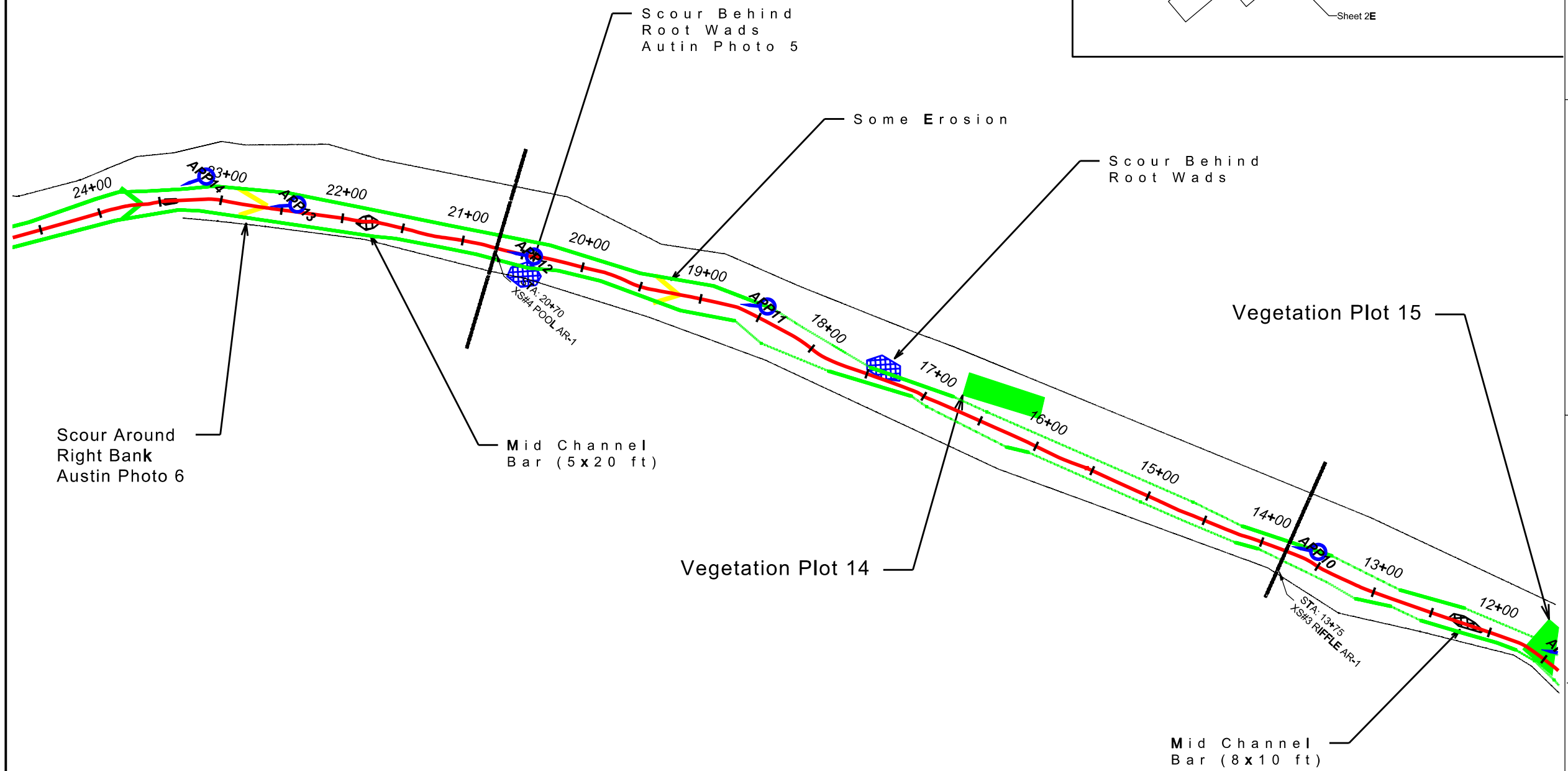

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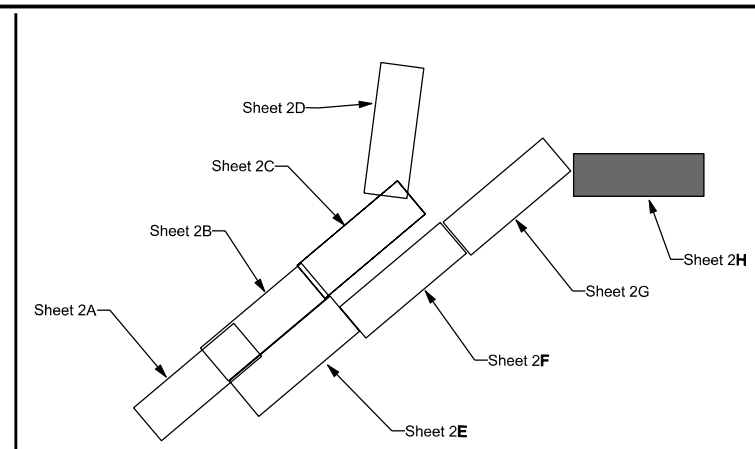

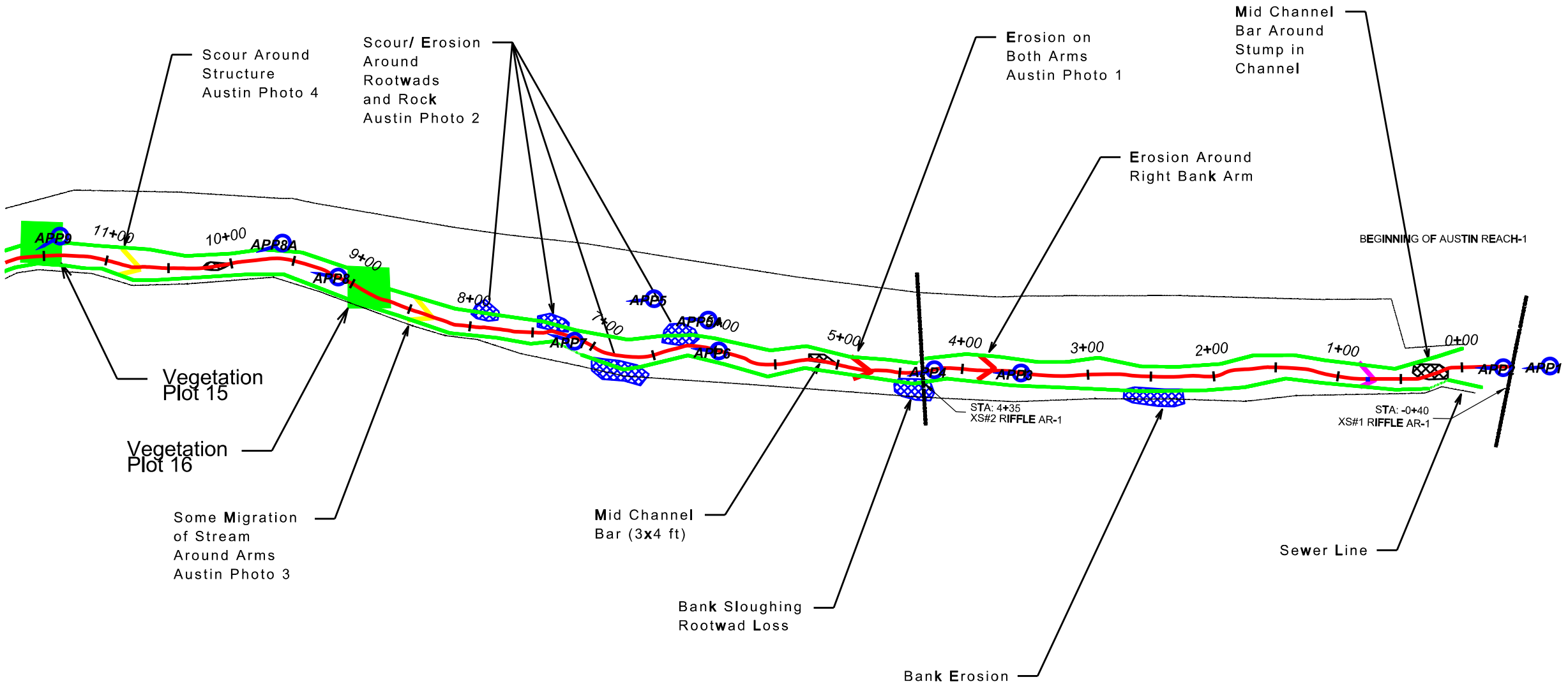

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Scale:	FIGURE NO.
1 in = 95 m	2H
Date: NOV 2006	
Project No.: 06-002.03	

Table 5. Stem Counts for Planted Species Arranged by Plot
Smith and Austin Creeks (Project Number 343)

Species	Year 4 (2006) Plot Counts (each plot is 10-meters square or 0.0247 acre in size)																Initial Totals*	Year 1 (2003) Totals*	Year 2 (2004) Totals*	Year 3 (2005) Totals*	Year 4 (2006) Totals*	Survival %
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16						
Acer negundo		1			2	2			1	1				1		1	Unknown	18	5	*	9	**
Acer rubrum																	Unknown		3	*	0	**
Alnus serrulata			1								1				1		Unknown			*	3	**
Aronia arbutifolia																	Unknown	13		*	0	**
Betula nigra	1		2	3	1		2			2	4	1	1		7	1	Unknown		6	*	25	**
Carpinus caroliniana																	Unknown	1		*	0	**
Carya aquatica																	Unknown	3		*	0	**
Carya sp.	1																Unknown			*	1	**
Cephalanthus occidentalis																	Unknown	8		*	0	**
Cercis canadensis																	Unknown		1	*	0	**
Cornus amomum			1		1												Unknown	44		*	2	**
Cornus sericea																	Unknown	5		*	0	**
Diospyros virginiana						1			4								Unknown		1	*	5	**
Fraxinus pennsylvanica		11	16	6	27	47	10	21	5	4	2	2		1	4	4	Unknown	5	76	*	160	**
Juglans nigra																	Unknown	1		*	0	**
Liquidambar styraciflua																	Unknown		4	*	0	**
Liriodendron tulipifera	2	1		1										1			Unknown		4	*	5	**
Myrica cerifera	1			1										1	1		Unknown			*	4	**
Nyssa aquatica													1				Unknown			*	1	**
Nyssa sylvatica																	Unknown	1		*	0	**
Nyssa sp.				3							1		4	3			Unknown			*	11	**
Pinus taeda	3	1	4	1	7	1	1	2	3	5	8	5	5	3		4	Unknown		3	*	53	**
Platanus occidentalis		3	1	3	2	1	3	3	1		6	1	3			1	Unknown		35	*	28	**
Populus deltoides																	Unknown	2		*	0	**
Quercus alba																	Unknown	6		*	0	**
Quercus falcata		2															Unknown		2	*	2	**
Quercus lyrata		1			1				2	1		1					Unknown			*	6	**
Quercus michauxii	1			1			1				1		1	3	2	4	Unknown	14		*	14	**
Quercus nigra			2	2				1	1		2		1			1	Unknown			*	10	**
Quercus pagoda					1	2				6	1	1	3	1			Unknown			*	15	**
Quercus phellos																	Unknown		4	*	0	**
Quercus sp.																	Unknown		1	*	0	**
Salix nigra																	Unknown	16	4	*	0	**
Sambucus canadensis										1							Unknown			*	1	**
Sambucus nigra																	Unknown	4		*		**
Ulmus rubra	1					1									1	1	Unknown			*	4	**
Ulmus sp.	1	2	1					2						2	1	1	Unknown			*	10	**
unknown species																	Unknown		2	*	0	**
Total Stems	**11**	**22**	**28**	**21**	**42**	**55**	**17**	**29**	**17**	**20**	**26**	**11**	**19**	**16**	**17**	**18**	**153**	**141**	**151**	*	**369**	**104%**
Total Stems Per Acre	**445**	**891**	**1134**	**850**	**1700**	**2227**	**688**	**1174**	**688**	**810**	**1053**	**445**	**769**	**648**	**688**	**729**	**890**	**705**	**1510**	*	**923**	

* Initial totals are based on the total of three-25-foot by 100-foot plots (a total of 0.17 acre sampled).
Year 1 (2003) totals are based on eight-10 meter square plots (a total of ~0.20 acre sampled).
Year 2 (2004) totals are based on four-10 meter square plots (a total of ~0.10 acre sampled).
Year 3 (2005) totals were not available at the time this document was prepared.
Year 4 (2006) totals are based on sixteen-10 meter squre plots (a total of ~0.40 acre sampled).

** Percent survival by species can not be determined since vegetation plot locations did not remain constant. The overall survival percentage is based on the stems per acre total from the initial (year 0) totals to the current monitoring year 4 (2006) totals; however, this number is an approximate since vegetation plot locations were different between years.

Based on the number of stems counted, the average plot density monitored at this Site is greater than 260 stems per acre and is considered successful. The average plot density has been measured at 923 stems per acre, or 23 stems per plot for 2006 (year 4) monitoring. The dominant species identified at the Site were green ash (*Fraxinus pennsylvanica*), sycamore (*Platanus occidentalis*), loblolly pine (*Pinus taeda*), and river birch (*Betula nigra*). Each of the sixteen individual vegetation plots were well-above the success criteria with 445 to 2227 planted stems per acre.

Shrub diversity was not particularly high within plots; however, various species would be expected to colonize the Site over time. Species documented within the shrub layer include eastern baccharis (*Baccharis halimifolia*), river birch (*Betula nigra*), and blackberry (*Rubus argutus*) with tag alder (*Aluns serrulata*), black willow (*Salix nigra*), and sycamore (*Platanus occidentalis*) along the stream banks.

The herbaceous vegetation is dense in all plots. An inventory of the dominant herbaceous species on the Site was also taken. It should be noted that species composition is seasonally dependant; surveys for 2006 (year 4) were completed in late July and early September. Dominant herbaceous species over the Site as a whole are listed below:

dogfennel (*Eupatorium capillifolium*)
Johnson grass (*Sorghum halepense*)
thoroughwort (*Eupatorium* sp.)
rush species (*Juncus* spp.)
microstegium (*Microstegium vimineum*)
sericea lespedeza (*Lespedeza cuneata*)
goldenrod species (*Solidago* spp.)
polygonum species (*Polygonum* spp.)

2.1.4 Vegetation Plot Photos

Photographs were taken at all permanent photo points and are included in Appendix A. The photographs show that vegetation is generally growing well and consists of a good combination of woody and herbaceous species.

2.2 Stream Assessment

Twenty-three permanent cross-sections were established after construction was completed for the as-built mitigation plan. Measurements of each cross-section includes points at all breaks in slope including top of bank, bankfull, and, thalweg. Riffle cross-sections have been classified using the Rosgen stream classification system. Longitudinal profiles were measured after construction and are scheduled to be completed in year 1 (2003), year 3 (2005), and year 5 (2007) for a total of four measurements; therefore, longitudinal profile measurements were not completed for the year 4 (2006) monitoring report. Longitudinal profile measurements should include thalweg, water surface, bankfull, and top of low bank; each should be taken at the head of facets (i.e. riffle, run, pool, and glide) and the maximum pool depth. The survey will also be used to calculate sinuosity. In addition, channel substrate is not expected to coarsen over time and is not monitored for success at this Site.

2.2.1 Bankfull Events

Documented bankfull events are included in the table below. Documents for year 0 through year 3 (2002 through 2005) did not provide this data; therefore, data presented prior to year 4 (2006) is limited to available peak discharge data for a nearby station. Two bankfull events were documented during the year 4 (2006) monitoring period.

Table 6. Verification of Bankfull Events

Project Name/Number: Smith and Austin Creeks (EEP Project Number 343)

Date of Data Collection	Date of Occurrence	Method	Photo (if available)
January 18, 2007	October 11, 2002	Peak discharge at nearby station** reported for October 11, 2002 of 523 cfs (bankfull discharge for station is approximately 357 cfs)	--
January 18, 2007	October 13, 2004	Peak discharge at nearby station** reported for October 13, 2004 of 478 cfs (bankfull discharge for station is approximately 357 cfs)	--
January 18, 2007	November 12, 2004	Peak discharge at nearby station** reported for November 12, 2004 of 361 cfs (bankfull discharge for station is approximately 357 cfs)	--
January 18, 2007	June 7, 2005	Peak discharge at nearby station** reported for June 7, 2005 of 951 cfs (bankfull discharge for station is approximately 357 cfs)	--
June 14, 2006	June 14, 2006	Total of 5.56 inches* of rain reported for June 14, 2006 resulting from Tropical Storm Alberto; water covered the soccer fields between Smith and Austin Creeks	--
September 1, 2006	September 1, 2006	Total of 3.75 inches* of rain reported to fall over 3 days (August 30 – September 1, 2006); overbanking was observed in several locations along Smith and Austin Creeks	--

* Reported at KNCWAKEF1 Weather Station on Welcome Drive in Wake Forest.

** Reported at USGS Gage Station 0208732885 on Marsh Creek near New Hope. Marsh Creek at this station has a 6.84 square mile watershed, which is expected to have a bankfull discharge of approximately 357 cfs based on the North Carolina Rural Piedmont Curves.

2.2.2 Bank Stability Assessments

Detailed Bank Erosion Hazard Index (BEHI) and Near Bank Stress (NBS) assessments were completed for the year 4 (2006) monitoring report. Results of the assessments are presented in the table below. BEHI and NBS assessments were not included in the previous monitoring reports and therefore no comparisons between preconstruction or previous monitoring years can be made.

The majority of onsite reaches are characterized by a moderate BEHI and moderate NBS. Reaches that are characterized by high or extreme BEHI include a section of the downstream preservation reach (Smith Reach 3) and sections of the upper extents of Smith and Austin Creeks (Smith Reach 1 and Austin Reach 1). These sections of stream are incised, show evidence of prior bank erosion and tree loss with low rooting densities and some bare soil exposure.

Approximately 84.6 percent or 9300 linear feet of onsite reaches are characterized by moderate BEHI/NBS indicating that stream reaches are relatively stable, exhibiting low erosion rates (approximately 624.5 tons per year). Site BEHI/NBS values indicate a successful stream restoration project, particularly when the project location is considered; the project is located within a developing, urbanized watershed that is targeted for restoration (Targeted Local Watershed 03020201070070).

Table 7. BEHI and Sediment Export Estimates

Project Name/Number: Smith and Austin Creeks (EEP Project Number 343)

Time Point	Reach	Approximate Linear Footage*	Extreme	High	Moderate	Low	Very Low	Sediment Export (tons/year)
			linear feet (% of total linear feet on Site)					
Year 4 (2006)	Smith Reach 1	2100	400 (3.6%)	--	1600 (14.6%)	100 (0.9%)	--	490.7
	Smith Reach 2	2550	--	325 (3.0%)	2225 (20.2%)	--	--	32.0
	Smith Reach 3	819	--	819 (7.4%)	--	--	--	58.6
	Austin Reach 1	2600	--	50 (0.5%)	2550 (23.2%)	--	--	27.6
	Austin Reach 2	500	--	--	500 (4.5%)	--	--	4.3
	Austin Reach 3	2425	--	--	2425 (22.1%)	--	--	11.4
	Total	**10,994**	**400 (3.6%)**	**1194 (10.9%)**	**9300 (84.6%)**	**100 (0.9%)**	**--**	**624.6**

* The total length/linear footage for each stream reach is approximate.

2.2.3 Stream Problem Areas

Stream problem areas within the Site are depicted on Figures 2A through 2H and are outlined in Table 8. Several problem areas noted in previous annual monitoring reports were no longer present. Beaver dams were removed in 2005 from Smith Reach 2; therefore, backwater effects resulting from the dams are no longer present. In addition, many of the mid-bars present in 2004 have shifted and are currently point bars. During the current site assessment several areas of bank erosion, mid-point bars, and reduced structure integrity/failure were identified. Example problem area photographs are included in Appendix B.

Table 8. Stream Problem Areas

Project Name/Number: Smith and Austin Creeks (EEP Project Number 343)

Feature Issue	Station Numbers	Suspected Cause	Photo*
Smith Creek			
Bank erosion with potential for future tree loss	1+50-1+75	Continuation of erosion around tree	S1
Old bank sloughing	3+10-3+20	Lack of deep-rooted vegetation	--
Erosion on left bank of structure	4+00-4+10	Lack of deep-rooted vegetation	--
Mid-channel bar (~ 5 x 25 feet)	4+30-4+55	Erosion around structure depositing in center of channel	--
Mid-channel bar (~ 5 x 10 feet)	5+50-5+60	Sediment deposition in center of channel.	--
Erosion on right bank of structure	4+00-4+10	Lack of deep-rooted vegetation, tight meander bend	--
Bank sloughing, root wad loss	6+55-6+90	Lack of deep-rooted vegetation, erosion around root wads	--

Feature Issue	Station Numbers	Suspected Cause	Photo*
Smith Creek (continued)			
Erosion on left bank of structure	7+00-7+10	Lack of deep-rooted vegetation, tie in of structure arm on bend	S2
Erosion on right bank of structure	8+00-8+10	Lack of deep-rooted vegetation, tie in of structure arm on bend	S3
Bank sloughing, root wad loss	8+80-9+20	Vertical banks on somewhat tight bend, erosion around root wads	S4
Bank erosion, sediment input	10+90-11+50	Input from stormwater, tight meanderbend	--
Erosion on left bank of structure	12+95-13+05	Lack of deep-rooted vegetation	--
Erosion on left bank of structure	14+00-14+10	Lack of deep-rooted vegetation, tie in of structure arms	S5
Bank sloughing, root wad loss	15+50-15+75	Vertical banks on tight bend, erosion around root wads	--
Bank erosion	17+30-17+50	On outer bend, lack of deep-rooted vegetation	--
Erosion around structure	18+00-18+10	Lack of deep-rooted vegetation	S6
Bank sloughing, root wad loss	18+70-19+00	Lack of deep-rooted vegetation, near vertical banks on slight bend, erosion around root wads	S7
Loose sewage pipe below structure collecting sediment	20+20-20+30	Sewage pipe possibly dumped in stream	S8
Bank erosion	21+10-21+40	Lack of deep-rooted vegetation, near vertical banks on sharp bend	--
Bank sloughing, root wad loss	23+50-23+90	Lack of deep-rooted vegetation, near vertical banks on slight bend, erosion around root wads	S9
Widening of stream above and below structure	24+00-24+30	Lack of deep-rooted vegetation, tie in of structure arms	--
Erosion around root wad	28+30-28+50	Lack of deep-rooted vegetation, near vertical banks on slight bend, erosion around root wads	--
Very small mid-channel bar	30+90-30+95	Sediment deposition in center of channel behind structure.	--
Bank erosion	33+80-34-70	Runoff from adjacent soccer fields	--
Mid-channel bar (~ 3 x 15 feet)	36+40-36+55	Sediment deposition in center of channel behind structure	--
Bank erosion, overflow area	46+10-46+60	Lack of deep-rooted vegetation, near vertical banks	S10-11
Bank erosion, future tree loss	47+60-48+20	Lack of deep-rooted vegetation, near vertical banks	S12-13
Austin Creek			
Mid-channel bar forming (~1 x 2 feet)	0+20-0+25	Sediment deposition at stump in center of channel	--
Bank erosion	2+30-2+60	Lack of deep-rooted vegetation, near vertical banks	--
Erosion on right bank of structure	3+70-3+80	Lack of deep-rooted vegetation	--

Feature Issue	Station Numbers	Suspected Cause	Photo*
Austin Creek (continued)			
Bank sloughing, root wad loss	4+30-4+50	Lack of deep-rooted vegetation, near vertical banks, erosion around root wads	--
Erosion around structure	4+70-4+80	Lack of deep-rooted vegetation, tie in of structure arms	A1
Mid-channel bar (~ 3 x 4 feet)	5+00-5+05	Sediment deposition in center of channel behind structure.	--
Bank sloughing, root wad and rock loss on banks at four locations	6+00-8+00	Lack of deep-rooted vegetation, near vertical banks, erosion around root wads and rocks	A2
Migration of stream around structure	8+90-9+00	Lack of deep-rooted vegetation, structure at an angle with large drop, tie in of structure arms	A3
Erosion around structure	10+80-10+90	Lack of deep-rooted vegetation, structure at an angle, tie in of structure arms	A4
Mid-channel bar (~ 8 x 10 feet)	12+10-12+20	Sediment deposition in center of channel	--
Some erosion around structure	19+30-19+40	Lack of deep-rooted vegetation	--
Loss of root wads	20+40-20+55	Lack of deep-rooted vegetation, erosion around root wad	A5
Mid-channel bar (~ 5 x 20 feet)	21+70-21+90	Sediment deposition in center of channel	--
Erosion on right bank of structure	22+70-22+80	Lack of deep-rooted vegetation, structure at an angle, tie in of structure arm	A6
Mid-channel bar (~ 5 x 20 feet)	27+30-27+50	Sediment deposition in center of channel behind structure	A7
Mid-channel bar (~ 3 x 20 feet)	30+30-30+50	Sediment deposition in center of channel behind structure	--
Mid-channel bar (~ 4 x 10 feet)	36+40-36+50	Sediment deposition in center of channel	--
Mid-channel bar (~ 3 x 30 feet)	37+20-37+50	Sediment deposition in center of channel	--
Bank sloughing	38+90-39+10	Stormwater runoff from adjacent development	A8
Mid-channel bar (~ 3 x 12 feet)	39+10-39+20	Sediment deposition in center of channel from adjacent bank sloughing/stormwater runoff	--
Mid-channel bar (~ 3 x 6 feet)	41+45-41+50	Sediment deposition in center of channel	--
Mid-channel bar (~ 3 x 20 feet)	43+30-43+50	Sediment deposition in center of channel	--

*Problem area photographs: A = Austin, S = Smith

Stream problem areas are relatively infrequent within the Site and are considered minor in respect to the Site location within an urban watershed, upstream watershed development, and the channel size. Most problem areas are expected to stabilize over time with further vegetation establishment. Areas of significant erosion are almost always associated with a tight radius of curvature or turbulence associated with a root wad. A few areas of erosion are associated with a compromised structure. In general, stream problems are minor with little to no lateral erosion or head cutting within the Site. Additional inspections and monitoring of bed and banks up and downstream of root wads or compromised structures is recommended prior to initiation of proactive maintenance measures.

2.2.4 Stream Fixed Station Photos

Photographs were taken at fixed station photo points and are included in Appendix B. The photographs show that the stream is generally functioning well with few minor problem areas as discussed above.

2.2.5 Categorical Stream Feature Visual Stability Assessment

Each stream reach was visually inspected during the year 4 (2006) monitoring period using seven feature categories and various metrics within each category. Assessment features included riffles, pools, thalweg, meanders, channel bed, structures, and root wads/boulders. Tables for semi-quantitative assessements of each reach are included in Appendix B (Tables B1-B6). The mean percentage of performance for features within each reach are summarized in the tables below. Data for the as-built and years 1 through 3 (2003-2005) were not provided in previous monitoring reports; therefore, no comparison can be made.

Table 9A. Categorical Stream Feature Visual Stability Assessment

Smith and Austin Creeks (Project Number 343)
Smith Reach 1 (1986 linear feet)

Feature	Initial	Year 1 (2003)	Year 2 (2004)	Year 3 (2005)	Year 4 (2006)	Year 5 (2007)
A. Riffles	*	*	*	*	85%	
B. Pools	*	*	*	*	86%	
C. Thalweg	*	*	*	*	93%	
D. Meanders	*	*	*	*	59%	
E. Bed General	*	*	*	*	98%	
F. Vanes / J. Hooks, Etc.	*	*	*	*	73%	
G. Wads and Boulders	*	*	*	*	0%	

* - Available project documents consisting of the 2003 Mitigation Plan, 2004 (Year 2) Annual Monitoring Report, and the 2005 (Year 3) Annual Monitoring Report do not include this information.

Table 9B. Categorical Stream Feature Visual Stability Assessment

Smith and Austin Creeks (Project Number 343)
Smith Reach 2 (2618 linear feet)

Feature	Initial	Year 1 (2003)	Year 2 (2004)	Year 3 (2005)	Year 4 (2006)	Year 5 (2007)
A. Riffles	*	*	*	*	90%	
B. Pools	*	*	*	*	93%	
C. Thalweg	*	*	*	*	100%	
D. Meanders	*	*	*	*	76%	
E. Bed General	*	*	*	*	99%	
F. Vanes / J. Hooks, Etc.	*	*	*	*	63%	
G. Wads and Boulders	*	*	*	*	33%	

* - Available project documents consisting of the 2003 Mitigation Plan, 2004 (Year 2) Annual Monitoring Report, and the 2005 (Year 3) Annual Monitoring Report do not include this information.

Table 9C. Categorical Stream Feature Visual Stability Assessment

Smith and Austin Creeks (Project Number 343)
Smith Reach 3 (794 linear feet)

Feature	Initial	Year 1 (2003)	Year 2 (2004)	Year 3 (2005)	Year 4 (2006)	Year 5 (2007)
A. Riffles	*	*	*	*	85%	
B. Pools	*	*	*	*	78%	
C. Thalweg	*	*	*	*	NA**	
D. Meanders	*	*	*	*	NA**	
E. Bed General	*	*	*	*	100%	
F. Vanes / J. Hooks, Etc.	*	*	*	*	100%	
G. Wads and Boulders	*	*	*	*	NA	

* - Available project documents consisting of the 2003 Mitigation Plan, 2004 (Year 2) Annual Monitoring Report, and the 2005 (Year 3) Annual Monitoring Report do not include this information.
** - Smith Reach 3 is a large channel that was targeted for stablilization/preservation; this reach is fairly straight with little to no meanders.

Table 9D. Categorical Stream Feature Visual Stability Assessment

Smith and Austin Creeks (Project Number 343)
Austin Reach 1 (2581 linear feet)

Feature	Initial	Year 1 (2003)	Year 2 (2004)	Year 3 (2005)	Year 4 (2006)	Year 5 (2007)
A. Riffles	*	*	*	*	76%	
B. Pools	*	*	*	*	77%	
C. Thalweg	*	*	*	*	NA	
D. Meanders	*	*	*	*	NA	
E. Bed General	*	*	*	*	99%	
F. Vanes / J. Hooks, Etc.	*	*	*	*	38%	
G. Wads and Boulders	*	*	*	*	14%	

* - Available project documents consisting of the 2003 Mitigation Plan, 2004 (Year 2) Annual Monitoring Report, and the 2005 (Year 3) Annual Monitoring Report do not include this information.

Table 9E. Categorical Stream Feature Visual Stability Assessment

Smith and Austin Creeks (Project Number 343)
Austin Reach 2 (526 linear feet)

Feature	Initial	Year 1 (2003)	Year 2 (2004)	Year 3 (2005)	Year 4 (2006)	Year 5 (2007)
A. Riffles	*	*	*	*	100%	
B. Pools	*	*	*	*	100%	
C. Thalweg	*	*	*	*	100%	
D. Meanders	*	*	*	*	67%	
E. Bed General	*	*	*	*	99%	
F. Vanes / J. Hooks, Etc.	*	*	*	*	100%	
G. Wads and Boulders	*	*	*	*	NA	

* - Available project documents consisting of the 2003 Mitigation Plan, 2004 (Year 2) Annual Monitoring Report, and the 2005 (Year 3) Annual Monitoring Report do not include this information.

Table 9F. Categorical Stream Feature Visual Stability Assessment

Smith and Austin Creeks (Project Number 343)
Austin Reach 3 (2480 linear feet)

Feature	Initial	Year 1 (2003)	Year 2 (2004)	Year 3 (2005)	Year 4 (2006)	Year 5 (2007)
A. Riffles	*	*	*	*	98%	
B. Pools	*	*	*	*	90%	
C. Thalweg	*	*	*	*	95%	
D. Meanders	*	*	*	*	95%	
E. Bed General	*	*	*	*	99%	
F. Vanes / J. Hooks, Etc.	*	*	*	*	90%	
G. Wads and Boulders	*	*	*	*	NA	

* - Available project documents consisting of the 2003 Mitigation Plan, 2004 (Year 2) Annual Monitoring Report, and the 2005 (Year 3) Annual Monitoring Report do not include this information.

Problem area trends observed during year 4 (2006) monitoring, as described above, included erosion around root wads with bank sloughing, potential for future root wad loss, and erosion around structure arms.

2.2.6 Quantitative Stream Measurements

During the year 4 (2006) monitoring period 23 cross-sections were measured (21 onsite and two just upstream of the Site). Tables for quantitative assessements are included below; these tables include data from previous years. No cross-sections are located on Smith Reach 3, which was targeted for stabilization/preservation; therefore, there is no table summarizing morphology monitoring for this reach. Cross-section plots for the 21 onsite cross-sections for year 4 (2006) monitoring are included in Appendix B. Longitudinal profiles were measured after construction and are scheduled to be completed in year 1 (2003), year 3 (2005), and year 5 (2007) for a total of four measurements; therefore, longitudinal profile measurements were not completed for the year 4 (2006) monitoring report.

Success criteria dictate that there should be little or no change in the as-built cross-sections. If a change takes place it should be determined if the change is to a more unstable condition (downcutting, erosion) or to a more stable condition (settling, increase in vegetative diversity, deposition along the banks, decrease in the width-depth ration, decrease in cross-sectional area). The as-built longitudinal profile should show that bed features are neither aggrading or degrading; however, short-term aggradation/degradation may occur depending on the peak annual discharge. Bed features should be consistent with those observed in typical E- and C-type channels. The as-built pattern should not change and the riffle-pool sequence should remain constant. A significant coarsening of bed materials is not expected due to the sand/gravel substrate; therefore, bed materials will not be analyzed for stream success.

Permanent cross-sections in the Site are included in Appendix B. Each cross-section is graphically depicted for as-built through year 4 (2006) for analysis of dimension attributes. Photographs of each cross-section for year 4 (2006) are included with graphs in Appendix B. As a whole, the majority of Site riffle cross-sections have decreased in cross-sectional area moving toward a more stable channel. All reaches classify as E-type or C-type channels. Width-depth ratios are similar to previous years with slightly elevated values in Austin Reach 3. This may result from sediment deoposition in a stable, low shear stress reach with good vegetation establishment; width-depth values are expected to lower as the banks continue to colonize with vegetation and capture sediment. Pools and associated point bars have remained relatively stable.

The as-built channel geometry compares favorably with the emulated, stable E/C stream type stream reaches as set forth in the detailed mitigation plan and construction plans. The current monitoring has demonstrated dimension was stable over the course of the year 4 (2006) monitoring.

Table 10. Baseline Morphology and Hydraulic Summary																		
Smith and Austin Creeks (Project Number 343)																		
Parameter	**USGS Gage Data**			**Regional Curve Interval**			**Pre-Existing Condition**			**Project Reference Stream**			**Design**			**As-built**		
Dimension	**Min**	**Max**	**Med**	**Min**	**Max**	**Med**	**Min**	**Max**	**Med**	**Min**	**Max**	**Med**	**Min**	**Max**	**Med**	**Min**	**Max**	**Med**
BF Width (ft)	USGS gage data is unavailable for this project			Available documents consisting of 2003 Mitigation Plan, 2004 (Year 2) Monitoring Report, and 2005 (Year 3) Monitoring Report do not provide this data.			Available documents consisting of 2003 Mitigation Plan, 2004 (Year 2) Monitoring Report, and 2005 (Year 3) Monitoring Report do not provide this data.			Available documents consisting of 2003 Mitigation Plan, 2004 (Year 2) Monitoring Report, and 2005 (Year 3) Monitoring Report do not provide this data.			Available documents consisting of 2003 Mitigation Plan, 2004 (Year 2) Monitoring Report, and 2005 (Year 3) Monitoring Report do not provide this data.			18.4	38.4	28.4
Floodprone Width (ft)																90	380	235
BF Cross Sectional Area (ft2)																37.2	126.5	81.9
BF Mean Depth (ft)																1.4	3.3	2.4
BF Max Depth (ft)																2.8	5.3	4
Width/Depth Ratio																7.7	23.7	15.7
Entrenchment Ratio																3.1	11.1	7.1
Wetted Perimeter(ft)																20.3	40.3	30.3
Hydraulic radius (ft)																1.3	3.1	2.2
Pattern																		
Channel Beltwidth (ft)																Available documents consisting of 2003 Mitigation Plan, 2004 (Year 2) Monitoring Report, and 2005 (Year 3) Monitoring Report do not provide this data.		
Radius of Curvature (ft)																		
Meander Wavelength (ft)																		
Meander Width ratio																		
Profile																		
Riffle length (ft)																		
Riffle slope (ft/ft)																		
Pool length (ft)																		
Pool spacing (ft)																		
Substrate																		
d50 (mm)																Substrate analysis was not completed because substrate is not expected to coarsen over time.		
d84 (mm)																		
Additional Reach Parameters																		
Valley Length (ft)																Available documents consisting of 2003 Mitigation Plan, 2004 (Year 2) Monitoring Report, and 2005 (Year 3) Monitoring Report do not provide this data.		
Channel Length (ft)																		
Sinuosity																		
Water Surface Slope (ft/ft)																		
BF slope (ft/ft)																		
Rosgen Classification																		
Number of Bankfull Events																		
Extent of BF floodplain (acres)																		
*BEHI																		

Table 11A. Morphology and Hydraulic Monitoring Summary																				
Smith and Austin Creeks (Project Number 343)																				
Smith Reach 1 (1986 linear feet)																				
Parameter	**Cross Section 2**					**Cross Section 3**					**Cross Section 4**					**Cross Section 5**				
	Station 9+35 Riffle					**Station 11+30 Riffle**					**Station 12+00 Pool**					**Station 16+90 Pool**				
Dimension	**MY0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY0**	**MY1**	**MY2**	**MY3**	**MY4**
BF Width (ft)	26.1	25.1	23.6	23.5	19.5	31.3	25.6	25.9	25.8	22.0	46.5	47.4	45.1	49.7	52.8	41.8	44.2	43.2	41.4	41.9
Floodprone Width (ft) (approx)	> 120					> 140					> 140					> 140				
BF Cross Sectional Area (ft^2)	54.6	55.9	60.8	59.6	32.8	44.9	47.5	36.6	41.3	29.6	57.9	69.3	43.8	53.4	54.5	109.2	123.2	78.9	55.8	70.2
BF Mean Depth (ft)	2.1	2.2	2.6	2.5	1.7	1.4	1.9	1.4	1.6	1.3	1.2	1.5	1.0	1.1	1.0	2.6	2.8	1.8	1.3	1.7
BF Max Depth (ft)	3.2	3.1	3.7	3.7	2.8	2.8	2.7	2.4	2.7	3.3	3.8	4.1	3.7	3.8	3.9	3.2	3.1	3.7	3.7	4.7
Width/Depth Ratio	12.5	11.3	9.2	9.3	11.5	21.8	13.8	18.3	16.1	16.9	37.3	32.4	46.4	46.3	52.8	16.0	15.9	23.7	30.7	24.6
Entrenchment Ratio	4.6	4.8	5.1	5.1	6.2	4.5	5.5	5.4	5.4	6.4										
Wetted Perimeter(ft)					35,6					23.7					54.5					43.8
Hydraulic radius (ft)					1.2					1.2					1.0					1.6
Substrate	**MY0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY0**	**MY1**	**MY2**	**MY3**	**MY4**
d50 (mm)			0.6					0.8					1.1					0.3		
d84 (mm)			2.0					2.7					2.7					1.8		
Parameter	**MY-00 (2002)**			**MY-01 (2003)**		**MY-02 (2004)**				**MY-03 (2005)**			**MY-04 (2006)**			**MY-05 (2007)**				
Pattern	**Min**	**Max**	**Med**	**Min**	**Max**	**Med**	**Min**	**Max**	**Med**	**Min**	**Max**	**Med**	**Min**	**Max**	**Med**	**Min**	**Max**	**Med**		
Channel Beltwidth (ft)							38	139	89											
Radius of Curvature (ft)							20	64	36											
Meander Wavelength (ft)							90	248	172											
Meander Width ratio																				
Profile																				
Riffle length (ft)							15	39	18											
Riffle slope (ft/ft)							0.7%	3.9%	1.3%											
Pool length (ft)							6	76	33											
Pool spacing (ft)							16	149	60											
Additional Reach Parameters	**MY-00 (2002)**			**MY-01 (2003)**		**MY-02 (2004)**				**MY-03 (2005)**			**MY-04 (2006)**			**MY-05 (2007)**				
Valley Length (ft)																				
Channel Length (ft)																				
Sinuosity																				
Water Surface Slope (ft/ft)																				
BF slope (ft/ft)																				
Rosgen Classification																				
Number of Bankfull Events																				
Extent of BF floodplain (area)																				
Note: Cross-section 1 is located upstream of the project																				

Table 11B. Morphology and Hydraulic Monitoring Summary
Smith and Austin Creeks (Project Number 343)
Smith Reach 2 (2618 linear feet)

Parameter	Cross Section 1					Cross Section 2					Cross Section 3					Cross Section 4					Cross Section 5				
	Station 24+30 Riffle					Station 24+87 Pool					Station 31+25 Pool					Station 32+45 Riffle					Station 39+20 Riffle				
Dimension	**MY0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY0**	**MY1**	**MY2**	**MY3**	**MY4**
BF Width (ft)	33.2	20.2	20.0	20.2	20.8	26.9	26.2	25.7	26.1	22.3	39.1	37.7	36.3	35.1	38.7	18.7	18.9	18.4	17.6	18.0	18.4	16.9		16.4	13.9
Floodprone Width (ft) (approx)	>200					>100					>120					>100					>140				
BF Cross Sectional Area (ft^2)	46.5	45.9	44.9	51.3	41.8	48.5	59.2	60.8	64.5	44.6	64.0	59.6	52.4	49.4	46.8	38.9	42.7	38.4	39.5	37.3	37.2	35.8		31.4	25.8
BF Mean Depth (ft)	1.4	2.3	2.2	2.5	2.0	1.8	2.3	2.4	2.5	2.0	1.6	1.6	1.4	1.4	1.2	2.1	2.3	2.1	2.2	2.1	2.0	2.1		1.9	1.9
BF Max Depth (ft)	3.1	3.3	3.9	3.6	3.7	3.8	3.8	4.6	4.6	4.3	4.1	4.2	3.4	3.6	3.2	3.1	3.3	3.2	2.8	3.4	3.0	3.0		2.8	2.8
Width/Depth Ratio	23.7	8.9	8.9	8.0	10.4	14.9	11.6	10.9	10.6	11.2	23.9	23.8	25.1	24.9	32.3	9.0	8.4	8.8	7.8	8.6	9.1	8.0		8.6	7.3
Entrenchment Ratio	6.0	9.9	10.0	9.9	9.6											5.3	5.3	5.4	5.7	5.6	7.6	8.3		8.5	10.1
Wetted Perimeter(ft)					23.1					25.6					40.2					19.7					16.1
Hydraulic radius (ft)					1.8					1.7					1.2					1.9					1.6
Substrate	**MY0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY0**	**MY1**	**MY2**	**MY3**	**MY4**
d50 (mm)			0.3					0.1					n/a					n/a	0.6						
d84 (mm)			2.3					0.7					n/a					n/a	1.1						

Parameter	**MY-00 (2002)**			**MY-01 (2003)**			**MY-02 (2004)**			**MY-03 (2005)**			**MY-04 (2006)**			**MY-05 (2007)**		
Pattern	**Min**	**Max**	**Med**	**Min**	**Max**	**Med**	**Min**	**Max**	**Med**	**Min**	**Max**	**Med**	**Min**	**Max**	**Med**	**Min**	**Max**	**Med**
Channel Beltwidth (ft)							67	140	95									
Radius of Curvature (ft)							42	97	62									
Meander Wavelength (ft)							204	398	309									
Meander Width ratio																		
Profile																		
Riffle length (ft)							n/a	n/a	n/a									
Riffle slope (ft/ft)							n/a	n/a	n/a									
Pool length (ft)							23	83	43									
Pool spacing (ft)							40	120	89									

Additional Reach Parameters	**MY-00 (2002)**	**MY-01 (2003)**	**MY-02 (2004)**	**MY-03 (2005)**	**MY-04 (2006)**	**MY-05 (2007)**
Valley Length (ft)						
Channel Length (ft)						
Sinuosity						
Water Surface Slope (ft/ft)						
BF slope (ft/ft)						
Rosgen Classification						
Number of Bankfull Events						
Extent of BF floodplain (area)						

