KEY BRANCH MITIGATION SITE
(Project No. .00013)

MONITORING YEAR 2 (2005)

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

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I. Executive Summary / Project Abstract

The Key Branch Mitigation Site encompasses approximately 119 acres on the floodplain of Brown Creek. The site is within the Pee Dee River basin in Anson County, North Carolina. Between the years of 1938 and 1993, conversion of the site from a functioning bottomland hardwood ecosystem to agricultural fields resulted in the loss of most wetland functions and values, including nutrient removal/transformation, flood flow alteration and aquatic and wildlife species diversity/abundance. Restoration of wetland ecosystem processes, structures, and composition entailed specific actions, including limiting offsite drainage, increasing discharge onto the site, reconnecting the stream to the floodplain, restoring over 6,000 linear feet of Key Branch through the site, and replanting with bottomland hardwood tree species. Stream construction and restoration was completed in Fall 2003, and included the installation of rootwads and various rock structures, sloping the adjacent streambanks to reduce overall erosion, and installation of native vegetation. Approximately 47,800 bottomland hardwood trees were planted on 70.2 acres of the site during the subsequent season (2004) at an average tree density of 680 trees per acre. First-year monitoring of both hydrology and vegetation was completed in Fall 2004.

The dimension, pattern and profile of the Key Branch channel appear stable. The frequent flooding in upstream portions of the reach during this monitoring year did not cause any serious instability in the channel. The floodplain adjacent to the Key Branch is also stable and appears to contain regular over-bank (6 events this year) flows within the wetlands. There is some difficulty in determining whether the floods are cause by Key Branch or Brown Creek which adjoins the site.

Three of the 14 monitoring gauges met the criteria for a wetland (saturation within 12 inches of the soil surface for greater than 12.5 percent of the growing season, or more than 30 consecutive days). Eleven monitoring gauges had insufficient data due to gauge failures to confirm whether or not they would meet criteria. Comparison of gauge performance between monitoring year 1 (2004) and monitoring year 2 (2005) suggests that gauges 9, 10, 13, and 14 would not have met the wetland criteria whereas gauges 6, 7, 8, 11, and 12 would have. In addition, two of the five wetland reference gauges area did not appear to meet criteria during 2005 due to gauge failure. However, similar to the monitoring gauges, past gauge data suggests that those gauges would have met the criteria during the monitoring period based upon similar hydrological patterns observed in the five gauges in 2004. Hydrology monitoring will continue in 2006.

Six bottomland hardwood species were planted at a density of 680 trees per acre on 70.2 acres of the site in 2004. An additional 24 acres in the northern portion of the site were purposely not planted, and approximately 6.1 acres consisted of existing forested wetlands.

One hundred thirty new sample plots were added in 2005 to the original 8 plots established in 2004, increasing the sampling area to the required 5 percent sample of the total planted area. Survival within the eight original plots established in 2004 ranged between 46 to 1200 percent. Survival for 2005 was estimated based on an assumed planting density of 680 trees per acre because prior data was absent. Tree densities

across the site ranged from 0 to 65 trees per plot, or 0 to 2630 trees per acre. Species misidentification and additional plantings completed in February 2005 resulted in survival numbers greater than 100 percent and tree densities greater than 6 trees per plot, or 240 trees per acre for 2005. Competition-induced tree mortality explain survival numbers that fell below the minimum survival criteria of 80 percent and tree densities less than 6 trees per plot, or 240 trees per acre. Herbaceous cover averaged nearly 100 percent over the site, with a range from 70 to 100 percent. Vegetation monitoring will continue in 2006.

II. Project Background

1. Location and Setting

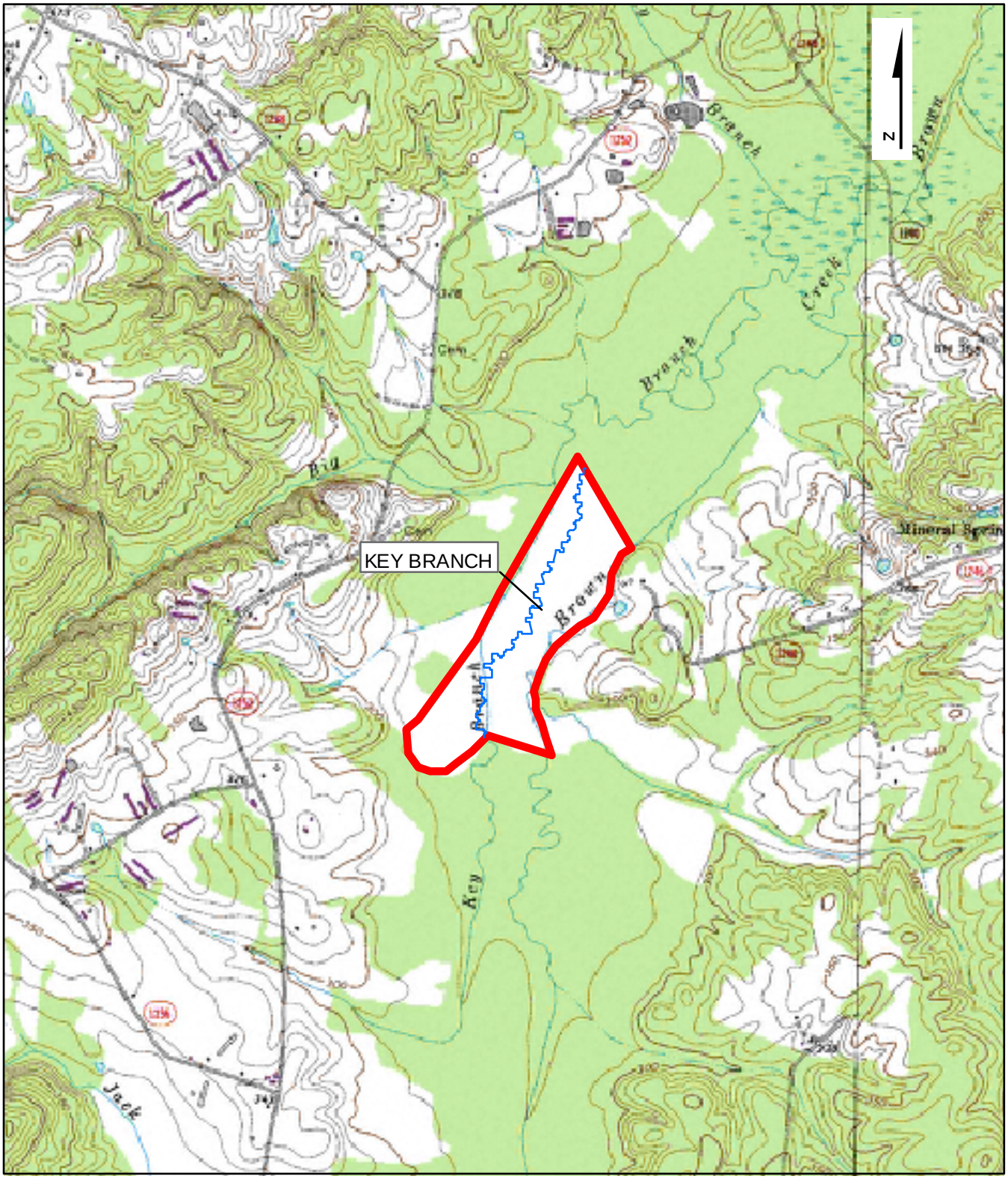
The Key Branch Mitigation Site is located within the Brown Creek watershed (USGS HUC 03040104; NCDWQ sub-basin 030710) of the Pee Dee River basin and occupies approximately 118 acres between Lower White Store Road (SR 1252) and Mineral Springs Church Road (SR 1240) (Figure 1). It is approximately 7 mi (11 km) southeast of Marshville, NC and 12 mi (20 km) southwest of Wadesboro, NC. The watershed is contained within the Triassic Basin of the Piedmont physiographic region and is in close proximity to the contact line between the Triassic Basin and the Carolina Slate Belt. The site represents an inclusion of agricultural land in the otherwise expansive Brown Branch wetland/floodplain complex that extends from the North Carolina/South Carolina line to its confluence with the Yadkin River at the Pee Dee National Wildlife Refuge.

2. Structure and Objectives

Extensive site disturbances between 1938 and 1993 resulted from the conversion of the bottomland hardwood wetland ecosystem to agricultural fields. Approximately 45% of the property had been logged, grubbed, and cleared by 1956. Key Branch was ditched and relocated during the 1950s and 1960s, while Brown Creek was channelized and relocated to its current position during the 1970s. By 1984, most of the lateral ditches were extended half the length of the site, and logging operations ceased. During the 1990s, the westernmost lateral ditches were extended to intersect Key Branch while the easternmost lateral ditches were extended to the southern boundary. On-site restoration efforts focused on 119.3 acres of piedmont bottomland hardwood and 4,313.8 linear feet of ditched Key Branch stream. Additional mitigation provided for the preservation of 3.6 acres of piedmont swamp hardwood forest and preservation of 6.1 acres of existing piedmont levee forest along Brown Creek. Project structures and objectives are summarized in Tables I and II.

Table I. Project Structure Table
Project Number and Name: .00013 (Key Branch Mitigation Site)

Segment/Reach ID	Linear Feet or Acreage
Key Branch – Stream Restoration	6183 feet
Key Branch – Riparian Buffer	14.2 acres
Piedmont Bottomland Hardwood Forest – Wetland Restoration	91.4 acres
Piedmont Swamp Hardwood Forest - Preservation	3.6 acres



0 1,000 2,000 Feet

Source: NCDOT USGS Quadrangle Images, 146.

Ecosystem Enhancement Program

FIGURE 1

PROJECT VICINITY MAP

KEY BRANCH WETLAND & STREAM RESTORATION

Project No. 00013

Monitoring Year 2 of 5

Anson County, North Carolina

THE LOUIS BERGER GROUP, INC.
30A Vreeland Road
Florham Park, NJ 07932

December 2005

Table II. Project Objectives Project Number and Name: .00013 (Key Branch Mitigation Site)			
Segment/Reach ID	**Objectives**	**Linear Feet or Acreage**	**Comment**
Key Branch – Ditch	Relocation	4313.8 feet	
Key Branch – Stream Restoration	Restoration	6183 feet	
Key Branch – Riparian Buffer	Restoration	14.2 acres	
Key Branch – Wetland Restoration Area	Restoration	91.4 acres	