Table 11C. Morphology and Hydraulic Monitoring Summary																
Smith and Austin Creeks (Project Number 343)																
Austin Reach 1 (2581 linear feet)																
Parameter	**Cross Section 2**					**Cross Section 3**					**Cross Section 4**					
	Station 4+42 Riffle					**Station 13+95 Riffle**					**Station 20+90 Pool**					
Dimension	**MY0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY0**	**MY1**	**MY2**	**MY3**	**MY4**	
BF Width (ft)	32.4	32.4	29.5	27.3	19.6	24.4	23.8	22.8	23.5	25.0	23.3	22.5	22.7	21.4	23.9	
Floodprone Width (ft) (approx)	>100					>90					>60					
BF Cross Sectional Area (ft^2)	49.0	49.0	62.4	63.5	57.6	49.8	51.2	52.7	54.7	60.6	38.2	38.5	38.3	34.0	47.6	
BF Mean Depth (ft)	1.5	1.5	2.1	2.3	2.9	2.0	2.2	2.3	2.3	2.4	1.6	1.7	1.7	1.6	2.0	
BF Max Depth (ft)	3.9	3.9	4.0	4.8	4.2	3.2	3.2	3.9	3.8	4.1	2.5	2.5	2.8	2.7	3.6	
Width/Depth Ratio	21.4	21.4	13.9	11.7	6.6	12.0	11.1	9.9	10.1	10.3	14.2	13.1	13.5	13.5	12.0	
Entrenchment Ratio	3.1	3.1	3.4	3.7	5.1	3.7	3.8	3.9	3.8	3.6						
Wetted Perimeter(ft)					22.6					27.4					25.7	
Hydraulic radius (ft)					2.6					2.2					1.8	
Substrate	**MY0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY0**	**MY1**	**MY2**	**MY3**	**MY4**	
d50 (mm)			n/a	0.3				0.1	3.1				0.2			
d84 (mm)			n/a	1.3				2.3	13.3				2.5			

Parameter	**MY-00 (2002)**			**MY-01 (2003)**			**MY-02 (2004)**			**MY-03 (2005)**			**MY-04 (2006)**			**MY-05 (2007)**		
Pattern	**Min**	**Max**	**Med**	**Min**	**Max**	**Med**	**Min**	**Max**	**Med**	**Min**	**Max**	**Med**	**Min**	**Max**	**Med**	**Min**	**Max**	**Med**
Channel Beltwidth (ft)							n/a	n/a	n/a									
Radius of Curvature (ft)							n/a	n/a	n/a									
Meander Wavelength (ft)							n/a	n/a	n/a									
Meander Width ratio																		
Profile																		
Riffle length (ft)							10	55	15									
Riffle slope (ft/ft)							1.1%	6.4%	4.2%									
Pool length (ft)							13	72	31									
Pool spacing (ft)							23	287	64									

Additional Reach Parameters	**MY-00 (2002)**	**MY-01 (2003)**	**MY-02 (2004)**	**MY-03 (2005)**	**MY-04 (2006)**	**MY-05 (2007)**
Valley Length (ft)						
Channel Length (ft)						
Sinuosity						
Water Surface Slope (ft/ft)						
BF slope (ft/ft)						
Rosgen Classification						
Number of Bankfull Events						
Extent of BF floodplain (area)						
Note: Cross-section 1 is located upstream of the project						

Table 11D. Morphology and Hydraulic Monitoring Summary																			
Smith and Austin Creeks (Project Number 343)																			
Austin Reach 2 (526 linear feet)																			
Parameter	**Cross Section 1**					**Cross Section 2**					**Cross Section 3**								
	Station 27+90 Riffle					**Station 28+35 Pool**					**Station 30+45 Riffle**								
Dimension	**MY0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY0**	**MY1**	**MY2**	**MY3**	**MY4**				
BF Width (ft)	19.3	18.8	20.8	20.6	22.2	21.3	19.7	17.3	18.2	22.8	24.9	24.0	24.1	25.1	25.7				
Floodprone Width (ft) (approx)	>120					>130					>140								
BF Cross Sectional Area (ft^2)	48.1	45.4	62.1	56.1	63.8	37.1	36.9	43.9	43.0	68.5	54.4	56.4	53.9	53.4	58.2				
BF Mean Depth (ft)	2.5	2.4	3.0	2.7	2.9	1.7	1.9	2.5	2.4	3.0	2.2	2.4	2.2	2.1	2.3				
BF Max Depth (ft)	3.6	3.6	4.0	4.0	4.3	3.6	3.5	3.4	3.3	4.9	3.1	3.2	3.2	3.1	3.2				
Width/Depth Ratio	7.7	7.8	7.0	7.6	7.7	12.2	10.5	6.8	7.7	7.6	11.4	10.2	10.8	11.8	11.2				
Entrenchment Ratio	6.2	6.4	5.8	5.8	5.4						5.6	5.8	5.8	5.6	5.5				
Wetted Perimeter(ft)					24.5					26.6					27.9				
Hydraulic radius (ft)					2.6					2.6					2.1				
Substrate	**MY0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY0**	**MY1**	**MY2**	**MY3**	**MY4**				
d50 (mm)			n/a					0.7					0.6						
d84 (mm)			n/a					2.0					1.9						
Parameter	**MY-00 (2002)**			**MY-01 (2003)**			**MY-02 (2004)**			**MY-03 (2005)**			**MY-04 (2006)**			**MY-05 (2007)**		
Pattern	**Min**	**Max**	**Med**	**Min**	**Max**	**Med**	**Min**	**Max**	**Med**	**Min**	**Max**	**Med**	**Min**	**Max**	**Med**	**Min**	**Max**	**Med**	
Channel Beltwidth (ft)							n/a	n/a	n/a										
Radius of Curvature (ft)							n/a	n/a	n/a										
Meander Wavelength (ft)							n/a	n/a	n/a										
Meander Width ratio																			
Profile																			
Riffle length (ft)							8	10	9										
Riffle slope (ft/ft)							5.4%	7.3%	6.3%										
Pool length (ft)							21	48	22										
Pool spacing (ft)							59	157	102										
Additional Reach Parameters	**MY-00 (2002)**			**MY-01 (2003)**			**MY-02 (2004)**			**MY-03 (2005)**			**MY-04 (2006)**			**MY-05 (2007)**		
Valley Length (ft)																			
Channel Length (ft)																			
Sinuosity																			
Water Surface Slope (ft/ft)																			
BF slope (ft/ft)																			
Rosgen Classification																			
Number of Bankfull Events																			
Extent of BF floodplain (area)																			

Table 11E. Morphology and Hydraulic Monitoring Summary
Smith and Austin Creeks (Project Number 343)
Austin Reach 3 (2480 linear feet)

Parameter	Cross Section 1					Cross Section 2					Cross Section 3					Cross Section 4					Cross Section 5					Cross Section 6				
	Station 34+55 Pool					Station 35+15 Riffle					Station 38+15 Pool					Station 41+00 Riffle					Station 46+40 Riffle					Station 48+20 Pool				
Dimension	**MY0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY0**	**MY1**	**MY2**	**MY3**	**MY4**
BF Width (ft)	37.3	41.2	39.6	38.5	44.5	38.4	37.2	35.5	37.6	38.7	38.5	39.4	39.1	38.8	39.6	31.6	34.1	35.1	32.7	32.9	34.3	39.1	35.6	36.4	33.4	58.3	58.4	56.9	39.1	59.2
Floodprone Width (ft) (approx)	>120					>160					>150					>100					>380					>150				
BF Cross Sectional Area (ft^2)	97.1	87.5	72.7	77.7	83.4	126.5	125.1	97.1	91.5	74.4	153.8	151.2	93.0	90.5	85.6	78.8	77.4	63.7	61.0	62.4	99.9	116.0	94.0	93.4	43.0	135.7	108.9	70.0	63.7	79.4
BF Mean Depth (ft)	2.6	2.1	1.8	2.0	1.9	3.3	3.4	2.7	2.4	1.9	4.0	3.8	2.4	2.3	2.2	2.5	2.3	1.8	1.9	2.0	2.9	3.0	2.6	2.6	1.3	2.3	1.9	1.2	1.6	1.3
BF Max Depth (ft)	4.8	4.8	3.8	4.2	3.9	5.3	5.3	3.8	3.8	3.6	7.1	7.1	3.8	3.8	4.2	4.0	4.0	3.3	3.2	3.9	4.2	4.7	4.0	3.9	3.3	6.9	6.7	3.4	3.2	4.1
Width/Depth Ratio	14.3	19.4	21.6	19.1	23.4	11.7	11.1	13.0	15.5	20.4	9.6	10.3	16.4	16.6	18.0	12.7	15.0	19.3	17.5	16.5	11.8	13.2	13.5	14.2	25.7	25.0	31.3	46.3	24.0	45.5
Entrenchment Ratio						4.2	4.3	4.5	4.3	4.1						3.2	2.9	2.8	3.1	3.0	11.1	9.7	10.7	10.4	11.4					
Wetted Perimeter(ft)					45.7					40.1					41.4					34.8					35.6					61.6
Hydraulic radius (ft)					1.8					1.9					2.1					1.8					1.2					1.3
Substrate	**MY0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY0**	**MY1**	**MY2**	**MY3**	**MY4**	**MY0**	**MY1**	**MY2**	**MY3**	**MY4**
d50 (mm)			n/a					0.6	1.1				1.1	n/a				n/a	n/a				0.8	n/a				0.5	n/a	
d84 (mm)			n/a					3.0	2.4				2.9	n/a				n/a	n/a				2.3	n/a				2.0	n/a	

Parameter	**MY-00 (2002)**			**MY-01 (2003)**			**MY-02 (2004)**			**MY-03 (2005)**			**MY-04 (2006)**			**MY-05 (2007)**		
Pattern	**Min**	**Max**	**Med**	**Min**	**Max**	**Med**	**Min**	**Max**	**Med**	**Min**	**Max**	**Med**	**Min**	**Max**	**Med**	**Min**	**Max**	**Med**
Channel Beltwidth (ft)							77	239	95									
Radius of Curvature (ft)							87	178	99									
Meander Wavelength (ft)							321	507	346									
Meander Width ratio																		
Profile																		
Riffle length (ft)							21	36	28									
Riffle slope (ft/ft)							1.2%	1.7%	1.4%									
Pool length (ft)							14	89	26									
Pool spacing (ft)							32	492	113									

Additional Reach Parameters	**MY-00 (2002)**	**MY-01 (2003)**	**MY-02 (2004)**	**MY-03 (2005)**	**MY-04 (2006)**	**MY-05 (2007)**
Valley Length (ft)						
Channel Length (ft)						
Sinuosity						
Water Surface Slope (ft/ft)						
BF slope (ft/ft)						
Rosgen Classification						
Number of Bankfull Events						
Extent of BF floodplain (area)						

3.0 REFERENCES

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APPENDIX A

VEGETATION RAW DATA

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

Report Prepared By	W Grant Lewis
Date Prepared	11/13/2006 12:52

database name	CVS_EEP_DataEntry_v202.mdb
database location	C:\Business\Projects\06\06-002 EEP Monitoring\Smith&Austin\Vegetation Monitoring

DESCRIPTION OF WORKSHEETS IN THIS DOCUMENT----------

Metadata	This worksheet, which is a summary of the project and the project data.
Plots	List of plots surveyed.
Vigor	Frequency distribution of vigor classes.
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.
Stem Count by Plot and Spp	Count of living stems of each species for each plot; dead and missing stems are excluded.

PROJECT SUMMARY----------

Project Code	343
project Name	Smith and Austin Creeks
Description	Stream Restoration
length (ft)	
stream-to-edge width (ft)	
area (sq m)	
Required Plots (calculated)	
Sampled Plots	16

CVS Summary of Project Data
Smith and Austin Creeks
Year 4 (2006)
Plot Data

plot	Latitude/UTM-N	Longitude/UTM-E	UTM Zone	Datum	Date Sampled	Living Stems	Dead Or Missing Stems	# species
343-AXE-0001	35.95376	78.50192		NAD83/WSG84	9/5/2006	11	0	8
343-AXE-0002	35.95324	78.50260		NAD83/WSG84	9/5/2006	22	0	8
343-AXE-0003	35.95287	78.50299		NAD83/WSG84	9/5/2006	28	0	8
343-AXE-0004	35.95230	78.50370		NAD83/WSG84	9/6/2006	21	0	9
343-AXE-0005	35.95168	78.50309		NAD83/WSG84	9/6/2006	42	0	8
343-AXE-0006	35.95105	-78.50515		NAD83/WSG84	9/6/2006	55	0	7
343-AXE-0007	35.95284	-78.50550		NAD83/WSG84	9/6/2006	17	0	5
343-AXE-0010	35.95589	-78.50267		NAD83/WSG84	9/6/2006	20	0	7
343-AXE-0011	35.95624	-78.50277		NAD83/WSG84	9/6/2006	26	0	9
343-AXE-0012	35.95683	-78.50289		NAD83/WSG84	9/8/2006	11	0	6
343-AXE-0013	35.95711	78.50323		NAD83/WSG84	9/8/2006	19	0	8
343-AXE-0014	35.95730	78.49870		NAD83/WSG84	9/6/2006	15	0	8
343-AXE-0015	35.95796	78.49722		NAD83/WSG84	9/8/2006	17	0	7
343-AXE-0016	35.95805	78.49622		NAD83/WSG84	9/8/2006	18	0	9
343-AXE-0008	35.95378	-78.50434		NAD83/WSG84	9/6/2006	29	0	5
343-AXE-0009	35.95439	-78.50358		NAD83/WSG84	9/6/2006	16	0	8

CVS Summary of Project Data
Smith and Austin Creeks
Year 4 (2006)
Vigor

vigor	Count	Percent
	103	28.1
1	3	0.8
2	53	14.4
3	141	38.4
4	170	46.3

CVS Summary of Project Data
Smith and Austin Creeks
Year 4 (2006)
Vigor by Species

	Species	4	3	2	1	0	Missing
	Alnus serrulata	3					
	Baccharis halimifolia						
	Betula nigra	16	8	1			
	Carya cordiformis						
	Cornus amomum		2				
	Diospyros virginiana		4				
	Fraxinus americana	1	1				
	Fraxinus pennsylvanica	82	65	10			
	Gleditsia triacanthos						
	Ligustrum sinense						
	Liquidambar styraciflua						
	Nyssa aquatica		1				
	Pinus taeda	42	8	3			
	Quercus alba						
	Quercus falcata			2			
	Quercus lyrata	6					
	Quercus michauxii	1	6	6	1		
	Quercus nigra		9	1			
	Quercus pagoda	2	9	2	1		
	Quercus phellos						
	Rhus glabra						
	Salix nigra						
	Sambucus canadensis			1			
	Ulmus rubra	1	2	1			
	Morella cerifera	2					
	Juniperus virginiana						
	Carya			1			
	Liriodendron tulipifera		1	4			
	Myrica	2					
	Nyssa		1	10			
	Platanus occidentalis	10	16	3			
	Prunus serotina						
	Acer negundo	2	5	2			
	Acer rubrum						
	Ulmus		3	6	1		
TOT:	**35**	**170**	**141**	**53**	**3**		

CVS Summary of Project Data
Smith and Austin Creeks
Year 4 (2006)
Damage

Damage	Count	Percent Of Stems
(no damage)	327	69.6
Insects	69	14.7
Flood	25	5.3
[Enter other damage]	22	4.7
Unknown	16	3.4
Deer	7	1.5
Drought	2	0.4
Other/Unknown Animal	1	0.2
Diseased	1	0.2

CVS Summary of Project Data
Smith and Austin Creeks
Year 4 (2006)
Damage by Species

	Species	All Damage Categories	(no damage)	_Enter other damage_	Deer	Diseased	Drought	Flood	Insects	Other/Unknown Animal	Unknown
	Acer negundo	14	8						4		2
	Acer rubrum	8	8								
	Alnus serrulata	4	4								
	Baccharis halimifolia	4	4								
	Betula nigra	33	29	1				1	2		
	Carya	1								1	
	Carya cordiformis	2	2								
	Cornus amomum	4	3	1							
	Diospyros virginiana	8	4						4		
	Fraxinus americana	2	1						1		
	Fraxinus pennsylvanica	173	110	6	4	1		5	43		4
	Gleditsia triacanthos	1	1								
	Juniperus virginiana	2	2								
	Ligustrum sinense	1	1								
	Liquidambar styraciflua	8	8								
	Liriodendron tulipifera	8	3	2				1			2
	Morella cerifera	2	2								
	Myrica	3	3								
	Nyssa	12	2	2	3			4			1
	Nyssa aquatica	1	1								
	Pinus taeda	64	60					2	1		1
	Platanus occidentalis	38	27	3				2	6		
	Prunus serotina	2	2								
	Quercus alba	1	1								
	Quercus falcata	2	1	1							
	Quercus lyrata	6	4						2		
	Quercus michauxii	14	10				2	2			
	Quercus nigra	12	10	1							1
	Quercus pagoda	15	3	3				3	5		1
	Quercus phellos	1	1								
	Rhus glabra	1	1								
	Salix nigra	4	4								
	Sambucus canadensis	1						1			
	Ulmus	13	5	2				3	1		2
	Ulmus rubra	5	2					1			2
TOT:	**35**	**470**	**327**	**22**	**7**	**1**	**2**	**25**	**69**	**1**	**16**

CVS Summary of Project Data
Smith and Austin Creeks
Year 4 (2006)
Damage by Plot

	plot	All Damage Categories	(no damage)	_Enter other damage_	Deer	Diseased	Drought	Flood	Insects	Other/Unknown Animal	Unknown
	343-AXE-0001	14	8	2				1		1	2
	343-AXE-0002	23	17	3				2			1
	343-AXE-0003	35	27	1					7		
	343-AXE-0004	30	25	2					2		1
	343-AXE-0005	49	28	2				1	18		
	343-AXE-0006	57	32		2			2	20		1
	343-AXE-0007	22	22								
	343-AXE-0008	34	25	3	2	1			2		1
	343-AXE-0009	23	12						11		
	343-AXE-0010	26	15	5				1	5		
	343-AXE-0011	36	26	4				2	3		1
	343-AXE-0012	24	21					3			
	343-AXE-0013	27	18		1			8			
	343-AXE-0014	24	16		2			4			2
	343-AXE-0015	24	19					1	1		3
	343-AXE-0016	22	16				2				4
TOT:	**16**	**470**	**327**	**22**	**7**	**1**	**2**	**25**	**69**	**1**	**16**

Smith and Austin Creeks
Vegetation Plot Photographs
Year 4 (2006) Monitoring Report
Pictures Taken September 5-8, 2006

Vegetation Plot 1

Vegetation Plot 2

Vegetation Plot 3

Vegetation Plot 4

Photo not available

Vegetation Plot 5

Vegetation Plot 6

Smith and Austin Creeks
Vegetation Plot Photographs
Year 4 (2006) Monitoring Report
Pictures Taken September 5-8, 2006
(continued)

Vegetation Plot 7

Vegetation Plot 8

Vegetation Plot 9

Vegetation Plot 10

Vegetation Plot 11

Vegetation Plot 12

Smith and Austin Creeks
Vegetation Plot Photographs
Year 4 (2006) Monitoring Report
Pictures Taken September 5-8, 2006
(continued)

Vegetation Plot 13

Vegetation Plot 14

Vegetation Plot 15

Vegetation Plot 16

APPENDIX B

GEOMORPHOLOGIC RAW DATA

1. Representative Stream Problem Area Photos
2. Stream Fixed-Station Photos
3. Tables B1-B6. Visual Morphological Stability Assessment
4. Cross-section Plots and Tables

Austin Creek: Example Problem/Watch Areas
Year 4 (2006) Monitoring Report
Pictures Taken February 9-10, 2006


Austin Picture 1: Scour around structure


Austin Picture 2: Scour around root wads/bank sloughing


Austin Picture 3: Migration of stream around structure


Austin Picture 4: Scour around structure


Austin Picture 5: Scour around root wads


Austin Picture 6: Confluence with small tributary at structure, some scour around structure on right bank


Austin Picture 7: Mid-channel bar


Austin Picture 8: Bank sloughing most likely from development stormwater runoff

Smith Creek: Example Problem/Watch Areas
Year 4 (2006) Monitoring Report
Pictures Taken February 9-10, 2006


Smith Picture 1: Bank erosion


Smith Picture 2: Scour around structure on left bank


Smith Picture 3: Scour around structure on right bank


Smith Picture 4: Bank erosion/scour around root wads


Smith Picture 5: Scour around structure


Smith Picture 6: Scour around structure


Smith Picture 7: Bank erosion/scour around root wads

Smith Creek: Example Problem/Watch Areas
Year 4 (2006) Monitoring Report (continued)
Pictures Taken February 9-10, 2006

Smith Picture 8: Loose sewage pipe below structure

Smith Picture 9: Bank erosion/scour around root wads

Smith Picture 10: Bank erosion

Smith Picture 11: Overflow area just below bank erosion

Smith Picture 12: Bank erosion/future tree loss

Smith Picture 13: Bank erosion

Smith and Austin Creeks Restoration Site
Fixed Photo Stations
Year 4 (2006) Monitoring Report
Pictures Taken September 12-13, 2006

APP1

APP2

APP3

APP4

APP5

APP5A

Smith and Austin Creeks Restoration Site
Fixed Photo Stations
Year 4 (2006) Monitoring Report
Pictures Taken September 12-13, 2006
(continued)

APP6

APP7

APP8

APP8A

APP9

APP10

Smith and Austin Creeks Restoration Site
Fixed Photo Stations
Year 4 (2006) Monitoring Report
Pictures Taken September 12-13, 2006
(continued)

APP11

APP12

APP13

APP14

APP15

APP16

Smith and Austin Creeks Restoration Site
Fixed Photo Stations
Year 4 (2006) Monitoring Report
Pictures Taken September 12-13, 2006
(continued)

APP17

APP19

APP20

APP21

APP22

APP22A

Smith and Austin Creeks Restoration Site
Fixed Photo Stations
Year 4 (2006) Monitoring Report
Pictures Taken September 12-13, 2006
(continued)

APP23

APP24

APP25

APP26

APP27

APP28

Smith and Austin Creeks Restoration Site
Fixed Photo Stations
Year 4 (2006) Monitoring Report
Pictures Taken September 12-13, 2006
(continued)

APP29

APP30

APP30A

APP31

APP31A

APP31B

Smith and Austin Creeks Restoration Site
Fixed Photo Stations
Year 4 (2006) Monitoring Report
Pictures Taken September 12-13, 2006
(continued)

APP32

APP33

APP34

SPP35

SPP36

SPP37

Smith and Austin Creeks Restoration Site
Fixed Photo Stations
Year 4 (2006) Monitoring Report
Pictures Taken September 12-13, 2006
(continued)

SPP38

SPP39

SPP40

SPP41

SPP42

SPP43

Smith and Austin Creeks Restoration Site
Fixed Photo Stations
Year 4 (2006) Monitoring Report
Pictures Taken September 12-13, 2006
(continued)

SPP44

SPP45

SPP46

SPP47

SPP47A

SPP47B

Smith and Austin Creeks Restoration Site
Fixed Photo Stations
Year 4 (2006) Monitoring Report
Pictures Taken September 12-13, 2006
(continued)

SPP48

SPP49

SPP50

SPP51

SPP51A

SPP51B

Smith and Austin Creeks Restoration Site
Fixed Photo Stations
Year 4 (2006) Monitoring Report
Pictures Taken September 12-13, 2006
(continued)

SPP52

SPP53

SPP54

SPP55

SPP56

SPP57

Smith and Austin Creeks Restoration Site
Fixed Photo Stations
Year 4 (2006) Monitoring Report
Pictures Taken September 12-13, 2006
(continued)

SPP58

SPP59

SPP60

SPP61

SPP62

SPP63

Smith and Austin Creeks Restoration Site
Fixed Photo Stations
Year 4 (2006) Monitoring Report
Pictures Taken September 12-13, 2006
(continued)

SPP64

SPP65

SPP66

SPP67

SPP68

SPP69

Smith and Austin Creeks Restoration Site
Fixed Photo Stations
Year 4 (2006) Monitoring Report
Pictures Taken September 12-13, 2006
(continued)

SPP70

SPP71

SPP72

SPP75

SPP77

SPP78

Smith and Austin Creeks Restoration Site
Fixed Photo Stations
Year 4 (2006) Monitoring Report
Pictures Taken September 12-13, 2006
(continued)

SPP79dow

SPP79up

SPP80

SPP81

SPP82

SPP83

Table B1. Visual Morphological Stability Assessment
Smith and Austin Creeks (Project Number 343)
Smith Reach 1 (1986 linear feet) September 12-13, 2006

Feature Category	Metric (per As-built and reference baselines)	(# Stable) Number Performing as Intended	Total number per As - built	Total Number / feet in unstable state	% Perform in Stable Condition	Feature Perform. Mean or Total
A. Riffles	1. Present	11	14	NA	79%	85%
	2. Armor stable (e.g. no displacement)?	13	14	NA	93%	
	3. Facet grade appears stable?	11	14	NA	79%	
	4. Minimal evidence of embedding / fining?	11	14	NA	79%	
	5. Length appropriate?	13	14	NA	93%	
B. Pools	1. Present? (e.g. not subject to severe aggrad. Or migrat.?)	12	14	NA	86%	86%
	2. Sufficiently deep (Max Pool D:Mean Bkf>1.6?)	12	14	NA	86%	
	3. Length appropriate?	12	14	NA	86%	
C. Thalweg	1. Upstream of meander bend (run/inflection) centering?	13	14	NA	93%	93%
	2. Downstream of meander (glide/inflection) centering?	13	14	NA	93%	
D. Meanders	1. Outer bend in state of limited/controlled erosion?	7	14	NA	50%	59%
	2. Of those eroding, # w/concomitant point bar formation?	2	7	NA	29%	
	3. Apparent Rc within spec?	12	14	NA	86%	
	4. Sufficient floodplain access and relief?	10	14	NA	71%	
E. Bed General	1. General channel bed aggradation areas (bar formation)	NA	NA	Apr-75	96%	98%
	2. Channel bed degradation – areas of increasing down-cutting or head cutting?	NA	NA	10-Jan	99%	
F. Vanes	1. Free of back or arm scour?	5	13	NA	38%	73%
	2. Height appropriate?	11	13	NA	85%	
	3. Angle and geometry appear appropriate?	11	13	NA	85%	
	4. Free of piping or other structural failures?	11	13	NA	85%	
G. Wads / Boulders	1. Free of scour?	0	3	NA	0%	0%
	2. Footing stable?	0	3	NA	0%	

Table B2. Visual Morphological Stability Assessment
Smith and Austin Creeks (Project Number 343)
Smith Reach 2 (2618 linear feet) September 12-13, 2006

Feature Category	Metric (per As-built and reference baselines)	(# Stable) Number Performing as Intended	Total number per As - built	Total Number / feet in unstable state	% Perform in Stable Condition	Feature Perform. Mean or Total
A. Riffles	1. Present	13	14	NA	93%	90%
	2. Armor stable (e.g. no displacement)?	13	14	NA	93%	
	3. Facet grade appears stable?	13	14	NA	93%	
	4. Minimal evidence of embedding / fining?	13	14	NA	93%	
	5. Length appropriate?	11	14	NA	79%	
B. Pools	1. Present? (e.g. not subject to severe aggrad. Or migrat.?)	13	14	NA	93%	93%
	2. Sufficiently deep (Max Pool D:Mean Bkf>1.6?)	13	14	NA	93%	
	3. Length appropriate?	13	14	NA	93%	
C. Thalweg	1. Upstream of meander bend (run/inflection) centering?	14	14	NA	100%	100%
	2. Downstream of meander (glide/inflection) centering?	14	14	NA	100%	
D. Meanders	1. Outer bend in state of limited/controlled erosion?	11	14	NA	79%	76%
	2. Of those eroding, # w/concomitant point bar formation?	1	3	NA	33%	
	3. Apparent Rc within spec?	13	14	NA	93%	
	4. Sufficient floodplain access and relief?	14	14	NA	100%	
E. Bed General	1. General channel bed aggradation areas (bar formation)	NA	NA	23-Mar	99%	99%
	2. Channel bed degradation – areas of increasing down-cutting or head cutting?	NA	NA	0/0	100%	
F. Vanes	1. Free of back or arm scour?	4	6	NA	67%	63%
	2. Height appropriate?	4	6	NA	67%	
	3. Angle and geometry appear appropriate?	3	6	NA	50%	
	4. Free of piping or other structural failures?	4	6	NA	67%	
G. Wads / Boulders	1. Free of scour?	1	3	NA	33%	33%
	2. Footing stable?	1	3	NA	33%	

Table B3. Visual Morphological Stability Assessment
Smith and Austin Creeks (Project Number 343)
Smith Reach 3 (794 linear feet) September 12-13, 2006

Feature Category	Metric (per As-built and reference baselines)	(# Stable) Number Performing as Intended	Total number per As - built	Total Number / feet in unstable state	% Perform in Stable Condition	Feature Perform. Mean or Total
A. Riffles	1. Present	3	4	NA	75%	85%
	2. Armor stable (e.g. no displacement)?	3	4	NA	75%	
	3. Facet grade appears stable?	4	4	NA	100%	
	4. Minimal evidence of embedding / fining?	4	4	NA	100%	
	5. Length appropriate?	3	4	NA	75%	
B. Pools	1. Present? (e.g. not subject to severe aggrad. Or migrat.?)	3	3	NA	100%	78%
	2. Sufficiently deep (Max Pool D:Mean Bkf>1.6?)	2	3	NA	67%	
	3. Length appropriate?	2	3	NA	67%	
C. Thalweg	1. Upstream of meander bend (run/inflection) centering?	NA	NA	NA	NA	NA
	2. Downstream of meander (glide/inflection) centering?	NA	NA	NA	NA	
D. Meanders	1. Outer bend in state of limited/controlled erosion?	NA	NA	NA	NA	NA
	2. Of those eroding, # w/concomitant point bar formation?	NA	NA	NA	NA	
	3. Apparent Rc within spec?	NA	NA	NA	NA	
	4. Sufficient floodplain access and relief?	NA	NA	NA	NA	
E. Bed General	1. General channel bed aggradation areas (bar formation)	NA	NA	0/0	100%	100%
	2. Channel bed degradation – areas of increasing down-cutting or head cutting?	NA	NA	0/0	100%	
F. Vanes	1. Free of back or arm scour?	2	2	NA	100%	100%
	2. Height appropriate?	2	2	NA	100%	
	3. Angle and geometry appear appropriate?	2	2	NA	100%	
	4. Free of piping or other structural failures?	2	2	NA	100%	
G. Wads / Boulders	1. Free of scour?	NA	NA	NA	NA	NA
	2. Footing stable?	NA	NA	NA	NA	

Table B4. Visual Morphological Stability Assessment
Smith and Austin Creeks (Project Number 343)
Austin Reach 1 (2581 linear feet) September 12-13, 2006

Feature Category	Metric (per As-built and reference baselines)	(# Stable) Number Performing as Intended	Total number per As - built	Total Number / feet in unstable state	% Perform in Stable Condition	Feature Perform. Mean or Total
	1. Present	8	10	NA	80%	
	2. Armor stable (e.g. no displacement)?	8	10	NA	80%	
	3. Facet grade appears stable?	8	10	NA	80%	
	4. Minimal evidence of embedding / fining?	8	10	NA	80%	
A. Riffles	5. Length appropriate?	6	10	NA	60%	76%
	1. Present? (e.g. not subject to severe aggrad. Or migrat.?)	8	10	NA	80%	
	2. Sufficiently deep (Max Pool D:Mean Bkf>1.6?)	8	10	NA	80%	
B. Pools	3. Length appropriate?	7	10	NA	70%	77%
	1. Upstream of meander bend (run/inflection) centering?	NA	NA	NA	NA	
C. Thalweg	2. Downstream of meander (glide/inflection) centering?	NA	NA	NA	NA	NA
	1. Outer bend in state of limited/controlled erosion?	NA	NA	NA	NA	
	2. Of those eroding, # w/concomitant point bar formation?	NA	NA	NA	NA	
	3. Apparent Rc within spec?	NA	NA	NA	NA	
D. Meanders	4. Sufficient floodplain access and relief?	NA	NA	NA	NA	NA
	1. General channel bed aggradation areas (bar formation)	NA	NA	Jun-47	98%	
E. Bed General	2. Channel bed degradation – areas of increasing down-cutting or head cutting?	NA	NA	0/0	100%	99%
	1. Free of back or arm scour?	2	8	NA	25%	
	2. Height appropriate?	4	8	NA	50%	
	3. Angle and geometry appear appropriate?	3	8	NA	38%	
F. Vanes	4. Free of piping or other structural failures?	3	8	NA	38%	38%
	1. Free of scour?	1	7	NA	14%	
G. Wads / Boulders	2. Footing stable?	1	7	NA	14%	14%

Table B5. Visual Morphological Stability Assessment
Smith and Austin Creeks (Project Number 343)
Austin Reach 2 (526 linear feet) September 12-13, 2006

Feature Category	Metric (per As-built and reference baselines)	(# Stable) Number Performing as Intended	Total number per As - built	Total Number / feet in unstable state	% Perform in Stable Condition	Feature Perform. Mean or Total
A. Riffles	1. Present	2	2	NA	100%	100%
	2. Armor stable (e.g. no displacement)?	2	2	NA	100%	
	3. Facet grade appears stable?	2	2	NA	100%	
	4. Minimal evidence of embedding / fining?	2	2	NA	100%	
	5. Length appropriate?	2	2	NA	100%	
B. Pools	1. Present? (e.g. not subject to severe aggrad. Or migrat.?)	3	3	NA	100%	100%
	2. Sufficiently deep (Max Pool D:Mean Bkf>1.6?)	3	3	NA	100%	
	3. Length appropriate?	3	3	NA	100%	
C. Thalweg	1. Upstream of meander bend (run/inflection) centering?	2	2	NA	100%	100%
	2. Downstream of meander (glide/inflection) centering?	2	2	NA	100%	
D. Meanders	1. Outer bend in state of limited/controlled erosion?	2	2	NA	100%	67%
	2. Of those eroding, # w/concomitant point bar formation?	NA	NA	NA	NA	
	3. Apparent Rc within spec?	0	2	NA	0%	
	4. Sufficient floodplain access and relief?	2	2	NA	100%	
E. Bed General	1. General channel bed aggradation areas (bar formation)	NA	NA	15-Jan	97%	99%
	2. Channel bed degradation – areas of increasing down-cutting or head cutting?	NA	NA	0/0	100%	
F. Vanes	1. Free of back or arm scour?	3	3	NA	100%	100%
	2. Height appropriate?	3	3	NA	100%	
	3. Angle and geometry appear appropriate?	3	3	NA	100%	
	4. Free of piping or other structural failures?	3	3	NA	100%	
G. Wads / Boulders	1. Free of scour?	NA	NA	NA	NA	NA
	2. Footing stable?	NA	NA	NA	NA	

Table B6. Visual Morphological Stability Assessment
Smith and Austin Creeks (Project Number 343)
Austin Reach 3 (2480 linear feet) September 12-13, 2006

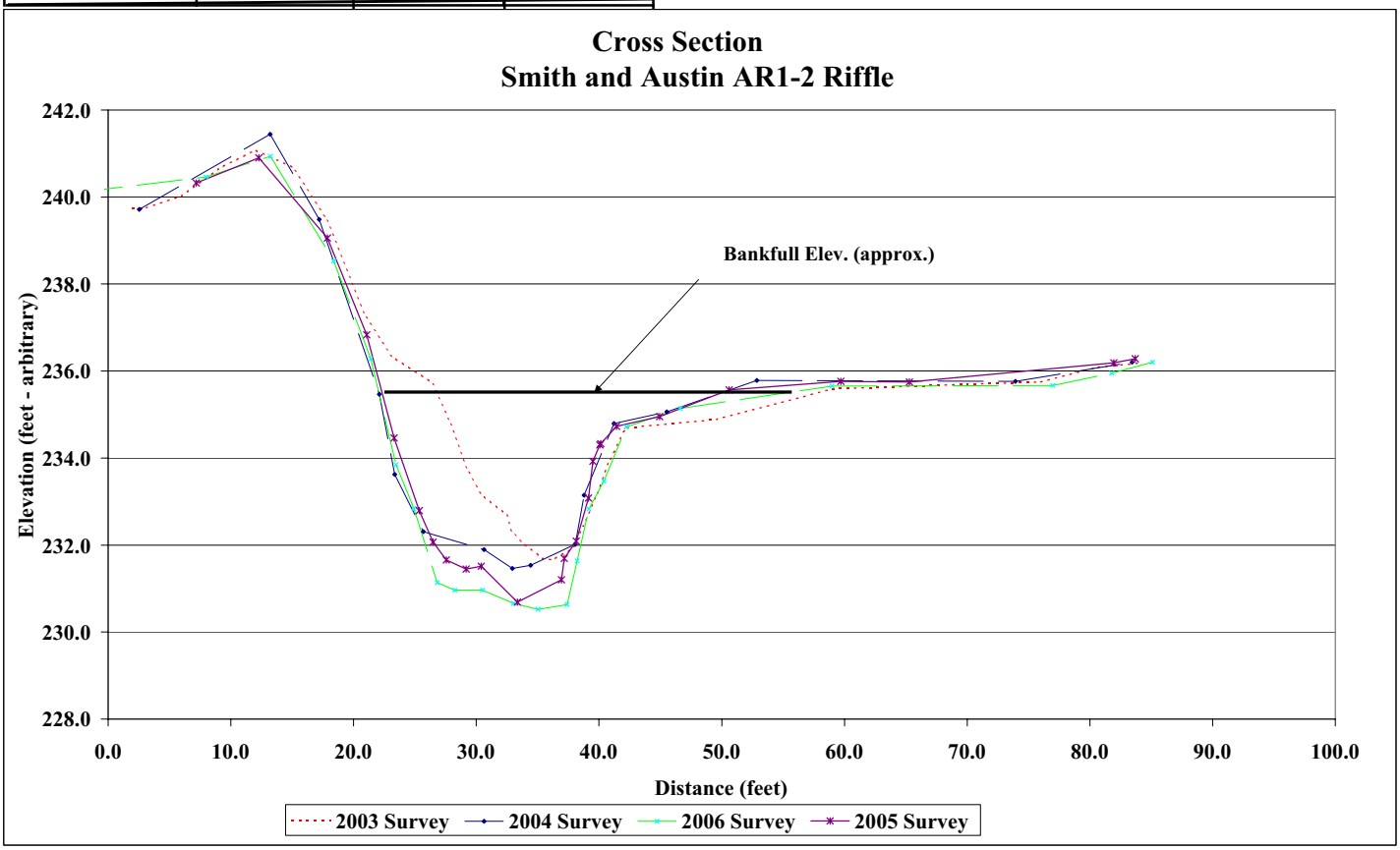
Feature Category	Metric (per As-built and reference baselines)	(# Stable) Number Performing as Intended	Total number per As - built	Total Number / feet in unstable state	% Perform in Stable Condition	Feature Perform. Mean or Total
A. Riffles	1. Present	11	11	NA	100%	98%
	2. Armor stable (e.g. no displacement)?	11	11	NA	100%	
	3. Facet grade appears stable?	11	11	NA	100%	
	4. Minimal evidence of embedding / fining?	10	11	NA	91%	
	5. Length appropriate?	11	11	NA	100%	
B. Pools	1. Present? (e.g. not subject to severe aggrad. Or migrat.?)	9	10	NA	90%	90%
	2. Sufficiently deep (Max Pool D:Mean Bkf>1.6?)	9	10	NA	90%	
	3. Length appropriate?	9	10	NA	90%	
C. Thalweg	1. Upstream of meander bend (run/inflection) centering?	8	9	NA	89%	95%
	2. Downstream of meander (glide/inflection) centering?	9	9	NA	100%	
D. Meanders	1. Outer bend in state of limited/controlled erosion?	9	10	NA	90%	95%
	2. Of those eroding, # w/concomitant point bar formation?	1	1	NA	100%	
	3. Apparent Rc within spec?	9	10	NA	90%	
	4. Sufficient floodplain access and relief?	10	10	NA	100%	
E. Bed General	1. General channel bed aggradation areas (bar formation)	NA	NA	May-63	97%	99%
	2. Channel bed degradation – areas of increasing down-cutting or head cutting?	NA	NA	0/0	100%	
F. Vanes	1. Free of back or arm scour?	6	7	NA	86%	90%
	2. Height appropriate?	6	7	NA	86%	
	3. Angle and geometry appear appropriate?	7	7	NA	100%	
	4. Free of piping or other structural failures?	6	7	NA	86%	
G. Wads / Boulders	1. Free of scour?	NA	NA	NA	NA	NA
	2. Footing stable?	NA	NA	NA	NA	

Project Name	Smith and Austin
Cross Section	AR1-2
Feature	Riffle
Date	9/18/06
Crew	Lewis, Jeffers

2006		2005		2004		2003	
2006 Survey		2005 Survey		2004 Survey		2003 Survey	
Station	**Elevation**	**Station**	**Elevation**	**Station**	**Elevation**	**Station**	**Elevation**
-7.4	239.9	7.2	240.3	2.6	239.7	2.0	239.7
8.0	240.5	12.3	240.9	13.2	241.4	3.0	239.7
13.2	240.9	17.9	239.1	17.2	239.5	6.0	240.0
18.4	238.5	21.1	236.8	22.1	235.5	9.0	240.7
21.4	236.3	23.3	234.5	23.4	233.6	12.0	241.1
23.5	233.9	25.4	232.8	25.7	232.3	15.0	240.7
24.9	232.8	26.5	232.1	30.6	231.9	17.8	239.5
26.8	231.1	27.6	231.7	33.0	231.5	21.0	237.2
28.2	231.0	29.2	231.5	34.4	231.5	23.1	236.4
30.5	231.0	30.4	231.5	38.1	232.0	26.4	235.7
33.0	230.7	33.4	230.7	38.8	233.1	27.9	234.8
35.0	230.5	37.0	231.2	41.2	234.8	29.3	233.7
37.4	230.6	37.2	231.7	45.5	235.1	30.4	233.2
38.2	231.6	38.2	232.1	52.9	235.8	32.5	232.7
39.2	232.8	39.2	233.1	73.9	235.8	32.9	232.3
40.4	233.5	39.5	233.9	83.5	236.2	33.7	232.1
42.2	234.7	40.1	234.3			35.4	231.7
46.6	235.1	40.1	234.3			36.2	231.7
59.0	235.7	41.4	234.7			37.9	231.9
77.0	235.7	45.0	235.0			38.7	232.4
81.8	235.9	50.6	235.6			39.8	233.1
85.1	236.2	59.7	235.8			40.8	233.9
		65.3	235.8			42.2	234.7
		82.0	236.2			49.6	234.9
		83.7	236.3			59.0	235.6
						70.0	235.7
						76.0	235.8
						80.5	236.1
						84.0	236.2
						84.7	236.2
						89.5	237.3
						97.9	239.6
						102.0	239.5
						110.0	239.3

Photo of Cross-Section AR1-2 - Looking Downstream @ STA 4+42

	2005	2004	2003	AS-BUILT	2006
Area	63.5	62.4	51.2	49.0	57.6
Width	27.3	29.5	31.1	32.4	19.6
Mean Depth	2.3	2.1	1.6	1.5	2.9
Max Depth	4.8	4.0	3.8	3.9	4.2
W/D	11.7	14.0	18.9	21.4	6.6

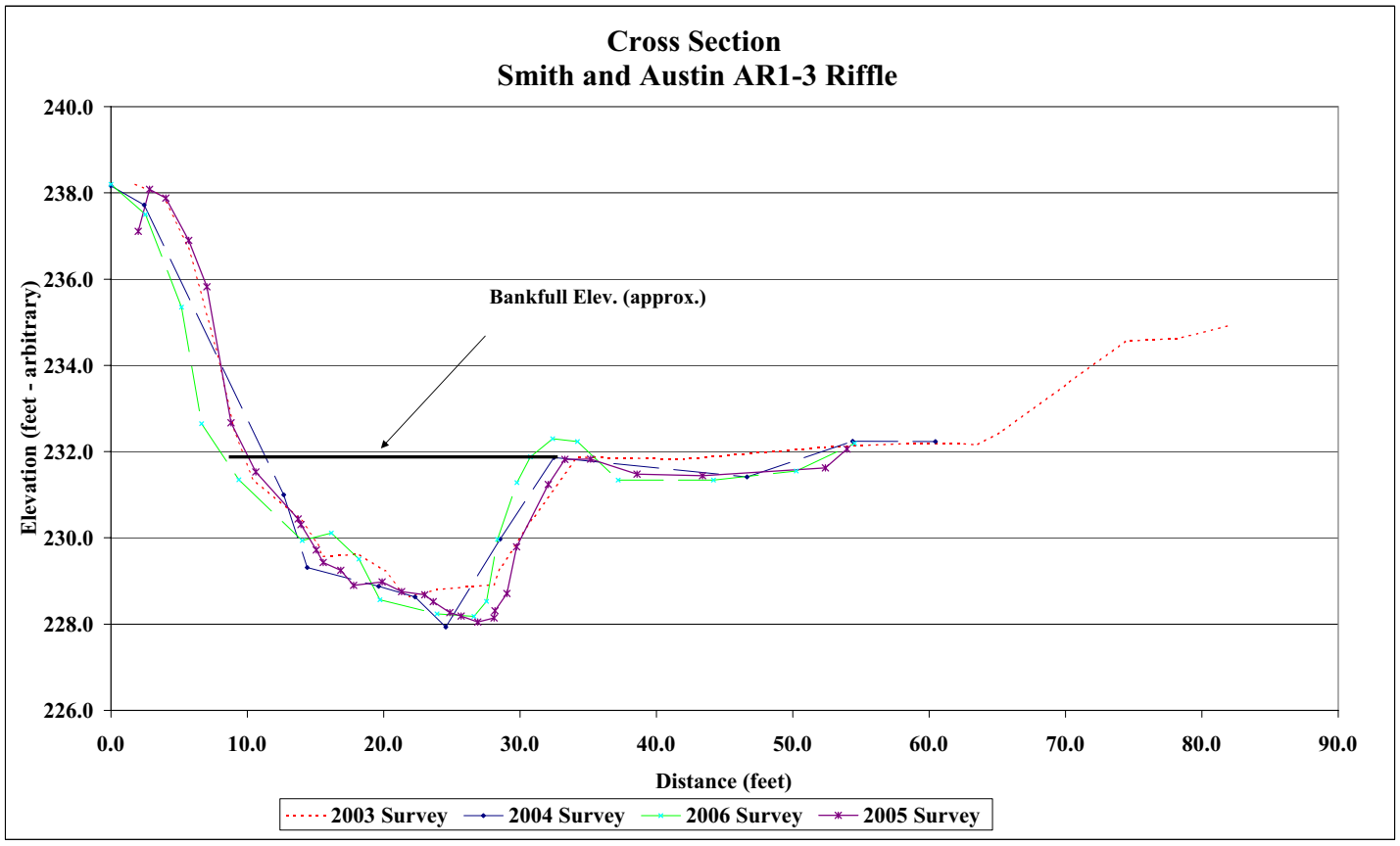


Project Name	Smith and Austin
Cross Section	AR1-3
Feature	Riffle
Date	9/18/06
Crew	Lewis, Jeffers