3. Project History and Background

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

Table III. Project Activity and Reporting History Project Number .00013		
Activity or Report	**Calendar Year of Completion or Planned Completion**	**Actual Completion Date**
Site Acquisition	NA*	NA*
Mitigation Planning	Completed	NA*
Site Design	Winter 2001-2002	August 2004
Site Construction	Summer 2002	
Site Planting	Winter 2002-2003	February 2004
Year 1 Hydrological Monitoring	Summer-Fall 2004	October 2004
Year 1 Vegetation Monitoring	Summer 2004	July 2004
Site Replanting		February 2005
Year 2 Hydrological Monitoring	Summer-Fall 2005	October 2005
Year 2 Vegetation Monitoring	Summer 2005	October 2005
Year 3 Hydrological Monitoring	Summer-Fall 2006	
Year 3 Vegetation Monitoring	Summer 2006	
Year 4 Hydrological Monitoring	Summer-Fall 2007	
Year 4 Vegetation Monitoring	Summer 2007	
Year 5 Hydrological Monitoring	Summer-Fall 2008	
Year 5 Vegetation Monitoring	Summer 2008	

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

Contact information regarding project designer, construction, planting and seeding contractor, and monitoring personnel are summarized in Table IV.

Table IV. Project Contact Table
Project Number .00013 (Key Branch Mitigation Site)

Designer	KCI Associates of North Carolina, P.A. Landmark Center One, Suite 201 4601 Six Forks Road Raleigh, North Carolina 27609-5210 Gary Mryncza - (919) 783-9214
Construction Contractor	AVR Group, Inc. (formerly Vaughn Contracting Inc.) P.O. Box 796 Wadesboro, NC 28710 Don Vaughn - (704) 694-6450
Planting Contractor	Professional Tree Forestry Services 640 Butler Ford Rd. Vanceboro, NC 28586 (252) 244-2258
Seeding Contractor	
Monitoring Performers Stream Monitoring Vegetation Monitoring Wetland Monitoring	The Louis Berger Group 1513 Walnut Street Suite 250 Cary, North Carolina 27511 Ed Samanns - (973) 765-1992 Ed Samanns - (973) 765-1992 Ed Samanns - (973) 765-1992

Relevant project background information is summarized in Table V.

Table V. Project Background Table Project Number .00013	
Project County	Anson
Drainage Area	50.06 sq mi
Drainage impervious cover estimate (%)	< 5.0%
Stream Order	First
Physiographic Region	Piedmont
Ecoregion	Triassic Basins
Rosgen Classification of As-built	NA*
Cowardin Classification	PFO1A, PFO1C, PSS1C
Dominant soil types	Chewacla, Tetotum
Reference site ID	Brown Creek
USGS HUC for Project and Reference	03040104
NCDWQ Sub-basin for Project and Reference	030710
NCDWQ classification for Project and Reference	Class C
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	N/A
% of project easement fenced	100

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

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-2D.

III. Project Condition and Monitoring Results

A. Vegetation Assessment

1. Soil Data

General soil conditions found on-site, including level of erosion and percentage of organic matter, are summarized in Table VI.

Table VI. Preliminary Soil Data					
Series	**Max. Depth (in.)**	**% Clay on Surface**	**K**	**T**	**OM %**
Chewacla (ChA)	60	10-35	0.28	5	1.0-4.0
Tetotum (ToA)	60	7-27	0.37	5	0.5-2.0

N

DITCH PLUG

PRESERVED WETLAND (6 ACRES)

EXISTING FOREST (NOT PLANTED)

EXISTING FOREST (NOT PLANTED)

BROWN CREEK

LEVEE BREAK

LEVEE BREAK

MATCHLINE 1

MATCHLINE 1

LEGEND

- ROOT WAD
- LOG VANE
- J-HOOK VANE
- STEP POOL
- ROCK CROSS VANE
- VEGETATION PLOT (VEG 92)
- CROSS SECTION (XSECT 1)
- MONITORING GAUGES
- 2005 GPS THALWEG
- PHOTO LOCATION

SCALE IN FEET

200 0 100

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FIGURE 2A
MONITORING PLAN VIEW
KEY BRANCH WETLAND & STREAM RESTORATION
Project No. 00013
Monitoring Year 2 of 5
Anson County, North Carolina

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December 2005

MATCHLINE 1

MATCHLINE 1

LEVEE BREAK

LEVEE BREAK

LEVEE BREAK

BROWN CREEK

EXISTING CROSSING/FORD OVER KEY BRANCH

POND

N

LEGEND

- ROOT WAD
- LOG VANE
- J-HOOK VANE
- STEP POOL
- ROCK CROSS VANE
- VEGETATION PLOT (VEG 92)
- CROSS SECTION (XSECT 1 / XSECT 1)
- MONITORING GAUGES
- 2005 GPS THALWEG
- PHOTO LOCATION

SCALE IN FEET

200 0 100

Ecosystem Enhancement Program

FIGURE 2B
MONITORING PLAN VIEW
KEY BRANCH WETLAND & STREAM RESTORATION

Project No. 00013
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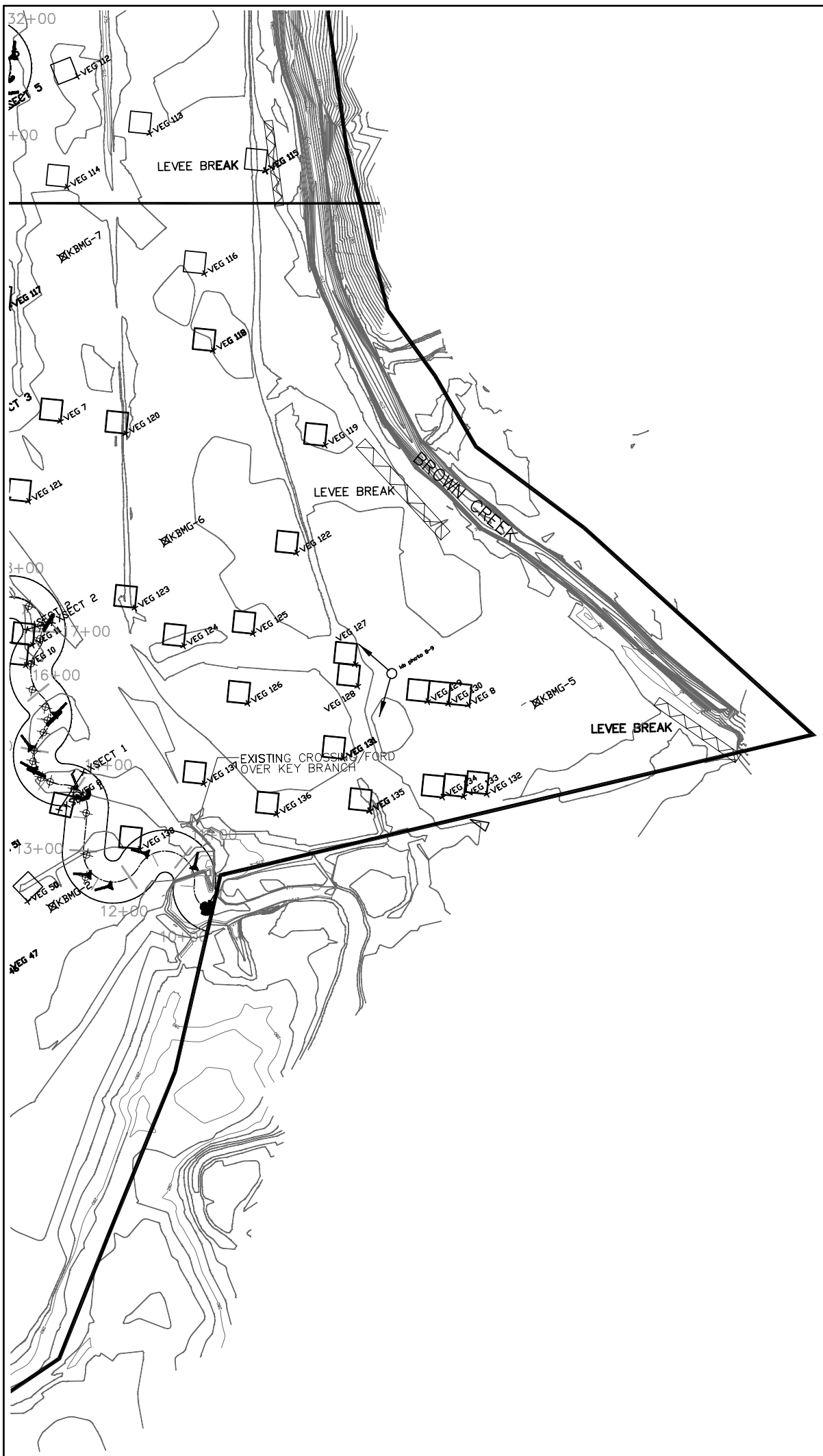

OFF-SITE MONITORING GAUGES

KB WRGW-4
KB WRGW-5
KB WRGW-2
KB WRGW-1
KB WRGW-3

LEGEND

- ROOT WAD
- LOG VANE
- J-HOOK VANE
- STEP POOL
- ROCK CROSS VANE
- VEG 92 — VEGETATION PLOT
- XSECT 1 / XSECT 1 — CROSS SECTION
- MONITORING GAUGES
- 2005 GPS THALWEG
- PHOTO LOCATION

SCALE IN FEET

200 0 100

Ecosystem Enhancement Program

FIGURE 2C
MONITORING PLAN VIEW
KEY BRANCH WETLAND & STREAM RESTORATION
Project No. 00013
Monitoring Year 2 of 5
Anson County, North Carolina

THE LOUIS BERGER GROUP, INC
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December 2005