2006 Survey		2005 Survey		2004 Survey		2003 Survey	
Station	**Elevation**	**Station**	**Elevation**	**Station**	**Elevation**	**Station**	**Elevation**
0.0	238.2	2.0	237.1	0.0	238.2	1.8	238.2
2.5	237.5	2.8	238.1	2.4	237.7	3.8	237.9
5.2	235.4	4.0	237.9	12.7	231.0	5.7	236.7
6.6	232.6	5.7	236.9	14.4	229.3	7.7	234.4
9.4	231.3	7.0	235.8	19.6	228.9	9.1	232.4
14.0	229.9	8.8	232.7	22.3	228.6	10.4	231.4
16.2	230.1	10.6	231.5	24.6	227.9	13.9	230.4
18.2	229.5	13.7	230.4	28.5	230.0	15.2	229.8
19.7	228.6	13.9	230.3	32.5	231.9	15.5	229.6
23.9	228.2	15.1	229.7	46.7	231.4	18.2	229.6
26.6	228.2	15.6	229.4	54.4	232.2	20.1	229.2
27.5	228.5	16.9	229.3	60.5	232.2	21.3	228.8
28.4	230.0	17.8	228.9			21.9	228.6
29.8	231.3	19.9	229.0			23.9	228.8
30.8	231.9	21.3	228.8			26.3	228.9
32.4	232.3	23.0	228.7			28.1	228.9
34.2	232.2	23.6	228.5			28.5	229.3
37.2	231.3	24.9	228.3			31.0	230.5
44.2	231.3	25.7	228.2			34.2	231.9
50.3	231.6	26.9	228.1			42.0	231.8
54.5	232.2	28.1	228.1			52.4	232.1
		28.2	228.3			59.0	232.2
		29.0	228.7			62.4	232.2
		29.8	229.8			63.5	232.2
		32.1	231.2			65.4	232.5
		33.3	231.8			70.0	233.6
		35.2	231.8			74.4	234.6
		38.6	231.5			78.4	234.6
		43.4	231.4			82.0	234.9
		52.4	231.6			86.0	235.9
		54.0	232.1			89.0	236.5

Photo of Cross-Section AR1-3 - Looking Downstream @ STA 13+95

	2005	2004	2003	AS-BUILT	2006
Area	54.7	52.7	51.2	49.8	60.6
Width	23.5	22.8	23.8	24.4	25
Mean Depth	2.3	2.3	2.2	2.0	2.4
Max Depth	3.8	3.9	3.2	3.2	4.1
W/D	10.1	9.9	11.1	12.0	10.3

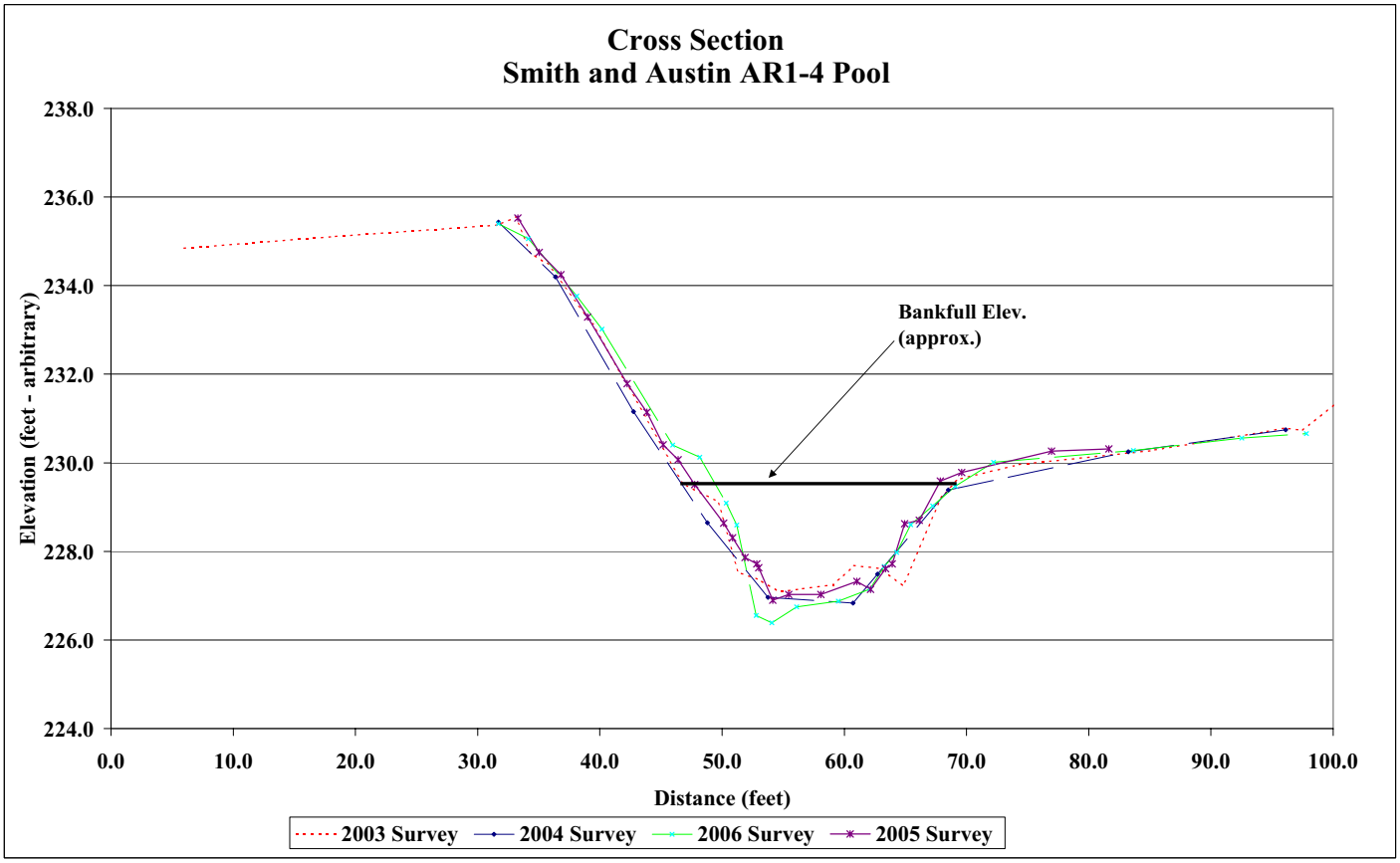


Project Name	Smith and Austin
Cross Section	AR1-4
Feature	Pool
Date	9/18/05
Crew	Lewis, Jeffers

2006		2005		2004		2003	
2006 Survey		2005 Survey		2004 Survey		2003 Survey	
Station	**Elevation**	**Station**	**Elevation**	**Station**	**Elevation**	**Station**	**Elevation**
31.7	235.4	33.3	235.5	31.7	235.4	6.0	234.8
34.1	235.1	35.0	234.8	36.4	234.2	18.0	235.1
38.1	233.8	36.8	234.3	42.7	231.2	31.7	235.4
40.2	233.0	39.0	233.3	48.8	228.6	33.1	235.6
45.9	230.4	42.2	231.8	53.8	227.0	34.3	234.7
48.2	230.1	43.8	231.1	60.7	226.8	35.7	234.5
50.3	229.1	45.2	230.4	62.7	227.5	39.4	233.1
51.2	228.6	46.4	230.1	68.5	229.4	42.0	231.9
52.8	226.6	47.8	229.5	83.2	230.2	46.8	229.5
54.1	226.4	50.1	228.6	96.1	230.7	49.7	229.1
56.1	226.7	50.9	228.3			51.3	227.5
59.5	226.9	51.9	227.9			53.1	227.4
62.1	227.1	52.8	227.7			54.7	227.1
63.3	227.7	53.0	227.6			56.4	227.2
64.3	228.0	54.2	226.9			59.1	227.2
65.4	228.6	55.5	227.0			60.8	227.7
67.2	229.0	58.1	227.0			63.0	227.6
69.1	229.5	61.0	227.3			64.8	227.2
72.2	230.0	62.2	227.1			68.0	229.2
83.7	230.3	63.4	227.6			69.3	229.6
92.5	230.6	63.9	227.7			74.3	230.0
97.8	230.7	64.9	228.6			85.0	230.3
		66.1	228.7			94.6	230.7
		67.9	229.6			96.1	230.8
		69.6	229.8			97.5	230.7
		77.0	230.3			103.0	232.0
		81.7	230.3			108.6	233.4

Photo of Cross-Section AR1-4 - Looking Downstream @ STA 20+90

	2005	2004	2003	AS-BUILT	2006
Area	34.0	38.3	38.5	38.2	47.6
Width	21.4	22.7	22.5	23.3	23.9
Mean Depth	1.6	1.7	1.7	1.6	2
Max Depth	2.7	2.8	2.5	2.5	3.6
W/D	13.4	13.5	13.1	14.2	NA

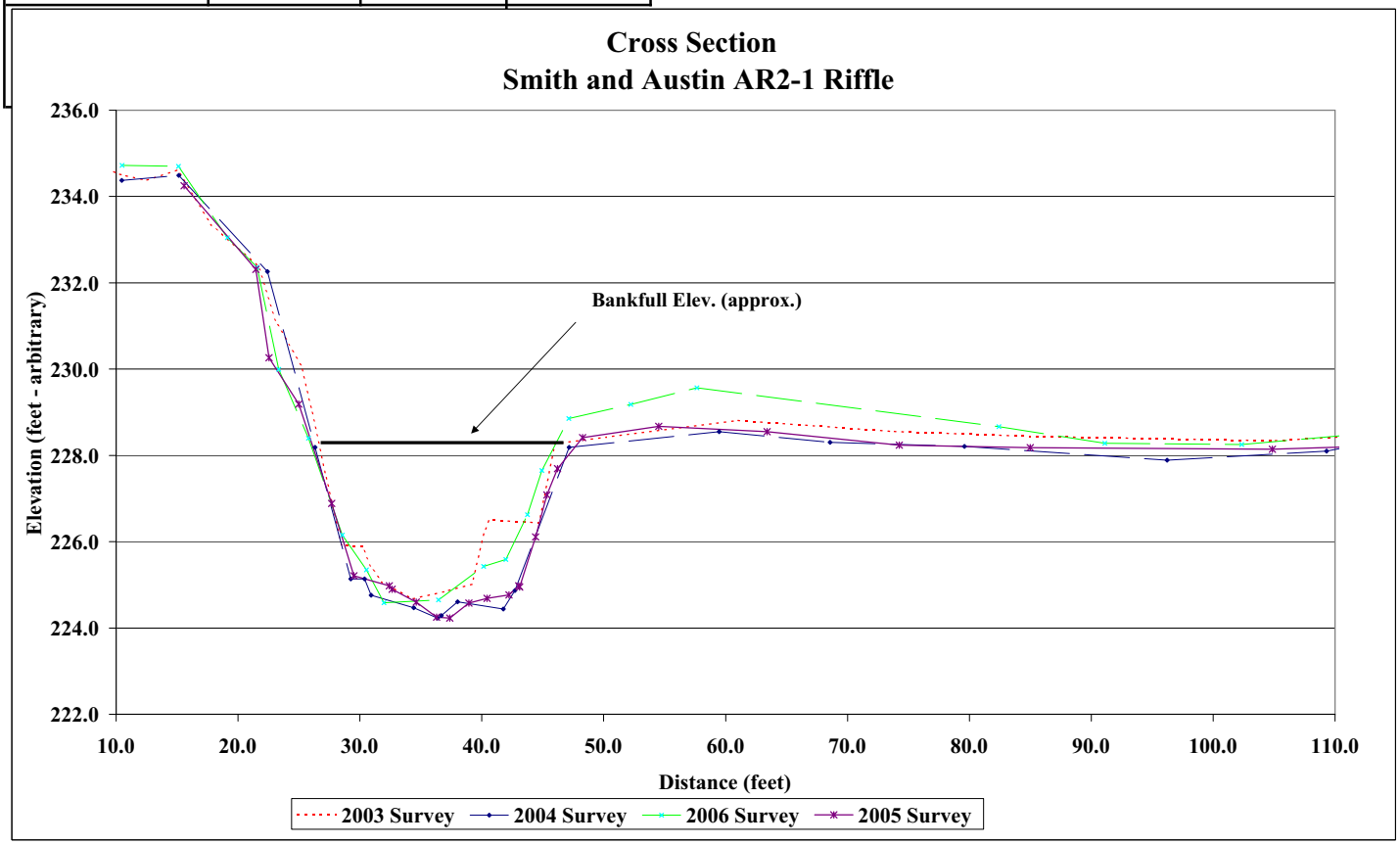


Project Name	Smith and Austin
Cross Section	AR2-1
Feature	Riffle
Date	9/18/06
Crew	Lewis, Jeffers

2006 Survey		2005 Survey		2004 Survey		2003 Survey	
Station	**Elevation**	**Station**	**Elevation**	**Station**	**Elevation**	**Station**	**Elevation**
10.5	234.7	15.6	234.3	10.5	234.4	7.5	234.8
15.1	234.7	21.5	232.3	15.1	234.5	10.3	234.5
19.1	233.0	22.5	230.3	22.4	232.3	10.6	234.5
21.6	232.4	25.0	229.2	26.3	228.2	12.5	234.4
23.3	230.0	27.7	226.9	29.2	225.1	15.0	234.6
25.8	228.4	29.5	225.2	30.4	225.1	17.8	233.4
28.6	226.2	32.4	225.0	30.9	224.8	21.7	232.4
30.5	225.3	32.6	224.9	34.4	224.5	23.1	231.1
32.0	224.6	34.6	224.6	36.4	224.2	25.2	230.1
36.4	224.6	36.3	224.3	36.7	224.3	26.1	229.0
40.1	225.4	37.4	224.2	38.0	224.6	27.2	227.5
42.0	225.6	39.0	224.6	41.8	224.4	28.5	225.9
43.7	226.6	40.4	224.7	42.7	224.9	30.2	225.9
44.9	227.6	42.2	224.8	47.2	228.2	30.9	225.4
47.1	228.9	43.0	225.0	59.5	228.6	31.8	225.1
52.2	229.2	43.1	225.0	68.6	228.3	34.3	224.7
57.7	229.6	44.4	226.1	79.6	228.2	37.3	224.9
82.4	228.7	45.4	227.1	96.2	227.9	39.2	225.0
91.1	228.3	46.2	227.7	109.3	228.1	40.2	226.2
102.4	228.3	48.3	228.4	120.6	228.7	40.6	226.5
120.3	228.7	54.5	228.7			44.7	226.4
		63.4	228.6			46.0	228.3
		74.3	228.2			50.2	228.4
		85.0	228.2			61.0	228.8
		104.9	228.1			73.6	228.6
		115.6	228.2			85.0	228.4
		120.6	228.4			105.0	228.3
						118.0	228.6
						120.5	228.6

Photo of Cross-Section AR2-1 - Looking Downstream @ STA 27+90

	2005	2004	2003	AS-BUILT	2006
Area	56.1	62.1	45.4	48.1	63.8
Width	20.6	20.8	18.8	19.3	22.2
Mean Depth	2.7	3.0	2.4	2.5	2.9
Max Depth	4.0	4.0	3.6	3.6	4.3
W/D	7.5	7.0	7.8	7.7	7.7

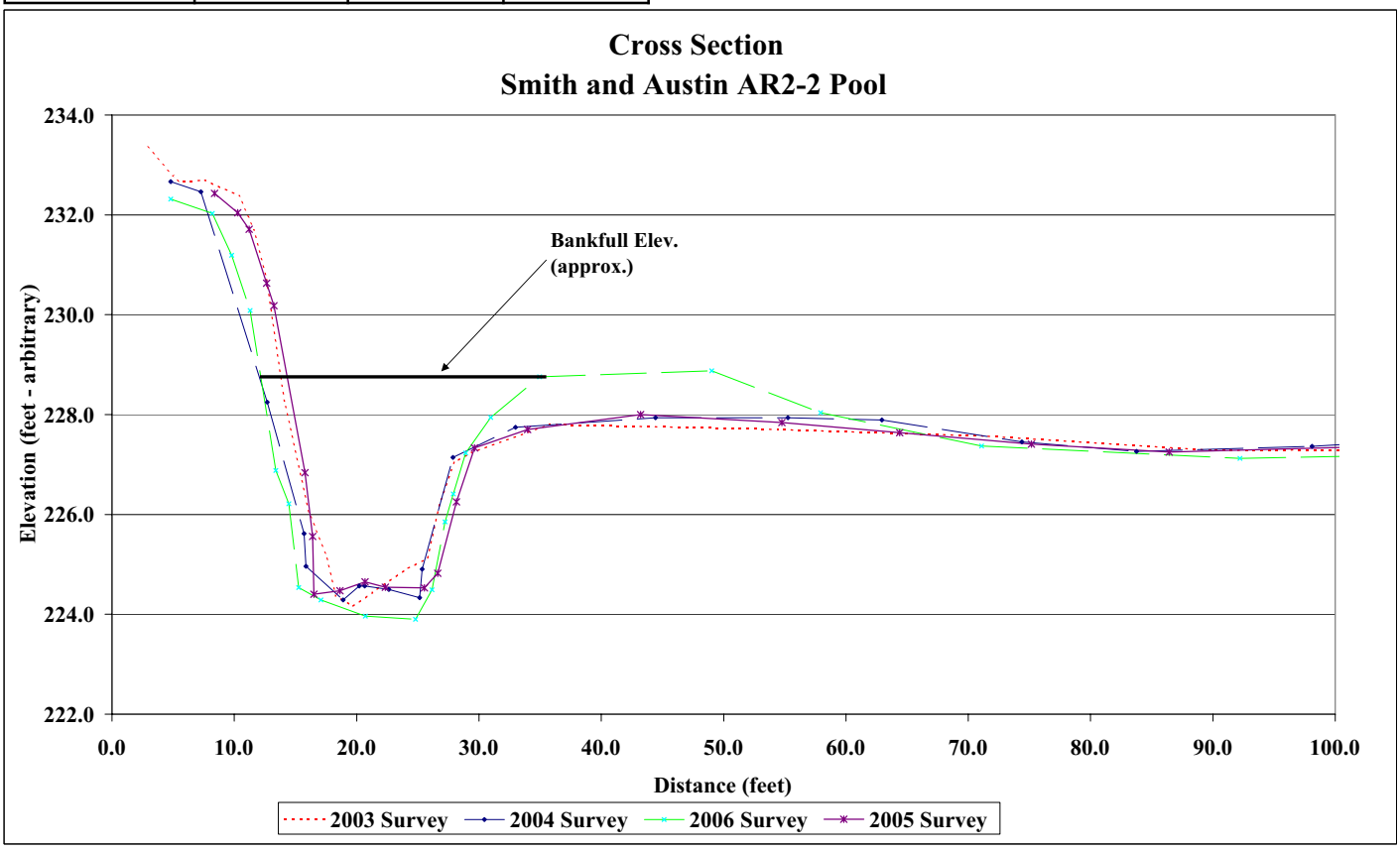


Project Name	Smith and Austin
Cross Section	AR2-2
Feature	Pool
Date	9/18/06
Crew	Lewis, Jeffers

2006		2005		2004		2003	
2006 Survey		2005 Survey		2004 Survey		2003 Survey	
Station	**Elevation**	**Station**	**Elevation**	**Station**	**Elevation**	**Station**	**Elevation**
4.8	232.3	8.4	232.4	4.8	232.7	2.9	233.4
8.2	232.0	10.3	232.0	7.3	232.5	5.0	232.8
9.8	231.2	11.2	231.7	12.7	228.2	5.5	232.7
11.3	230.1	12.7	230.6	15.7	225.6	7.6	232.7
13.4	226.9	13.2	230.2	15.9	225.0	10.4	232.4
14.5	226.2	15.8	226.8	18.9	224.3	11.6	231.7
15.3	224.5	16.4	225.6	20.2	224.6	12.6	230.8
17.1	224.3	16.5	224.4	20.7	224.6	14.1	228.3
20.7	224.0	18.6	224.5	22.6	224.5	16.1	226.1
24.8	223.9	20.7	224.7	25.1	224.3	17.5	225.2
26.2	224.5	22.3	224.5	25.3	224.9	18.3	224.4
27.2	225.8	25.6	224.5	27.9	227.1	19.7	224.2
27.9	226.4	26.6	224.8	33.0	227.7	21.3	224.4
28.9	227.2	28.2	226.3	44.4	227.9	24.0	224.9
31.0	227.9	29.6	227.3	55.3	227.9	25.8	225.1
35.0	228.8	34.0	227.7	62.9	227.9	26.8	226.2
49.0	228.9	43.2	228.0	74.4	227.5	28.0	227.1
57.9	228.0	54.8	227.8	83.8	227.3	29.4	227.2
71.1	227.4	64.4	227.6	98.1	227.4	35.8	227.8
92.2	227.1	75.2	227.4	108.5	227.5	54.4	227.7
101.5	227.2	86.4	227.3			71.6	227.6
108.6	227.5	101.9	227.4			90.0	227.3
		108.1	227.5			103.0	227.3
		108.1	227.5			107.0	227.4
						107.8	227.5
						109.0	227.6
						114.0	228.8
						119.0	230.0
						121.2	230.6
						130.0	230.9
						136.0	231.1

Photo of Cross-Section AR2-2 - Looking Downstream @ STA 28+35

	2005	2004	2003	AS-BUILT	2006
Area	43.0	43.9	36.9	37.1	68.5
Width	18.2	17.3	19.7	21.3	22.8
Mean Depth	2.4	2.5	1.9	1.7	3
Max Depth	3.3	3.4	3.5	3.6	4.9
W/D	7.7	6.8	10.5	12.2	NA

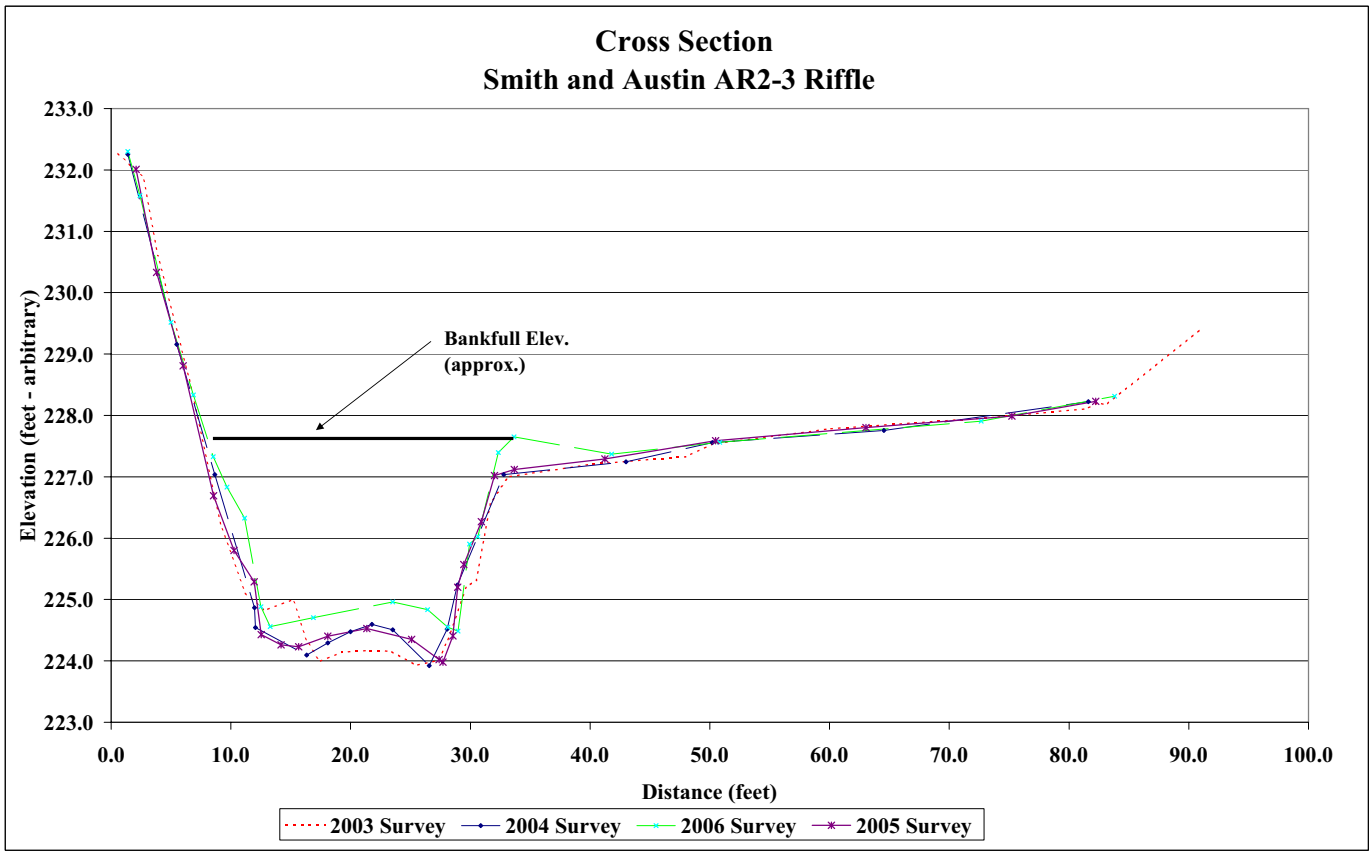


Project Name	Smith and Austin
Cross Section	AR2-3
Feature	Riffle
Date	9/18/06
Crew	Lewis, Jeffers

2006		2005		2004		2003	
2006 Survey		2005 Survey		2004 Survey		2003 Survey	
Station	**Elevation**	**Station**	**Elevation**	**Station**	**Elevation**	**Station**	**Elevation**
1.4	232.3	2.1	232.0	1.4	232.3	0.6	232.3
2.4	231.6	3.8	230.3	5.5	229.2	2.7	231.9
5.0	229.5	6.0	228.8	8.7	227.0	3.9	230.6
6.9	228.3	8.6	226.7	12.0	224.9	6.5	228.6
8.5	227.3	10.3	225.8	12.0	224.5	9.2	226.2
9.7	226.8	12.0	225.3	16.3	224.1	11.2	225.1
11.1	226.3	12.5	224.4	18.1	224.3	12.8	224.8
12.5	224.9	14.2	224.3	20.0	224.5	15.2	225.0
13.3	224.6	15.7	224.2	21.8	224.6	16.3	224.3
16.9	224.7	18.1	224.4	23.5	224.5	17.4	224.0
23.5	225.0	21.3	224.5	26.6	223.9	19.3	224.1
26.4	224.8	25.1	224.4	28.1	224.5	21.4	224.2
28.1	224.5	27.4	224.0	28.9	225.2	23.4	224.2
29.0	224.5	27.7	224.0	32.8	227.0	25.5	223.9
29.9	225.9	28.6	224.4	43.0	227.2	27.4	224.0
30.6	226.0	28.9	225.2	50.2	227.6	28.1	224.3
32.3	227.4	29.5	225.6	64.6	227.8	29.7	225.2
33.6	227.7	30.9	226.3	81.6	228.2	30.5	225.3
41.8	227.4	32.0	227.0			31.7	226.6
50.8	227.6	33.7	227.1			33.2	227.0
72.7	227.9	41.2	227.3			40.0	227.2
83.8	228.3	50.5	227.6			48.0	227.3
		63.0	227.8			50.2	227.5
		75.2	228.0			60.0	227.8
		82.2	228.2			73.7	228.0
						81.5	228.1
						82.4	228.2
						83.1	228.2
						91.0	229.4
						96.5	230.0
						103.3	230.5
						112.0	231.1
						121.0	231.6
						140.0	231.9
						145.0	232.0

Photo of Cross-Section AR2-3 - Looking Downstream @ STA 30+45

	2005	2004	2003	AS-BUILT	2006
Area	53.4	53.9	56.4	54.4	58.2
Width	25.1	24.1	24.0	24.9	25.7
Mean Depth	2.1	2.2	2.4	2.2	2.3
Max Depth	3.1	3.2	3.2	3.1	3.2
W/D	11.8	10.8	10.2	11.4	11.3

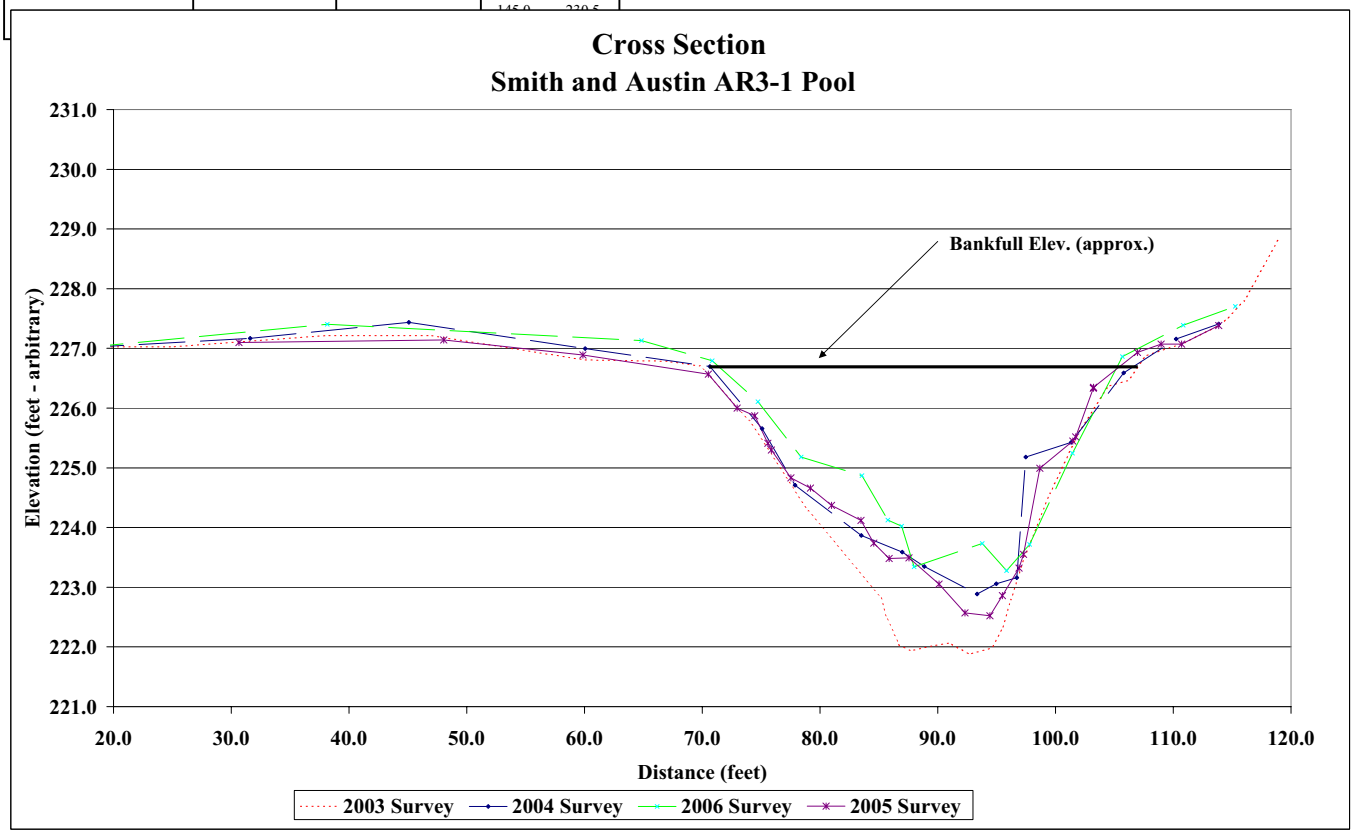


Project Name	Smith and Austin
Cross Section	AR3-1
Feature	Pool
Date	9/19/06
Crew	Lewis, Jeffers

2006		2005		2004		2003	
2006 Survey		2005 Survey		2004 Survey		2003 Survey	
Station	Elevation	Station	Elevation	Station	Elevation	Station	Elevation
16.9	227.0	30.6	227.1	16.9	227.0	2.0	230.0
38.2	227.4	48.0	227.1	31.6	227.2	4.4	230.1
64.8	227.1	59.9	226.9	45.1	227.4	6.0	230.3
70.8	226.8	70.5	226.6	60.0	227.0	7.9	230.2
74.7	226.1	73.0	226.0	70.6	226.7	10.0	229.7
78.4	225.2	74.5	225.9	75.1	225.7	11.3	229.3
83.6	224.9	75.6	225.4	77.9	224.7	12.2	228.5
85.8	224.1	75.9	225.3	83.5	223.9	13.0	227.4
86.9	224.0	77.5	224.8	87.0	223.6	14.0	226.9
88.0	223.3	79.2	224.7	88.9	223.3	16.9	227.0
93.8	223.7	81.0	224.4	93.3	222.9	25.0	227.0
95.9	223.3	83.5	224.1	95.0	223.1	38.0	227.2
97.8	223.7	84.6	223.7	96.7	223.2	47.0	227.2
101.4	225.2	85.9	223.5	97.5	225.2	60.0	226.8
105.7	226.9	87.6	223.5	101.3	225.4	67.0	226.8
110.8	227.4	90.1	223.1	105.8	226.6	69.8	226.7
115.3	227.7	92.3	222.6	110.3	227.2	74.0	225.8
		94.4	222.5	113.9	227.4	79.0	224.3
		95.5	222.9			85.2	222.8
		96.9	223.3			85.6	222.5
		97.3	223.6			86.7	222.0
		98.7	225.0			87.7	221.9
		101.5	225.5			89.5	222.0
		101.7	225.5			91.0	222.1
		103.2	226.3			92.7	221.9
		103.2	226.4			94.6	222.0
		107.0	226.9			95.5	222.3
		109.0	227.1			96.2	222.8
		110.7	227.1			97.4	223.5
		113.9	227.4			99.5	224.6
						102.1	225.6
						104.5	226.4
						106.2	226.5
						107.7	226.9
						111.0	227.1
						113.9	227.4
						114.6	227.5
						116.0	227.8
						119.0	228.8
						122.0	229.9
						132.0	230.2

Photo of Cross-Section AR3-1 - Looking Downstream @ STA 34+55

	2005	2004	2003	AS-BUILT	2006
Area	77.7	72.7	87.5	97.1	83.4
Width	38.5	39.6	41.2	37.3	44.5
Mean Depth	2.0	1.8	2.1	2.6	1.9
Max Depth	4.2	3.8	4.8	4.8	3.9
W/D	19.0	21.6	19.4	14.3	NA

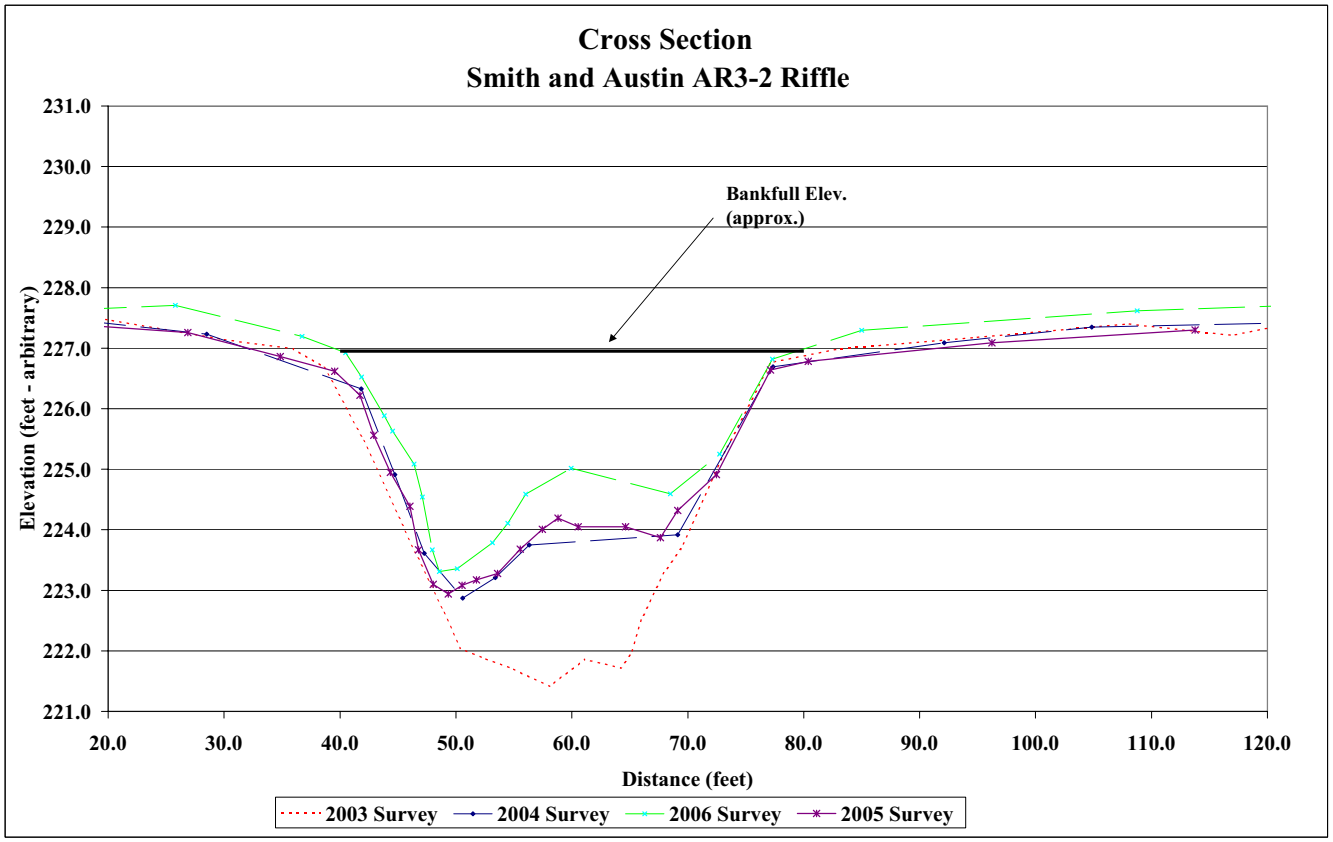


Project Name	Smith and Austin
Cross Section	AR3-2
Feature	Riffle
Date	9/19/06
Crew	Lewis, Jeffers

2006 Survey		2005 Survey		2004 Survey		2003 Survey	
Station	**Elevation**	**Station**	**Elevation**	**Station**	**Elevation**	**Station**	**Elevation**
12.3	227.6	12.3	227.5	12.3	227.6	3.0	229.6
25.8	227.7	13.2	227.5	28.5	227.2	4.0	226.8
36.7	227.2	18.7	227.4	41.8	226.3	6.0	227.0
40.5	226.9	26.9	227.3	44.7	224.9	9.4	227.3
41.9	226.5	34.9	226.9	47.3	223.6	12.6	227.6
43.8	225.9	39.5	226.6	50.6	222.9	20.0	227.5
44.5	225.6	41.7	226.2	53.4	223.2	30.0	227.1
46.4	225.1	42.9	225.6	56.3	223.8	36.0	227.0
47.1	224.5	44.4	225.0	69.1	223.9	38.6	226.7
48.0	223.7	46.0	224.4	77.4	226.7	42.0	225.5
48.6	223.3	46.8	223.7	92.1	227.1	46.5	223.6
50.1	223.4	48.0	223.1	104.9	227.4	48.9	222.7
53.2	223.8	49.3	222.9	122.7	227.4	50.4	222.0
54.5	224.1	50.5	223.1			52.3	221.9
56.0	224.6	51.8	223.2			55.0	221.7
59.9	225.0	53.6	223.3			58.1	221.4
68.5	224.6	55.5	223.7			61.1	221.9
72.7	225.3	57.5	224.0			64.2	221.7
77.3	226.8	58.8	224.2			65.1	221.9
85.0	227.3	60.6	224.1			66.0	222.5
108.8	227.6	64.6	224.1			68.0	223.3
124.1	227.7	67.6	223.9			69.4	223.7
		69.1	224.3			73.4	225.4
		72.5	224.9			77.2	226.8
		77.1	226.6			83.0	227.0
		80.4	226.8			95.0	227.2
		96.2	227.1			108.0	227.4
		113.8	227.3			117.0	227.2
						122.4	227.4
						124.0	227.5
						128.0	228.1
						132.0	228.9
						136.0	229.6
						145.0	230.1
						161.0	230.6

Photo of Cross-Section AR3-2 - Looking Downstream @ STA 35+15

	2005	2004	2003	AS-BUILT	2006
Area	91.5	97.1	125.1	126.5	74.4
Width	37.6	35.5	37.2	38.4	38.7
Mean Depth	2.4	2.7	3.4	3.3	1.9
Max Depth	3.8	3.8	5.3	5.3	3.6
W/D	15.4	13.0	11.1	11.7	20.1

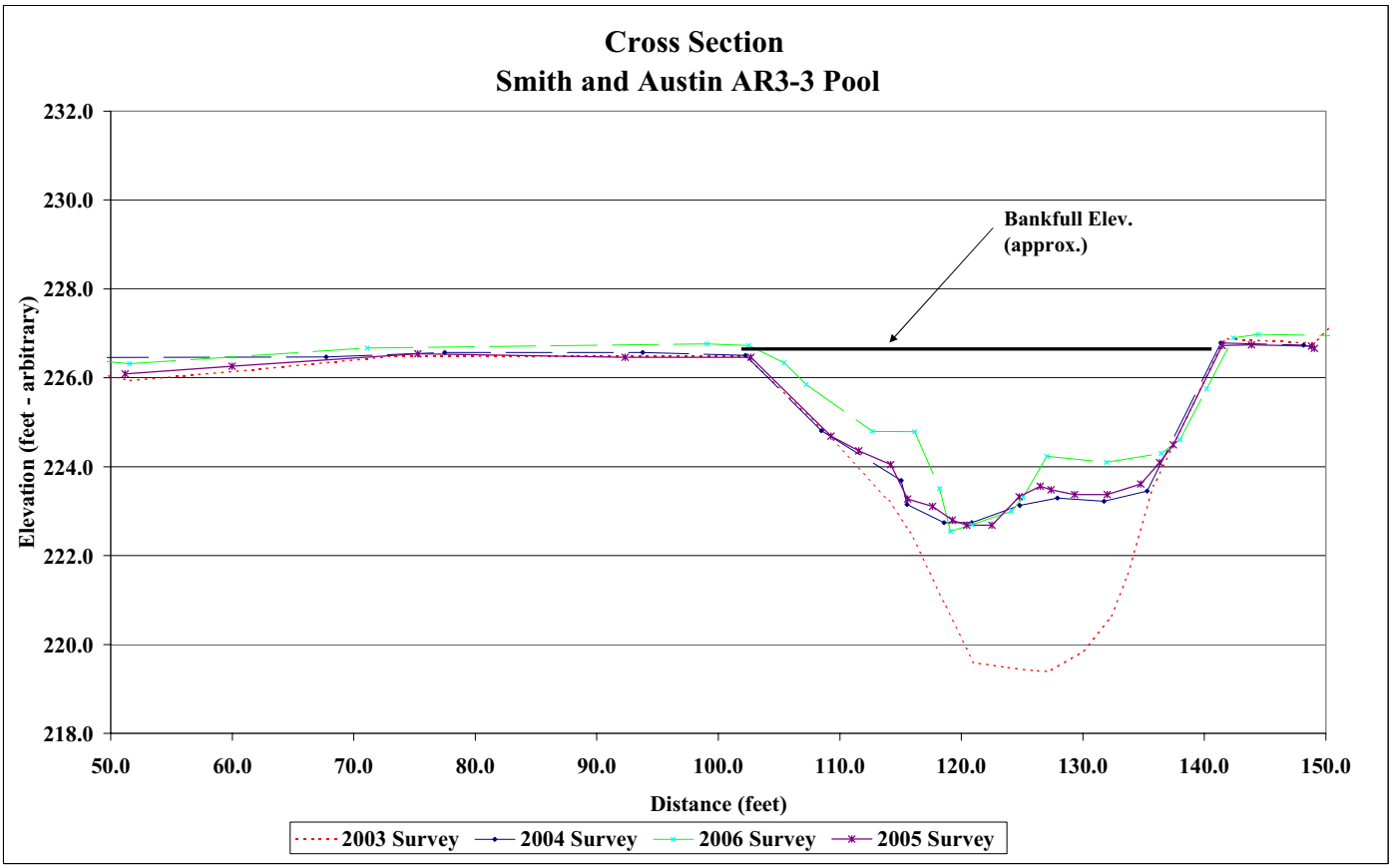


Project Name	Smith and Austin
Cross Section	AR3-3
Feature	Pool
Date	9/19/06
Crew	Lewis, Jeffers