GROOUNDWATER WELLS			VEGETATION PLOTS		
KB WRGW-1	433215.96	1621550.43	VEG 2	434933.69	1620095.24
KB WRGW-2	433254.28	1621548.44	VEG 20	436077.32	1620951.72
KB WRGW-4	433295.93	1621436.87	VEG 21	436306.66	1621138.31
KB WRGW-5	433261.21	1621422.40	VEG 22	436325.61	1621167.16
KBMG-1	434216.54	1619760.35	VEG 23	436615.42	1621315.68
KBMG-10	436266.76	1620942.39	VEG 24	436877.58	1621490.00
KBMG-11	436072.24	1621192.90	VEG 25	436881.51	1621522.12
KBMG-12	436420.27	1621269.98	VEG 26	436968.96	1621559.94
KBMG-13	435852.56	1621594.67	VEG 27	433779.25	1619234.78
KBMG-14	435583.59	1621130.03	VEG 28	433728.20	1619467.73
KBMG-2	434052.06	1620022.90	VEG 29	433725.50	1619604.55
KBMG-3	434758.19	1620063.85	VEG 3	435764.47	1620498.61
KBMG-4	433701.88	1619849.46	VEG 30	433801.11	1619510.25
KBMG-5	433942.03	1620814.19	VEG 31	433834.68	1619513.59
KBMG-6	434442.07	1620454.90	VEG 32	433869.16	1619513.14
KBMG-7	434892.96	1620542.46	VEG 33	433858.76	1619314.35
KBMG-8	435313.40	1620354.78	VEG 34	433884.02	1619292.72
KBMG-9	435615.08	1620729.05	VEG 35	434007.79	1619180.91
KBSG-1	434624.22	1620223.08	VEG 36	434032.54	1619202.50
KBSG-2	435373.48	1620780.60	VEG 37	434055.00	1619224.85
PHOTOS LOCATIONS			VEG 38	434047.75	1619319.97
kb photo 1-2-3	434098.95	1619321.29	VEG 39	434067.29	1619347.22
kb photo 4-5	436729.27	1621309.24	VEG 4	436885.49	1621389.65
kb photo 6-7	436111.69	1621226.47	VEG 40	434085.51	1619375.38
kb photo 8-9	434092.40	1620647.81	VEG 41	433977.57	1619602.19
CROSS SECTIONS			VEG 42	433984.87	1619648.14
XSECT 1	434173.02	1620106.81	VEG 43	433902.17	1619746.75
XSECT 1	434203.54	1620167.82	VEG 44	434241.65	1619488.85
XSECT 10	436406.83	1621137.91	VEG 45	434223.35	1619516.77
XSECT 10	436392.44	1621200.02	VEG 46	433999.42	1619876.41
XSECT 11	436605.98	1621261.86	VEG 47	434003.91	1619914.46
XSECT 11	436868.92	1621453.11	VEG 48	434128.80	1619885.92
XSECT 11	436605.62	1621334.69	VEG 49	434098.78	1619868.52
XSECT 12	436874.95	1621507.29	VEG 5	436134.79	1621169.80
XSECT 2	434433.49	1620204.62	VEG 50	434077.62	1619994.47
XSECT 2	434423.32	1620243.51	VEG 51	434162.05	1619979.32
XSECT 3	434737.15	1620313.78	VEG 52	434155.88	1619948.45
XSECT 3	434790.82	1620286.47	VEG 53	434246.90	1619992.38
XSECT 4	434989.31	1620365.00	VEG 54	434249.15	1619960.15
XSECT 4	435009.10	1620311.04	VEG 55	434259.82	1619930.29
XSECT 5	435195.87	1620565.56	VEG 56	434266.28	1619895.89
XSECT 5	435133.11	1620568.37	VEG 57	434350.55	1619704.54
XSECT 6	435392.49	1620774.64	VEG 58	434369.75	1619676.43
XSECT 6	435344.48	1620774.40	VEG 59	434532.81	1619695.46
XSECT 7	435618.93	1620839.92	VEG 6	435194.06	1620990.45
XSECT 7	435572.59	1620872.93	VEG 60	434513.79	1619720.89
XSECT 8	435836.32	1620958.85	VEG 61	434494.23	1619747.30
XSECT 8	435874.36	1620992.47	VEG 62	434394.36	1620054.37
XSECT 9	436084.82	1621018.70	VEG 64	434547.55	1620047.69
XSECT 9	436064.67	1621074.60	VEG 65	434388.20	1620086.92
VEGETATION PLOTS			VEG 65	434563.54	1620019.54
VEG 1	434332.52	1619562.48	VEG 66	434582.39	1619989.65
VEG 10	434387.07	1620176.11	VEG 67	434679.62	1619908.87
VEG 100	435817.51	1621414.70	VEG 68	434694.92	1619879.35
VEG 101	435847.51	1621430.39	VEG 69	434810.42	1619887.64
VEG 102	435917.28	1621061.27	VEG 7	434679.81	1620410.72
VEG 103	435894.43	1621085.62	VEG 70	434837.36	1619908.94
VEG 104	435729.36	1621312.90	VEG 71	434862.69	1619926.75
VEG 105	435718.54	1621123.74	VEG 72	434890.08	1619945.44
VEG 106	435498.03	1621191.75	VEG 73	435107.20	1620150.07
VEG 107	435526.06	1621175.01	VEG 74	435094.20	1620180.28
VEG 108	435453.68	1621257.73	VEG 75	435079.73	1620210.89
VEG 109	435444.12	1621116.31	VEG 76	435388.84	1620450.50
VEG 11	434409.08	1620200.12	VEG 77	435404.93	1620420.32
VEG 110	435392.59	1621079.41	VEG 78	435568.92	1620347.61
VEG 111	435361.28	1621072.02	VEG 79	435554.24	1620374.93
VEG 112	435117.60	1620701.29	VEG 8	434022.41	1620729.54
VEG 113	434986.43	1620751.64	VEG 80	435538.33	1620681.68
VEG 114	434980.47	1620601.74	VEG 81	435558.77	1620655.92
VEG 115	434847.43	1620874.00	VEG 82	435578.40	1620629.84
VEG 116	434760.67	1620714.13	VEG 83	435946.31	1620722.86
VEG 117	434868.66	1620431.92	VEG 84	435930.51	1620752.36
VEG 118	434653.40	1620665.61	VEG 85	435976.50	1620785.21
VEG 119	434442.57	1620738.31	VEG 86	435992.93	1620756.08
VEG 12	434759.42	1620245.21	VEG 87	436080.20	1620829.80
VEG 120	434612.62	1620486.54	VEG 88	436060.54	1620859.56
VEG 121	434600.27	1620307.05	VEG 89	436228.10	1620923.27
VEG 122	434324.05	1620617.08	VEG 9	434177.75	1620137.59
VEG 123	434377.76	1620362.88	VEG 90	436247.64	1620898.53
VEG 124	434290.42	1620397.12	VEG 91	436877.44	1621399.32
VEG 125	434252.35	1620497.71	VEG 92	436811.59	1621561.32
VEG 126	434165.31	1620436.35	VEG 93	436377.57	1621288.63
VEG 127	434132.87	1620603.25	VEG 94	436347.54	1621271.41
VEG 128	434102.28	1620593.50	VEG 95	436192.53	1621197.55
VEG 129	434025.46	1620673.53	VEG 96	436022.42	1621379.63
VEG 13	434996.05	1620326.32	VEG 97	436007.66	1621408.32
VEG 130	434008.55	1620698.38	VEG 98	435815.39	1621709.70
VEG 131	434019.13	1620518.38	VEG 99	435832.61	1621681.68
VEG 132	433860.45	1620678.67			
VEG 133	433875.36	1620646.29			
VEG 134	433891.24	1620618.23			
VEG 135	433929.81	1620512.34			
VEG 136	433997.97	1620387.84			
VEG 137	434094.37	1620316.59			
VEG 138	434058.62	1620182.09			
VEG 14	435026.62	1620329.64			
VEG 15	435170.17	1620531.05			
VEG 16	435383.41	1620794.36			
VEG 17	435382.20	1620820.68			
VEG 18	435744.81	1620922.41			
VEG 19	436063.21	1620922.97			