2006		2005		2004		2003	
2006 Survey		2005 Survey		2004 Survey		2003 Survey	
Station	**Elevation**	**Station**	**Elevation**	**Station**	**Elevation**	**Station**	**Elevation**
44.3	226.5	51.2	226.1	44.3	226.5	4.0	230.2
51.5	226.3	60.0	226.3	67.7	226.5	15.0	229.4
71.1	226.7	75.3	226.5	77.5	226.6	25.0	228.8
99.1	226.8	92.3	226.5	93.8	226.6	35.7	228.5
102.5	226.7	102.7	226.5	102.2	226.5	39.3	227.8
105.4	226.3	109.3	224.7	108.5	224.8	43.7	226.4
107.2	225.8	111.6	224.4	115.1	223.7	44.2	226.4
112.7	224.8	114.2	224.1	115.5	223.2	51.6	225.9
116.2	224.8	115.6	223.3	118.6	222.7	62.0	226.2
118.2	223.5	117.6	223.1	120.9	222.7	72.9	226.5
119.1	222.6	119.3	222.8	124.8	223.1	88.0	226.5
120.9	222.7	120.4	222.7	127.9	223.3	102.3	226.5
124.1	223.0	122.5	222.7	131.7	223.2	109.0	224.7
125.1	223.3	124.8	223.3	135.3	223.5	114.0	223.2
127.0	224.2	126.5	223.6	141.3	226.8	115.8	222.5
131.9	224.1	127.4	223.5	148.2	226.7	118.7	220.9
136.5	224.3	129.3	223.4	148.8	226.7	121.0	219.6
138.0	224.6	132.0	223.4			123.8	219.5
140.2	225.8	134.8	223.6			126.0	219.4
142.4	226.9	136.3	224.1			127.2	219.4
144.5	227.0	137.4	224.5			130.0	219.8
150.4	227.0	141.5	226.7			132.3	220.6
		143.9	226.7			133.6	221.5
		148.8	226.7			135.8	223.6
		149.1	226.7			141.7	226.9
						148.9	226.8
						149.4	226.9
						153.0	227.8
						156.9	228.7
						164.0	228.9
						180.0	228.8
						201.0	228.8

Photo of Cross-Section AR3-3 - Looking Downstream @ STA 38+15

	2005	2004	2003	AS-BUILT	2006
Area	90.5	93.0	151.2	153.8	85.6
Width	38.8	39.1	39.4	38.5	39.6
Mean Depth	2.3	2.4	3.8	4.0	2.2
Max Depth	3.8	3.8	7.1	7.1	4.2
W/D	16.6	16.4	10.3	9.6	NA

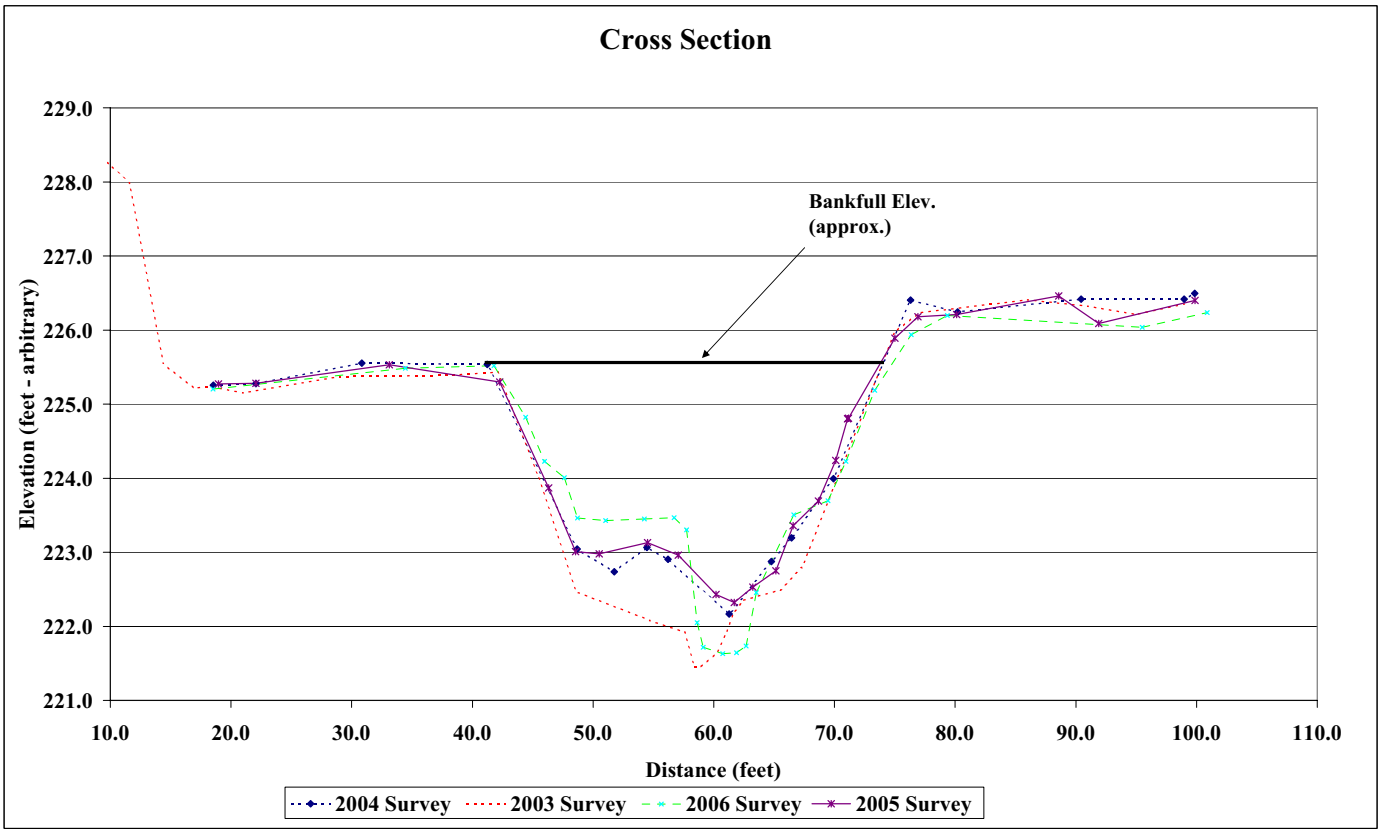


Project Name	Smith and Austin
Cross Section	AR3-4
Feature	Riffle
Date	9/18/06
Crew	Lewis, Jeffers

2006 Survey		2005 Survey		2004 Survey		2003 Survey	
Station	**Elevation**	**Station**	**Elevation**	**Station**	**Elevation**	**Station**	**Elevation**
18.5	225.2	19.0	225.3	18.5	225.3	6.5	228.6
34.4	225.5	22.1	225.3	22.1	225.3	10.0	228.2
41.8	225.5	33.1	225.5	30.8	225.6	11.6	228.0
44.4	224.8	42.3	225.3	41.2	225.5	14.4	225.6
46.0	224.2	46.3	223.9	48.7	223.0	16.9	225.2
47.6	224.0	48.6	223.0	51.8	222.7	18.5	225.2
48.7	223.5	50.5	223.0	54.5	223.1	21.0	225.2
51.1	223.4	54.5	223.1	56.2	222.9	29.0	225.4
54.2	223.4	57.1	223.0	61.3	222.2	38.0	225.4
56.7	223.5	60.2	222.4	64.8	222.9	42.1	225.4
57.7	223.3	61.7	222.3	66.5	223.2	45.4	224.1
58.6	222.1	63.2	222.5	69.9	224.0	48.6	222.5
59.1	221.7	65.2	222.8	76.3	226.4	54.7	222.1
60.7	221.6	66.6	223.4	80.2	226.2	57.6	221.9
61.9	221.6	68.7	223.7	90.4	226.4	58.4	221.5
62.7	221.7	70.1	224.2	99.0	226.4	58.9	221.5
63.5	222.5	71.1	224.8	99.9	226.5	60.3	221.7
66.6	223.5	71.2	224.8			61.0	221.9
69.5	223.7	75.0	225.9			61.7	222.2
70.9	224.2	76.9	226.2			62.5	222.4
73.3	225.2	80.1	226.2			65.5	222.5
76.3	225.9	88.6	226.5			67.3	222.8
79.4	226.2	91.9	226.1			70.4	224.1
95.5	226.0	99.9	226.4			75.0	226.0
100.9	226.2					77.0	226.2
						86.0	226.4
						91.0	226.3
						95.0	226.2
						99.0	226.4
						99.9	226.5
						100.6	226.5
						103.6	227.5
						106.3	228.2
						112.0	228.2
						128.0	228.2
						133.0	228.5
						147.2	228.3
						150.0	228.6

Photo of Cross-Section AR3-4 - Looking Downstream @ STA 41+00

	2005	2004	2003	AS-BUILT	2006
Area	61.0	63.7	77.4	78.8	64.2
Width	32.7	35.1	34.1	31.6	32.9
Mean Depth	1.9	1.8	2.3	2.5	2
Max Depth	3.2	3.3	4.0	4.0	3.9
W/D	17.6	19.3	15.0	12.7	16.8

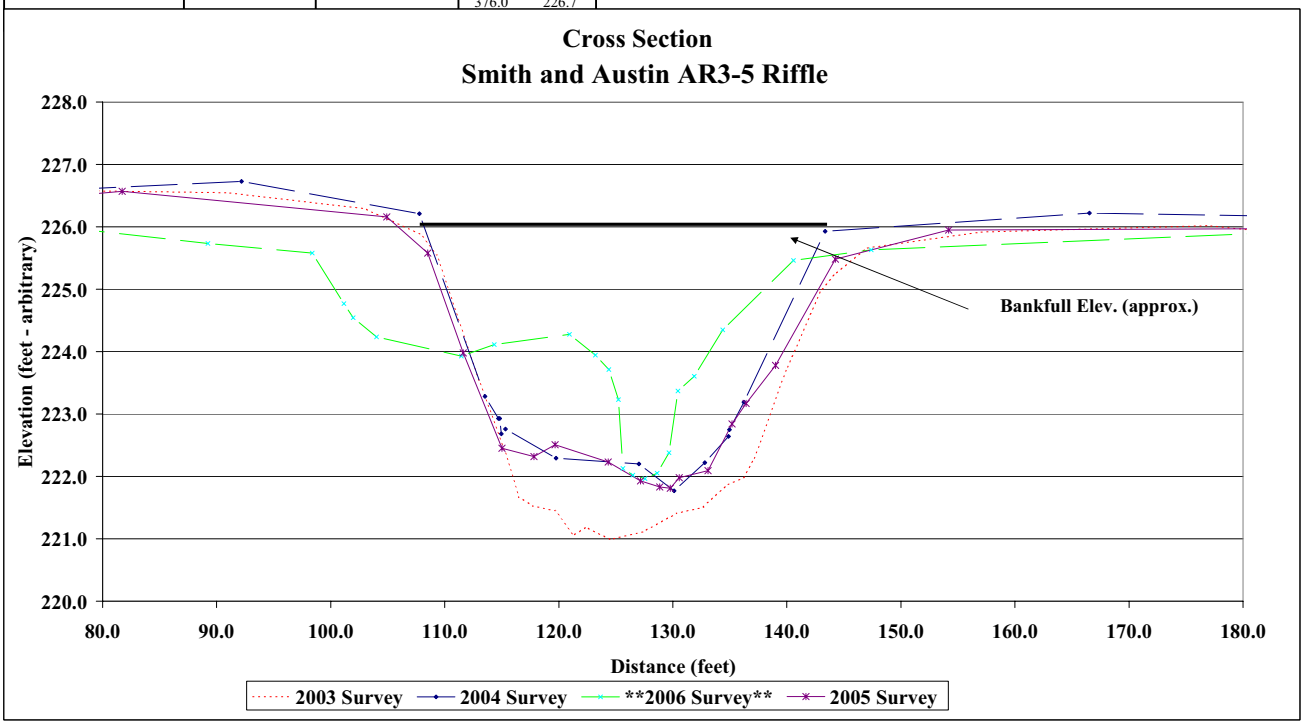


Project Name	Smith and Austin
Cross Section	AR3-5
Feature	Riffle
Date	9/18/06
Crew	Lewis, Jeffers

2006 **2006 Survey**		2005 2005 Survey		2004 2004 Survey		2003 2003 Survey	
Station	**Elevation**	**Station**	**Elevation**	**Station**	**Elevation**	**Station**	**Elevation**
37.1	226.2	21.2	226.5	16.6	226.8	2.0	226.9
70.1	226.1	52.1	226.1	33.0	226.3	7.0	226.7
89.2	225.7	81.7	226.6	60.3	226.5	15.6	226.7
98.4	225.6	104.9	226.2	92.2	226.7	31.0	226.4
101.2	224.8	108.5	225.6	107.8	226.2	44.0	226.1
102.0	224.5	111.6	224.0	113.5	223.3	58.0	226.4
104.0	224.2	115.0	222.5	114.7	222.9	75.0	226.6
111.5	223.9	117.8	222.3	114.8	222.9	91.0	226.6
114.3	224.1	119.7	222.5	115.0	222.7	103.0	226.3
120.9	224.3	124.3	222.2	115.3	222.8	107.9	225.9
123.2	223.9	127.2	221.9	119.8	222.3	109.3	225.6
124.4	223.7	128.8	221.8	127.0	222.2	113.0	223.5
125.2	223.2	129.8	221.8	130.1	221.8	115.3	222.4
125.6	222.1	130.6	222.0	132.8	222.2	116.5	221.7
126.5	222.0	133.1	222.1	134.9	222.6	117.7	221.5
127.6	222.0	135.2	222.8	135.0	222.8	119.7	221.5
128.6	222.0	136.4	223.2	136.2	223.2	121.3	221.1
129.7	222.4	139.0	223.8	143.4	225.9	122.4	221.2
130.5	223.4	144.3	225.5	166.5	226.2	124.5	221.0
131.9	223.6	154.2	226.0	186.9	226.2	127.5	221.1
134.4	224.4	181.0	226.0	201.5	225.8	130.3	221.4
140.6	225.5	229.5	225.3	229.0	225.6	132.7	221.5
147.4	225.6	284.9	225.6	257.8	225.6	134.7	221.9
184.3	225.9	338.9	225.4	282.8	225.8	136.2	222.0
228.4	226.4			299.7	225.9	137.1	222.3
274.4	226.5			310.9	225.8	140.0	223.7
321.5	226.6			334.7	225.7	143.0	225.0
347.4	226.6			358.6	224.8	144.2	225.2
358.6	226.7					147.0	225.7
						157.0	225.9
						177.0	226.0
						200.0	225.6
						208.0	225.4
						219.0	225.5
						247.0	225.4
						274.0	225.5
						293.0	225.8
						300.0	225.7
						306.0	225.7
						320.0	225.4
						337.0	225.4
						356.0	225.6
						359.6	225.6
						363.5	225.6
						368.0	226.2
						376.0	226.7

Photo of Cross-Section AR3-5 - Looking Downstream @ STA 46+40

	2005	2004	2003	AS-BUILT	2006
Area	93.4	88.9	116.0	99.9	64.2
Width	36.4	35.6	39.1	34.3	32.9
Mean Depth	2.6	2.5	3.0	2.9	2
Max Depth	3.9	3.9	4.7	4.2	3.9
W/D	14.2	14.2	13.2	11.8	16.8

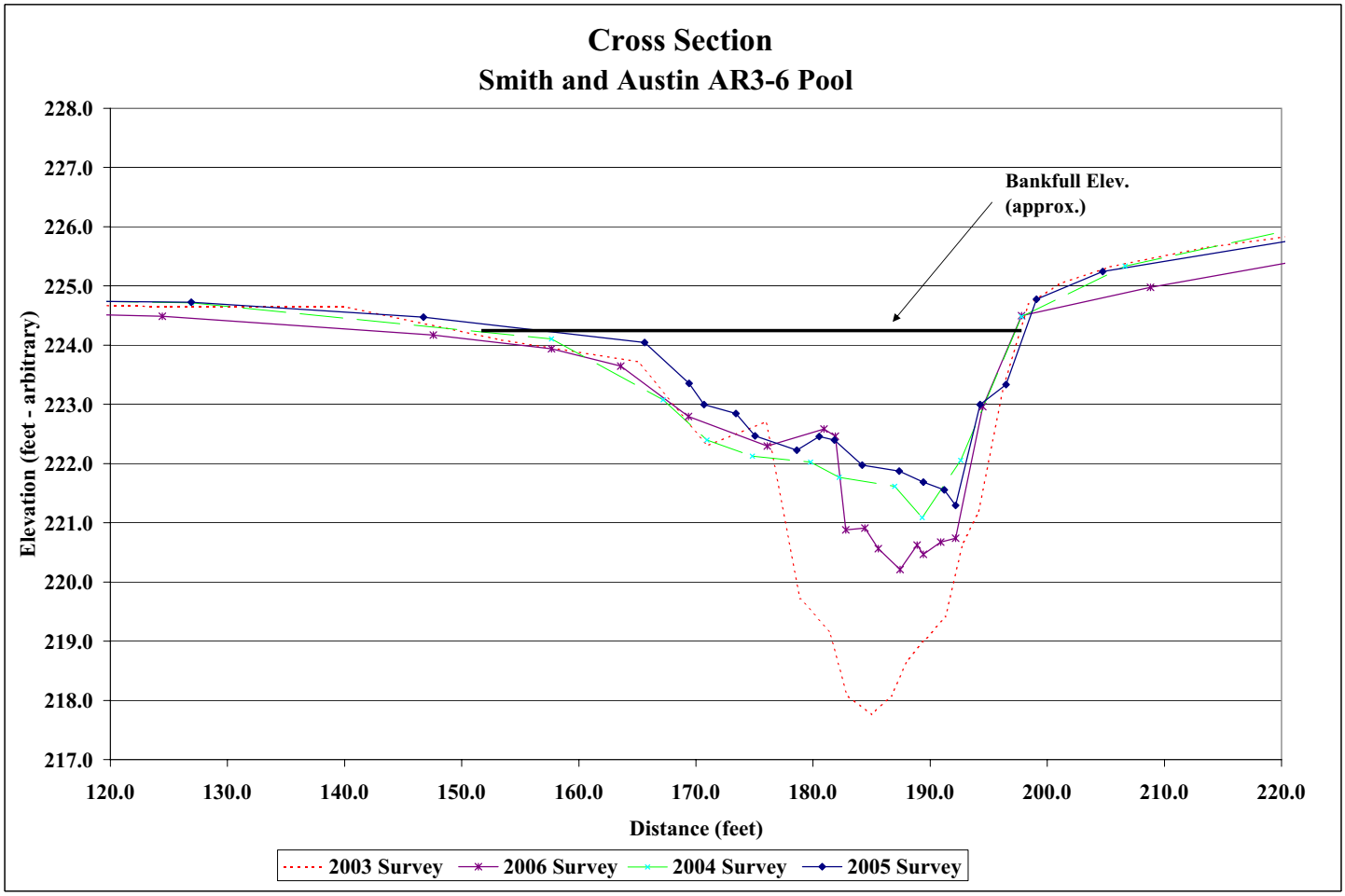


Project Name	Smith and Austin
Cross Section	AR3-6
Feature	Pool
Date	9/18/05
Crew	Lewis, Jeffers

2006 Survey		2005 Survey		2004 Survey		2003 Survey	
Station	**Elevation**	**Station**	**Elevation**	**Station**	**Elevation**	**Station**	**Elevation**
79.9	224.9	95.3	224.8	79.9	225.1	2.0	226.6
100.3	224.6	126.9	224.7	94.7	224.8	20.0	226.2
124.4	224.5	146.7	224.5	126.9	224.7	37.0	225.9
147.6	224.2	165.6	224.0	157.7	224.1	61.0	225.4
157.7	223.9	169.4	223.4	167.2	223.1	79.9	225.2
163.6	223.6	170.7	223.0	171.0	222.4	101.0	224.7
169.4	222.8	173.4	222.8	174.8	222.1	125.0	224.7
176.1	222.3	175.1	222.5	179.8	222.0	140.0	224.7
180.9	222.6	178.6	222.2	182.2	221.8	153.0	224.1
181.9	222.5	180.5	222.5	187.0	221.6	165.0	223.7
182.8	220.9	181.8	222.4	189.3	221.1	171.0	222.3
184.4	220.9	184.2	222.0	192.6	222.1	176.0	222.7
185.6	220.6	187.4	221.9	197.8	224.5	178.9	219.7
187.4	220.2	189.4	221.7	206.6	225.3	181.4	219.2
188.9	220.6	191.2	221.6	227.4	226.2	182.9	218.1
189.4	220.5	192.2	221.3			185.0	217.8
190.9	220.7	194.3	223.0			186.7	218.1
192.2	220.7	196.5	223.3			188.1	218.7
194.5	223.0	199.1	224.8			189.4	219.0
197.8	224.5	204.7	225.2			191.3	219.4
208.8	225.0	220.7	225.8			192.8	220.7
221.5	225.4	227.4	226.2			194.1	221.2
226.6	225.6					196.3	223.3
						198.4	224.7
						201.0	225.0
						205.3	225.3
						213.3	225.6
						223.0	225.9
						227.4	226.2
						229.0	226.2

Photo of Cross-Section AR3-6 - Looking Downstream @ STA 48+20

	2005	2004	2003	AS-BUILT	2006
Area	63.7	70.0	108.9	135.7	79.4
Width	39.1	56.9	58.4	58.3	59.5
Mean Depth	1.6	1.2	1.9	2.3	1.3
Max Depth	3.2	3.4	6.7	6.9	4.1
W/D	24.0	46.2	31.3	25.0	NA

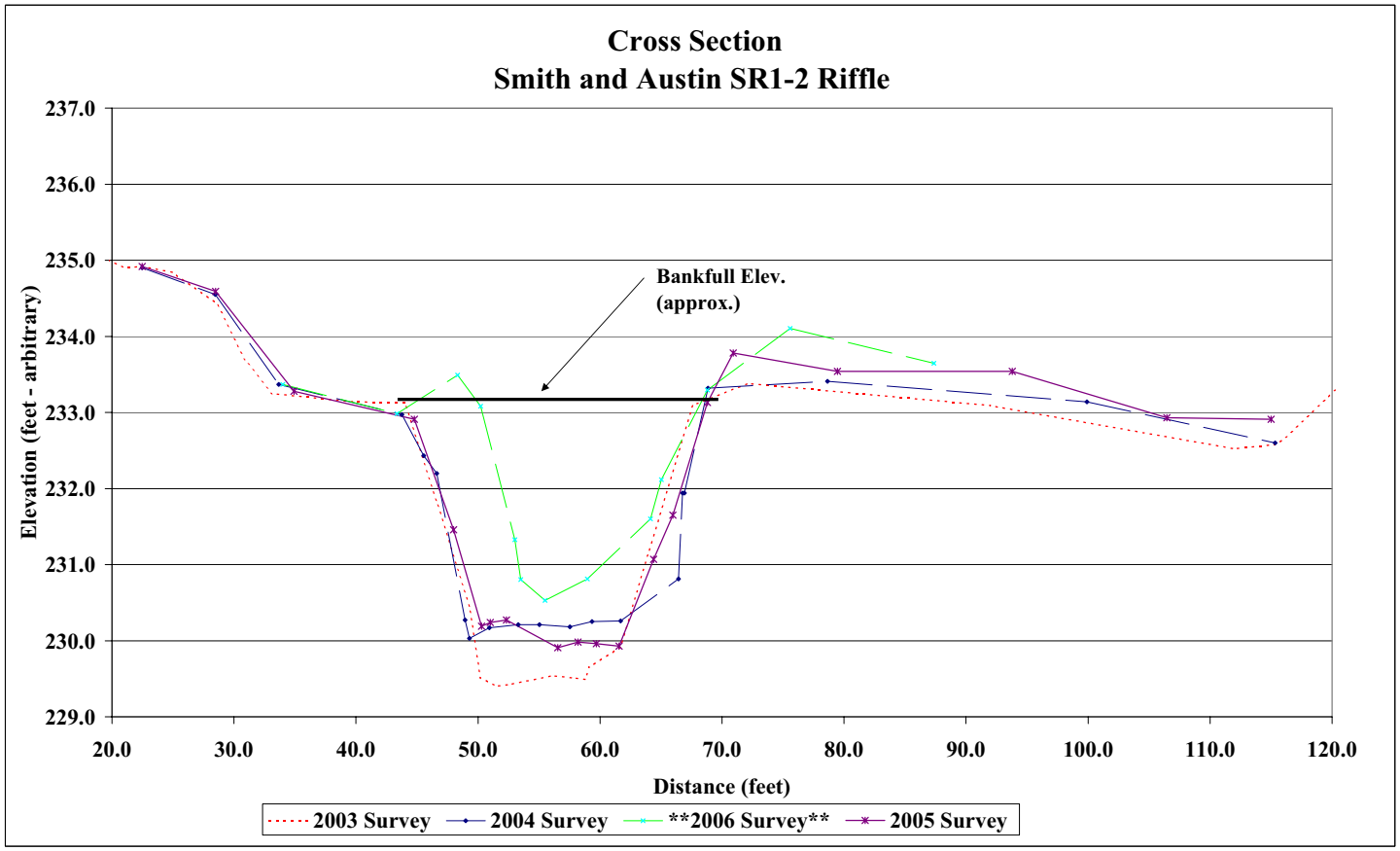


Project Name	Smith and Austin
Cross Section	SR1-2
Feature	Riffle
Date	9/18/06
Crew	Lewis, Jeffers

2006 **2006 Survey**		2005 2005 Survey		2004 2004 Survey		2003 2003 Survey	
Station	**Elevation**	**Station**	**Elevation**	**Station**	**Elevation**	**Station**	**Elevation**
33.99	233.37	22.47	234.92	22.475	234.9	1.0	235.7
43.35	232.98	28.49	234.59	28.455	234.55	12.0	235.6
48.32	233.49	34.91	233.28	33.665	233.37	21.0	234.9
50.21	233.08	44.78	232.91	43.765	232.97	22.5	234.920
53.01	231.33	48	231.46	45.555	232.43	25.0	234.8
53.50	230.80	50.29	230.19	46.615	232.2	28.6	234.4
55.48	230.53	51.01	230.24	48.935	230.27	30.9	233.7
58.95	230.81	52.33	230.27	49.295	230.03	33.1	233.3
64.13	231.60	56.54	229.91	50.925	230.17	39.7	233.1
65.03	232.11	58.2	229.98	53.305	230.21	44.0	233.1
68.80	233.30	59.7	229.96	55.035	230.21	46.6	231.8
75.57	234.10	61.57	229.93	57.525	230.18	49.3	230.5
87.36	233.65	64.4	231.1	59.3	230.3	50.2	229.5
		66.0	231.7	61.7	230.3	51.5	229.4
		68.8	233.1	66.4	230.8	52.8	229.4
		70.9	233.8	66.8	231.9	56.1	229.5
		79.5	233.5	66.9	231.9	57.7	229.5
		93.8	233.5	68.8	233.3	58.8	229.5
		106.5	232.9	78.6	233.4	59.1	229.7
		115.01	232.91	99.92	233.14	61.7	229.9
				115.33	232.60	64.0	231.2
						67.6	233.09
						72.1	233.38
						92	233.09
						112	232.52
						115.3	232.58
						116.2	232.66
						122	233.57
						130	234.8
						136	235.39
						140	235.42

Photo of Cross-Section SR1-2 - Looking Downstream @ STA 9+35

	2005	2004	2003	AS-BUILT	2006
Area	54.6	55.9	60.8	59.6	32.8
Width	26.1	25.1	23.6	23.5	19.5
Mean Depth	2.1	2.2	2.6	2.5	1.7
Max Depth	3.2	3.1	3.7	3.7	2.8
W/D	12.5	11.3	9.2	9.3	11.6

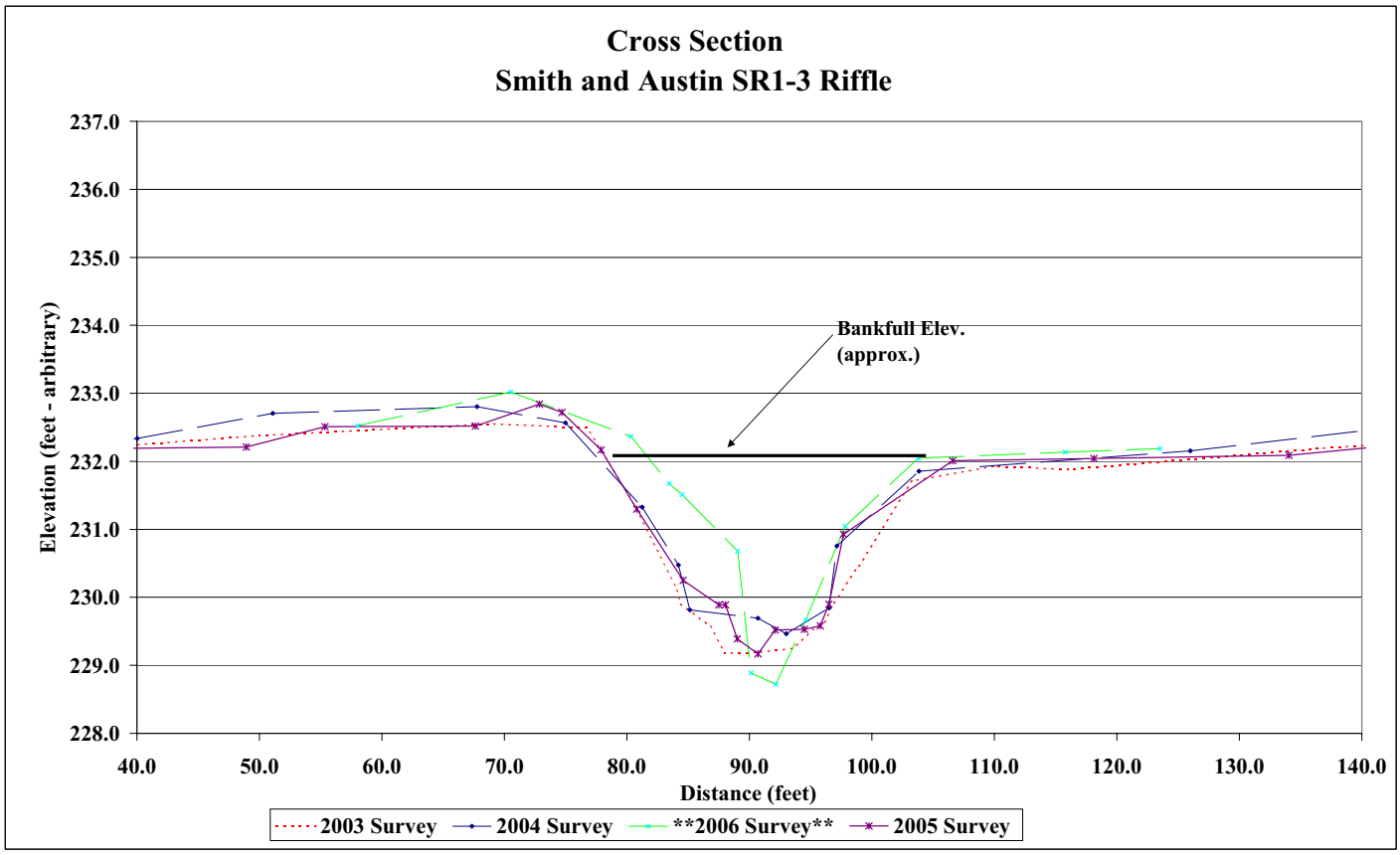


Project Name	Smith and Austin
Cross Section	SR1-3
Feature	Riffle
Date	9/18/06
Crew	Lewis, Jeffers

2006 **2006 Survey**		2005 2005 Survey		2004 2004 Survey		2003 2003 Survey	
Station	**Elevation**	**Station**	**Elevation**	**Station**	**Elevation**	**Station**	**Elevation**
58.0	232.5	27.2	232.2	27.0	232.2	2.8	236.6
70.5	233.0	48.9	232.2	40.0	232.3	7.0	236.3
80.3	232.4	55.4	232.5	51.1	232.7	13.0	235.1
83.5	231.7	67.6	232.5	67.8	232.8	18.0	233.7
84.5	231.5	72.9	232.8	75.0	232.6	24.0	232.5
89.0	230.7	74.7	232.7	81.2	231.3	27.4	232.3
90.1	228.9	77.9	232.2	84.2	230.5	33.0	232.2
92.2	228.7	80.8	231.3	85.1	229.8	50.0	232.4
94.6	229.7	84.6	230.3	90.7	229.7	69.0	232.6
97.8	231.0	87.5	229.9	93.0	229.5	76.7	232.5
103.8	232.0	88.1	229.9	96.5	229.8	80.0	231.6
115.8	232.1	89.0	229.4	97.2	230.8	84.0	230.2
123.5	232.2	90.7	229.2	103.8	231.9	84.4	229.9
		92.1	229.5	126.0	232.2	86.8	229.6
		94.5	229.5	147.4	232.6	88.0	229.2
		95.8	229.6	172.9	232.7	90.6	229.2
		96.5	229.9			93.6	229.3
		97.7	230.9			95.2	229.5
		106.6	232.0			96.2	229.7
		118.1	232.0			96.8	229.9
		134.1	232.1			98.7	230.4
		153.2	232.4			103.3	231.7
		165.6	232.6			110.0	231.9
						116.0	231.9
						136.0	232.2
						169.0	232.6
						172.5	232.7
						174.5	232.7
						179.0	233.6
						185.0	234.4
						191.0	235.0
						194.0	235.4
						204.8	235.4

Photo of Cross-Section SR1-3 - Looking Downstream @ STA 11+30

	2005	2004	2003	AS-BUILT	2006
Area	41.3	36.6	47.5	44.9	29.6
Width	25.8	25.9	25.6	31.3	22
Mean Depth	1.6	1.4	1.9	1.4	1.3
Max Depth	2.7	2.4	2.7	2.8	3.3
W/D	16.1	18.3	13.8	21.8	16.4

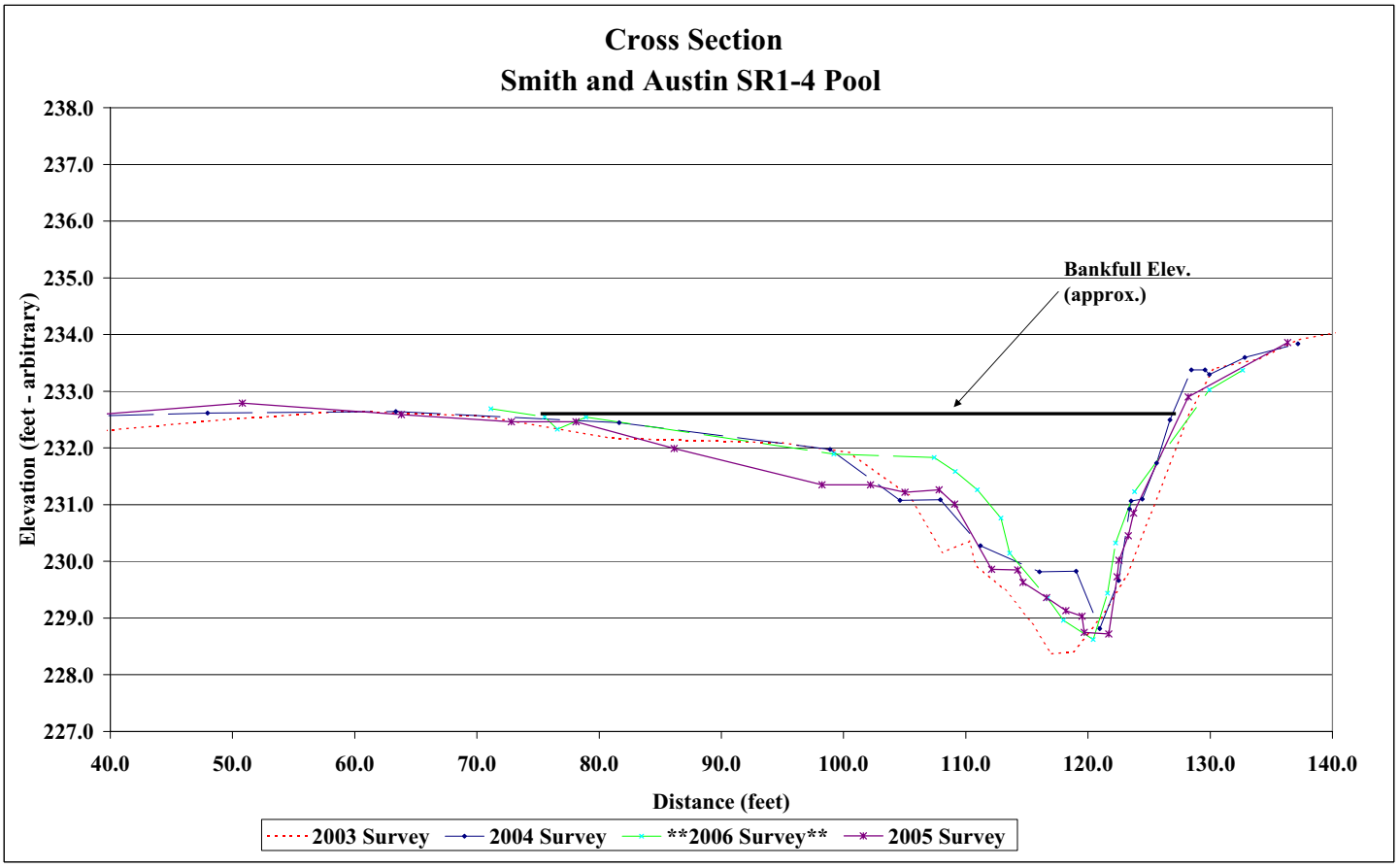


Project Name	Smith and Austin
Cross Section	SR1-4
Feature	Pool
Date	9/18/06
Crew	Lewis, Jeffers

2006 **2006 Survey**		2005 2005 Survey		2004 2004 Survey		2003 2003 Survey	
Station	**Elevation**	**Station**	**Elevation**	**Station**	**Elevation**	**Station**	**Elevation**
71.1	232.7	30.1	232.5	30.1	232.5	11.2	236.8
75.5	232.5	37.3	232.6	48.0	232.6	13.7	236.6
76.6	232.3	50.8	232.8	63.4	232.6	17.7	235.4
78.9	232.5	63.8	232.6	81.6	232.4	22.3	233.7
99.2	231.9	72.8	232.5	98.9	232.0	26.2	232.6
107.4	231.8	78.1	232.5	104.6	231.1	30.2	232.5
109.1	231.6	86.1	232.0	107.9	231.1	39.7	232.3
110.9	231.3	98.2	231.4	111.2	230.3	49.4	232.5
112.9	230.8	102.2	231.4	116.0	229.8	59.4	232.7
113.6	230.1	105.0	231.2	119.0	229.8	70.5	232.6
116.7	229.4	107.8	231.3	121.0	228.8	81.0	232.2
118.0	229.0	109.1	231.0	122.5	229.7	95.0	232.1
120.4	228.6	112.1	229.9	123.4	230.9	100.5	231.9
121.6	229.4	114.3	229.9	123.5	231.1	105.3	231.2
122.3	230.3	114.7	229.6	124.5	231.1	108.1	230.2
123.8	231.2	116.6	229.4	125.6	231.7	110.3	230.4
129.9	233.0	118.2	229.1	126.7	232.5	110.8	229.9
132.7	233.4	119.5	229.0	128.5	233.4	113.2	229.5
		119.7	228.8	129.6	233.4	115.2	229.0
		121.7	228.7	129.9	233.3	117.0	228.4
		122.4	229.7	132.8	233.6	118.8	228.4
		122.5	230.0	137.2	233.8	121.0	229.0
		123.3	230.5			123.2	229.8
		123.7	230.9			125.0	230.8
		128.2	232.9			128.4	232.7
		136.4	233.9			130.3	233.4
						134.0	233.6
						137.1	233.9
						155.0	234.6

Photo of Cross-Section SR1-4 - Looking Downstream @ STA 12+00

	2005	2004	2003	AS-BUILT	2006
Area	53.4	43.8	69.3	57.9	54.5
Width	49.7	45.1	47.4	46.5	52.8
Mean Depth	1.1	1.0	1.5	1.2	1
Max Depth	3.8	3.7	4.1	3.8	3.9
W/D	46.3	46.4	32.4	37.3	NA

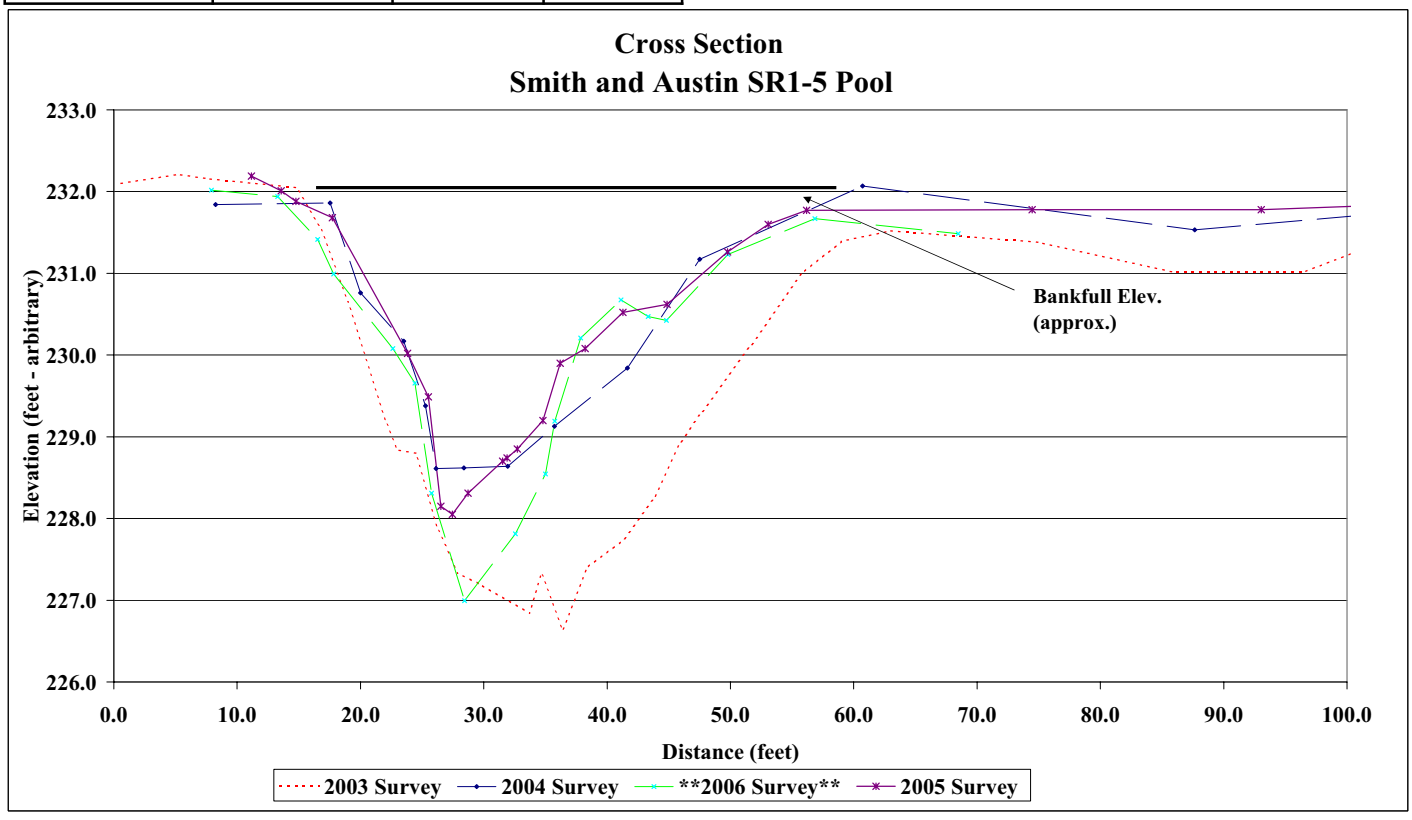


Project Name	Smith and Austin
Cross Section	SR1-5
Feature	Pool
Date	9/18/06
Crew	Lewis, Jeffers

2006 **2006 Survey**		2005 2005 Survey		2004 2004 Survey		2003 2003 Survey	
Station	**Elevation**	**Station**	**Elevation**	**Station**	**Elevation**	**Station**	**Elevation**
7.9	232.0	11.2	232.2	8.2	231.8	0.6	232.1
13.3	231.9	13.6	232.0	17.5	231.9	5.2	232.2
16.5	231.4	14.8	231.9	20.0	230.8	7.6	232.2
17.8	231.0	17.7	231.7	23.5	230.2	14.8	232.1
22.6	230.1	23.8	230.0	25.3	229.4	16.8	231.6
24.4	229.7	25.5	229.5	26.1	228.6	19.0	230.7
25.8	228.3	26.5	228.2	28.4	228.6	22.0	229.2
28.4	227.0	27.5	228.1	31.9	228.6	23.0	228.8
32.6	227.8	28.7	228.3	35.7	229.1	24.5	228.8
35.0	228.5	31.5	228.7	41.7	229.8	26.2	227.9
35.8	229.2	31.9	228.7	47.5	231.2	27.9	227.3
37.9	230.2	32.7	228.9	60.7	232.1	29.8	227.2
41.1	230.7	34.8	229.2	87.7	231.5	33.7	226.8
43.3	230.5	36.2	229.9	117.1	231.9	34.7	227.3
44.8	230.4	38.2	230.1	139.2	231.4	36.4	226.6
49.8	231.2	41.3	230.5			38.4	227.4
56.9	231.7	44.9	230.6			41.3	227.7
68.5	231.5	49.8	231.3			43.8	228.2
		53.1	231.6			45.9	228.9
		56.2	231.8			47.6	229.3
		74.5	231.8			51.7	230.1
		93.1	231.8			55.8	231.0
		120.5	231.9			59.0	231.4
		139.2	231.4			63.0	231.5
						75.0	231.4
						86.0	231.0
						96.6	231.0
						101.5	231.3
						113.0	231.7
						122.0	231.5
						135.0	231.2
						139.8	231.1
						153.5	231.4
						166.0	231.9
						172.0	232.0

Photo of Cross-Section SR1-5 - Looking Downstream @ STA 16+90

	2005	2004	2003	AS-BUILT	2006
Area	55.8	78.9	123.2	109.2	70.2
Width	41.4	43.2	44.2	41.8	41.9
Mean Depth	1.3	1.8	2.8	2.6	1.7
Max Depth	3.6	3.1	5.1	4.8	4.7
W/D	30.7	23.6	15.9	16.0	NA

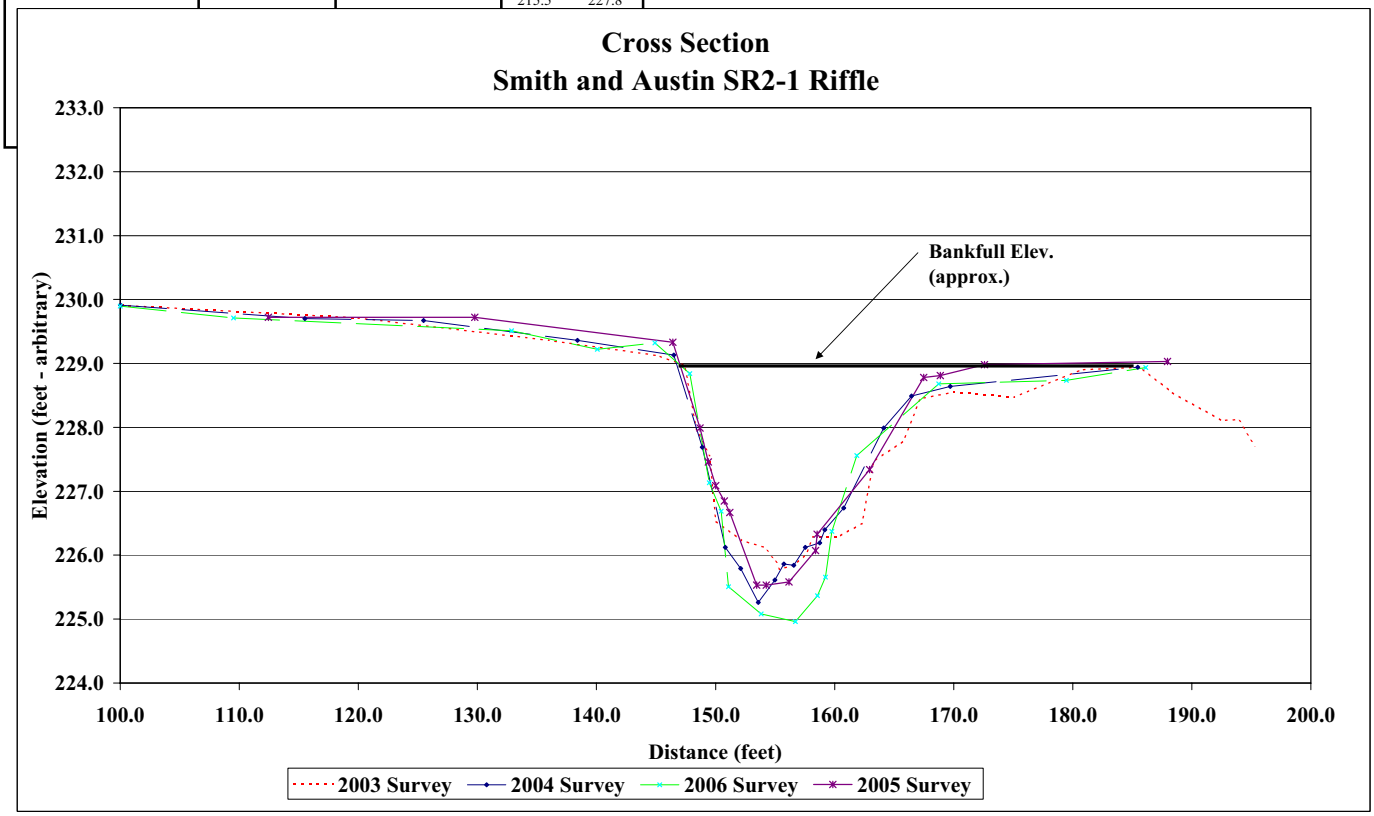


Project Name	Smith and Austin
Cross Section	SR2-1
Feature	Riffle
Date	9/18/06
Crew	Lewis, Jeffers

2006 Survey		2005 Survey		2004 Survey		2003 Survey	
Station	**Elevation**	**Station**	**Elevation**	**Station**	**Elevation**	**Station**	**Elevation**
100.0	229.9	112.4	229.7	100.0	229.9	0.0	232.3
109.5	229.7	129.8	229.7	115.5	229.7	11.0	232.0
132.9	229.5	146.4	229.3	125.5	229.7	20.0	231.2
140.1	229.2	148.7	228.0	138.4	229.4	22.8	231.1
144.9	229.3	149.4	227.5	146.5	229.1	39.0	231.4
147.8	228.8	150.0	227.1	148.9	227.7	50.0	231.2
149.5	227.1	150.8	226.9	150.8	226.1	60.4	231.2
150.5	226.7	151.2	226.7	152.1	225.8	69.0	231.2
151.1	225.5	153.5	225.5	153.6	225.3	79.0	230.8
153.8	225.1	154.3	225.5	155.0	225.6	89.0	230.4
156.7	225.0	156.2	225.6	155.7	225.9	97.0	230.1
158.6	225.4	158.4	226.1	156.6	225.8	99.8	229.9
159.2	225.7	158.5	226.3	157.6	226.1	120.0	229.7
159.8	226.4	162.9	227.3	158.8	226.2	136.0	229.4
161.9	227.6	167.5	228.8	159.2	226.4	145.2	229.1
168.8	228.7	168.9	228.8	160.8	226.7	147.4	229.0
179.5	228.7	172.6	229.0	164.1	228.0	148.4	228.0
186.1	228.9	188.0	229.0	166.5	228.5	149.5	227.6
				169.7	228.6	150.0	226.5
				185.5	228.9	152.2	226.2
						154.1	226.1
						155.0	225.9
						155.4	225.8
						156.6	225.8
						157.6	226.0
						158.2	226.3
						160.3	226.3
						162.3	226.5
						163.3	227.5
						165.8	227.8
						167.2	228.5
						170.0	228.6
						175.1	228.5
						180.7	228.9
						185.7	228.9
						188.3	228.6
						192.5	228.1
						193.9	228.1
						195.3	227.7
						198.3	227.9
						204.8	228.3
						212.8	227.9
						215.5	227.8

Photo of Cross-Section SR2-1 - Looking Downstream @ STA 24+30

	2005	2004	2003	AS-BUILT	2006
Area	51.3	44.9	45.9	46.5	41.8
Width	20.2	20.0	20.2	33.2	20.8
Mean Depth	2.5	2.2	2.3	1.4	2
Max Depth	3.6	3.9	3.3	3.1	3.7
W/D	7.9	8.9	8.9	23.7	10.3

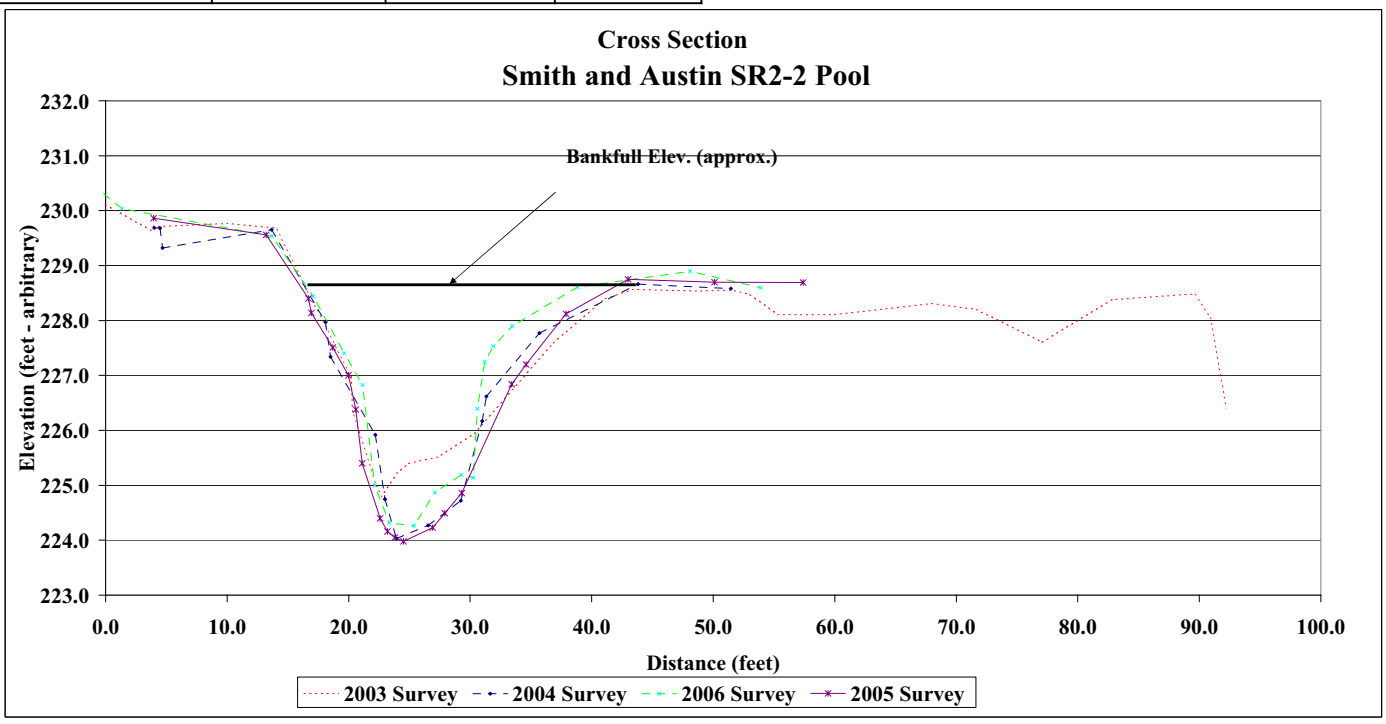


Project Name	Smith and Austin
Cross Section	SR2-2
Feature	Pool
Date	9/18/05
Crew	Lewis, Jeffers

2006 Survey		2005 Survey		2004 Survey		2003 Survey	
Station	**Elevation**	**Station**	**Elevation**	**Station**	**Elevation**	**Station**	**Elevation**
-9.2	231.2	4.0	229.9	4.0	229.7	0.0	230.1
-3.6	230.9	13.2	229.6	4.5	229.7	3.7	229.6
1.4	230.0	16.7	228.4	4.7	229.3	4.0	229.7
13.7	229.5	16.9	228.1	13.7	229.7	10.0	229.8
17.1	228.4	18.7	227.5	18.1	228.0	14.0	229.7
19.6	227.4	20.0	227.0	18.5	227.3	17.2	228.3
21.1	226.8	20.6	226.4	22.2	225.9	20.2	227.0
22.1	225.0	21.1	225.4	23.0	224.8	20.3	226.4
23.3	224.3	22.6	224.4	23.9	224.0	22.3	225.0
25.4	224.3	23.2	224.2	26.5	224.3	22.7	224.8
27.1	224.9	23.8	224.1	29.2	224.7	24.0	225.2
29.3	225.2	24.5	224.0	31.0	226.2	24.9	225.4
30.3	225.1	26.9	224.2	31.3	226.6	27.5	225.5
30.6	226.4	27.9	224.5	35.7	227.8	30.3	225.9
31.2	227.2	29.3	224.9	43.8	228.7	36.9	227.6
31.9	227.5	33.4	226.8	51.4	228.6	41.0	228.4
33.5	227.9	34.6	227.2			43.4	228.6
38.8	228.6	37.9	228.1			48.8	228.5
48.1	228.9	43.0	228.8			51.5	228.6
53.9	228.6	50.1	228.7			53.0	228.5
		57.4	228.7			55.3	228.1
						60.0	228.1
						68.0	228.3
						71.7	228.2
						77.1	227.6
						82.8	228.4
						89.6	228.5
						90.9	228.1
						92.2	226.4
						99.4	226.2
						101.8	226.1
						103.1	228.1
						104.4	228.4
						107.4	228.9

Photo of Cross-Section SR2-2 - Looking Downstream @ STA 24+87

	2005	2004	2003	AS-BUILT	2006
Area	64.5	60.8	59.2	48.5	44.6
Width	26.1	25.7	26.2	26.9	22.3
Mean Depth	2.5	2.4	2.3	1.8	2
Max Depth	4.6	4.6	3.8	3.8	4.3
W/D	10.5	10.9	11.6	14.9	NA

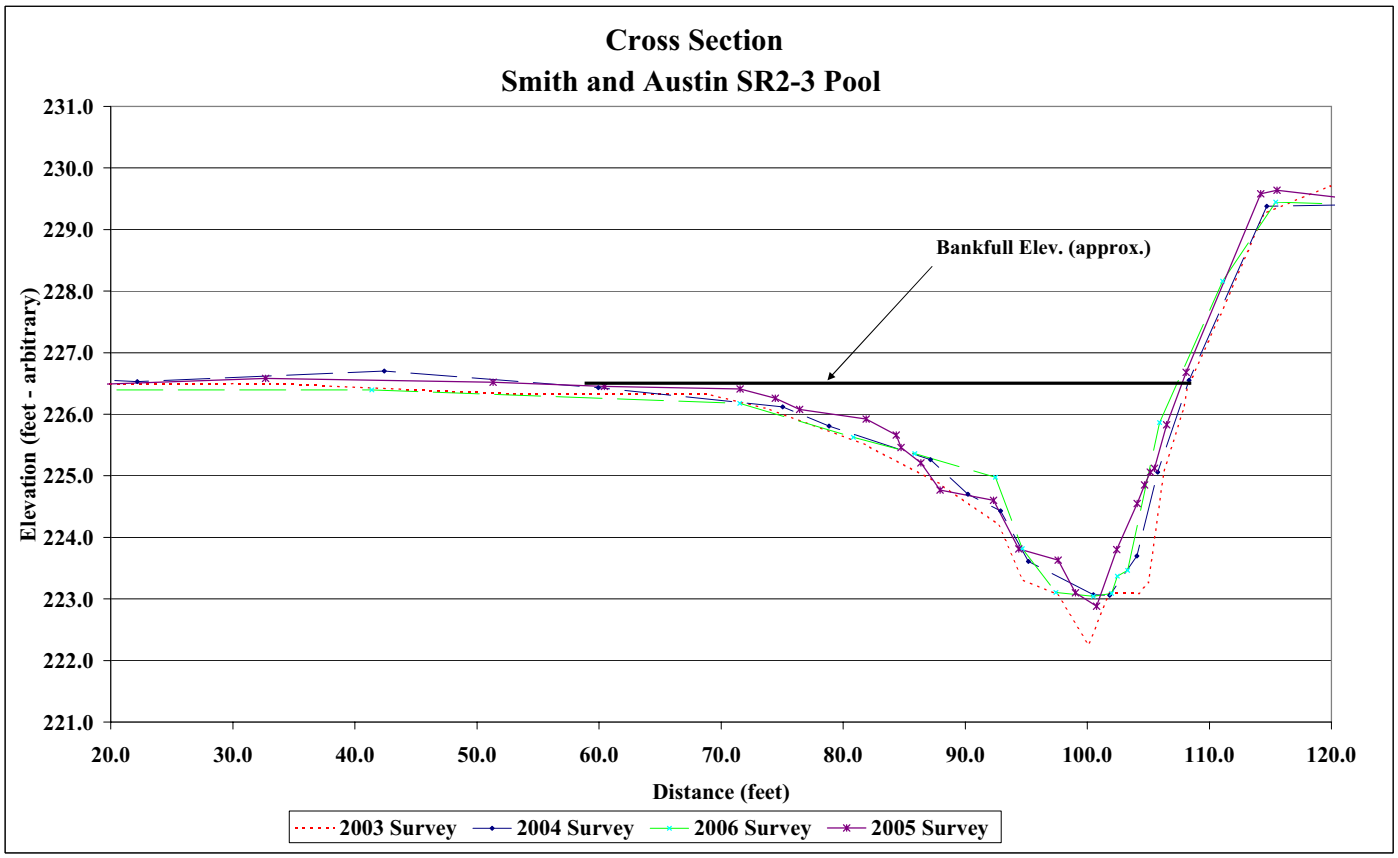


Project Name	Smith and Austin
Cross Section	SR2-3
Feature	Pool
Date	9/18/06
Crew	Lewis, Jeffers

2006 Survey		2005 Survey		2004 Survey		2003 Survey	
Station	**Elevation**	**Station**	**Elevation**	**Station**	**Elevation**	**Station**	**Elevation**
5.40	226.40	7.8	226.5	7.4	226.6	2.0	226.7
41.38	226.39	8.6	226.6	8.1	226.7	7.0	226.6
71.54	226.17	19.5	226.5	22.2	226.5	7.6	226.5
80.84	225.63	32.7	226.6	42.4	226.7	21.0	226.5
85.87	225.36	51.3	226.5	59.9	226.4	33.0	226.5
92.48	224.98	60.5	226.5	75.0	226.1	53.0	226.3
94.69	223.82	71.6	226.4	78.8	225.8	69.0	226.3
97.44	223.10	74.5	226.3	87.2	225.3	74.0	226.1
100.51	223.05	76.4	226.1	90.2	224.7	81.9	225.5
101.99	223.09	81.9	225.9	92.9	224.4	88.0	224.9
102.46	223.37	84.3	225.7	95.2	223.6	92.7	224.2
103.29	223.46	84.8	225.5	100.5	223.1	94.7	223.3
105.94	225.86	86.4	225.2	101.8	223.1	97.5	223.1
111.09	228.16	88.0	224.8	104.1	223.7	100.1	222.3
115.44	229.44	92.3	224.6	105.8	225.1	101.8	223.1
123.07	229.40	94.4	223.8	108.3	226.6	104.2	223.1
		97.6	223.6	114.7	229.4	105.0	223.3
		99.0	223.1	123.7	229.4	106.3	225.1
		100.8	222.9			107.9	226.1
		102.4	223.8			108.2	226.4
		104.1	224.6			110.9	227.6
		104.7	224.9			114.5	229.3
		105.2	225.1			119.9	229.7
		105.5	225.1			122.1	229.5
		106.5	225.8			123.5	229.4
		108.10	226.68				
		114.22	229.58				
		115.56	229.64				
		123.66	229.45				

Photo of Cross-Section SR2-3 - Looking Downstream @ STA 31+25

	2005	2004	2003	AS-BUILT	2006
Area	49.4	52.4	59.6	64.0	46.8
Width	35.1	36.3	37.7	39.1	38.7
Mean Depth	1.4	1.4	1.6	1.6	1.2
Max Depth	3.6	3.4	4.2	4.1	3.2
W/D	25.0	25.1	23.8	23.9	NA

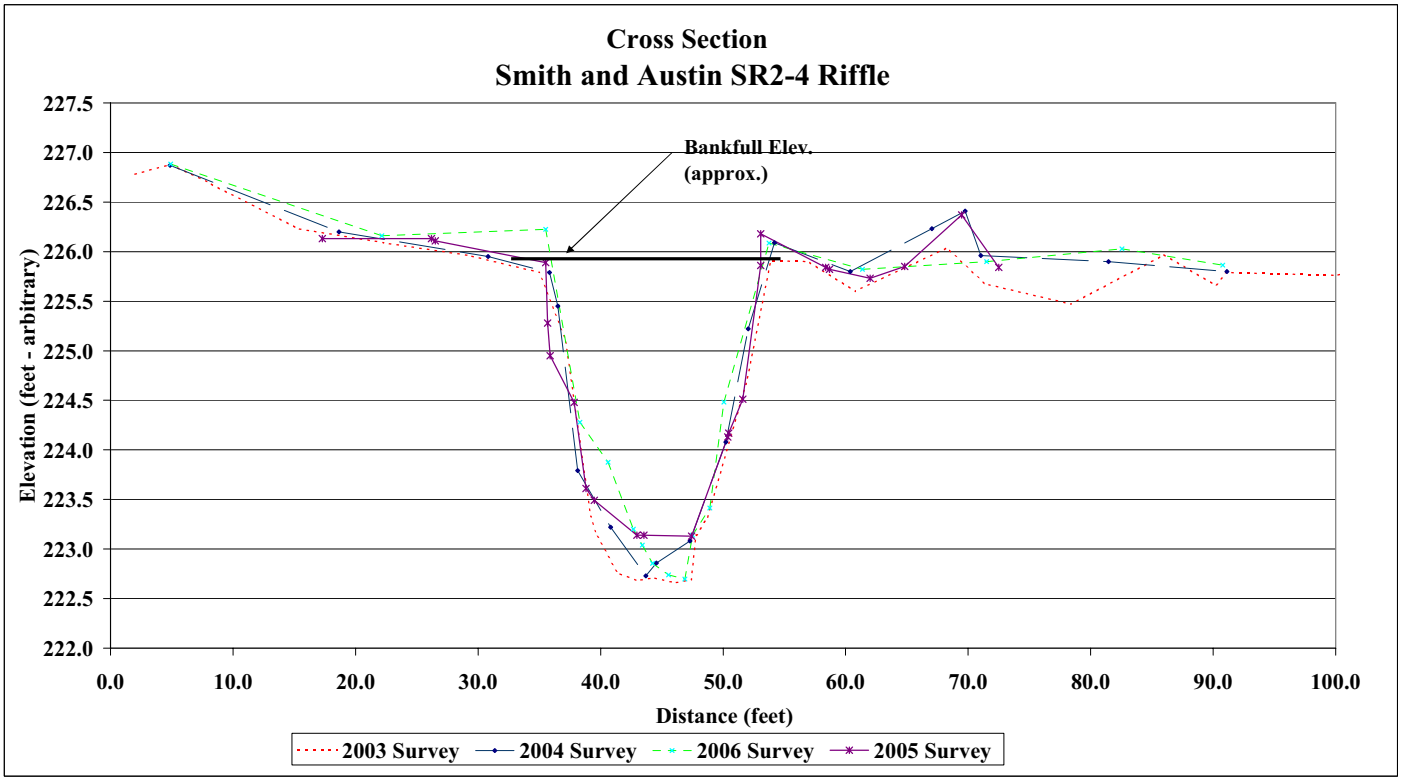


Project Name	Smith and Austin
Cross Section	SR2-4
Feature	Riffle
Date	9/18/06
Crew	Lewis, Jeffers

2006 2006 Survey		2005 2005 Survey		2004 2004 Survey		2003 2003 Survey	
Station	**Elevation**	**Station**	**Elevation**	**Station**	**Elevation**	**Station**	**Elevation**
4.9	226.9	17.3	226.1	4.9	226.9	2.0	226.8
22.1	226.2	26.2	226.1	18.6	226.2	4.9	226.9
35.5	226.2	26.5	226.1	30.8	226.0	8.0	226.7
38.3	224.3	35.5	225.9	35.8	225.8	15.3	226.2
40.6	223.9	35.7	225.3	36.5	225.5	22.3	226.1
42.7	223.2	35.9	225.0	38.1	223.8	29.3	226.0
43.4	223.0	37.9	224.5	40.8	223.2	35.0	225.8
44.2	222.9	38.8	223.6	43.7	222.7	37.1	225.1
45.5	222.7	39.5	223.5	44.6	222.9	39.2	223.3
46.9	222.7	43.0	223.1	47.3	223.1	39.7	223.1
47.5	223.1	43.5	223.1	50.2	224.1	41.4	222.8
48.9	223.4	47.4	223.1	52.1	225.2	43.0	222.7
50.1	224.5	50.4	224.1	54.2	226.1	44.3	222.7
53.8	226.1	50.5	224.2	60.4	225.8	46.1	222.7
61.4	225.8	51.6	224.5	67.0	226.2	47.4	222.7
71.5	225.9	53.1	225.9	69.8	226.4	47.8	223.1
82.6	226.0	53.1	226.2	71.0	226.0	48.7	223.3
90.8	225.9	58.4	225.8	81.5	225.9	51.9	224.7
		58.7	225.8	91.1	225.8	53.9	225.9
		62.0	225.7			57.0	225.9
		64.8	225.9			60.8	225.6
		69.5	226.4			68.3	226.0
		72.5	225.8			71.3	225.7
						78.4	225.5
						86.0	226.0
						90.2	225.7
						91.1	225.8
						100.1	225.8
						108.0	226.0
						113.6	226.3
						117.0	226.5
						118.6	228.2
						121.3	228.5
						124.6	228.1

Photo of Cross-Section SR2-4 - Looking Downstream @ STA 32+45

	2005	2004	2003	AS-BUILT	2006
Area	39.5	38.4	42.7	38.9	37.3
Width	17.6	18.4	18.9	18.7	18
Mean Depth	2.2	2.1	2.3	2.1	2.1
Max Depth	2.8	3.2	3.3	3.1	3.4
W/D	7.8	8.8	8.4	9.0	8.7

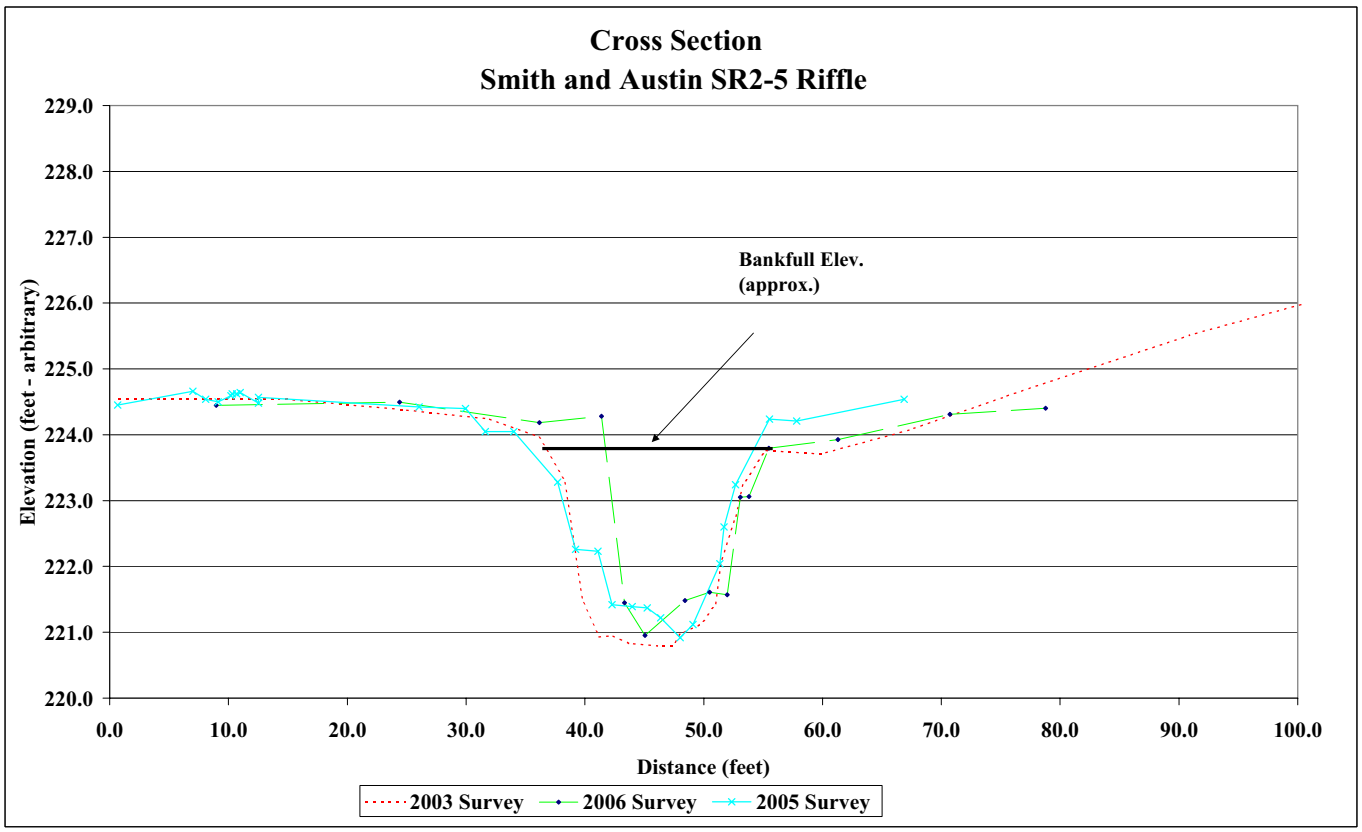


Project Name	Smith and Austin
Cross Section	SR2-5
Feature	Riffle
Date	9/18/06
Crew	Lewis, Jeffers

2006		2005		2004		2003	
2006 Survey		2005 Survey		2004 Survey		2003 Survey	
Station	**Elevation**	**Station**	**Elevation**	**Station**	**Elevation**	**Station**	**Elevation**
9.0	224.4	0.7	224.5			0.8	224.5
24.4	224.5	7.0	224.7			4.6	224.5
36.2	224.2	8.1	224.5			14.3	224.6
41.4	224.3	9.1	224.5			24.8	224.4
43.3	221.4	10.2	224.6			32.0	224.2
45.1	221.0	10.3	224.6			36.1	224.0
48.4	221.5	10.7	224.6			38.3	223.3
50.5	221.6	11.0	224.6			39.8	221.5
52.0	221.6	12.5	224.5			41.2	220.9
53.1	223.1	12.5	224.6			42.3	221.0
53.8	223.1	26.0	224.4			43.7	220.8
55.5	223.8	30.0	224.4			46.1	220.8
61.3	223.9	31.6	224.1			47.4	220.8
70.7	224.3	34.0	224.1			48.0	221.0
78.8	224.4	37.7	223.3			49.8	221.1
		39.2	222.3			51.0	221.4
		41.1	222.2			51.5	222.1
		42.3	221.4			52.7	222.8
		44.0	221.4			53.3	223.2
		45.2	221.4			55.2	223.8
		46.4	221.2			59.9	223.7
		48.0	220.9			67.5	224.1
		49.1	221.1			75.2	224.6
		51.4	222.0			90.9	225.5
		51.7	222.6			102.5	226.1
		52.7	223.2			111.6	227.3
		55.5	224.2			121.0	228.1
		57.8	224.2			125.9	228.3
		66.9	224.5			131.0	228.2

Photo of Cross-Section SR2-5 - Looking Downstream @ STA 39+20

	2005	2004	2003	AS-BUILT	2006
Area	31.4		35.8	37.2	25.8
Width	16.4		16.9	18.4	13.9
Mean Depth	1.9		2.1	2.0	1.9
Max Depth	2.8		3.0	3.0	2.8
W/D	8.6		8.0	9.1	7.4



APPENDIX C

CVS LEVELS 1 & 2 DATA FORMS

Plot Data: CVS Levels 1 & 2

General Information

Project Label: 343

Project Name: Smith/Austin

Team: Sarah / Mahan

Plot: 1

☐ Level 1 (planted stems only)
☑ Level 2 (planted and natural stems)

Start Date: Sept / 5 / 2006
e.g.: JAN / 15 / 2006

End Date (if different): NA

Party	Role**
Sarah	Plot Leader
Mahan	tech.

**Roles: Co-leader, Assistant, Guide, Land owner, Taxonomist, Other

Soil Drainage*

☐ Excessively drained
☐ Somewhat excessively drained
☑ Well drained
☐ Moderately well drained
☐ Somewhat poorly drained
☐ Poorly drained
☐ Very poorly drained

Water

Percent of Plot Submerged: 0 %

Mean Water Depth: NA cm

Location

General: Wake Forest

State: NC County: Wake

Quadrangle: Rolesville

Place Names: 1)

2) 3)

Land Owner:

GPS Receiver Location (m): x= 0 y= 0

Datum: ☑ NAD83/WGS84 ☐ NAD27

UTM Zone: if UTMs used

Lat: decimal deg. e.g. 35.16623: 35.953716 (or **UTM-N** meters e.g. 3962248)

Long: e.g. -125.12413: 78.50192 (or **UTM-E** e.g. 710524)

Coordinate Accuracy (m radius): e.g. 30: submeter

GPS File Name: smithaustin_veg

Site Characteristics

Elevation: ± ☐m ☐ft.

Slope (deg):

Aspect (deg):

Compass Type: ☑ magnetic ☐ true

Plot Placement

☑ Representative
☐ Random
☐ Stratified random
☐ Transect component
☐ Systematic (grid)
☐ Capture specific feature

Further details of placement can be mentioned in Plot Rationale.

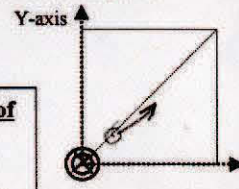
Taxonomic Standard Used for Plant Identification

Authority: RAB, **Publ. Date:** 1968

Plot Diagram

Fill in ***ONE*** of the templates below, using the key to draw GPS location, photos and posts. Edit shape if plot doesn't match one of the templates. Draw any landmarks, such as streams, banks, fences, etc.

Standard 10m x 10m (14.142m diagonal):



Non-standard 5m x 20m (20.616m diagonal):

Bearing of Plot X-Axis: 29°

●Posts (x,y) (meters)
(0, 0)
(0, 10)
(10, 10)
(10, 0)
(,)

Key

- ◎ Plot origin (0,0) point
- ⊗ GPS location point
- ○→ photo taken, with direction
- ● posts

Plot Size (ares, default=1): (An "are" is 100 m²): 1

○→ Photo Identifier(s):

Notes

If more space is needed, check the box and use back of datasheets.

Layout: (anything unusual about plot layout and shape) ☐ more...

Plot Location: (directions to plot, landscape content) ☐ more...

Plot Rationale: (why location was chosen for the plot) ☐ more...

Other Notes: (invasive species, erosion, disturbances, etc.) ☐ more...

Required Fields in Bold and Underlined. *Definitions and/or values are in the Definitions section of the CVS Field Guide.

Planted Woody Stem Data: CVS Levels 1 & 2

Leader: SWAB **Project:** Amat/Austin **Team:** Swab/Mahan **Plot:** 1 **Date:** 5 Sept 2006 Page 1 of 1

Species Name	Source	Coordinates X (m)	Coordinates Y (m)	ddh (mm)	Height (cm)	DBH (cm)	Vigor	Damage
Liriodendron tulipifera	unkn	0.5	2.0	20	140	0.4	3	plastic sleeve (removed)
Quercus michauxii	unkn	3.0	3.0	14	120	—	4	—
Ulmus sp.	unkn	4.7	1.3	11	80	—	2	plastic sleeve (removed)
Liriodendron tulipifera	unkn	7.9	4.7	13	90	—	2	—
Pinus taeda	unkn	2.5	7.5	37	150	0.5	4	—
Ulmus rubra	unkn	6.5	8.2	13	120	—	3	Flooding
Carya sp.	unkn	5.7	6.7	5	30	—	2	Anim
Myrica cerifera	unkn	9.0	5.7	11	120	—	4	—
Pinus taeda	unkn	8.4	4.5	12	70	—	2	nutrient lacking
Betula nigra	unkn	6.3	4.2	19	160	0.2	3	—
Pinus taeda	unkn	9.4	3.0	26	120	—	4	—

Source: Cultivated, Transplant, Live stake, Ball and Burlap, Pot, Bare Root

Vigor: 4=excellent, 3=good, 2=weak, 1=unlikely to survive year, 0=Dead, Missing.

Damage: Removal, Cut, Mowing, Beaver, Deer, Rodents, Insects, Game, Livestock, Other/Unknown Animal, Human Trampled, Site Too Wet, Site Too Dry, Flood, Drought, Storm, Hurricane, Diseased, Vine Strangulation, Unknown, specify other.

Natural Woody Stem Data: CVS Levels 2 & 3

Leader: SWAB **Project:** Smith/Austin **Team:** Sarah/Mahaley **Plot:** 1 **Date:** 5 / Sept / 2006 **Ares** (=100m²): 1 Page 1 of 1

Height Cut-Off for Stems (all stems shorter than this height are ignored and not tallied): ☑ 10cm ☐ 50cm ☐ 100cm ☐ 137cm

Species Name	☑ c	Mod*	Seedlings — Height Classes: Sub-Seed	10 cm-50 cm	50 cm-100 cm	100 cm-137 cm	Saplings — DBH: Sub-Sapl	0-1 cm	1-2.5 cm	Trees — DBH: 2.5-	5-	10-	15-	20-	25-	30-	35-	≥40 (write dbh)
Fraxinus pennsylvanica			___	•			___											
Betula nigra			___	• • • •	•		___											
Pinus taeda			___	• •	•		___											
			___				___											
			___				___											
			___				___											
			___				___											
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			___				___											
			___				___											

*Module is for Sampling Level 3.

Tally key: 1 2 3 4 5 6 7 8 9 10

Plot Data: CVS Levels 1 & 2

General Information

Project Label:

Project Name: Smith/Austin

Team: Swab/Faquin

Plot: 2

☐ Level 1 (planted stems only)
☐ Level 2 (planted and natural stems)

Start Date: Sept. / 5 / 2006
e.g.: JAN / 15 / 2006

End Date (if different): NA

Party	Role**
Swab	Plot Leader
Faquin	Guide

**Roles: Co-leader, Assistant, Guide, Land owner, Taxonomist, Other

Soil Drainage*

☐ Excessively drained
☐ Somewhat excessively drained
☑ Well drained
☐ Moderately well drained
☐ Somewhat poorly drained
☐ Poorly drained
☐ Very poorly drained

Water

Percent of Plot Submerged: 0 %

Mean Water Depth: NA cm

Location

General: Wake Forest

State: NC **County:** Wake

Quadrangle: Rolesville

Place Names: 1)

2) 3)

Land Owner:

GPS Receiver Location (m): x= 0 y= 0

Datum: ☑ NAD83/WGS84 ☐ NAD27

UTM Zone: if UTMs used

Lat: decimal deg. e.g. 35.16623: 35.95324 **(or UTM-N)** meters e.g. 3962248

Long: e.g. -125.12413: 78.50260 **(or UTM-E)** e.g. 710524

Coordinate Accuracy (m radius): e.g. 30: Submeter

GPS File Name: smithaustin_rec

Site Characteristics

Elevation: ± ☐m ☐ft.

Slope (deg):

Aspect (deg):

Compass Type: ☑ magnetic ☐ true

Plot Placement

☑ Representative
☐ Random
☐ Stratified random
☐ Transect component
☐ Systematic (grid)
☐ Capture specific feature

Further details of placement can be mentioned in Plot Rationale.

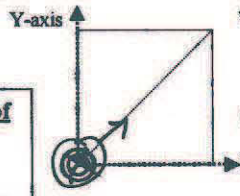
Taxonomic Standard Used for Plant Identification

Authority: RAB, **Publ. Date:** 1968

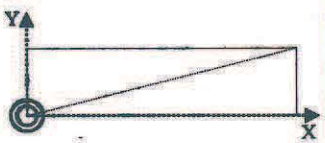
Plot Diagram

Fill in *ONE* of the templates below, using the key to draw GPS location, photos and posts. Edit shape if plot doesn't match one of the templates. Draw any landmarks, such as streams, banks, fences, etc.

Standard 10m x 10m (14.142m diagonal):



Non-standard 5m x 20m (20.616m diagonal):



Bearing of Plot X-Axis: 24°

Posts (x,y) (meters)
(0, 0)
(0, 10)
(10, 10)
(10, 0)
(,)

Key
- Plot origin (0,0) point
- GPS location point
- photo taken, with direction
- posts

Plot Size (ares, default=1): 1 (An "are" is 100 m²)

Photo Identifier(s):

Notes

If more space is needed, check the box and use back of datasheets.

Layout: (anything unusual about plot layout and shape) ☐ more...

Plot Location: (directions to plot, landscape content)

along soccer field - east side on westside of Smith Creek

☐ more...

Plot Rationale: (why location was chosen for the plot) ☐ more...

Other Notes: (invasive species, erosion, disturbances, etc.) ☐ more...

Required Fields in Bold and Underlined. *Definitions and/or values are in the Definitions section of the CVS Field Guide.

Planted Woody Stem Data: CVS Levels 1 & 2

Leader: Swab/Faquin **Project:** Smith/Austin **Team:** 1 **Plot:** 2 **Date:** Sept 15, 2006 Page 1 of 1

Species Name	Source	Coordinates X (m)	Coordinates Y (m)	ddh (mm)	Height (cm)	DBH (cm)	Vigor	Damage
Fraxinus pennsylvanica	unkn.	1.6	0.4	7	65	–	3	–
Fraxinus pennsylvanica	unkn.	2.2	1.5	11	120	–	4	–
Fraxinus pennsylvanica	unkn	0.7	3.7	4	40	–	3	–
Quercus lyrata	unkn.	2.1	3.7	10	110	–	4	–
Ulmus sp.	unkn.	0.9	5.0	3	60	–	2	Flood.
Fraxinus pennsylvanica	unkn.	3.3	4.8	7	70	–	3	
Quercus falcata	unkn.	4.9	4.5	5	60	–	2	plastic Mesh collar (removed)
Platanus occidentalis	unkn.	4.5	2.5	4	40	–	3	Resprout
Fraxinus pennsylvanica	unkn.	3.0	1.5	4	40	–	3	–
Fraxinus pennsylvanica	unkn.	5.0	1.5	6	70	–	3	–
Fraxinus pennsylvanica	unkn.	4.4	5.0	5	60	–	3	–
Fraxinus pennsylvanica	unkn.	3.0	7.0	8	75	–	4	–
Liriodendron tulipifera	unkn.	4.6	7.5	5	35	–	2	Resprout
Platanus occidentalis	unkn.	3.0	8.5	13	100	–	4	–
Fraxinus pennsylvanica	unkn.	1.0	9.4	4	25	–	3	–
Fraxinus pennsylvanica	unkn.	3.3	9.8	13	80	–	4	Insects
Acer negundo	unkn.	6.5	9.0	18	105	0.4	2	unknown.
Platanus occidentalis	unkn.	8.6	8.0	5	60	–	3	Resprout.
Fraxinus pennsylvanica	unkn.	8.5	7.3	11	100	–	3	–
Quercus falcata/pagoda	unkn.	8.3	4.3	6	65	–	2	Plastic mesh collar (removed)
Pinus taeda	unkn.	9.7	2.5	6	75	–	3	–
Ulmus sp.	unkn.	7.5	0.4	5	65	–	2	Flood

Source: Cultivated, Transplant, Live stake, Ball and Burlap, Pot, Bare Root

Vigor: 4=excellent, 3=good, 2=weak, 1=unlikely to survive year, 0=Dead, Missing.

Damage: Removal, Cut, Mowing, Beaver, Deer, Rodents, Insects, Game, Livestock, Other/Unknown Animal, Human Trampled, Site Too Wet, Site Too Dry, Flood, Drought, Storm, Hurricane, Diseased, Vine Strangulation, Unknown, specify other.