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FIGURE 2D
MONITORING PLAN VIEW
KEY BRANCH WETLAND & STREAM RESTORATION
Project No. 00013
Monitoring Year 2 of 5
Anson County, North Carolina

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December
2005

2. Vegetative Problem Areas

No problem areas were observed regarding lack of vegetation or the presence of exotic/invasive vegetation within the restored forested wetland areas. Information regarding vegetative problem areas is summarized in Table VII.

Table VII. Vegetative Problem Areas

Feature/Issue	Station #/Range	Probable Cause	Photo #
Bare Bank	N/A	N/A	N/A
Bare Bench	N/A	N/A	N/A
Bare Flood Plain	N/A	N/A	N/A
Invasive/Exotic Populations	N/A	N/A	N/A

3. Vegetative Problem Areas Plan View

A plan view illustrating vegetative problem areas was not included in this report due to an absence of observed vegetative problems.

4. Stem Counts

Survival

Approximately 47,800 bottomland hardwood trees were planted on 70.2 acres of the site in February 2004 at an average tree density of 680 trees per acre, or 17 trees per plot. Eight plots were established to monitor vegetative conditions in the wetland restoration area. Observations made during vegetation monitoring activities in July 2004 found that the average tree density of the plots fell below the minimum success criteria of 320 trees per acre, or 8 trees per plot, resulting in replanting activities in February 2005.

Species-specific survival numbers corresponding to the eight original sampling plots established in 2004 range from 46 to 1200 percent. Comparisons between 2004 and 2005 values are based on observed numbers of six specific tree species planted in 2004: *Betula nigra, Fraxinus pennsylvanica, Quercus lyrata, Q. michauxii, Q. nigra*, and *Q. phellos*. Competition from surrounding vegetation, including dense herbaceous cover, could account for the decrease in plant survival between 2004 and 2005. Herbaceous cover averaged 100 percent in the plots where *Betula nigra* survival numbers decreased below the minimum survival threshold of 80 percent. Tall stands of the predominant herbaceous species, such as *Aster vimineus, Mentha suaveolens,* and *Solidago altissima*, formed a thick canopy over the *Betula nigra* trees, decreasing the amount of light the stems were exposed to during the growing season. In addition, certain parts of the site were characterized by thick layers of the vine *Campsis radicans*, where the canopy reduced the number of all vegetative species, herbaceous as well as woody stem.

Additional *Quercus lyrata* and *Q. michauxii* plantings in sampling plots resulted in survival numbers greater than 100 percent. Four of the original eight sampling plots were below the required minimum density criteria in 2004, resulting in additional tree plantings in early 2005. Species misidentification could account for the high survival numbers associated with *Q. laurifolia*. *Quercus nigra*, identified in only one sampling plot, is listed as a species planted on site. However, young *Q. nigra* foliage closely resembles foliage from *Q. laurifolia*, a species identified in three of the eight original sampling plots. It could be possible that the latter was planted instead of the former. Errors encountered during time of planting, including mislabeled nursery stock and/or incorrect field identification, could have resulted in erroneous records. In addition, *Q. laurifolia* was identified in 26 of the 130 new sampling plots, whereas no *Q. nigra* were found, further supporting the notion that *Q. laurifolia* seedlings were planted and misidentified.