Natural Woody Stem Data: CVS Levels 2 & 3

Leader: Swab **Project:** Smith/Austin **Team:** 1 **Plot:** 2 **Date:** Sept 15 2006 **Ares (=100m²):** 1 Page 1 of 1

Height Cut-Off for Stems (all stems shorter than this height are ignored and not tallied): ☑ 10cm ☐ 50cm ☐ 100cm ☐ 137cm

Species Name	☑ c	Mod*	SEEDLINGS — HEIGHT CLASSES				SAPLINGS — DBH			TREES — DBH								
			Sub-Seed	10 cm-50 cm	50 cm-100 cm	100 cm-137 cm	Sub-Sapl	0-1 cm	1-2.5 cm	2.5-	5-	10-	15-	20-	25-	30-	35-	≥40 (write dbh)
Fraxinus pennsylvanica				••														

 *Module is for Sampling Level 3. 1 2 3 4 5 6 7 8 9 10 Form NWS23, ver 6.2

Plot Data: CVS Levels 1 & 2

General Information

Project Label:

Project Name: Smith/Austin

Team: 1

Plot: 3

☐ Level 1 (planted stems only)
☑ Level 2 (planted and natural stems)

Start Date: Sept / 5 / 2006
e.g.: JAN / 15 / 2006

End Date (if different): N/A

Party	Role**
Swab	Plot Leader
Faquin	Guide

**Roles: Co-leader, Assistant, Guide, Land owner, Taxonomist, Other

Soil Drainage*

☐ Excessively drained
☐ Somewhat excessively drained
☑ Well drained
☐ Moderately well drained
☐ Somewhat poorly drained
☐ Poorly drained
☐ Very poorly drained

Water

Percent of Plot Submerged: 0 %

Mean Water Depth: NA cm

Location

General: Wake Forest

State: NC **County:** Wake

Quadrangle: Rolesville

Place Names: 1)

2) 3)

Land Owner:

GPS Receiver Location (m): x= 0 y= 0

Datum: ☑ NAD83/WGS84 ☐ NAD27

UTM Zone: if UTMs used

Lat: decimal deg. e.g. 35.16623: 35.95287 (or **UTM-N** meters e.g. 3962248)

Long: e.g. -125.12413: 78.50299 (or **UTM-E** e.g. 710524)

Coordinate Accuracy (m radius): e.g. 30: submeter

GPS File Name: smithaustin_veg

Site Characteristics

Elevation: ± ☐m ☐ft.

Slope (deg):

Aspect (deg):

Compass Type: ☑ magnetic ☐ true

Plot Placement

☑ Representative
☐ Random
☐ Stratified random
☐ Transect component
☐ Systematic (grid)
☐ Capture specific feature

Further details of placement can be mentioned in Plot Rationale.

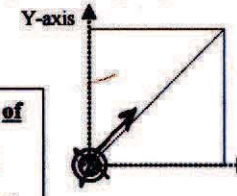
Taxonomic Standard Used for Plant Identification

Authority: RAB, **Publ. Date:** 1986

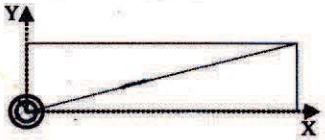
Plot Diagram

Fill in *ONE* of the templates below, using the key to draw GPS location, photos and posts. Edit shape if plot doesn't match one of the templates. Draw any landmarks, such as streams, banks, fences, etc.

Standard 10m x 10m (14.142m diagonal):



Non-standard 5m x 20m (20.616m diagonal):



Bearing of Plot X-Axis: 26°

Posts (x,y) (meters)
(0,0)
(0,10)
(10,10)
(10,0)
(,)

Key
- Plot origin (0,0) point
- GPS location point
- photo taken, with direction
- posts

Plot Size (ares, default=1): 1
(An "are" is 100 m²)

Photo Identifier(s):

Notes

If more space is needed, check the box and use back of datasheets.

Layout: (anything unusual about plot layout and shape) ☐ more...

Plot Location: (directions to plot, landscape content)

Along socer field - east side on west side of Smith Creek

☐ more...

Plot Rationale: (why location was chosen for the plot) ☐ more...

Other Notes: (invasive species, erosion, disturbances, etc.) ☐ more...

Required Fields in Bold and Underlined. *Definitions and/or values are in the Definitions section of the CVS Field Guide.

 Form PLT12, ver 6.2

Planted Woody Stem Data: CVS Levels 1 & 2

Leader: Swab **Project:** Smith/Austin **Team:** 1 **Plot:** 3 **Date:** Sept. 15 2006 **Page** 1 of 1

Species Name	Source	Coordinates X (m)	Coordinates Y (m)	ddh (mm)	Height (cm)	DBH (cm)	Vigor	Damage
Fraxinus pennsylvanica	unkn.	1.0	0.4	15	120	—	4	—
Pinus taeda	unkn.	0.0	1.7	24	150	0.6	4	—
Fraxinus pennsylvanica	unkn.	2.5	2.5	5	40	—	3	—
Fraxinus pennsylvanica	unkn.	2.5	2.5	5	50	—	4	—
Fraxinus pennsylvanica	unkn.	2.7	2.5	6	60	—	3	Insects
Betula nigra	unkn.	2.0	1.5	7	60	—	3	Insects
Betula nigra	unkn.	3.0	1.5	6	80	—	3	plastic mesh container (removed)
Fraxinus pennsylvanica	unkn.	3.6	1.6	7	60	—	3	Insects
Fraxinus pennsylvanica	unkn.	3.4	1.0	5	50	—	4	—
Cornus amomum	unkn.	4.0	1.1	3	40	—	3	—
Fraxinus pennsylvanica	unkn.	3.7	0.5	5	50	—	4	—
Pinus taeda	unkn.	1.5	5.7	29	135	—	4	—
Fraxinus pennsylvanica	unkn.	0.4	6.7	12	75	—	3	Insects
Fraxinus pennsylvanica	unkn.	1.9	9.8	6	70	—	4	Resprout
Fraxinus pennsylvanica	unkn.	8.7	6.8	13	80	—	3	Insects
Ulmus sp.	unkn.	4.8	8.0	5	60	—	3	Insects
Fraxinus pennsylvanica	unkn.	4.7	6.0	6	60	—	3	—
Fraxinus pennsylvanica	unkn.	6.3	8.4	13	110	—	4	—
Pinus taeda	unkn.	6.4	6.0	12	80	—	4	—
Quercus nigra	unkn	6.0	5.5	9	70	—	3	—
Pinus taeda	unkn	8.0	5.6	31	150	0.5	4	—
Quercus nigra	unkn	8.4	8.0	10	90	—	3	mesh collar
Alnus serrulata	unkn	9.5	9.0	15	150	0.3	4	—
Fraxinus pennsylvanica	unkn	6.4	0	6	70	—	4	—
Fraxinus pennsylvanica	unkn	7	1.8	9	50	—	3	—
Platanus occidentalis	unkn	8	2	9	90	—	3	—
Fraxinus pennsylvanica	unkn	9.8	2.0	11	80	—	3	insect damage
Fraxinus pennsylvanica	unkn	8.7	4.9	11	95	—	4	

Source: Cultivated, Transplant, Live stake, Ball and Burlap, Pot, Bare Root

Vigor: 4=excellent, 3=good, 2=weak, 1=unlikely to survive year, 0=Dead, Missing.

Damage: Removal, Cut, Mowing, Beaver, Deer, Rodents, Insects, Game, Livestock, Other/Unknown Animal, Human Trampled, Site Too Wet, Site Too Dry, Flood, Drought, Storm, Hurricane, Diseased, Vine Strangulation, Unknown, specify other.

Form PWS12, ver 6.3

Natural Woody Stem Data: CVS Levels 2 & 3

Leader: Swab **Project:** Smith/Austin **Team:** 1 **Plot:** 3 **Date:** Sept / 5 / 2006 **Ares** (=100m²): 1 **Page** 1 of 1

Height Cut-Off for Stems (all stems shorter than this height are ignored and not tallied): ☑ 10cm ☐ 50cm ☐ 100cm ☐ 137cm

Species Name	☑ c	Mod*	Seedlings — Height Classes: Sub-Seed	10 cm-50 cm	50 cm-100 cm	100 cm-137 cm	Saplings — DBH: Sub-Sapl	0-1 cm	1-2.5 cm	Trees — DBH: 2.5-	5-	10-	15-	20-	25-	30-	35-	≥40 (write dbh)
Platanus occidentalis				••														
Liquidambar styraciflua				••														
Fraxinus pennsylvanica				⊠⊠⊠	••													
Betula nigra				•														
Diospyros virginiana					•													
Ulmus rubra					•													
Pinus taeda				•														

*Module is for Sampling Level 3.

● 1 ⁘ 2 ⁘ 3 ⁘ 4 ⁘ 5 ⁘ 6 ⁘ 7 ⁘ 8 ⁘ 9 ⁘ 10

Plot Data: CVS Levels 1 & 2

General Information

Project Label: [illegible]

Project Name: Smith/Austin

Team: SWAB

Plot: 4

☐ Level 1 (planted stems only)
☑ Level 2 (planted and natural stems)

Start Date: Sept / 6 / 2006
e.g.: JAN / 15 / 2006

End Date (if different): NA

Party	Role**
SWAB	Plot Leader
Jeffers	tech

**Roles: Co-leader, Assistant, Guide, Land owner, Taxonomist, Other

Soil Drainage*

☐ Excessively drained
☐ Somewhat excessively drained
☑ Well drained
☐ Moderately well drained
☐ Somewhat poorly drained
☐ Poorly drained
☐ Very poorly drained

Water

Percent of Plot Submerged: 0 %

Mean Water Depth: NA cm

Location

General: Wake Forest

State: NC County: Wake

Quadrangle: Rolesville

Place Names: 1)

2) 3)

Land Owner:

GPS Receiver Location (m): x= 0 y= 0

Datum: ☑ NAD83/WGS84 ☐ NAD27

UTM Zone: if UTMs used

Lat: decimal deg. e.g. 35.16623: 35.95230 (or UTM-N) meters e.g. 3962248

Long: e.g. -125.12413: 78.50370 (or UTM-E) e.g. 710524

Coordinate Accuracy (m radius): e.g. 30: submeter

GPS File Name: smithaustin_veg

Site Characteristics

Elevation: ± ☐m ☐ft.

Slope (deg):

Aspect (deg):

Compass Type: ☑ magnetic, ☐ true

Plot Placement

☑ Representative
☐ Random
☐ Stratified random
☐ Transect component
☐ Systematic (grid)
☐ Capture specific feature

Further details of placement can be mentioned in Plot Rationale.

Taxonomic Standard Used for Plant Identification

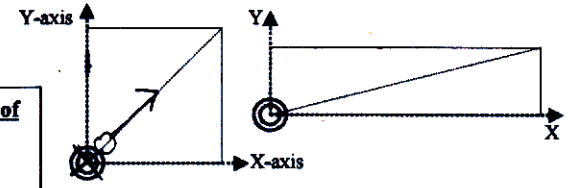
Authority: RAB, **Publ. Date:** 1968

Plot Diagram

Fill in *ONE* of the templates below, using the key to draw GPS location, photos and posts. Edit shape if plot doesn't match one of the templates. Draw any landmarks, such as streams, banks, fences, etc.

Standard 10m x 10m (14.142m diagonal):

Non-standard 5m x 20m (20.616m diagonal):



Bearing of Plot X-Axis: 326 °

Posts (x,y) (meters)
(0, 0)
(0, 10)
(10, 10)
(10, 0)
(,)

Key
- Plot origin (0,0) point
- GPS location point
- photo taken, with direction
- posts

Plot Size (ares, default=1): 1 (An "are" is 100 m²)

Photo Identifier(s): #9 (Corri's camera)

Notes

If more space is needed, check the box and use back of datasheets.

Layout: (anything unusual about plot layout and shape) ☐ more...

Plot Location: (directions to plot, landscape content) ☐ more...

Plot Rationale: (why location was chosen for the plot) ☐ more...

Other Notes: (invasive species, erosion, disturbances, etc.)

Lespedeza cuneata + recent flooding has flattened much of plot.
Mesh collars a serious detriment to tree health. Trees mostly prostrate

☐ more...

Planted Woody Stem Data: CVS Level 1 & 2

Leader: SWAB Project: Smith/Austin Team: Swab/Jeffcoat Plot: A Date: Sep 16 2006 Page 1 of 1

Species Name	Source	Coordinates X (m)	Coordinates Y (m)	ddh (mm)	Height (cm)	DBH (cm)	Vigor	Damage
Fraxinus pennsylvanica		0.1	0.1	10	70	—	3	—
Fraxinus pennsylvanica		0.5	4.1	6	50	—	3	—
Quercus nigra		2.3	4.5	4	70	—	3	—
Platanus occidentalis		3.0	4.5	5	70	—	2	Ins
Fraxinus pennsylvanica		2.5	2.5	7	90	—	3	—
Platanus occidentalis		2.3	0.5	6	100	—	3	—
Nyssa sp.		4.6	3.0	12	50	—	3	resprout
Fraxinum pennsylvanica		3.5	8.8	7	50	—	3	—
Nyssa sp		1.4	9.7	6	70	—	2	Mesh Collar
Myrica cerifera		1.3	9.9	17	150	0.3	4	—
Betula nigra		5.8	0.3	21	180	0.4	4	—
Fraxinus pennsylvanica		6.2	3.0	11	90	—	4	—
Pinus Taeda		5.5	4.5	22	140	0.5	4	—
Betula nigra		9	8.4	21	220	0.8	4	—
Quercus michauxii		9.4	4.6	6	80	—	3	Mesh Collar
Liriodendron tulipifera		5.8	9.2	7	60	—	2	die back
Fraxinus pennsylvanica		5.3	9.4	7	90	—	3	—
Nyssa sp.		9.1	9.7	5	30	—	2	Mesh Collar
Platanus occidentalis		9.9	9.3	8	90	—	3	Ins
Betula nigra		9.5	8.0	15	190	0.5	4	—
Quercus nigra		9.5	5.3	10	100	—	3	—

Source: Cultivated, Transplant, Live stake, Ball and Burlap, Pot, Bare Root

Vigor: 4=excellent, 3=good, 2=weak, 1=unlikely to survive year, 0=Dead, Missing.

Damage: Removal, Cut, Mowing, Beaver, Deer, Rodents, Insects, Game, Livestock, Other/Unknown Animal, Human Trampled, Site Too Wet, Site Too Dry, Flood, Drought, Storm, Hurricane, Diseased, Vine Strangulation, Unknown, specify other.

Natural Woody Stem Data: CVS Levels 2 & 3

Leader: SW[illegible] **Project:** Smith/Austin **Team:** Swan, Jeffers **Plot:** 4 **Date:** Sep 1:6 / 2006 **Ares** (=100m²): 1 **Page** 1 **of** 1

Height Cut-Off for Stems (all stems shorter than this height are ignored and not tallied): ☑ 10cm ☐ 50cm ☐ 100cm ☐ 137cm

Species Name	☑ c	Mod*	SEEDLINGS — HEIGHT CLASSES Sub-Seed	10 cm-50 cm	50 cm-100 cm	100 cm-137 cm	SAPLINGS — DBH Sub-Sapl	0-1 cm	1-2.5 cm	TREES — DBH 2.5-	5-	10-	15-	20-	25-	30-	35-	≥40 (write dbh)
Liquidambar styraciflua			—	•	•		—											
Fraxinus pennsylvanica			—	⊠ ⊠ ⊠	⁘		—											
Fraxinus pennsylvanica			—	[illegible]			—											
			—				—											
Platanus occidentalis			—	[illegible]	•		—											
			—				—											
Acer rubrum			—	•		[illegible]	—											
			—				—											
Juniperus virginiana			—	•			—											
			—				—											
Pinus taeda			—	•			—											
			—				—											
Betula nigra			—	•	•		—											
Cornus amomum			—		•		—											
Baccharis halimifolia			—			•	—											
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			—				—											

*Module is for Sampling Level 3.

1 2 3 4 5 6 7 8 9 10

Plot Data: CVS Levels 1 & 2

General Information

Project Label: 343

Project Name: Smith/Austin

Team: 2

Plot: 5

☐ Level 1 (planted stems only)
☑ Level 2 (planted and natural stems)

Start Date: Sept / 6 / 2006
e.g.: JAN / 15 / 2006

End Date (if different): NA

Party	Role**
Fagin	Plot Leader
Mahan	tech

**Roles: Co-leader, Assistant, Guide, Land owner, Taxonomist, Other

Soil Drainage*

☐ Excessively drained
☐ Somewhat excessively drained
☑ Well drained
☐ Moderately well drained
☐ Somewhat poorly drained
☐ Poorly drained
☐ Very poorly drained

Water

Percent of Plot Submerged: 0 %

Mean Water Depth: NA cm

Location

General: Wake Forest

State: NC **County:** Wake

Quadrangle: Rolesville

Place Names: 1)

2) 3)

Land Owner:

GPS Receiver Location (m): x= 0 y= 0

Datum: ☑ NAD83/WGS84 ☐ NAD27

UTM Zone: if UTMs used

Lat: decimal deg. e.g. 35.16623: 35,95168 **(or UTM-N)** meters e.g. 3962248

Long: e.g. -125.12413: 78,50390 **(or UTM-E)** e.g. 710524

Coordinate Accuracy (m radius): e.g. 30: submeter

GPS File Name: smithaustin_veg

Site Characteristics

Elevation: ± ☐m ☐ft.

Slope (deg):

Aspect (deg):

Compass Type: ☑ magnetic ☐ true

Plot Placement

☑ Representative
☐ Random
☐ Stratified random
☐ Transect component
☐ Systematic (grid)
☐ Capture specific feature

Further details of placement can be mentioned in Plot Rationale.

Taxonomic Standard Used for Plant Identification

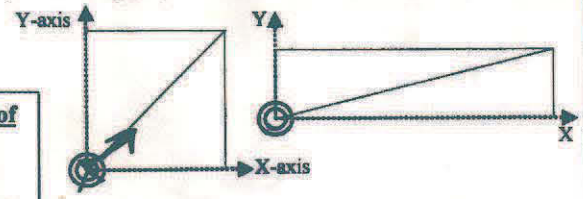
Authority: RAB, **Publ. Date:** 1968

Plot Diagram

Fill in *ONE* of the templates below, using the key to draw GPS location, photos and posts. Edit shape if plot doesn't match one of the templates. Draw any landmarks, such as streams, banks, fences, etc.

Standard 10m x 10m (14.142m diagonal):

Non-standard 5m x 20m (20.616m diagonal):



Bearing of Plot X-Axis: 353 °

Posts (x,y) (meters)
(0,0)
(0,10)
(10,10)
(10,0)
(,)

Key
- Plot origin (0,0) point
- GPS location point
- photo taken, with direction
- posts

Plot Size (ares, default=1): 1
(An "are" is 100 m²)

Photo Identifier(s):

Notes

If more space is needed, check the box and use back of datasheets.

Layout: (anything unusual about plot layout and shape) ☐ more...

Plot Location: (directions to plot, landscape content)

east side of soccer fields
west side of Smith creek.

☐ more...

Plot Rationale: (why location was chosen for the plot) ☐ more...

Other Notes: (invasive species, erosion, disturbances, etc.) ☐ more...

Required Fields in Bold and Underlined. *Definitions and/or values are in the Definitions section of the CVS Field Guide.

Planted Woody Stem Data: CVS Levels 1 & 2

Leader: Fagan **Project:** Smith/Austin **Team:** 2 **Plot:** 5 **Date:** Sept 16 2006

Species Name	Source	Coordinates X (m)	Coordinates Y (m)	ddh (mm)	Height (cm)	DBH (cm)	Vigor	Damage
Pinus taeda	unkn.	0.0	1.1	29	151	0.8	4	—
Pinus taeda	unkn	3.9	1.8	50	212	3.0	4	—
Fraxinus pennsylvanica	unkn	4.6	1.8	7	72	—	3	Insects
Fraxinus pennsylvanica	unkn.	1.1	5.6	5	51	—	3	Insects
Pinus taeda	unkn	1.4	5.9	13	91	—	4	—
Platanus occidentalis	unkn.	2.4	9.8	20	194	1.0	4	Insects
Acer negundo	unkn.	2.5	8.1	4	65	—	4	—
Fraxinus pennsylvanica	unkn	3.1	9.9	9	118	—	4	Insects
Fraxinus pennsylvanica	unkn.	3.1	8.9	9	92	—	4	Insects
Fraxinus pennsylvanica	unkn.	3.5	8.5	16	154	0.5	4	Insects
Cornus amomum	unkn.	3.1	8.5	11	62	—	3	Overtopping
Fraxinus pennsylvanica	unkn.	3.3	7.1	10	99	—	4	—
Fraxinus pennsylvanica	unkn.	3.2	7.7	16	173	0.5	4	Insects
Fraxinus pennsylvanica	unkn	3.5	6.2	7	88	—	3	Insects
Fraxinus pennsylvanica	unkn.	4.8	7.4	10	98	—	4	—
Fraxinus pennsylvanica	unkn.	4.0	7.4	9	95	—	4	Insects
Fraxinus pennsylvanica	unkn.	4.2	7.9	9	105	—	4	Insects
Fraxinus pennsylvanica	unkn.	3.8	7.9	12	115	—	4	—
Fraxinus pennsylvanica	unkn.	4.9	8.0	4	66	—	2	Flood
Fraxinus pennsylvanica	unkn.	3.7	8.4	12	110	—	4	Insects
Fraxinus pennsylvanica	unkn.	3.8	9.0	8	60	—	2	Resprout
Fraxinus pennsylvanica	unkn.	3.0	9.2	7	59	—	4	—
Fraxinus pennsylvanica	unkn.	3.8	9.6	13	111	—	3	Insects
Fraxinus pennsylvanica	unkn.	3.5	9.7	9	110	—	3	Insects
Fraxinus pennsylvanica	unkn.	5.4	9.1	10	71	—	4	Insects
Fraxinus pennsylvanica	unkn.	5.7	8.9	13	70	—	3	Insects/Browse
Quercus lyrata	unkn.	5.5	7.5	22	190	0.9	4	—
Fraxinus pennsylvanica	unkn.	5.5	6.3	4	52	—	4	—
Fraxinus pennsylvanica	unkn.	7.0	5.5	5	43	—	3	Insects/Browse
Acer negundo	unkn.	7.9	6.6	6	53	—	4	—
Fraxinus pennsylvanica	unkn.	7.4	8.7	12	85	—	4	Insects
Fraxinus pennsylvanica	unkn.	7.2	9.7	10	63	—	4	—
Fraxinus pennsylvanica	unkn.	8.2	9.2	7	70	—	4	Insects
Pinus taeda	unkn.	9.7	5.2	34	201	1.9	4	—

Source: Cultivated, Transplant, Live stake, Ball and Burlap, Pot, Bare Root

Vigor: 4=excellent, 3=good, 2=weak, 1=unlikely to survive year, 0=Dead, Missing.

↓ continue to page 2

Damage: Removal, Cut, Mowing, Beaver, Deer, Rodents, Insects, Game, Livestock, Other/Unknown Animal, Human Trampled, Site Too Wet, Site Too Dry, Flood, Drought, Storm, Hurricane, Diseased, Vine Strangulation, Unknown, specify other.

Planted Woody Stem Data: CVS Levels 1 & 2

Leader: Faquin **Project:** Smith/Austin **Team:** 2 **Plot:** 5 (cont'd) **Date:** Sept 16 2006

Species Name	Source	Coordinates X (m)	Coordinates Y (m)	ddh (mm)	Height (cm)	DBH (cm)	Vigor	Damage
Pinus taeda	unkn.	9.4	7.2	16	143	0.7	4	-
Fraxinus pennsylvanica	unkn.	9.4	7.8	8	91	—	4	Insects
Fraxinus pennsylvanica	unkn.	9.4	9.5	6	53	—	4	—
Platanus occidentalis	unkn	9.4	1.1	5	64	—	4	—
Pinus taeda	unkn.	8.5	0.6	35	139	0.9	4	—
Quercus pagoda	unkn.	8.3	0.4	9	103	—	4	—
Pinus taeda	unkn	8.1	0.0	14	103	—	4	—
Betula nigra	unkn.	7.0	2.6	11	120	—	4	—

Source: Cultivated, Transplant, Live stake, Ball and Burlap, Pot, Bare Root

Vigor: 4=excellent, 3=good, 2=weak, 1=unlikely to survive year, 0=Dead, Missing.

Damage: Removal, Cut, Mowing, Beaver, Deer, Rodents, Insects, Game, Livestock, Other/Unknown Animal, Human Trampled, Site Too Wet, Site Too Dry, Flood, Drought, Storm, Hurricane, Diseased, Vine Strangulation, Unknown, specify other.

Natural Woody Stem Data: CVS Levels 2 & 3

Leader: Fagan **Project:** Smith/Austin **Team:** 2 **Plot:** 5 **Date:** Sept / 6 / 2006 **Ares (=100m²):** 1

Height Cut-Off for Stems (all stems shorter than this height are ignored and not tallied): ☑ 10cm ☐ 50cm ☐ 100cm ☐ 137cm

Species Name	☑ C	Mod*	Seedlings — Height Classes: Sub-Seed	10 cm-50 cm	50 cm-100 cm	100 cm-137 cm	Saplings — DBH: Sub-Sapl	0-1 cm	1-2.5 cm	Trees — DBH: 2.5-	5-	10-	15-	20-	25-	30-	35-	≥40 (write dbh)
Platanus occidentalis			—		•		—											
Pinus taeda			—	•	•		—											
Acer rubrum			—	•			—											
Fraxinus pennsylvanica			—	•	••		—											
Juniperus virginiana			—	•			—											
Acer negundo			—	••			—											
Rhus glabra			—		•		—											
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*Module is for Sampling Level 3.

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Plot Data: CVS Levels 1 & 2

General Information

Project Label: 343
Project Name: Smith/Austin
Team: 2
Plot: 6
☐ Level 1 (planted stems only)
☑ Level 2 (planted and natural stems)
Start Date: Sept / 6 / 2006
e.g.: JAN / 15 / 2006
End Date (if different): NA

Party	Role**
Faquin	Plot Leader
Mahan	tech

**Roles: Co-leader, Assistant, Guide, Land owner, Taxonomist, Other

Soil Drainage*

☐ Excessively drained
☐ Somewhat excessively drained
☑ Well drained
☐ Moderately well drained
☐ Somewhat poorly drained
☐ Poorly drained
☐ Very poorly drained

Water

Percent of Plot Submerged: 0 %
Mean Water Depth: NA cm

Location

General: Wake Forest
State: NC **County:** Wake
Quadrangle: Rolesville
Place Names: 1)
2) 3)
Land Owner:
GPS Receiver Location (m): x= 0 y= 0
Datum: ☑ NAD83/WGS84 ☐ NAD27
UTM Zone: if UTMs used
Lat: decimal deg. e.g. 35.16623 — 35.95105 — **(or UTM-N)** e.g. 39[illegible]
Long: e.g. -125.12413 — 78.50515 — **(or UTM-E)** e.g. 710524
Coordinate Accuracy (m radius): e.g. 30 — submeter
GPS File Name: smithaustin_reg

Site Characteristics

Elevation: ± ☐m ☐ft.
Slope (deg):
Aspect (deg):
Compass Type: ☑ Magnetic ☐ True

Plot Placement

☑ Representative
☐ Random
☐ Stratified random
☐ Transect component
☐ Systematic (grid)
☐ Capture specific feature

Further details of placement can be mentioned in Plot Rationale.

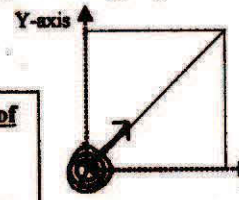
Taxonomic Standard Used for Plant Identification

Authority: RAB, **Publ. Date:** 1968

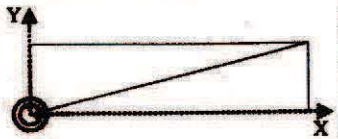
Plot Diagram

Fill in *ONE* of the templates below, using the key to draw GPS location, photos and posts. Edit shape if plot doesn't match one of the templates. Draw any landmarks, such as streams, banks, fences, etc.

Standard 10m x 10m (14.142m diagonal):



Non-standard 5m x 20m (20.616m diagonal):



Bearing of Plot X-Axis: 1 °

Posts (x,y) (meters)
(0, 0)
(0, 10)
(10, 10)
(10, 0)
(,)

Key
- Plot origin (0,0) point
- GPS location point
- photo taken, with direction
- posts

Plot Size (area, default=1): (An "are" is 100 m²) 1

Photo Identifier(s):

Notes

If more space is needed, check the box and use back of datasheets.

Layout: (anything unusual about plot layout and shape) ☐ more...

Plot Location: (directions to plot, landscape content)
east of soccer fields
west side of Smith creek
☐ more...

Plot Rationale: (why location was chosen for the plot) ☐ more...

Other Notes: (invasive species, erosion, disturbances, etc.) ☐ more...

Required Fields in Bold and Underlined. *Definitions and/or values are in the Definitions section of the CVS Field Guide.

Planted Woody Stem Data: CVS Levels 1 & 2

Leader: Faquin **Project:** Smith/Austin **Team:** 2 **Plot:** 6 **Date:** Sept / 6 / 2006

Species Name	Source	Coordinates X (m)	Coordinates Y (m)	ddh (mm)	Height (cm)	DBH (cm)	Vigor	Damage
Fraxinus pennsylvanica	unkn.	0.9	0.4	5	60	—	3	Insects
Fraxinus pennsylvanica	unkn.	0.9	0.0	9	63	—	4	—
Fraxinus pennsylvanica	unkn	0.7	1.1	13	101	—	3	Insects
Fraxinus pennsylvanica	unkn	1.3	1.9	11	115	—	3	Insects
Ulmus rubra	unkn	0.8	2.5	8	109	—	4	—
Fraxinus pennsylvanica	unkn.	1.5	2.7	8	105	—	3	Flood
Fraxinus pennsylvanica	unkn.	0.7	4.2	6	59	—	4	—
Fraxinus pennsylvanica	unkn	2.8	2.8	11	89	—	4	—
Fraxinus pennsylvanica	unkn	4.4	0.5	13	132	—	4	Resprout
Fraxinus pennsylvanica	unkn.	4.2	1.6	13	125	—	4	—
Fraxinus pennsylvanica	unkn.	5.0	4.6	9	105	—	4	—
Fraxinus pennsylvanica	unkn.	3.1	6.5	11	84	—	3	Insects
Fraxinus pennsylvanica	unkn	3.9	7.9	10	106	—	4	—
Fraxinus pennsylvanica	unkn.	5.0	7.7	24	166	0.5	4	—
Fraxinus pennsylvanica	unkn.	3.2	8.0	11	112	—	4	Insects
Fraxinus pennsylvanica	unkn.	3.5	8.3	12	129	—	4	—
Fraxinus pennsylvanica	unkn.	3.0	8.3	15	128	—	4	Insects
Fraxinus pennsylvanica	unkn.	4.5	9.9	5	69	—	2	Flood
Fraxinus pennsylvanica	unkn	1.4	9.8	20	140	0.4	4	—
Fraxinus pennsylvanica	unkn.	0.3	10.0	17	163	0.4	4	—
Fraxinus pennsylvanica	unkn.	0.8	8.3	18	121	—	4	—
Fraxinus pennsylvanica	unkn.	2.0	7.0	7	68	—	3	Browse/Insects
Fraxinus pennsylvanica	unkn.	2.2	6.4	10	88	—	4	Insects
Fraxinus pennsylvanica	unkn.	6.4	5.2	15	121	—	4	Insects
Platanus occidentalis	unkn.	5.3	8.7	38	287	2.0	4	Insects
Acer negundo	unkn.	6.7	8.4	11	128	—	3	Insects
Fraxinus pennsylvanica	unkn.	6.5	8.6	16	147	0.4	4	—
Acer negundo	unkn.	6.6	8.6	10	121	—	3	Insects
Diospyros virginiana	unkn.	5.6	8.6	10	130	—	3	Insects
Fraxinus pennsylvanica	unkn.	5.5	9.2	31	179	0.09	4	—
Fraxinus pennsylvanica	unkn.	8.6	9.3	17	148	0.41	4	—
Fraxinus pennsylvanica	unkn.	9.6	9.7	10	84	—	2	Browse, Resprout.
Fraxinus pennsylvanica	unkn.	9.9	9.8	11	93	—	3	Browse, Resprout
Quercus pagoda	unkn.	8.6	8.8	6	47	—	1	Unknown

Source: Cultivated, Transplant, Live stake, Ball and Burlap, Pot, Bare Root

Vigor: 4=excellent, 3=good, 2=weak, 1=unlikely to survive year, 0=Dead, Missing.

continue to page 2

Damage: Removal, Cut, Mowing, Beaver, Deer, Rodents, Insects, Game, Livestock, Other/Unknown Animal, Human Trampled, Site Too Wet, Site Too Dry, Flood, Drought, Storm, Hurricane, Diseased, Vine Strangulation, Unknown, specify other.

Planted Woody Stem Data: CVS Levels 1 & 2

Leader: Faquin **Project:** Smith/Austin **Team:** 2 **Plot:** 6 (cont'd) **Date:** Sept 16 2000

Species Name	Source	Coordinates X (m)	Coordinates Y (m)	ddh (mm)	Height (cm)	DBH (cm)	Vigor	Damage
Fraxinus pennsylvanica	unkn.	8.5	8.3	14	121	—	4	—
Fraxinus pennsylvanica	unkn.	8.7	7.5	17	160	0.7	4	—
Fraxinus pennsylvanica	unkn.	8.2	7.3	16	155	0.4	4	—
Fraxinus pennsylvanica	unkn.	7.5	8.4	12	113	—	3	Insects
Fraxinus pennsylvanica	unkn.	8.5	6.8	11	98	—	4	—
Fraxinus pennsylvanica	unkn.	9.6	7.3	17	142	0.5	4	—
Fraxinus pennsylvanica	unkn.	9.8	7.1	16	157	0.6	4	—
Fraxinus pennsylvanica	unkn.	9.4	6.8	15	140	0.6	4	—
Quercus pagoda	unkn.	8.5	5.8	14	122	—	4	Insects
Pinus taeda	unkn.	8.8	4.5	15	94	—	4	—
Fraxinus pennsylvanica	unkn.	9.7	4.1	14	51	—	3	Resprout
Fraxinus pennsylvanica	unkn.	9.7	1.4	8	40	—	3	Insects
Fraxinus pennsylvanica	unkn.	6.5	0.3	12	88	—	3	Insects
Fraxinus pennsylvanica	unkn.	5.7	1.1	17	121	—	4	—
Fraxinus pennsylvanica	unkn.	7.0	1.2	11	75	—	3	Insects/Browse
Fraxinus pennsylvanica	unkn.	6.3	1.9	6	49	—	3	Insects
Fraxinus pennsylvanica	unkn	5.8	1.6	8	75	—	3	Resprout
Fraxinus pennsylvanica	unkn.	5.7	2.0	14	54	—	4	Resprout.
Fraxinus pennsylvanica	unkn.	5.1	4.4	9	92	—	4	—
Fraxinus pennsylvanica	unkn.	6.3	4.8	16	119	—	3	Insects, Topheavy
Fraxinus pennsylvanica	unkn.	8.0	4.6	16	135	—	4	—

Source: Cultivated, Transplant, Live stake, Ball and Burlap, Pot, Bare Root

Vigor: 4=excellent, 3=good, 2=weak, 1=unlikely to survive year, 0=Dead, Missing.

Damage: Removal, Cut, Mowing, Beaver, Deer, Rodents, Insects, Game, Livestock, Other/Unknown Animal, Human Trampled, Site Too Wet, Site Too Dry, Flood, Drought, Storm, Hurricane, Diseased, Vine Strangulation, Unknown, specify other.

Natural Woody Stem Data: CVS Levels 2 & 3

Leader: Fagin **Project:** Smith/Austin **Team:** 2 **Plot:** 6 **Date:** Sept / 6 / 2006 **Area** (=100m²): 1 Page 1 of 1

Height Cut-Off for Stems (all stems shorter than this height are ignored and not tallied): ☑ 10cm ☐ 50cm ☐ 100cm ☐ 137cm

Species Name	☑ c	Mod*	Seedlings — Height Classes				Saplings — DBH			Trees — DBH								
			Sub-Seed	10 cm-50 cm	50 cm-100 cm	100 cm-137 cm	Sub-Sapl	0-1 cm	1-2.5 cm	2.5-	5-	10-	15-	20-	25-	30-	35-	≥40 (write dbh)
Fraxinus pennsylvanica				::	.													
Acer rubrum				:.														
Acer rubrum				::														

*Module is for Sampling Level 3.

● 1 ●● 2 ●●● 3 ●●●● 4 ●●●● 5 ●●●● 6 ●●●● 7 ●●●● 8 ●●●● 9 ●●●● 10

Plot Data: CVS Levels 1 & 2

General Information

Project Label: 343

Project Name: Smith/Austin

Team: SWAB

Plot: 7

☐ Level 1 (planted stems only)
☑ Level 2 (planted and natural stems)

Start Date: Sep / 06 / 2006
e.g.: JAN / 15 / 2006

End Date (if different): NA

Party	Role**
SWAB	Plot Leader
Jeffers	tech

**Roles: Co-leader, Assistant, Guide, Land owner, Taxonomist, Other

Soil Drainage*

☐ Excessively drained
☐ Somewhat excessively drained
☑ Well drained
☐ Moderately well drained
☐ Somewhat poorly drained
☐ Poorly drained
☐ Very poorly drained

Water

Percent of Plot Submerged: 0 %

Mean Water Depth: NA cm

Location

General: Wake Forest

State: NC **County:** Wake

Quadrangle: Rolesville

Place Names: 1)

2) 3)

Land Owner:

GPS Receiver Location (m): x= 0 y= 0

Datum: ☑ NAD83/WGS84 ☐ NAD27

UTM Zone: if UTMs used

Lat: decimal deg. e.g. 35.16623: 35.95284 (or **UTM-N** meters e.g. 3962248)

Long: e.g. -125.12413: 78.50550 (or **UTM-E** e.g. 710524)

Coordinate Accuracy (m radius): e.g. 30: submeter

GPS File Name: smithaustin-veg

Site Characteristics

Elevation: ± ☐m ☐ft.

Slope (deg):

Aspect (deg):

Compass Type: ☑ magnetic ☐ true

Plot Placement

☑ Representative
☐ Random
☐ Stratified random
☐ Transect component
☐ Systematic (grid)
☐ Capture specific feature

Further details of placement can be mentioned in Plot Rationale.

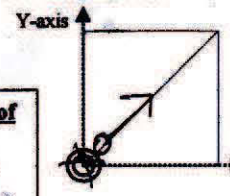
Taxonomic Standard Used for Plant Identification

Authority: RAB, **Publ. Date:** 1968

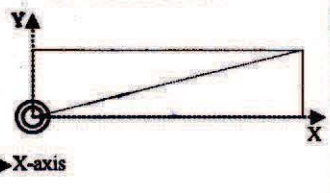
Plot Diagram

Fill in *ONE* of the templates below, using the key to draw GPS location, photos and posts. Edit shape if plot doesn't match one of the templates. Draw any landmarks, such as streams, banks, fences, etc.

Standard 10m x 10m (14.142m diagonal):



Non-standard 5m x 20m (20.616m diagonal):



Bearing of Plot X-Axis: 189°

Posts (x,y) (meters)
(0, 0)
(0, 10)
(10, 10)
(10, 0)
(,)

Key
- Plot origin (0,0) point
- GPS location point
- photo taken, with direction
- posts

Plot Size (ares, default=1): 1
(An "are" is 100 m²)

Photo Identifier(s): 10 (Carrie's cam)

Notes

If more space is needed, check the box and use back of datasheets.

Layout: (anything unusual about plot layout and shape) ☐ more...

Plot Location: (directions to plot, landscape content)

NW side of soccer field ☐ more...

Plot Rationale: (why location was chosen for the plot) ☐ more...

Other Notes: (invasive species, erosion, disturbances, etc.) ☐ more...

Required Fields in Bold and Underlined. *Definitions and/or values are in the Definitions section of the CVS Field Guide.

Planted Woody Stem Data: CVS Levels 1 & 2

Leader: SWAB Project: Smith/Austin Team: Swab/Jeffers Plot: 7 Date: Sep-10 6 /2006 Page 1 of 1

Species Name	Source	Coordinates X (m)	Coordinates Y (m)	ddh (mm)	Height (cm)	DBH (cm)	Vigor	Damage
Fraxinus pennsylvanica		0.2	2.1	5	80	–	3	–
Platanus occidentalis		0.3	3.0	18	130	–	3	–
Betula nigra		1.3	3.4	20	210	0.5	4	–
Platanus Occidentalis		3.5	0.8	12	110	–	3	–
Pinus Taeda		1.1	9.6	34	160	1.0	4	–
Fraxinus pennsylvanica		4.6	8.9	18	90	–	4	–
Platanus Occidentalis		3.9	6.9	9	100	–	3	–
Fraxinus pennsylvanica		5.7	6.1	9	80	–	3	–
Fraxinus pennsylvanica		6.5	5.9	12	100	–	4	–
Fraxinus pennsylvanica		6.9	7.2	11	60	–	4	–
Fraxinus pennsylvanica		7.3	3.6	6	90	–	4	–
Fraxinus pennsylvanica		6.9	4.1	11	111	–	4	–
Fraxinus pennsylvanica		6.7	4.7	9	110	–	4	–
Quercus michauxii		5.4	4.3	3	40	–	2	Resprout
Fraxinus pennsylvanic		7.4	2.5	15	100	–	4	Resprout
Betula nigra		8.5	3.0	13	160	0.3	4	–
Fraxinus pennsylvanica		9	2.4	12	60	–	3	Resprout

Source: Cultivated, Transplant, Live stake, Ball and Burlap, Pot, Bare Root

Vigor: 4=excellent, 3=good, 2=weak, 1=unlikely to survive year, 0=Dead, Missing.

Damage: Removal, Cut, Mowing, Beaver, Deer, Rodents, Insects, Game, Livestock, Other/Unknown Animal, Human Trampled, Site Too Wet, Site Too Dry, Flood, Drought, Storm, Hurricane, Diseased, Vine Strangulation, Unknown, specify other:

Natural Woody Stem Data: CVS Levels 2 & 3

Leader: SWAB **Project:** Smith/Austin **Team:** Swabel Steffes **Plot:** 7 **Date:** Sep 1 06 1 2006 **Ares** (=100m²): 1 Page 1 of 1

Height Cut-Off for Stems (all stems shorter than this height are ignored and not tallied): ☑ 10cm ☐ 50cm ☐ 100cm ☐ 137cm

Species Name	☑ C	Mod*	Seedlings — Height Classes: Sub-Seed	10 cm-50 cm	50 cm-100 cm	100 cm-137 cm	Saplings — DBH: Sub-Sapl	0-1 cm	1-2.5 cm	Trees — DBH: 2.5-	5-	10-	15-	20-	25-	30-	35-	≥40 (write dbh)
Fraxinus pennsylvanica				☒☒☒	☒													
Fraxinus pennsylvanica				☒☒														
Diospyros virginiana				•	•	•												
Pinus Taeda					•													
Salix Nigra					•													
Acer Negundo				•	•													
Pinus Taeda				•	•													

*Module is for Sampling Level 3.

• 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10

Form NWS23, ver 6.2

Plot Data: CVS Levels 1 & 2

General Information

Project Label: 343

Project Name: Smith Austin

Team: Swab/Mahan

Plot: 8

☐ Level 1 (planted stems only)
☑ Level 2 (planted and natural stems)

Start Date: Sep / 06 / 2006
e.g.: JAN / 15 / 2006

End Date (if different): NA

Party	Role**
Swab	Plot Leader
Mahan	tech

**Roles: Co-leader, Assistant, Guide, Land owner, Taxonomist, Other

Soil Drainage*

☐ Excessively drained
☐ Somewhat excessively drained
☑ Well drained
☐ Moderately well drained
☐ Somewhat poorly drained
☐ Poorly drained
☐ Very poorly drained

Water

Percent of Plot Submerged: 0 %

Mean Water Depth: NA cm

Location

General: Wake Forest

State: NC **County:** Wake

Quadrangle: Rolesville

Place Names: 1)

2) 3)

Land Owner:

GPS Receiver Location (m): x= 0 y= 0

Datum: ☑ NAD83/WGS84 ☐ NAD27

UTM Zone: if UTMs used

Lat: decimal deg. e.g. 35.16623: 35.95378 **(or UTM-N)** meters e.g. 3962248

Long: e.g. -125.12413: 78.50434 **(or UTM-E)** e.g. 710524

Coordinate Accuracy (m radius): e.g. 30: submeter

GPS File Name: smithaustin_veg

Site Characteristics

Elevation: ± ☐m ☐ft.

Slope (deg):

Aspect (deg):

Compass Type: ☑ magnetic ☐ true

Plot Placement

☑ Representative
☐ Random
☐ Stratified random
☐ Transect component
☐ Systematic (grid)
☐ Capture specific feature

Further details of placement can be mentioned in Plot Rationale.

Taxonomic Standard Used for Plant Identification

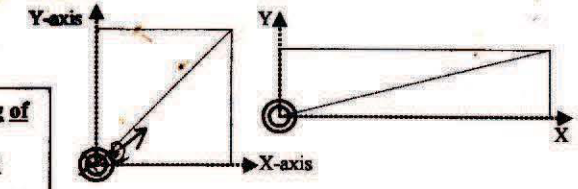
Authority: RAB, **Publ. Date:** 1968

Plot Di[redacted]

Fill [redacted] templates below, using the key to dra[redacted]n, photos and posts. Edit shape if plot [redacted] one of the templates. Draw any landmarks, [redacted] as streams, banks, fences, etc.

[redacted] 10m x 10m (diagonal):

Non-standard 5m x [redacted]m (20.616m diagonal):



Bearing of Plot X-Axis: 261°

Posts (x,y) (meters)
(0, 0)
(0, 10)
(10, 10)
(10, 0)
(,)

Key
- Plot origin (0,0) point
- GPS location point
- photo taken, with direction
- posts

Plot Size (ares, default=1): 1 (An "are" is 100 m²)

Photo Identifier(s): 11+12 Corri's camera

Notes

If more space is needed, check the box and use back of datasheets.

Layout: (anything unusual about plot layout and shape) ☐ more...

Plot Location: (directions to plot, landscape content) ☐ more...

Plot Rationale: (why location was chosen for the plot) ☐ more...

Other Notes: (invasive species, erosion, disturbances, etc.)

Tree with mesh collars mostly prostrate on ground + restricting growth — all removed

☐ more...

Required Fields in Bold and Underlined. *Definitions and/or values are in the Definitions section of the CVS Field Guide.

 Form PLT12, ver 6.2

Planted Woody Stem Data: CVS Levels 1 & 2

Leader: SWAB **Project:** Smith/Austin **Team:** Swab/mahaffey **Plot:** 8 **Date:** Sep 06 / 2006 Page 1 of 1

Species Name	Source	Coordinates X (m)	Coordinates Y (m)	ddh (mm)	Height (cm)	DBH (cm)	Vigor	Damage
Fraxinus Pennsylvanica	unkn	1.3	0.2	16	130	—	4	—
Fraxinus pennsylvanica	unkn	1.4	0.0	14	110	—	4	—
Fraxinus pennsylvanica	unkn	1.5	0.0	12	120	—	4	—
Fraxinus pennsylvanica	unkn	1.5	0.2	10	100	—	4	—
Fraxinus pennsylvanica	unkn	1.8	0.1	8	100	—	3	—
Fraxinus pennsylvanica	unkn	2.2	0.0	11	110	—	4	—
Fraxinus pennsylvanica	unkn	2.3	0.0	9	100	—	3	—
Fraxinus pennsylvanica	unkn	3.3	0.8	23	150	0.6	4	—
Fraxinus pennsylvanica	unkn	3.8	1.1	14	120	—	4	—
F. pennsylvanica	unkn	4.1	1.1	18	140	0.3	4	—
F. pennsylvanica	unkn	4.7	0.7	17	130	—	4	—
F. pennsylvanica	unkn	0.5	2.5	11	70	—	3	Ins, resprout
Quercus nigra	unkn	2.3	3.4	5	70	—	3	—
F. pennsylvanica	unkn	4.2	4.3	13	70	—	3	Deer
F. pennsylvanica	unkn	3.2	6.3	10	70	—	3	Dis
Platanus occidentalis	unkn	0	2.1	12	120	—	3	—
F. pennsylvanica	unkn	1.3	8.5	14	100	—	3	—
Platanus occidentalis	unkn	2.3	8.5	17	130	—	3	Ins
Ulmus sp.	unkn	4.3	9.7	5	60	—	2	unkn
Platanus occidentalis	unkn	5.5	3.8	7	70	—	2	mesh collar
Pinus taeda	unkn	9.5	8.8	23	90	—	4	—
F. pennsylvanica	unkn	9.9	4.8	13	50	—	3	Deer
F. pennsylvanica	unkn	8.8	3.9	15	110	—	4	—
Pinus taeda	unkn	5.6	4.9	15	100	—	4	—
F. pennsylvanica	unkn	5.8	2.9	11	100	—	3	mesh collar
F. pennsylvanica	unkn	3.6	3.5	15	120	—	4	—
Ulmus sp.	unkn	8.7	0.8	4	80	—	2	mesh collar
F. pennsylvanica	unkn	5.7	1.5	10	110	—	4	—
F. pennsylvanica	unkn	5.5	1.1	15	90	—	4	—

Source: Cultivated, Transplant, Live stake, Ball and Burlap, Pot, Bare Root

Vigor: 4=excellent, 3=good, 2=weak, 1=unlikely to survive year, 0=Dead, Missing.

Damage: Removal, Cut, Mowing, Beaver, Deer, Rodents, Insects, Game, Livestock, Other/Unknown Animal, Human Trampled, Site Too Wet, Site Too Dry, Flood, Drought, Storm, Hurricane, Diseased, Vine Strangulation, Unknown, specify other.

Natural Woody Stem Data: CVS Levels 2 & 3

Leader: SWAB **Project:** Smith/Austin **Team:** Swabb/Thomas **Plot:** 8 **Date:** Sep 06 2006 **Ares** (=100m²): 1 Page 1 of 1

Height Cut-Off for Stems (all stems shorter than this height are ignored and not tallied): ☑ 10cm ☐ 50cm ☐ 100cm ☐ 137cm

Species Name	☑ c	Mod*	Seedlings — Height Classes: Sub-Seed	10 cm-50 cm	50 cm-100 cm	100 cm-137 cm	Saplings — DBH: Sub-Sapl	0-1 cm	1-2.5 cm	Trees — DBH: 2.5-	5-	10-	15-	20-	25-	30-	35-	≥40 (write dbh)
Fraxinus pennsylvanica				1	3													
Liquidambar styraciflua					1													
Pinus taeda				1	1													
Carya cordiformis				1														
Liriodendron tulipifera					1													

*Module is for Sampling Level 3.

● 1 ⁘ 2 ⁘ 3 ⁘ 4 ⁘ 5 ⁘ 6 ⁘ 7 ⁘ 8 ⁘ 9 ⁘ 10

Plot Data: CVS Levels 1 & 2

General Information

Project Label: 343
Project Name: Smith/Austin
Team: 2
Plot: 9
☐ Level 1 (planted stems only)
☑ Level 2 (planted and natural stems)
Start Date: Sept / 6 / 2006 (e.g.: JAN / 15 / 2006)
End Date (if different): NA

Party	Role**
Fagan	Plot Leader
Jeffers	tech

**Roles: Co-leader, Assistant, Guide, Land owner, Taxonomist, Other

Soil Drainage*

☐ Excessively drained
☐ Somewhat excessively drained
☑ Well drained
☐ Moderately well drained
☐ Somewhat poorly drained
☐ Poorly drained
☐ Very poorly drained

Water

Percent of Plot Submerged: 0 %
Mean Water Depth: NA cm

Location

General: Wake Forest
State: NC **County:** Wake
Quadrangle: Rolesville
Place Names: 1)
2) 3)
Land Owner:
GPS Receiver Location (m): x= 0 y= 0
Datum: ☑ NAD83/WGS84 ☐ NAD27
UTM Zone: if UTMs used
Lat: decimal deg. e.g. 35.16623: 35.95439 (or **UTM-N** meters e.g. 3962248)
Long: e.g. -125.12413: 78.50358 (or **UTM-E** e.g. 710524)
Coordinate Accuracy (m radius): e.g. 30: submeter
GPS File Name: smithaustin-veg

Site Characteristics

Elevation: ± ☐m ☐ft.
Slope (deg):
Aspect (deg):
Compass Type: ☑ magnetic ☐ true

Plot Placement

☑ Representative
☐ Random
☐ Stratified random
☐ Transect component
☐ Systematic (grid)
☐ Capture specific feature

Further details of placement can be mentioned in Plot Rationale.

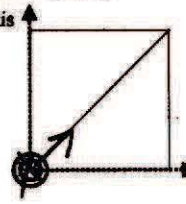
Taxonomic Standard Used for Plant Identification

Authority: RAB, **Publ. Date:** 1968

Plot Diagram

Fill in *ONE* of the templates below, using the key to draw GPS location, photos and posts. Edit shape if plot doesn't match one of the templates. Draw any landmarks, such as streams, banks, fences, etc.

Standard 10m x 10m (14.142m diagonal):



Non-standard 5m x 20m (20.616m diagonal):

Bearing of Plot X-Axis: 222°

Posts (x,y) (meters)
(0 , 0)
(0 , 10)
(10 , 10)
(10 , 0)
(,)

Key
- Plot origin (0,0) point
- GPS location point
- photo taken, with direction
- posts

Plot Size (ares, default=1) (An "are" is 100 m²): 1
Photo Identifier(s): pic. 13 corn's camera

Notes

If more space is needed, check the box and use back of datasheets.

Layout: (anything unusual about plot layout and shape) ☐ more...

Plot Location: (directions to plot, landscape content)

west of soccer fields
east of Austin creek.

☐ more...

Plot Rationale: (why location was chosen for the plot) ☐ more...

Other Notes: (invasive species, erosion, disturbances, etc.) ☐ more...

Required Fields in Bold and Underlined. *Definitions and/or values are in the Definitions section of the CVS Field Guide.

Planted Woody Stem Data: CVS Levels 1 & 2

Leader: Fag·in Project: Smith/Ash Team: 2 Plot: 9 Date: Sept / 6 / 2006 Page 1 of 1

Species Name	Source	Coordinates X (m)	Coordinates Y (m)	ddh (mm)	Height (cm)	DBH (cm)	Vigor	Damage
Quercus lyrata	unkn.	1.8	1.6	26	145	0.6	4	Insects
Pinus taeda	unkn.	3.6	3.3	24	105	—	4	—
Pinus taeda	unkn.	3.7	2.8	41	170	1.9	4	—
Diospyros virginiana	unkn.	4.5	1.6	15	100	—	3	Insects
Platanus occidentalis	unkn.	4.2	4.6	24	170	0.8	4	Insects
Pinus taeda	unkn.	3.6	3.4	22	141	0.6	4	—
Fraxinus pennsylvanica	unkn.	3.1	8.2	11	98	—	3	Insects
Fraxinus pennsylvanica	unkn.	3.2	6.9	10	100	—	3	Insects
Diospyros virginiana	unkn.	4.0	7.8	9	58	—	3	Insects
Quercus nigra	unkn.	6.7	6.8	26	200	1.4	3	Spindly
Quercus lyrata	unkn.	6.7	9.4	28	170	0.9	4	Insects
Fraxinus pennsylvanica	unkn.	9.3	6.2	51	260	2.3	4	Insects
Acer negundo	unkn.	9.9	3.2	26	153	1.1	3	Insects
Fraxinus americana	unkn.	9.3	1.5	31	174	0.8	4	—
Diospyros virginiana	unkn.	7.0	1.4	11	100	—	3	Insects
Fraxinus americana	unk.	7.0	4.2	14	94	—	3	Insects

Source: Cultivated, Transplant, Live stake, Ball and Burlap, Pot, Bare Root

Vigor: 4=excellent, 3=good, 2=weak, 1=unlikely to survive year, 0=Dead, Missing.

Damage: Removal, Cut, Mowing, Beaver, Deer, Rodents, Insects, Game, Livestock, Other/Unknown Animal, Human Trampled, Site Too Wet, Site Too Dry, Flood, Drought, Storm, Hurricane, Diseased, Vine Strangulation, Unknown, specify other.

Form PWS12, ver 6.3

Natural Woody Stem Data: CVS Levels 2 & 3

Leader: Faguin **Project:** Smith/Austin **Team:** 2 **Plot:** 9 **Date:** Sept / 6 / 2006 **Area** (=100m²): 1 Page 1 of 1

Height Cut-Off for Stems (all stems shorter than this height are ignored and not tallied): ☑ 10cm ☐ 50cm ☐ 100cm ☐ 137cm

Species Name	☑ c	Mod*	Seedlings — Height Classes: Sub-Seed	10 cm-50 cm	50 cm-100 cm	100 cm-137 cm	Saplings — DBH: Sub-Sapl	0-1 cm	1-2.5 cm	Trees — DBH: 2.5-	5-	10-	15-	20-	25-	30-	35-	≥40 (write dbh)
Acer negundo			—	⊠ ⊠ ⊠ 10 9	⊠ •	•	—											
Cornus amomum			—		•		—											
Betula nigra			—	•			—		••	••	•							
Salix nigra			—		•		—		•	•••								
Fraxinus pennsylvanica			—	••	⊠		—											
Acer rubrum			—	•			—											
Pinus taeda			—		•		—											
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*Module is for Sampling Level 3.

Tally key: 1 2 3 4 5 6 7 8 9 10

Plot Data: CVS Levels 1 & 2

General Information

Project Label: 343

Project Name: Smith/Austin

Team: 2

Plot: 10

☐ Level 1 (planted stems only)
☑ Level 2 (planted and natural stems)

Start Date: Sept / 6 / 2006
e.g.: JAN / 15 / 2006

End Date (if different): NA

Party	Role**
Faqin	Plot Leader
Jeffers.	tech

**Roles: Co-leader, Assistant, Guide, Land owner, Taxonomist, Other

Soil Drainage*

- ☐ Excessively drained
- ☐ Somewhat excessively drained
- ☑ Well drained
- ☐ Moderately well drained
- ☐ Somewhat poorly drained
- ☐ Poorly drained
- ☐ Very poorly drained

Water

Percent of Plot Submerged: 0 %

Mean Water Depth: NA cm

Location

General: Wake Forest

State: NC **County:** Wake

Quadrangle: Rolesville

Place Names: 1)

2) 3)

Land Owner:

GPS Receiver Location (m): x= 0 y= 0

Datum: ☑ NAD83/WGS84 ☐ NAD27

UTM Zone: if UTMs used

Lat: decimal deg. e.g. 35.16623: 35.95589 (or **UTM-N** meters e.g. 3962248)

Long: e.g. -125.12413: 78.50267 (or **UTM-E** e.g. 710524)

Coordinate Accuracy (m radius): e.g. 30: submeter

GPS File Name: smithaustin_veg

Site Characteristics

Elevation: ± ☐m ☐ft.

Slope (deg):

Aspect (deg):

Compass Type: ☑ magnetic ☐ true

Plot Placement

- ☑ Representative
- ☐ Random
- ☐ Stratified random
- ☐ Transect component
- ☐ Systematic (grid)
- ☐ Capture specific feature

Further details of placement can be mentioned in Plot Rationale.

Taxonomic Standard Used for Plant Identification

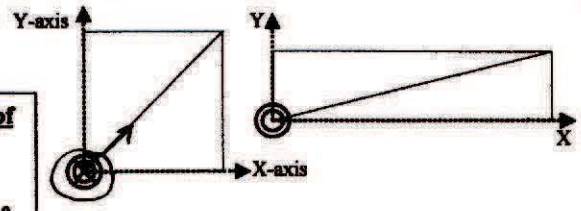
Authority: RAB, **Publ. Date:** 1996

Plot Diagram

Fill in *ONE* of the templates below, using the key to draw GPS location, photos and posts. Edit shape if plot doesn't match one of the templates. Draw any landmarks, such as streams, banks, fences, etc.

Standard 10m x 10m (14.142m diagonal):

Non-standard 5m x 20m (20.616m diagonal):



Bearing of Plot X-Axis: 60 °

Posts (x,y) (meters)
(0, 0)
(0, 10)
(10, 10)
(10, 0)
(,)

Key

- Plot origin (0,0) point
- GPS location point
- photo taken, with direction
- posts

Plot Size (ares, default=1): (An "are" is 100 m²): 1

Photo Identifier(s): pic 14 corn camera

Notes

If more space is needed, check the box and use back of datasheets.

Layout: (anything unusual about plot layout and shape)

North of soccer fields
Northwest of Austin creek

☐ more...

Plot Location: (directions to plot, landscape content)

☐ more...

Plot Rationale: (why location was chosen for the plot)

☐ more...

Other Notes: (invasive species, erosion, disturbances, etc.)

☐ more...

Required Fields in Bold and Underlined. *Definitions and/or values are in the Definitions section of the CVS Field Guide.

Planted Woody Stem Data: CVS Levels 1 & 2

Leader: Faquin **Project:** Smith/Austin **Team:** 2 **Plot:** 10 **Date:** Sept / 6 / 2006 Page 1 of 1

Species Name	Source	Coordinates X (m)	Coordinates Y (m)	ddh (mm)	Height (cm)	DBH (cm)	Vigor	Damage
Pinus taeda	unkn.	8.6	0.9	12	100	—	3	spindly
Quercus lyrata	unkn.	8.9	1.6	11	102	—	4	—
Fraxinus pennsylvanica	unkn.	6.8	1.4	10	92	—	3	hindered/contained by plastic mesh collar
Betula nigra	unkn.	9.9	3.0	18	140	0.1	4	—
Fraxinus pennsylvanica	unkn.	8.2	3.8	9	72	—	3	Resprout
Pinus taeda	unkn.	9.1	4.7	11	80	—	4	—
Quercus pagoda	unkn	8.7	5.8	6	50	—	3	Insects.
Quercus pagoda	unkn.	7.7	8.3	7	78	—	3	Plastic mesh collar (removed)
Fraxinus pennsylvanica	unkn.	6.1	5.9	13	97	—	3	Plastic mesh collar (removed)
Pinus taeda	unkn.	4.3	9.4	29	162	0.9	4	—
Quercus pagoda	unkn.	2.9	9.9	10	58	—	2	Insects
Fraxinus pennsylvanica	unkn.	1.7	6.5	9	69	—	2	Plastic mesh collar (removed)
Sambucus canadensis	unkn.	0.3	5.6	9	92	—	2	Flood
Acer negundo	unkn.	0.3	7.5	12	140	0.5	3	Insects
Pinus taeda	unkn.	4.7	6.3	37	173	1.6	4	—
Betula nigra	unkn	4.8	3.6	11	112	—	4	—
Quercus pagoda	unkn.	2.7	4.1	5	64	—	3	Insects
Quercus pagoda	unkn.	3.9	1.2	12	89	—	3	Plastic mesh collar
Pinus taeda	unkn.	3.3	0.7	35	172	0.1	4	—
Quercus pagoda	unkn.	0.3	0.7	10	82	—	3	Insects.

Source: Cultivated, Transplant, Live stake, Ball and Burlap, Pot, Bare Root

Vigor: 4=excellent, 3=good, 2=weak, 1=unlikely to survive year, 0=Dead, Missing.

Damage: Removal, Cut, Mowing, Beaver, Deer, Rodents, Insects, Game, Livestock, Other/Unknown Animal, Human Trampled, Site Too Wet, Site Too Dry, Flood, Drought, Storm, Hurricane, Diseased, Vine Strangulation, Unknown, specify other.

Form PWS12, ver 6.3

Natural Woody Stem Data: CVS Levels 2 & 3

Leader: Faquin **Project:** Smith/Austin **Team:** 2 **Plot:** 10 **Date:** Sept / 6 / 2006 **Area** (=100m²): 1 Page 1 of 1

Height Cut-Off for Stems (all stems shorter than this height are ignored and not tallied): ☑ 10cm ☐ 50cm ☐ 100cm ☐ 137cm

Species Name	☑ c	Mod*	Seedlings — Height Classes: Sub-Seed	10 cm-50 cm	50 cm-100 cm	100 cm-137 cm	Saplings — DBH: Sub-Sapl	0-1 cm	1-2.5 cm	Trees — DBH: 2.5-	5-	10-	15-	20-	25-	30-	35-	≥40 (write dbh)
Gleditsea tricanthos			—		•		—											
Acer rubrum			—	••			—											
Acer negundo			—	•			—											
Ligustrum sinense			—		⁝	•	—											
Pinus taeda			—		••		—											
Fraxinus pennsylvanica			—	•	•		—											
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*Module is for Sampling Level 3.

• 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10

Plot Data: CVS Levels 1 & 2

General Information

Project Label: 343

Project Name: Smith/Austin

Team: SWAB

Plot: 11

☐ Level 1 (planted stems only)
☑ Level 2 (planted and natural stems)

Start Date: Sep / 06 / 2006
e.g.: JAN / 15 / 2006

End Date (if different): NA

Party	Role**
SWAB	Plot Leader
Mahan	tech

**Roles: Co-leader, Assistant, Guide, Land owner, Taxonomist, Other

Soil Drainage*

☐ Excessively drained
☐ Somewhat excessively drained
☐ Well drained
☐ Moderately well drained
☑ Somewhat poorly drained
☐ Poorly drained
☐ Very poorly drained

Water

Percent of Plot Submerged: 45 %

Mean Water Depth: 2 cm

Location

General: Wake Forest

State: NC County: Wake

Quadrangle: Rolesville

Place Names: 1)

2) 3)

Land Owner:

⊗ **GPS Receiver Location** (m): x= 0 y= 0

Datum: ☑ NAD83/WGS84 ☐ NAD27

UTM Zone: if UTMs used

Lat: decimal deg. e.g. 35.16623: 35.95624 (or UTM-N) meters e.g. 3962248

Long: e.g. -125.12413: 78.50277 (or UTM-E) e.g. 710524

Coordinate Accuracy (m radius): e.g. 30: submeter

GPS File Name: SMITHAUSTIN-VEG

Site Characteristics

Elevation: ± ☐m ☐ft.

Slope (deg):

Aspect (deg):

Compass Type: ☑ magnetic ☐ true

Plot Placement

☑ Representative
☐ Random
☐ Stratified random
☐ Transect component
☐ Systematic (grid)
☐ Capture specific feature

Further details of placement can be mentioned in Plot Rationale.

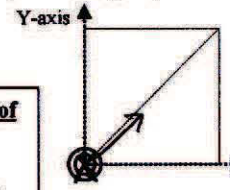
Taxonomic Standard Used for Plant Identification

Authority: RAB, **Publ. Date:** 1968

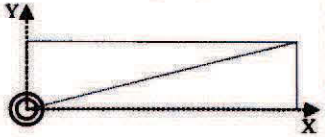
Plot Diagram

Fill in *ONE* of the templates below, using the key to draw GPS location, photos and posts. Edit shape if plot doesn't match one of the templates. Draw any landmarks, such as streams, banks, fences, etc.

Standard 10m x 10m (14.142m diagonal):



Non-standard 5m x 20m (20.616m diagonal):



Bearing of Plot X-Axis: 58°

●Posts (x,y) (meters)
(0,0)
(0,10)
(10,10)
(10,0)
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Key
- ◎ Plot origin (0,0) point
- ⊗ GPS location point
- ○→ photo taken, with direction
- ● posts

Plot Size (ares, default=1): 1
(An "are" is 100 m²)

○→ Photo Identifier(s): Chis' cell phone photo

Notes

If more space is needed, check the box and use back of datasheets.

Layout: (anything unusual about plot layout and shape) ☐ more...

Plot Location: (directions to plot, landscape content) ☐ more...

Plot Rationale: (why location was chosen for the plot) ☐ more...

Other Notes: (invasive species, erosion, disturbances, etc.)

Plot recently flooded + large debris + large L. sinensis covering trees. Trees with mesh collars were mostly prostrate + compromised. Collars removed. ☐ more...

Required Fields in Bold and Underlined. *Definitions and/or values are in the Definitions section of the CVS Field Guide.

Planted Woody Stem Data: CVS Levels 1 & 2

?1.2?

Leader: SWAB Project: Smith Austin Team: Swab Mahan Plot: 11 Date: Sep 06 2006 Page 1 of 1

Species Name	Source	Coordinates X (m)	Coordinates Y (m)	ddh (mm)	Height (cm)	DBH (cm)	Vigor	Damage
Platanus occidentalis	unkn	0.7	0.7	12	130	—	4	
Pinus taeda	unkn	1.0	8.5	43	180	12	4	
Platanus occidentalis	unkn	2.5	3.0	12	90	—	3	
Quercus michauxii	unkn	2.5	2.7	5	70	—	2	Flood
Pinus taeda	unkn	0.1	2.5	23	110	—	4	
Pinus taeda	unkn	4.1	4.3	22	130	—	3	
Betula nigra	unkn	5.0	4.8	15	110	—	4	
Quercus nigra	unkn	6.5	4.8	5	110	—	3	mesh collar
Betula nigra	unkn	6.6	3.2	12	100	—	3	Ins
Pinus taeda	unkn	6.2	1.6	21	70	—	2	Ins
Fraxinus pennsylvanica	unkn	5.5	0.8	11	70	—	3	Flood, ins
Alnus serrulata	unkn	6.1	0.3	13	120	—	4	
Platanus occidentalis	unkn	9.0	4.7	12	130	—	4	
Platanus occidentalis	unkn	9.4	0.3	11	110	—	3	
Quercus pagoda	unkn	9.1	6.4	6	70	—	3	mesh collar
Platanus occidentalis	unkn	7.2	5.5	10	100	—	3	
Fraxinus pennsylvanica	unkn	5.4	6.5	6	80	—	2	mesh collar
Pinus taeda	unkn	5.1	7.4	22	70	—	4	
Pinus taeda	unkn	5.0	7.5	19	100	—	3	
Quercus nigra	unkn	3.3	7.4	5	80	—	3	
Betula nigra	unkn	9.0	9.7	15	140	0.2	4	
Nyssa sp.	unkn	6.5	9.2	10	50	—	2	unkn
Platanus occidentalis	unkn	4.0	8.2	9	100	—	3	mesh collar
Pinus taeda	unkn	4.2	6.1	42	140	0.5	3	flood
Pinus taeda	unkn	1.9	6.9	38	130	—	4	
Betula nigra	unkn	1.1	6.2	12	110	—	3	

Source: Cultivated, Transplant, Live stake, Ball and Burlap, Pot, Bare Root

Vigor: 4=excellent, 3=good, 2=weak, 1=unlikely to survive year, 0=Dead, Missing.

Damage: Removal, Cut, Mowing, Beaver, Deer, Rodents, Insects, Game, Livestock, Other/Unknown Animal, Human Trampled, Site Too Wet, Site Too Dry, Flood, Drought, Storm, Hurricane, Diseased, Vine Strangulation, Unknown, specify other.

Natural Woody Stem Data: CVS Levels 2 & 3

Leader: SWAB **Project:** Smith/Austin **Team:** Swab, Manan **Plot:** 11 **Date:** Sep 06 2006 **Area** (=100m²): 1 Page 1 of 1

Height Cut-Off for Stems (all stems shorter than this height are ignored and not tallied): ☑ 10cm ☐ 50cm ☐ 100cm ☐ 137cm

Species Name	☑ c	Mod*	Seedlings — Height Classes: Sub-Seed	10 cm-50 cm	50 cm-100 cm	100 cm-137 cm	Saplings — DBH: Sub-Sapl	0-1 cm	1-2.5 cm	Trees — DBH: 2.5-	5-	10-	15-	20-	25-	30-	35-	≥40 (write dbh)
* Fraxinus pennsylvanica			—	⊠⊠⊠	⊠⊠⊠ r.		—											
Liquidambar styraciflua			—	:	:		—											
Prunus serotina			—	•			—											
Quercus nigra			—	•			—											
Carya cordiformis			—	•			—											
Acer rubrum			—	:			—											
Baccharis halimifolia			—	•			—	•										
* Fraxinus pennsylvanica			—	⊠⊠⊠			—											
Platanus occidentalis			—		•		—											
Salix nigra			—			•	—											
Ulmus sp.			—		•		—											
* Fraxinus pennsylvanica			—	:: ⊠			—											
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*Module is for Sampling Level 3.

● 1 ⁘ 2 ⁙ 3 ⁘ 4 ⁙ 5 ⁘ 6 ⁙ 7 ⁘ 8 ⁙ 9 ⁘ 10

Plot Data: CVS Levels 1 & 2

General Information

Project Label: 343

Project Name: Smith Austin

Team: 1

Plot: 12

☐ Level 1 (planted stems only)
☑ Level 2 (planted and natural stems)

Start Date: Sep 08 / 2006
e.g.: JAN / 15 / 2006

End Date (if different): NA

Party	Role**
SWAB	Plot Leader
Mahan	tech

**Roles: Co-leader, Assistant, Guide, Land owner, Taxonomist, Other

Soil Drainage*

- ☐ Excessively drained
- ☐ Somewhat excessively drained
- ☑ Well drained
- ☐ Moderately well drained
- ☐ Somewhat poorly drained
- ☐ Poorly drained
- ☐ Very poorly drained

Water

Percent of Plot Submerged: 0 %

Mean Water Depth: NA cm

Location

General: Wake Forest

State: NC County: Wake

Quadrangle: Rolesville

Place Names: 1)

2) 3)

Land Owner:

GPS Receiver Location (m): x= 0 y= 0

Datum: ☑ NAD83/WGS84 ☐ NAD27

UTM Zone: if UTMs used

Lat: decimal deg. e.g. 35.16623: 35.956083 **(or UTM-N)** meters e.g. 3962248

Long: e.g. -125.12413: 78.50289 **(or UTM-E)** e.g. 710524

Coordinate Accuracy (m radius): e.g. 30: Submeter

GPS File Name: smithaustin_veg

Site Characteristics

Elevation: ± ☐m ☐ft.

Slope (deg):

Aspect (deg):

Compass Type: ☒ magnetic ☐ true

Plot Placement

- ☑ Representative
- ☐ Random
- ☐ Stratified random
- ☐ Transect component
- ☐ Systematic (grid)
- ☐ Capture specific feature

Further details of placement can be mentioned in Plot Rationale.

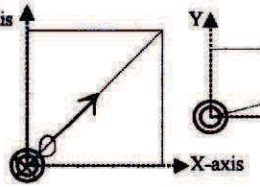
Taxonomic Standard Used for Plant Identification

Authority: RAB, **Publ. Date:** 1968

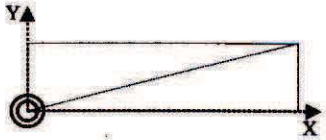
Plot Diagram

Fill in *ONE* of the templates below, using the key to draw GPS location, photos and posts. Edit shape if plot doesn't match one of the templates. Draw any landmarks, such as streams, banks, fences, etc.

Standard 10m x 10m (14.142m diagonal):



Non-standard 5m x 20m (20.616m diagonal):



Bearing of Plot X-Axis: 332°

Posts (x,y) (meters)
(0, 0)
(0, 10)
(10, 10)
(10, 0)
(,)

Key

- Plot origin (0,0) point
- GPS location point
- photo taken, with direction
- posts

Plot Size (ares, default=1): 1 (An "are" is 100 m²)

Photo Identifier(s): Christopher cell camera

Notes

If more space is needed, check the box and use back of datasheets.

Layout: (anything unusual about plot layout and shape) ☐ more...

Plot Location: (directions to plot, landscape content) ☐ more...

Plot Rationale: (why location was chosen for the plot) ☐ more...

Other Notes: (invasive species, erosion, disturbances, etc.)
[redacted] herbs (large Panicum + Leopedeza) flattened from earlier floods
spp with mesh collars compromised due to debris + catching sediment
☐ more...

Required Fields in Bold and Underlined. *Definitions and/or values are in the Definitions section of the CVS Field Guide.

 Form PLT12, ver 6.2

Planted Woody Stem Data: CVS Levels 1 & 2

Leader: Swab **Project:** Smyth Meadow **Team:** 1 **Plot:** 12 **Date:** Sep / 08 / 2006 Page 1 of 1

Species Name	Source	Coordinates X (m)	Coordinates Y (m)	ddh (mm)	Height (cm)	DBH (cm)	Vigor	Damage
Pinus taeda	unkn	5.1	0.0	47	200	1.5	4	— (removed)
Platanus occidentalis	unkn	5.1	0.4	18	170	0.5	3	mesh collar, Flood
Quercus lyrata	unkn	0.7	6.4	12	70	—	4	—
Fraxinus pennsylvanica	unkn	9.0	8.2	21	180	0.9	4	—
Pinus taeda	unkn	4.6	9.6	23	140	0.5	3	—
Fraxinus pennsylvanica	unkn	8.2	7.0	11	70	—	3	resprout, flood
Quercus pagoda	unkn	5.4	4.0	6	70	—	3	Flood
Betula nigra	unkn	6.6	2.4	5	100	—	2	mesh collar
Pinus taeda	unkn	6.2	1.4	43	170	1.0	4	— (removed)
Pinus taeda	unkn	5.7	0.1	36	200	1.4	4	—
Pinus taeda	unkn	5.5	1.1	35	130	—	4	—

Source: Cultivated, Transplant, Live stake, Ball and Burlap, Pot, Bare Root

Vigor: 4=excellent, 3=good, 2=weak, 1=unlikely to survive year, 0=Dead, Missing.

Damage: Removal, Cut, Mowing, Beaver, Deer, Rodents, Insects, Game, Livestock, Other/Unknown Animal, Human Trampled, Site Too Wet, Site Too Dry, Flood, Drought, Storm, Hurricane, Diseased, Vine Strangulation, Unknown, specify other.

Natural Woody Stem Data: CVS Levels 2 & 3

Leader: Ed Swab **Project:** Smith/Austin **Team:** Swab, Shar **Plot:** 12 **Date:** Sept / 8 / 2006 **Area** (=100m²): 1 Page 1 of 1

Height Cut-Off for Stems (all stems shorter than this height are ignored and not tallied): ☑ 10cm ☐ 50cm ☐ 100cm ☐ 137cm

Species Name	☑ C	Mod*	SEEDLINGS — HEIGHT CLASSES: Sub-Seed	10 cm-50 cm	50 cm-100 cm	100 cm-137 cm	SAPLINGS — DBH: Sub-Sapl	0-1 cm	1-2.5 cm	TREES — DBH: 2.5-	5-	10-	15-	20-	25-	30-	35-	≥40 (write dbh)
Fraxinus pennsylvanica			—	(120)			—											
Diospyros virginiana			—	•	••		—											
Acer rubrum			—	••			—											
Liquidambar styraciflua			—				—											
Liriodendron tulipifera			—	••			—											
Ulmus sp.			—	•			—											
Platanus occidentalis			—	•	•		—											
Betula nigra			—	••	••		—											
Pinus taeda			—		••	••	—											
Quercus nigra			—	•			—											
Baccharis halimifolia			—		••		—											
Nyssa sp.			—	•			—											
Quercus phellos			—	•			—											
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*Module is for Sampling Level 3.

● 1 ⁘ 2 ⁙ 3 ⁘ 4 ⁘ 5 ⁘ 6 ⁘ 7 ⁘ 8 ⁘ 9 ⁘ 10

Plot Data: CVS Levels 1 & 2

General Information

Project Label: 343

Project Name: Smith/Austin

Team: 1

Plot: 13

☐ Level 1 (planted stems only)
☑ Level 2 (planted and natural stems)

Start Date: Sep / 8 / 2006
e.g.: JAN / 15 / 2006

End Date (if different): NA

Party	Role**
Sarah	Plot Leader
Mahan	tech

**Roles: Co-leader, Assistant, Guide, Land owner, Taxonomist, Other

Soil Drainage*

☐ Excessively drained
☐ Somewhat excessively drained
☑ Well drained
☐ Moderately well drained
☐ Somewhat poorly drained
☐ Poorly drained
☐ Very poorly drained

Water

Percent of Plot Submerged: 0 %

Mean Water Depth: NA cm

Location

General: Wake Forest

State: NC **County:** Wake

Quadrangle: Rolesville

Place Names: 1)

2) 3)

Land Owner:

GPS Receiver Location (m): x= 0 y= 0

Datum: ☑ NAD83/WGS84 ☐ NAD27

UTM Zone: if UTMs used

Lat: decimal deg. 35.95711 (or **UTM-N** meters) e.g. 35.16623 / e.g. 3962248

Long: 78.50323 (or **UTM-E**) e.g. -125.12413 / e.g. 710524

Coordinate Accuracy (m radius): e.g. 30 submeter

GPS File Name: Smithaustin_rcg

Site Characteristics

Elevation: ± ☐m ☐ft.

Slope (deg):

Aspect (deg):

Compass Type: ☑ magnetic ☐ true

Plot Placement

☑ Representative
☐ Random
☐ Stratified random
☐ Transect component
☐ Systematic (grid)
☐ Capture specific feature

Further details of placement can be mentioned in Plot Rationale.

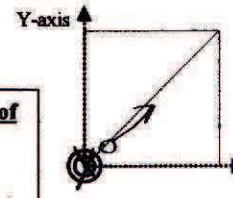
Taxonomic Standard Used for Plant Identification

Authority: RAB, **Publ. Date:** 1968

Plot Diagram

Fill in *ONE* of the templates below, using the key to draw GPS location, photos and posts. Edit shape if plot doesn't match one of the templates. Draw any landmarks, such as streams, banks, fences, etc.

Standard 10m x 10m (14.142m diagonal):



Non-standard 5m x 20m (20.616m diagonal):

Bearing of Plot X-Axis: 114°

Posts (x,y) (meters)
(0, 0)
(0, 10)
(10, 10)
(10, 0)
(,)

Key
- Plot origin (0,0) point
- GPS location point
- photo taken, with direction
- posts

Plot Size (ares, default=1): 1
(An "are" is 100 m²)

Photo Identifier(s): 0908 (9 Sept 06 Chris cell phone)

Notes

If more space is needed, check the box and use back of datasheets.

Layout: (anything unusual about plot layout and shape) ☐ more...

Plot Location: (directions to plot, landscape content)
East side of stream ☐ more...

Plot Rationale: (why location was chosen for the plot) ☐ more...

Other Notes: (invasive species, erosion, disturbances, etc.)
very flattened by recent flood
mesh collars affecting growth - all removed
lots of tall flattened Panicum sp
Lots of silt deposits + debris ☐ more...

Required Fields in Bold and Underlined. *Definitions and/or values are in the Definitions section of the CVS Field Guide.

 Form PLT12, ver 6.2

Planted Woody Stem Data: CVS Levels 1 & 2

Leader: SWAB **Project:** Smith/Austin **Team:** 1 **Plot:** 13 **Date:** Sep 18 2006 **Page** 1 of 1

Species Name	Source	Coordinates X (m)	Coordinates Y (m)	ddh (mm)	Height (cm)	DBH (cm)	Vigor	Damage
Pinus taeda	unkn	2.7	D	49	210	2.1	4	—
Quercus nigra	unkn	2.1	8.3	9	110	—	3	—
Quercus michauxii	unkn	0.5	6.0	7	60	—	2	mesh collar
Plantanus occidentalis	unkn	2.7	7.0	2	20	—	2	flood
Quercus pogoda	unkn	2.7	3.6	13	160	0.5	3	mesh collar, flood
Pinus taeda	unkn	0.4	3.7	19	110	—	4	—
Nyssa sp.	unkn	2.5	0.4	5	60	—	2	flood
Nyssa aquatica	unkn	4.5	1.1	6	60	—	3	—
Pinus taeda	unkn	4.3	1.0	18	110	—	4	—
Betula nigra	unkn	5.0	8.3	11	130	—	3	flood
Platanus occidentalis	unkn	5.8	9.1	17	150	0.5	3	—
Pinus taeda	unkn	6.6	5.1	20	140	0.1	3	—
Nyssa sp.	unkn	7.3	9.2	12	70	—	2	flood, deer
Nyssa sp.	unkn	8.4	6.6	11	60	—	2	deer
Pinus taeda	unkn	8.9	5.2	18	120	—	2	flood
Platanus occidentalis	unkn	9.6	5.0	—	350	4.2	4	—
Nyssa sp.	unkn	8.7	2.4	6	50	—	2	flood, deer
Quercus pogoda	unkn	8.0	0.7	5	30	—	2	flood
Quercus pogoda	unkn	9.2	0.3	13	90	—	3	mesh collar

Source: Cultivated, Transplant, Live stake, Ball and Burlap, Pot, Bare Root

Vigor: 4=excellent, 3=good, 2=weak, 1=unlikely to survive year, 0=Dead, Missing.

Damage: Removal, Cut, Mowing, Beaver, Deer, Rodents, Insects, Game, Livestock, Other/Unknown Animal, Human Trampled, Site Too Wet, Site Too Dry, Flood, Drought, Storm, Hurricane, Diseased, Vine Strangulation, Unknown, specify other.

Form PWS12, ver 6.3

Natural Woody Stem Data: CVS Levels 2 & 3

Leader: S WAB **Project:** Smith/Austin **Team:** 1 **Plot:** 13 **Date:** Sep / 8 / 2006 **Ares** (=100m²): 1 Page 1 of 1

Height Cut-Off for Stems (all stems shorter than this height are ignored and not tallied): ☑ 10cm ☐ 50cm ☐ 100cm ☐ 137cm

Species Name	☑ c	Mod*	Seedlings — Height Classes: Sub-Seed	10 cm-50 cm	50 cm-100 cm	100 cm-137 cm	Saplings — DBH: Sub-Sapl	0-1 cm	1-2.5 cm	Trees — DBH: 2.5-	5-	10-	15-	20-	25-	30-	35-	≥40 (write dbh)
Fraxinus pennsylvanica			—	⊠ ⊠ ⊠ ⊠ ⊠ •	⊠ ⌐:		—											
Diospyros virginiana			—	•			—											
Pinus taeda			—	•	•		—											
Ulmus sp.			—	•			—											
Acer negundo			—	••			—											
Liquidambar styraciflua			—	:	⌐:		—											
Platanus occidentalis			—	:	•		—											
Quercus alba			—	:•			—											
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*Module is for Sampling Level 3.

Tally key: 1 2 3 4 5 6 7 8 9 10

Plot Data: CVS Levels 1 & 2

golf cours

General Information

Project Label: 343

Project Name: Smith Austin

Team: 1

Plot: 14

☐ Level 1 (planted stems only)
☑ Level 2 (planted and natural stems)

Start Date: Sep / 06 / 2006
e.g.: JAN / 15 / 2006

End Date (if different): NA

Party	Role**
SWAB	Plot Leader
Mahan	tech

**Roles: Co-leader, Assistant, Guide, Land owner, Taxonomist, Other

Soil Drainage*

☐ Excessively drained
☐ Somewhat excessively drained
☑ Well drained
☐ Moderately well drained
☐ Somewhat poorly drained
☐ Poorly drained
☐ Very poorly drained

Water

Percent of Plot Submerged: 0 %

Mean Water Depth: NA cm

Location

General: Wake Forest

State: NC **County:** Wake

Quadrangle: Rolesville

Place Names: 1)

2) 3)

Land Owner:

GPS Receiver Location (m): x= 0 y= 0

Datum: ☑ NAD83/WGS84 ☐ NAD27

UTM Zone: if UTMs used

Lat: decimal deg. e.g. 35.16623: 35.95130 (or **UTM-N** meters e.g. 3962248)

Long: e.g. -125.12413: 78.49870 (or **UTM-E** e.g. 710524)

Coordinate Accuracy (m radius): e.g. 30: submeter

GPS File Name: smithaustin-veg

Site Characteristics

Elevation: ± ☐m ☐ft.

Slope (deg):

Aspect (deg):

Compass Type: ☑ magnetic ☐ true

Plot Placement

☑ Representative
☐ Random
☐ Stratified random
☐ Transect component
☐ Systematic (grid)
☐ Capture specific feature

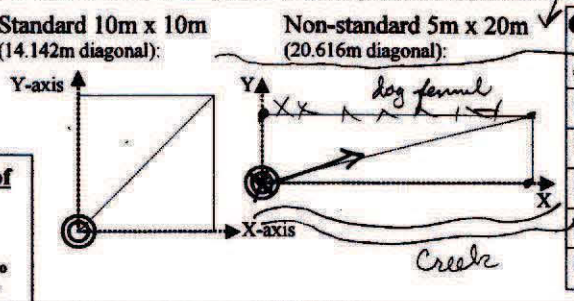
Further details of placement can be mentioned in Plot Rationale.

Taxonomic Standard Used for Plant Identification

Authority: RAB, **Publ. Date:** 1968

Plot Diagram

Fill in *ONE* of the templates below, using the key to draw GPS location, photos and posts. Edit shape if plot doesn't match one of the templates. Draw any landmarks, such as streams, banks, fences, etc.



Posts (x,y) (meters)
(0,0)
(0,5)
(20,0)
(20,5)
(,)

Key
- Plot origin (0,0) point
- GPS location point
- photo taken, with direction
- posts

Bearing of Plot X-Axis: 59°

Plot Size (ares, default=1): 5X20m
(An "are" is 100 m²)

Photo Identifier(s):

Notes

If more space is needed, check the box and use back of datasheets.

Layout: (anything unusual about plot layout and shape) ☐ more...

Plot Location: (directions to plot, landscape content) ☐ more...

Plot Rationale: (why location was chosen for the plot) ☐ more...

Other Notes: (invasive species, erosion, disturbances, etc.)
mesh collars + solid collars retarding growth + increase damage during flooding events ☐ more...

Required Fields in Bold and Underlined. *Definitions and/or values are in the Definitions section of the CVS Field Guide.