Density

One hundred thirty new sampling plots were added in September and November 2005 to increase the size of the sample area to meet the required sampling area criteria of 5 percent. Vegetation plots within the riparian zone are numbered 9 through 26, and vegetation plots established throughout the wetland restoration area number 27 to 138. The minimum survival criteria of 80 percent cannot be used to determine the success of vegetation establishment for sampling plots 9 to 138 due to the absence of prior data for comparison. Therefore, a minimum density criterion of 260 trees per acre, or 6 trees per plot, is used as a substitute to determine success of vegetation establishment.

Average tree density for the wetland restoration area was 485 trees per acre, or 12 trees per plot, for original and newly-established sampling plots. Woody stem densities ranged from 0 to 2632 trees per acre, or 0 to 65 trees per plot. Nearly 30 percent of all plots fell below the minimum success density criteria, and three of the plots possessed no trees.

Competition-induced mortality from dense herbaceous cover evident on site could account for individual plots that did not meet the minimum success criteria. Plots were planted at a density of 680 trees per acre, or 17 trees per plot with an expected final survival density of 260 trees per acre, or 6 trees per plot. Herbaceous cover of 100 percent was observed in 97 percent of sampling plots, of which approximately 31 percent experienced above average mortality. Replanting and volunteer recruitment appear to have increased plant densities above the minimum success density criteria in certain plots. A minimum of 13 percent of plots appear to be replanted because tree densities within these plots are greater than the original planting density of 680 trees per acre, with volunteer or recruitment trees increasing the tree densities above the original planting density limit in an additional 9 percent of plots. Vegetation sampling results are summarized in Table VIII. Raw vegetative sampling forms can be found in Appendix A1.

Table VIII. Stem counts for each species arranged by plot.

Species	Plots																														
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**
Shrubs																																
Baccharis halimifolia [1]	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0
Cephalanthus occidentalis	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cornus amomum	0	0	0	0	0	0	0	0	1	13	16	8	0	12	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cornus sericea [1]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	4	0	2	0	0	0	3	0	0	0	0	0	0
Cornus sp. [1]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
Symphoricarpos orbiculatus [1]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trees																																
Acer negundo [1]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acer rubrum [1]	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Betula nigra	6	0	3	1	0	0	0	1	13	1	0	0	0	0	1	0	0	0	1	0	0	0	5	0	1	2	0	0	1	3	3	1
Betula nigra [1]	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Diospyros virginiana [1]	5	0	0	0	0	0	1	0	0	0	36	0	1	9	0	0	0	0	0	0	0	0	1	0	0	2	0	0	0	0	0	0
Fraxinus pennsylvanica	10	3	11	1	0	10	1	4	0	0	0	1	1	0	0	0	0	1	1	1	3	0	0	1	0	0	3	1	0	0	0	2
Fraxinus pennsylvanica [1]	0	0	8	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0
Liquidambar styraciflua [1]	3	0	0	0	0	1	2	0	0	2	0	0	1	1	0	0	0	0	5	1	0	0	0	0	0	0	0	0	0	0	0	0
Populus deltoides [1]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Quercus falcata var. pagoda	1	0	0	0	8	0	0	7	0	0	1	0	0	0	2	0	0	4	1	1	1	1	0	1	3	1	0	0	0	0	0	0
Quercus laurifolia	0	7	0	0	0	2	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	2
Quercus lyrata	4	14	11	0	4	28	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1	3	5	1	7
Quercus michauxii	11	2	0	0	2	0	3	4	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	1	1	0	3	1	0	0	0	0
Quercus phellos	2	2	1	0	0	4	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0
Salix nigra	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	2	7	1	1	2	3	3	0	0	1	0	0	0	0	0	0
Salix nigra [1]	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ulmus alata [1]	1	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ulmus sp. [1]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Trees per Plot	43	28	39	3	14	45	44	16	19	3	37	2	4	12	4	0	2	12	9	4	6	4	10	3	6	6	11	3	4	9	6	12
Total Herbaceous Cover per Plot (%)	100	100	100	100	100	100	100	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100	100	100	100	100	95

[1] volunteer or recruitment vegetation found within sampling plots

Table VIII (continued). Stem counts for each species arranged by plot.

Species	Plots																															
	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64
Shrubs																																
Baccharis halimifolia [1]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cephalanthus occidentalis	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cornus amomum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cornus sericea [1]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cornus sp. [1]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Symphoricarpos orbiculatus [1]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trees																																
Acer negundo [1]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Acer rubrum [1]	1	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Betula nigra	0	2	1	2	2	0	2	1	0	0	3	1	0	0	1	0	1	3	2	1	2	3	0	3	0	1	1	1	0	2	4	0
Betula nigra [1]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Diospyros virginiana [1]	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	62	14	0	0	6	0	0	1	4	1	0	15	8
Fraxinus pennsylvanica	0	0	2	1	1	4	4	2	0	0	0	3	4	1	0	0	0	0	0	1	1	3	4	3	2	0	16	3	4	5	13	0
Fraxinus pennsylvanica [1]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Liquidambar styraciflua [1]	0	0	4	8	12	5	2	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0
Populus deltoides [1]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Quercus falcata var. pagoda	0	0	0	0	0	3	0	0	0	0	1	0	1	0	0	0	0	0	2	1	1	3	3	6	4	0	4	7	2	3	2	6
Quercus laurifolia	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	3	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Quercus lyrata	2	1	1	0	1	1	9	4	0	2	1	2	0	0	0	3	0	1	1	0	0	4	1	1	7	2	1	0	0	0	0	0
Quercus michauxii	4	3	2	4	3	0	0	5	0	0	0	0	2	0	0	2	3	1	0	0	1	1	5	3	3	7	6	3	5	0	0	0
Quercus phellos	2	0	0	1	0	3	0	3	0	0	1	0	0	0	0	0	0	0	0	0	0	4	4	2	4	1	0	1	0	0	0	2
Salix nigra	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Salix nigra [1]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ulmus alata [1]	0	0	0	0	1	9	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ulmus sp. [1]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Total Trees per Plot	10	6	10	17	22	25	21	16	0	2	6	6	7	1	1	9	11	5	5	65	20	18	17	24	22	12	29	20	12	10	34	16
Total Herbaceous Cover per Plot (%)	100	100	100	100	100	100	100	100	90	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