Planted Woody Stem Data: CVS Levels 1 & 2

Leader: SWAB **Project:** Smooth Austin **Team:** 1 **Plot:** 14 **Date:** Sep 10 8 / 2006 Page 1 of 1

Species Name	Source	Coordinates X (m)	Coordinates Y (m)	ddh (mm)	Height (cm)	DBH (cm)	Vigor	Damage
Q. michauxii		0.7	0.7	10	110	—	3	flooded
Q. michauxii		0.6	4.2	7	50	—	2	mesh collar (removed)
Q. pagoda		2.5	2.5	9	100	—		—
Fraxinus pennsylvanica		4.6	1.5	38	220	2.0	2	die-back + collared (removed)
Myrica cerifera		6.0	2.6	22	160	0.5	4	—
Nyssa sp.		5.3	3.3	9	70	—	2	deer, flood mesh collar (removed)
Q. michauxii		6.4	0.3	15	190	0.8	3	—
Pinus taeda		12.3	2.1	39	180	1.6	4	—
Ulmus sp		12.3	1.1	8	70	—	2	ukn (removed) mesh collar, flattened flood
Nyssa sp		11.7	1.8	6	50	—	2	flood (previous collar gone)
Liriodendron tulipifera		14.1	1.1	7	70	—	2	UKn + flood
Ulmus sp		16.3	0.9	6	100	—	1	—
Pinus taeda		15.3	1.9	15	110	—	3	—
P. taeda		15.1	4.9	35	150	0.5	4	deer + mesh collar (removed)
Nyssa Sp.		16.8	1.7	7	50	—	2	—
Acer negundo		18.8	0.4	22	180	1.0	3	

Source: Cultivated, Transplant, Live stake, Ball and Burlap, Pot, Bare Root

Vigor: 4=excellent, 3=good, 2=weak, 1=unlikely to survive year, 0=Dead, Missing.

Damage: Removal, Cut, Mowing, Beaver, Deer, Rodents, Insects, Game, Livestock, Other/Unknown Animal, Human Trampled, Site Too Wet, Site Too Dry, Flood, Drought, Storm, Hurricane, Diseased, Vine Strangulation, Unknown, specify other.

Natural Woody Stem Data: CVS Levels 2 & 3

Leader: Ed Swab **Project:** Smith/Austin **Team:** Swab Mahan **Plot:** 14 **Date:** Sept / 6 / 2006 **Area** (=100m²): 1 **Page** 1 **of** 1

Height Cut-Off for Stems (all stems shorter than this height are ignored and not tallied): ☑ 10cm ☐ 50cm ☐ 100cm ☐ 137cm

Species Name	☑ c	Mod*	Seedlings — Height Classes: Sub-Seed	10 cm-50 cm	50 cm-100 cm	100 cm-137 cm	Saplings — DBH: Sub-Sapl	0-1 cm	1-2.5 cm	Trees — DBH: 2.5-	5-	10-	15-	20-	25-	30-	35-	≥40 (write dbh)
Betula nigra			—	⊠ ⊠ ⊠ ⊐	⊠ ⊠ ⊐ (20)(10)(10)(14)	⊐	—											
Platanus occidentalis			—	•	•		—											
Baccharis halimifolia			—		•		—	•										
Fraxinus pennsylvanica			—	∴			—											
Liquidambar styraciflua			—	∴			—											
Pinus taeda			—	•			—											
Acer rubrum			—	•			—											
Prunus serotina			—	•			—											
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Plot Data: CVS Levels 1 & 2

General Information

Project Label: 343

Project Name: Smith Austin

Team: 1

Plot: 15

☐ Level 1 (planted stems only)
☑ Level 2 (planted and natural stems)

Start Date: Sept / 8 / 2006
e.g.: JAN / 15 / 2006

End Date (if different): NA

Party	Role**
Swab	Plot Leader
Mahan	tech

**Roles: Co-leader, Assistant, Guide, Land owner, Taxonomist, Other

Soil Drainage*

☐ Excessively drained
☐ Somewhat excessively drained
☑ Well drained
☐ Moderately well drained
☐ Somewhat poorly drained
☐ Poorly drained
☐ Very poorly drained

Water

Percent of Plot Submerged: 0 %

Mean Water Depth: NA cm

Location

General: Wake Forest

State: NC **County:** Wake

Quadrangle: Rolesville

Place Names: 1)

2) 3)

Land Owner:

GPS Receiver Location (m): x= 0 y= 0

Datum: ☑ NAD83/WGS84 ☐ NAD27

UTM Zone: if UTMs used

Lat: decimal deg. e.g. 35.16623: 35.95796 **(or UTM-N)** meters e.g. 3962248

Long: e.g. -125.12413: -78.49722 **(or UTM-E)** e.g. 710524

Coordinate Accuracy (m radius): e.g. 30: submeter

GPS File Name: smithaustin_veg

Site Characteristics

Elevation: ± ☐m ☐ft.

Slope (deg):

Aspect (deg):

Compass Type: ☑ magnetic ☐ true

Plot Placement

☑ Representative
☐ Random
☐ Stratified random
☐ Transect component
☐ Systematic (grid)
☐ Capture specific feature

Further details of placement can be mentioned in Plot Rationale.

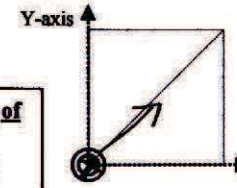
Taxonomic Standard Used for Plant Identification

Authority: RAB, **Publ. Date:** 1968

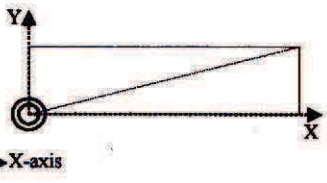
Plot Diagram

Fill in ***ONE*** of the templates below, using the key to draw GPS location, photos and posts. Edit shape if plot doesn't match one of the templates. Draw any landmarks, such as streams, banks, fences, etc.

Standard 10m x 10m (14.142m diagonal):



Non-standard 5m x 20m (20.616m diagonal):



Bearing of Plot X-Axis: 92°

Posts (x,y) (meters)
(0,0)
(0,10)
(10,10)
(10,0)
(,)

Key
- Plot origin (0,0) point
- GPS location point
- photo taken, with direction
- posts

Plot Size (ares, default=1): (An "are" is 100 m²) 1

Photo Identifier(s):

Notes

If more space is needed, check the box and use back of datasheets.

Layout: (anything unusual about plot layout and shape) ☐ more...

Plot Location: (directions to plot, landscape content) ☐ more...

Plot Rationale: (why location was chosen for the plot) ☐ more...

Other Notes: (invasive species, erosion, disturbances, etc.)

Collars on planted trees a detriment - they collect debris + silt, + pull the tree down; deform growth
Much Panicum in plot + much vegetation flattened
all collars removed

☐ more...

Required Fields in Bold and Underlined. *Definitions and/or values are in the Definitions section of the CVS Field Guide.

 Form PLT12, ver 6.2

Planted Woody Stem Data: CVS Levels 1 & 2

Leader: SWAB **Project:** Smith Ancestry **Team:** 1 **Plot:** 15 **Date:** Sep 08 2006 Page 1 of 1

Species Name	Source	Coordinates X (m)	Coordinates Y (m)	ddh (mm)	Height (cm)	DBH (cm)	Vigor	Damage
Ulmus rubra	unkn	0.8	0.3	9	110	—	3	resprout
Fraxinus pennsylvanica	unkn	2.2	0.3	34	160	0.5	3	collar, flood
Myrica cerifera	unkn	4.2	2.6	8	100	—	4	—
Betula nigra	unkn	3.2	4.2	10	130	—	3	—
Quercus michauxii	unkn	2.3	4.1	11	120	—	3	—
Fraxinus pennsylvanica	unkn	4.2	6.3	10	80	—	3	resprout
Betula nigra	unkn	3.1	6.5	15	160	0.3	4	—
Betula nigra	unkn	1.3	6.6	15	160	0.4	4	—
Quercus michauxii	unkn	1.3	8.4	6	60	—	3	mesh collar
Alnus serulata	unkn	2.0	10	11	110	—	4	—
Betula nigra	unkn	3.2	6.6	15	160	0.5	4	—
Fraxinus pennsylvanica	unkn	4.1	6.2	9	80	—	3	resprout
Betula nigra	unkn	5.6	6.2	12	150	0.3	4	—
Betula nigra	unkn	5.3	5.9	18	180	0.3	4	—
Betula nigra	unkn	6.8	9.7	14	190	0.4	3	—
Ulmus sp.	unkn	6.9	4.7	8	80	—	3	—
Fraxinus pennsylvanica	unkn	6.9	1.0	33	150	0.4	2	Ins, Flood, collar

Source: Cultivated, Transplant, Live stake, Ball and Burlap, Pot, Bare Root

Vigor: 4=excellent, 3=good, 2=weak, 1=unlikely to survive year, 0=Dead, Missing.

Damage: Removal, Cut, Mowing, Beaver, Deer, Rodents, Insects, Game, Livestock, Other/Unknown Animal, Human Trampled, Site Too Wet, Site Too Dry, Flood, Drought, Storm, Hurricane, Diseased, Vine Strangulation, Unknown, specify other.

Natural Woody Stem Data: CVS Levels 2 & 3

Leader: SWAB **Project:** Irish Austin **Team:** 1 **Plot:** 15 **Date:** Sep 08 2006 **Ares** (=100m²): 1 Page 1 of 1

Height Cut-Off for Stems (all stems shorter than this height are ignored and not tallied): ☑ 10cm ☐ 50cm ☐ 100cm ☐ 137cm

Species Name	☑ c	Mod*	Seedlings — Height Classes: Sub-Seed	10 cm-50 cm	50 cm-100 cm	100 cm-137 cm	Saplings — DBH: Sub-Sapl	0-1 cm	1-2.5 cm	Trees — DBH: 2.5-	5-	10-	15-	20-	25-	30-	35-	≥40 (write dbh)
Liriodendron tulipifera				•	•													
Platanus occidentalis				⁘	⁘													
Betula nigra				⁘	⁘	⁘		⁘										
Fraxinus pennsylvanica				⁘	⁘	•												
Liquidambar styraciflua					•													
Alnus serrulata				•														
Salix nigra						•												

©2006 Carolina Vegetation Survey. *Module is for Sampling Level 3. ● 1 ⁘ 2 ⁘ 3 ⁘ 4 ⁘ 5 ⁘ 6 ⁘ 7 ⁘ 8 ⁘ 9 ⁘ 10 Form NWS23, ver 6.2

Plot Data: CVS Levels 1 & 2

General Information

Project Label: 343

Project Name: SmithAustin

Team: 1

Plot: 16

☐ Level 1 (planted stems only)
☑ Level 2 (planted and natural stems)

Start Date: Sep / 08 / 2006
e.g.: JAN / 15 / 2006

End Date (if different): NA

Party	Role**
SWAB	Plot Leader
Maher	tech

**Roles: Co-leader, Assistant, Guide, Land owner, Taxonomist, Other

Soil Drainage*

☐ Excessively drained
☐ Somewhat excessively drained
☑ Well drained
☐ Moderately well drained
☐ Somewhat poorly drained
☐ Poorly drained
☐ Very poorly drained

Water

Percent of Plot Submerged: 0 %

Mean Water Depth: NA cm

Location

General: Wake Forest

State: NC County: Wake

Quadrangle: Rolesville

Place Names: 1)

2) 3)

Land Owner:

GPS Receiver Location (m): x= 0 y= 0

Datum: ☑ NAD83/WGS84 ☐ NAD27

UTM Zone: if UTMs used

Lat: decimal deg. e.g. 35.16623: 35.95805 (or **UTM-N** meters e.g. 3962248)

Long: e.g. -125.12413: 78.49622 (or **UTM-E** e.g. 710524)

Coordinate Accuracy (m radius): e.g. 30 submeter

GPS File Name: smithaustin_veg

Site Characteristics

Elevation: ± ☐m ☐ft.

Slope (deg):

Aspect (deg):

Compass Type: ☑ magnetic ☐ true

Plot Placement

☑ Representative
☐ Random
☐ Stratified random
☐ Transect component
☐ Systematic (grid)
☐ Capture specific feature

Further details of placement can be mentioned in Plot Rationale.

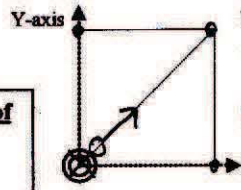
Taxonomic Standard Used for Plant Identification

Authority: RAB, **Publ. Date:** 1968

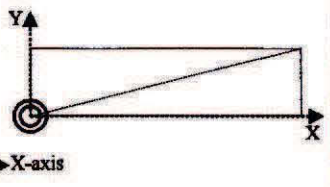
Plot Diagram

Fill in *ONE* of the templates below, using the key to draw GPS location, photos and posts. Edit shape if plot doesn't match one of the templates. Draw any landmarks, such as streams, banks, fences, etc.

Standard 10m x 10m (14.142m diagonal):



Non-standard 5m x 20m (20.616m diagonal):



Bearing of Plot X-Axis: 352 °

Posts (x,y) (meters)
(0, 0)
(0, 10)
(10, 10)
(10, 0)
(,)

Key
- Plot origin (0,0) point
- GPS location point
- photo taken, with direction
- posts

Plot Size (ares, default=1): (An "are" is 100 m²): 1

Photo Identifier(s): 1051 Christopher's cell

Notes

If more space is needed, check the box and use back of datasheets.

Layout: (anything unusual about plot layout and shape)

☐ more...

Plot Location: (directions to plot, landscape content)

between creek + golf course, east of Heritage Lake

☐ more...

Plot Rationale: (why location was chosen for the plot)

☐ more...

Other Notes: (invasive species, erosion, disturbances, etc.)

Lots of large Panicum
Some bare soil ; 2 rubber mats present

☐ more...

Planted Woody Stem Data: CVS Levels 1 & 2

Leader: SWRB **Project:** Smyth Riverton **Team:** 1 **Plot:** 16 **Date:** Sep 10 01 2006 Page 1 of 1

Species Name	Source	Coordinates X (m)	Coordinates Y (m)	ddh (mm)	Height (cm)	DBH (cm)	Vigor	Damage
Pinus taeda	unkn.	1.4	1.4	15	80	—	4	
Fraxinus pennsylvanica	unkn.	4.7	.8	28	190	60		artificial collar removed
Ulmus sp.	unkn.	2.1	2.0	13	110	—	3	artificial collar removed
Q. michauxii	unkn	4.9	3.6	10	70	—	3	—
Acer negundo	unkn	2.2	4.2	23	150	1.1	2	unknown
Q. nigra	unkn	2.3	2.3	7	30	—	2	unknown
Platanus occidentalis	unkn	.2	6.1	17	120	—	4	
Q. michauxii	unkn	2.4	6.6	13	110		2	artificial collar; removed
Fraxinus pennsylvanica	unkn	5.0	5.7	23	130	—	2	artificial collar; removed
Ulmus rubra	unkn	4.9	7.4	7	80	—	2	ukn
Fraxinus pennsylvanica	unkn	0.2	8.5	16	90	—	4	—
P. taeda	unkn.	3.5	9.5	40	170	1.4	4	—
Q. michauxii	unkn	8.0	7.4	6	40	—	1	ank. (?drought?/soil?
P. taeda	unkn	7.0	8.1	34	150	0.8	4	—
Q. michauxii	unkn	8.0	3.0	14	70	—	2	drought?
Betula nigra	unkn	9.5	1.9	16	110	—	4	—
Fraxinus pennsylvanica	unkn	7.1	1.9	8	30	—	2	resprout
Pinus taeda	unkn	6.9	3.3	45	150	0.5	4	—

Source: Cultivated, Transplant, Live stake, Ball and Burlap, Pot, Bare Root

Vigor: 4=excellent, 3=good, 2=weak, 1=unlikely to survive year, 0=Dead, Missing.

Damage: Removal, Cut, Mowing, Beaver, Deer, Rodents, Insects, Game, Livestock, Other/Unknown Animal, Human Trampled, Site Too Wet, Site Too Dry, Flood, Drought, Storm, Hurricane, Diseased, Vine Strangulation, Unknown, specify other.

Natural Woody Stem Data: CVS Levels 2 & 3

Leader: SWAB **Project:** Smith/Austin **Team:** 1 **Plot:** 16 **Date:** Sept 08/2006 **Ares** (=100m²): 1 Page 1 of 1

Height Cut-Off for Stems (all stems shorter than this height are ignored and not tallied): ☑ 10cm ☐ 50cm ☐ 100cm ☐ 137cm

Species Name	☑ c	Mod*	Seedlings — Height Classes: Sub-Seed	10 cm-50 cm	50 cm-100 cm	100 cm-137 cm	Saplings — DBH: Sub-Sapl	0-1 cm	1-2.5 cm	Trees — DBH: 2.5-	5-	10-	15-	20-	25-	30-	35-	≥40 (write dbh)
Myrica cerifera					•													
Fraxinus pennsylvanica				7														
Platanus occidentalis					•													
Betula nigra				•														

©2006 Carolina Vegetation Survey. *Module is for Sampling Level 3. 1 2 3 4 5 6 7 8 9 10 Form NWS23, ver 6.2

APPENDIX D

BEHI and NBS DATA FORMS

Total Bank Erosion Calculation

Stream: Smith & Austin			Total Bank Length: ~10,900 lf		Stream Type: E/C	
Observers: Axiom			Date: 9/13/06		Graph Used: NRCS, NCSU, & NCDSWC	
	BEHI (adjective)	Near Bank Stress (adjective)	Erosion Rate (ft/yr)	Length of Bank (ft)	Bank Height (ft)	Erosion Sub-Total (ft^3/yr)
1	SMITH CREEK					
2	EXT	MOD	2.5	400	10	10,000.0
3	LOW	LOW	0.01	100	3.5	3.5
4	MOD	LOW	0.018	775	4	55.8
5	MOD	MOD	0.04	825	4	132
6	MOD	LOW	0.018	1,475	4	106.2
7	MOD	MOD	0.04	750	4	120
8	HIGH	MOD	0.27	325	5	438.8
9	HIGH	MOD	0.27	819	5,5	1216.2
10	AUSTIN CREEK					
11	HIGH	HIGH	0.3	50	11	165.0
12	MOD	MOD	0.04	2550	4	408.0
13	MOD	MOD	0.04	500	4,5	90.0
14	MOD	MOD	0.04	1025	3	123.0
15	MOD	LOW	0.018	1400	4,5	113.4
I. Sum erosion sub-totals for each BEHI/NBS combination					Total Erosion (ft^3/yr)	12,971.9
II. Divide total erosion ($feet^3$) by 27 $feet^3/yard^3$					Total Erosion (yd^3/yr)	480.4
III. Multiply Total Erosion ($yard^3$) by 1.3 (conversion of yd^3 to tons for average material type)					Total Erosion (tons/year)	624.6

Smith Reach 1: rows 2–5
Smith Reach 2: rows 6–8
Smith Reach 3: row 9
Austin Reach 1: rows 11–12
Austin Reach 2: row 13
Austin Reach 3: rows 14–15

Stream: Smith Reach: 1 Cross Section: 0+25-0+75 Date: 9/13/06 Crew: Axiom

Erodibility Variable			Index	Bank Erosion Potential
Bank Height/Bankfull Height				
Bank Height (ft) A	Bankfull Height (ft) B	A/B	8.6	V. High
10	4	2.5		
Root Depth/Bank Height				
Root Depth (ft) C	C/A		8.4	V. High
1	0.1			
Weighted Root Density				
Root Density (%) D	D*(C/A)		10	Ext.
10	1			
Bank Angle				
Bank Angle (degrees)			7.9	High
90				
Surface Protection				
Surface Protection (%)			9.0	V. High
10				
Materials: Sand			+10	
Stratification:			+10	
TOTAL SCORE:			63.9	Ext.

Near Bank Stress = Mod.

Bank Erosion Hazard Index

Erodibility Variable			Bank Erosion Potential: *Very Low*	*Low*	*Moderate*	*High*	*Very High*	*Extreme*
Bank Height/ Bankfull Height		Value	1.0 - 1.1	1.11 - 1.19	1.2 - 1.5	1.6 - 2.0	2.1 - 2.8	>2.8
		Index	1.0 - 1.9	2.0 - 3.9	4.0 - 5.9	6.0 - 7.9	8.0 - 9.0	10
Root Depth/ Bank Height		Value	1.0 - 0.9	0.89 - 0.5	0.49 - 0.3	0.29 - 0.15	0.14 - 0.05	<0.05
		Index	1.0 - 1.9	2.0 - 3.9	4.0 - 5.9	6.0 - 7.9	8.0 - 9.0	10
Weighted Root Density		Value	100 - 80	79 - 55	54 - 30	29 - 15	14 - 5.0	<5.0
		Index	1.0 - 1.9	2.0 - 3.9	4.0 - 5.9	6.0 - 7.9	8.0 - 9.0	10
Bank Angle		Value	0 - 20	21 - 60	61 - 80	81 - 90	91 - 119	>119
		Index	1.0 - 1.9	2.0 - 3.9	4.0 - 5.9	6.0 - 7.9	8.0 - 9.0	10
Surface Protection		Value	100 - 80	79 - 55	54 - 30	29 - 15	14 - 10	<10
		Index	1.0 - 1.9	2.0 - 3.9	4.0 - 5.9	6.0 - 7.9	8.0 - 9.0	10

Bank Materials

Bedrock (Bedrock banks have very low bank erosion potential)
Boulders (Banks composed of boulders have low bank erosion potential)
Cobble (Subtract 10 points. If sand/gravel matrix greater than 50% of bank material, then do not adjust)
Gravel (Add 5-10 points depending on percentage of bank material that is composed of sand)
Sand (Add 10 points)
Silt/Clay (+ 0: no adjustment)

Stratification

Add 5-10 points depending on position of unstable layers in relation to bankfull stage

Total Score

Very Low	*Low*	*Moderate*	*High*	*Very High*	*Extreme*
5-9.5	10-19.5	20-29.5	30-39.5	40-45	46-50

Stream: Smith Reach: 1 Cross Section: 7+00-4+50 Date: 9/13/06 Crew: Axiom

Erodibility Variable			Index	Bank Erosion Potential
Bank Height/Bankfull Height				
Bank Height (ft) A	Bankfull Height (ft) B	A/B	8.6	V. High
10	4	2.5		
Root Depth/Bank Height				
Root Depth (ft) C	C/A		4.9	Mod.
4	0.4			
Weighted Root Density				
Root Density (%) D	D*(C/A)		7.2	High
50	20			
Bank Angle				
Bank Angle (degrees)			5.4	Mod.
75				
Surface Protection				
Surface Protection (%)			6.5	High
25				
Materials: Sand			+10	
Stratification:			+5	
TOTAL SCORE:			47.6	Ext.

Near Bank Stress = Mod.

Bank Erosion Hazard Index

Erodibility Variable		Bank Erosion Potential					
		Very Low	*Low*	*Moderate*	*High*	*Very High*	*Extreme*
Bank Height/ Bankfull Height	Value	1.0 - 1.1	1.11 - 1.19	1.2 - 1.5	1.6 - 2.0	2.1 - 2.8	>2.8
	Index	1.0 - 1.9	2.0 - 3.9	4.0 - 5.9	6.0 - 7.9	8.0 - 9.0	10
Root Depth/ Bank Height	Value	1.0 - 0.9	0.89 - 0.5	0.49 - 0.3	0.29 - 0.15	0.14 - 0.05	<0.05
	Index	1.0 - 1.9	2.0 - 3.9	4.0 - 5.9	6.0 - 7.9	8.0 - 9.0	10
Weighted Root Density	Value	100 - 80	79 - 55	54 - 30	29 - 15	14 - 5.0	<5.0
	Index	1.0 - 1.9	2.0 - 3.9	4.0 - 5.9	6.0 - 7.9	8.0 - 9.0	10
Bank Angle	Value	0 - 20	21 - 60	61 - 80	81 - 90	91 - 119	>119
	Index	1.0 - 1.9	2.0 - 3.9	4.0 - 5.9	6.0 - 7.9	8.0 - 9.0	10
Surface Protection	Value	100 - 80	79 - 55	54 - 30	29 - 15	14 - 10	<10
	Index	1.0 - 1.9	2.0 - 3.9	4.0 - 5.9	6.0 - 7.9	8.0 - 9.0	10

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Sand (Add 10 points)
Silt/Clay (+ 0: no adjustment)

Stratification

Add 5-10 points depending on position of unstable layers in relation to bankfull stage

Total Score

Very Low	*Low*	*Moderate*	*High*	*Very High*	*Extreme*
5-9.5	10-19.5	20-29.5	30-39.5	40-45	46-50

Stream: Smith Reach: 1 Cross Section: 19+00-18+00 Date: 9/13/06 Crew: Axiom

Erodibility Variable			Index	Bank Erosion Potential
Bank Height/Bankfull Height				
Bank Height (ft) A	Bankfull Height (ft) B	A/B	5.3	Mod.
3.5	2.5	1.4		
Root Depth/Bank Height				
Root Depth (ft) C	C/A		2.1	Low
3	0.86			
Weighted Root Density				
Root Density (%) D	D*(C/A)		2.3	Low
90	77			
Bank Angle				
Bank Angle (degrees)			3.2	Low
45				
Surface Protection				
Surface Protection (%)			4.5	Mod.
50				
Materials: cobble w/ sand and gravel			0	
Stratification:			0	
TOTAL SCORE:			17.4	Low

Near Bank Stress = Low

Bank Erosion Hazard Index

Erodibility Variable		Bank Erosion Potential: Very Low	Low	Moderate	High	Very High	Extreme
Bank Height/ Bankfull Height	Value	1.0 - 1.1	1.11 - 1.19	1.2 - 1.5	1.6 - 2.0	2.1 - 2.8	>2.8
	Index	1.0 - 1.9	2.0 - 3.9	4.0 - 5.9	6.0 - 7.9	8.0 - 9.0	10
Root Depth/ Bank Height	Value	1.0 - 0.9	0.89 - 0.5	0.49 - 0.3	0.29 - 0.15	0.14 - 0.05	<0.05
	Index	1.0 - 1.9	2.0 - 3.9	4.0 - 5.9	6.0 - 7.9	8.0 - 9.0	10
Weighted Root Density	Value	100 - 80	79 - 55	54 - 30	29 - 15	14 - 5.0	<5.0
	Index	1.0 - 1.9	2.0 - 3.9	4.0 - 5.9	6.0 - 7.9	8.0 - 9.0	10
Bank Angle	Value	0 - 20	21 - 60	61 - 80	81 - 90	91 - 119	>119
	Index	1.0 - 1.9	2.0 - 3.9	4.0 - 5.9	6.0 - 7.9	8.0 - 9.0	10
Surface Protection	Value	100 - 80	79 - 55	54 - 30	29 - 15	14 - 10	<10
	Index	1.0 - 1.9	2.0 - 3.9	4.0 - 5.9	6.0 - 7.9	8.0 - 9.0	10

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Sand (Add 10 points)

Silt/Clay (+ 0: no adjustment)

Stratification

Add 5-10 points depending on position of unstable layers in relation to bankfull stage

Total Score

Very Low	Low	Moderate	High	Very High	Extreme
5-9.5	10-19.5	20-29.5	30-39.5	40-45	46-50

Stat. 43+75 - 40+50
38+50 - 27+00
18+00 - 17+00
14+50 - 10+25

Stream: Smith Reach: 1 & 2 Cross Section: 3+25 - 0+75 Date: 9/13/06 Crew: Axiom

Erodibility Variable			Index	Bank Erosion Potential
Bank Height/Bankfull Height				
Bank Height (ft) A	Bankfull Height (ft) B	A/B	1.9	V. Low
4	3.5	1.1		
Root Depth/Bank Height				
Root Depth (ft) C	C/A		1.0	V. Low
4	1			
Weighted Root Density				
Root Density (%) D	D*(C/A)		2.5	Low
75	75			
Bank Angle				
Bank Angle (degrees)			5.4	Mod.
75				
Surface Protection				
Surface Protection (%)			1.2	V. Low
95				
Materials: sand.			+10	
Stratification:			0	
TOTAL SCORE:			22	Mod.

Bank Erosion Hazard Index

Erodibility Variable			Bank Erosion Potential					
			Very Low	*Low*	*Moderate*	*High*	*Very High*	*Extreme*
Bank Height/ Bankfull Height		Value	1.0 - 1.1	1.11 - 1.19	1.2 - 1.5	1.6 - 2.0	2.1 - 2.8	>2.8
		Index	1.0 - 1.9	2.0 - 3.9	4.0 - 5.9	6.0 - 7.9	8.0 - 9.0	10
Root Depth/ Bank Height		Value	1.0 - 0.9	0.89 - 0.5	0.49 - 0.3	0.29 - 0.15	0.14 - 0.05	<0.05
		Index	1.0 - 1.9	2.0 - 3.9	4.0 - 5.9	6.0 - 7.9	8.0 - 9.0	10
Weighted Root Density		Value	100 - 80	79 - 55	54 - 30	29 - 15	14 - 5.0	<5.0
		Index	1.0 - 1.9	2.0 - 3.9	4.0 - 5.9	6.0 - 7.9	8.0 - 9.0	10
Bank Angle		Value	0 - 20	21 - 60	61 - 80	81 - 90	91 - 119	>119
		Index	1.0 - 1.9	2.0 - 3.9	4.0 - 5.9	6.0 - 7.9	8.0 - 9.0	10
Surface Protection		Value	100 - 80	79 - 55	54 - 30	29 - 15	14 - 10	<10
		Index	1.0 - 1.9	2.0 - 3.9	4.0 - 5.9	6.0 - 7.9	8.0 - 9.0	10

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Add 5-10 points depending on position of unstable layers in relation to bankfull stage

Total Score

Very Low	*Low*	*Moderate*	*High*	*Very High*	*Extreme*
5-9.5	10-19.5	20-29.5	30-39.5	40-45	46-50

Near Bank Stress = Low

Stat. 45+50-43+75
40+50-38+50
27+00-24+50
21+25-19+00
17+00-14+50
10+25-7+00
4+50-3+25
0+25-0+00

Stream: Smith Reach: 1 & 2 Cross Section: Date: 9/13/06 Crew: Axiom

Erodibility Variable			Index	Bank Erosion Potential
Bank Height/Bankfull Height				
Bank Height (ft) A	Bankfull Height (ft) B	A/B	1.9	V. Low
4	3.5	1.1		
Root Depth/Bank Height				
Root Depth (ft) C	C/A		1.0	V. Low
6	1			
Weighted Root Density				
Root Density (%) D	D*(C/A)		2.5	Low
75	75			
Bank Angle				
Bank Angle (degrees)			5.4	Mod.
75				
Surface Protection				
Surface Protection (%)			1.2	V. Low
95				
Materials: Sand			+10	
Stratification:			0	
TOTAL SCORE:			22	Mod.

Bank Erosion Hazard Index

Erodibility Variable		Bank Erosion Potential					
		Very Low	*Low*	*Moderate*	*High*	*Very High*	*Extreme*
Bank Height/ Bankfull Height	Value	1.0 - 1.1	1.11 - 1.19	1.2 - 1.5	1.6 - 2.0	2.1 - 2.8	>2.8
	Index	1.0 - 1.9	2.0 - 3.9	4.0 - 5.9	6.0 - 7.9	8.0 - 9.0	10
Root Depth/ Bank Height	Value	1.0 - 0.9	0.89 - 0.5	0.49 - 0.3	0.29 - 0.15	0.14 - 0.05	<0.05
	Index	1.0 - 1.9	2.0 - 3.9	4.0 - 5.9	6.0 - 7.9	8.0 - 9.0	10
Weighted Root Density	Value	100 - 80	79 - 55	54 - 30	29 - 15	14 - 5.0	<5.0
	Index	1.0 - 1.9	2.0 - 3.9	4.0 - 5.9	6.0 - 7.9	8.0 - 9.0	10
Bank Angle	Value	0 - 20	21 - 60	61 - 80	81 - 90	91 - 119	>119
	Index	1.0 - 1.9	2.0 - 3.9	4.0 - 5.9	6.0 - 7.9	8.0 - 9.0	10
Surface Protection	Value	100 - 80	79 - 55	54 - 30	29 - 15	14 - 10	<10
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Sand (Add 10 points)
Silt/Clay (+ 0; no adjustment)

Stratification

Add 5-10 points depending on position of unstable layers in relation to bankfull stage

Total Score

Very Low	*Low*	*Moderate*	*High*	*Very High*	*Extreme*
5-9.5	10-19.5	20-29.5	30-39.5	40-45	46-50

Near Bank Stress = Mod.

Stream: Smith Reach: 2 Cross Section: 24+50-21+25 Date: 9/13/06 Crew: Axiom

Erodibility Variable			Index	Bank Erosion Potential
Bank Height/Bankfull Height				
Bank Height (ft) A	Bankfull Height (ft) B	A/B	6.5	High
5	3	1.7		
Root Depth/Bank Height				
Root Depth (ft) C	C/A		3.4	Low
3	0.6			
Weighted Root Density				
Root Density (%) D	D*(C/A)		5.1	Mod.
60	36			
Bank Angle				
Bank Angle (degrees)			6.8	High
85				
Surface Protection				
Surface Protection (%)			5.9	Mod.
30				
Materials: sand/gravel			+10	
Stratification:			0	
TOTAL SCORE:			37.7	High

Near Bank Stress = Mod.

Bank Erosion Hazard Index

Erodibility Variable		Bank Erosion Potential					
		Very Low	*Low*	*Moderate*	*High*	*Very High*	*Extreme*
Bank Height/ Bankfull Height	Value	1.0 - 1.1	1.11 - 1.19	1.2 - 1.5	1.6 - 2.0	2.1 - 2.8	>2.8
	Index	1.0 - 1.9	2.0 - 3.9	4.0 - 5.9	6.0 - 7.9	8.0 - 9.0	10
Root Depth/ Bank Height	Value	1.0 - 0.9	0.89 - 0.5	0.49 - 0.3	0.29 - 0.15	0.14 - 0.05	<0.05
	Index	1.0 - 1.9	2.0 - 3.9	4.0 - 5.9	6.0 - 7.9	8.0 - 9.0	10
Weighted Root Density	Value	100 - 80	79 - 55	54 - 30	29 - 15	14 - 5.0	<5.0
	Index	1.0 - 1.9	2.0 - 3.9	4.0 - 5.9	6.0 - 7.9	8.0 - 9.0	10
Bank Angle	Value	0 - 20	21 - 60	61 - 80	81 - 90	91 - 119	>119
	Index	1.0 - 1.9	2.0 - 3.9	4.0 - 5.9	6.0 - 7.9	8.0 - 9.0	10
Surface Protection	Value	100 - 80	79 - 55	54 - 30	29 - 15	14 - 10	<10
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Sand (Add 10 points)

Silt/Clay (+ 0: no adjustment)

Stratification

Add 5-10 points depending on position of unstable layers in relation to bankfull stage

Total Score

Very Low	*Low*	*Moderate*	*High*	*Very High*	*Extreme*
5-9.5	10-19.5	20-29.5	30-39.5	40-45	46-50

Stream: Smith Reach: 3 Cross Section: 53+69-45+50 Date: 9/13/06 Crew: Axiom

Erodibility Variable			Index	Bank Erosion Potential
Bank Height/Bankfull Height				
Bank Height (ft) A	Bankfull Height (ft) B	A/B	6.0	High
5.5	3.5	1.6		
Root Depth/Bank Height				
Root Depth (ft) C	C/A		1.9	V. Low
5	0.9			
Weighted Root Density				
Root Density (%) D	D*(C/A)		4.0	Mod.
60	54			
Bank Angle				
Bank Angle (degrees)			5.4	Mod.
75				
Surface Protection				
Surface Protection (%)			5.9	Mod.
30				
Materials: Sand/gravel			+10	
Stratification:			0	
TOTAL SCORE:			33.2	High

Near Bank Stress = Mod.

Bank Erosion Hazard Index

Erodibility Variable			Bank Erosion Potential: Very Low	Low	Moderate	High	Very High	Extreme
Bank Height/ Bankfull Height		Value	1.0 - 1.1	1.11 - 1.19	1.2 - 1.5	1.6 - 2.0	2.1 - 2.8	>2.8
		Index	1.0 - 1.9	2.0 - 3.9	4.0 - 5.9	6.0 - 7.9	8.0 - 9.0	10
Root Depth/ Bank Height		Value	1.0 - 0.9	0.89 - 0.5	0.49 - 0.3	0.29 - 0.15	0.14 - 0.05	<0.05
		Index	1.0 - 1.9	2.0 - 3.9	4.0 - 5.9	6.0 - 7.9	8.0 - 9.0	10
Weighted Root Density		Value	100 - 80	79 - 55	54 - 30	29 - 15	14 - 5.0	<5.0
		Index	1.0 - 1.9	2.0 - 3.9	4.0 - 5.9	6.0 - 7.9	8.0 - 9.0	10
Bank Angle		Value	0 - 20	21 - 60	61 - 80	81 - 90	91 - 119	>119
		Index	1.0 - 1.9	2.0 - 3.9	4.0 - 5.9	6.0 - 7.9	8.0 - 9.0	10
Surface Protection		Value	100 - 80	79 - 55	54 - 30	29 - 15	14 - 10	<10
		Index	1.0 - 1.9	2.0 - 3.9	4.0 - 5.9	6.0 - 7.9	8.0 - 9.0	10

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Sand (Add 10 points)

Silt/Clay (+ 0: no adjustment)

Stratification

Add 5-10 points depending on position of unstable layers in relation to bankfull stage

Total Score

Very Low	Low	Moderate	High	Very High	Extreme
5-9.5	10-19.5	20-29.5	30-39.5	40-45	46-50

Stream: Austin Reach: 1 Cross Section: 5+00-5+50 Date: 9/12/06 Crew: Axiom

Erodibility Variable			Index	Bank Erosion Potential
Bank Height/Bankfull Height				
Bank Height (ft) A	Bankfull Height (ft) B	A/B	10	Ext.
11	3.5	3.1		
Root Depth/Bank Height				
Root Depth (ft) C	C/A		1.5	V. Low
10.5	0.96			
Weighted Root Density				
Root Density (%) D	D*(C/A)		3.0	Low
75	72			
Bank Angle				
Bank Angle (degrees)			5.4	Mod.
75				
Surface Protection				
Surface Protection (%)			5.9	Mod.
30				
Materials: cobble w/ sand and gravel			0	
Stratification:			+5	
TOTAL SCORE:			30.9	High

Near Bank Stress = High

Bank Erosion Hazard Index

Erodibility Variable		Bank Erosion Potential					
		Very Low	*Low*	*Moderate*	*High*	*Very High*	*Extreme*
Bank Height/ Bankfull Height	Value	1.0 - 1.1	1.11 - 1.19	1.2 - 1.5	1.6 - 2.0	2.1 - 2.8	>2.8
	Index	1.0 - 1.9	2.0 - 3.9	4.0 - 5.9	6.0 - 7.9	8.0 - 9.0	10
Root Depth/ Bank Height	Value	1.0 - 0.9	0.89 - 0.5	0.49 - 0.3	0.29 - 0.15	0.14 - 0.05	<0.05
	Index	1.0 - 1.9	2.0 - 3.9	4.0 - 5.9	6.0 - 7.9	8.0 - 9.0	10
Weighted Root Density	Value	100 - 80	79 - 55	54 - 30	29 - 15	14 - 5.0	<5.0
	Index	1.0 - 1.9	2.0 - 3.9	4.0 - 5.9	6.0 - 7.9	8.0 - 9.0	10
Bank Angle	Value	0 - 20	21 - 60	61 - 80	81 - 90	91 - 119	>119
	Index	1.0 - 1.9	2.0 - 3.9	4.0 - 5.9	6.0 - 7.9	8.0 - 9.0	10
Surface Protection	Value	100 - 80	79 - 55	54 - 30	29 - 15	14 - 10	<10
	Index	1.0 - 1.9	2.0 - 3.9	4.0 - 5.9	6.0 - 7.9	8.0 - 9.0	10

Bank Materials

Bedrock (Bedrock banks have very low bank erosion potential)

Boulders (Banks composed of boulders have low bank erosion potential)

Cobble (Subtract 10 points. If sand/gravel matrix greater than 50% of bank material, then do not adjust)

Gravel (Add 5-10 points depending on percentage of bank material that is composed of sand)

Sand (Add 10 points)

Silt/Clay (+ 0: no adjustment)

Stratification

Add 5-10 points depending on position of unstable layers in relation to bankfull stage

Total Score

Very Low	*Low*	*Moderate*	*High*	*Very High*	*Extreme*
5-9.5	10-19.5	20-29.5	30-39.5	40-45	46-50

30+00-38+00 39+50-40+25
Stat. 0+00-5+00 44+50-45+50
5+50-32+50

Stream: Austin Reach: 1-3 Cross Section: Date: 9/12/06 Crew: Axiom

Erodibility Variable			Index	Bank Erosion Potential
Bank Height/Bankfull Height				
Bank Height (ft) A	Bankfull Height (ft) B	A/B	8.1	V. High
10.5	3	2.2		
Root Depth/Bank Height				
Root Depth (ft) C	C/A		2.2	Low
5.5	0.85			
Weighted Root Density				
Root Density (%) D	D*(C/A)		5.4	Mod.
40	34			
Bank Angle				
Bank Angle (degrees)			3.2	Low
45				
Surface Protection				
Surface Protection (%)			4.5	Mod.
50				
Materials: cobble w/ sand and gravel			0	
Stratification:			+5	
TOTAL SCORE:			28.4	Mod.

Near Bank Stress = Mod.

Bank Erosion Hazard Index

Erodibility Variable		Bank Erosion Potential: Very Low	Low	Moderate	High	Very High	Extreme
Bank Height/ Bankfull Height	Value	1.0 - 1.1	1.11 - 1.19	1.2 - 1.5	1.6 - 2.0	2.1 - 2.8	>2.8
	Index	1.0 - 1.9	2.0 - 3.9	4.0 - 5.9	6.0 - 7.9	8.0 - 9.0	10
Root Depth/ Bank Height	Value	1.0 - 0.9	0.89 - 0.5	0.49 - 0.3	0.29 - 0.15	0.14 - 0.05	<0.05
	Index	1.0 - 1.9	2.0 - 3.9	4.0 - 5.9	6.0 - 7.9	8.0 - 9.0	10
Weighted Root Density	Value	100 - 80	79 - 55	54 - 30	29 - 15	14 - 5.0	<5.0
	Index	1.0 - 1.9	2.0 - 3.9	4.0 - 5.9	6.0 - 7.9	8.0 - 9.0	10
Bank Angle	Value	0 - 20	21 - 60	61 - 80	81 - 90	91 - 119	>119
	Index	1.0 - 1.9	2.0 - 3.9	4.0 - 5.9	6.0 - 7.9	8.0 - 9.0	10
Surface Protection	Value	100 - 80	79 - 55	54 - 30	29 - 15	14 - 10	<10
	Index	1.0 - 1.9	2.0 - 3.9	4.0 - 5.9	6.0 - 7.9	8.0 - 9.0	10

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Total Score

Very Low	Low	Moderate	High	Very High	Extreme
5-9.5	10-19.5	20-29.5	30-39.5	40-45	46-50

45+50 - 55+25
Stat. 32+50 - 36+00
38+00 - 39+50
40+25 - 44+50

Stream: Austin Reach: 3 Cross Section: Date: 9/12/06 Crew: Axiom

Erodibility Variable			Index	Bank Erosion Potential
Bank Height/Bankfull Height				
Bank Height (ft) A	Bankfull Height (ft) B	A/B	4.0	Mod.
3	2.5	1.2		
Root Depth/Bank Height				
Root Depth (ft) C	C/A		1.0	V. Low
3	1			
Weighted Root Density				
Root Density (%) D	D*(C/A)		1.9	V. Low
90	80			
Bank Angle				
Bank Angle (degrees)			3.4	Low
50				
Surface Protection				
Surface Protection (%)			3.5	Low
60				
Materials: sand/gravel			+10	
Stratification:			0	
TOTAL SCORE:			23.9	Mod.

Bank Erosion Hazard Index

Erodibility Variable			Bank Erosion Potential					
			Very Low	*Low*	*Moderate*	*High*	*Very High*	*Extreme*
Bank Height/ Bankfull Height		Value	1.0 - 1.1	1.11 - 1.19	1.2 - 1.5	1.6 - 2.0	2.1 - 2.8	>2.8
		Index	1.0 - 1.9	2.0 - 3.9	4.0 - 5.9	6.0 - 7.9	8.0 - 9.0	10
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		Index	1.0 - 1.9	2.0 - 3.9	4.0 - 5.9	6.0 - 7.9	8.0 - 9.0	10
Weighted Root Density		Value	100 - 80	79 - 55	54 - 30	29 - 15	14 - 5.0	<5.0
		Index	1.0 - 1.9	2.0 - 3.9	4.0 - 5.9	6.0 - 7.9	8.0 - 9.0	10
Bank Angle		Value	0 - 20	21 - 60	61 - 80	81 - 90	91 - 119	>119
		Index	1.0 - 1.9	2.0 - 3.9	4.0 - 5.9	6.0 - 7.9	8.0 - 9.0	10
Surface Protection		Value	100 - 80	79 - 55	54 - 30	29 - 15	14 - 10	<10
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Sand (Add 10 points)
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Stratification

Add 5-10 points depending on position of unstable layers in relation to bankfull stage

Total Score

Very Low	*Low*	*Moderate*	*High*	*Very High*	*Extreme*
5-9.5	10-19.5	20-29.5	30-39.5	40-45	46-50

Near Bank Stress = Low