[1] volunteer or recruitment vegetation found within sampling plots

Table VIII (continued). Stem counts for each species arranged by plot.

Species	Plots																														
	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96
Shrubs																																
Baccharis halimifolia [1]	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cephalanthus occidentalis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cornus amomum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cornus sericea [1]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cornus sp. [1]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Symphoricarpos orbiculatus [1]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trees																																
Acer negundo [1]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Acer rubrum [1]	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	3	0	0	0	1	0	0	0	1
Betula nigra	0	0	2	1	0	1	0	0	0	0	2	2	0	3	0	0	0	0	3	2	3	2	4	3	3	1	1	0	0	0	0	0
Betula nigra [1]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Diospyros virginiana [1]	2	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fraxinus pennsylvanica	1	2	5	7	5	0	0	4	4	1	0	0	1	10	10	0	0	3	5	1	8	1	3	5	1	0	2	1	2	5	3	0
Fraxinus pennsylvanica [1]	0	0	0	0	0	0	0	0	0	0	0	0	0	40	0	0	0	0	1	0	6	0	1	2	1	1	0	0	0	0	0	1
Liquidambar styraciflua [1]	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	2	2	0	23	5	5	1	0	0	0	0	0	3
Populus deltoides [1]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Quercus falcata var. pagoda	4	3	3	0	3	1	5	2	0	0	0	0	0	0	1	0	0	0	7	7	9	7	5	1	2	6	0	0	0	0	1	0
Quercus laurifolia	0	0	1	0	0	0	0	0	0	0	0	0	4	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Quercus lyrata	4	0	7	9	0	1	0	2	0	1	0	3	2	3	3	3	1	10	0	0	0	0	2	0	0	0	0	0	0	0	0	3
Quercus michauxii	4	4	5	1	1	0	1	2	0	1	4	1	0	2	2	0	0	1	5	0	2	4	3	2	3	0	0	0	0	3	2	3
Quercus phellos	1	2	2	1	0	3	0	2	0	0	0	0	1	3	2	1	0	0	6	3	2	0	0	0	2	0	0	0	0	0	0	0
Salix nigra	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Salix nigra [1]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0
Ulmus alata [1]	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	3	0	0	1	0	0	1	0	0	0	0	0	0	0
Ulmus sp. [1]	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Trees per Plot	16	11	25	20	10	6	7	14	5	3	6	6	9	63	19	5	1	14	30	15	32	16	41	21	19	9	4	3	2	8	6	11
Total Herbaceous Cover per Plot (%)	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

[1] volunteer or recruitment vegetation found within sampling plots

Table VIII (continued). Stem counts for each species arranged by plot.

Species	Plots																									
	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123
Shrubs																											
Baccharis halimifolia [1]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	2	0	1	0
Cephalanthus occidentalis	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cornus amomum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cornus sericea [1]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cornus sp. [1]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Symphoricarpos orbiculatus [1]	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trees																											
Acer negundo [1]	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acer rubrum [1]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Betula nigra	5	0	5	0	0	0	1	1	0	0	0	2	1	3	2	4	2	0	1	1	5	5	4	0	3	4	0
Betula nigra [1]	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Diospyros virginiana [1]	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Fraxinus pennsylvanica	2	0	1	0	1	0	0	1	0	0	0	0	0	0	0	0	6	0	0	1	0	3	0	1	0	0	1
Fraxinus pennsylvanica [1]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Liquidambar styraciflua [1]	0	2	2	0	0	0	1	0	0	0	0	0	0	0	1	0	3	0	0	0	0	0	0	1	0	1	0
Populus deltoides [1]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Quercus falcata var. pagoda	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Quercus laurifolia	0	1	2	1	1	1	3	0	0	0	0	1	0	0	0	0	2	0	0	1	0	0	0	4	5	0	2
Quercus lyrata	2	3	6	2	0	4	2	18	0	3	0	0	1	4	5	2	1	3	2	0	1	0	0	3	1	4	1
Quercus michauxii	1	5	0	2	4	0	1	1	0	2	2	0	0	1	0	3	0	2	0	0	0	0	0	0	1	0	0
Quercus phellos	0	2	0	3	0	4	1	0	0	0	0	2	0	0	0	0	3	1	0	0	1	0	0	0	0	0	0
Salix nigra	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Salix nigra [1]	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Ulmus alata [1]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ulmus sp. [1]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Trees per Plot	12	13	17	8	8	9	9	22	0	5	3	5	3	8	8	9	18	6	3	3	8	8	4	10	10	10	5
Total Herbaceous Cover per Plot (%)	100	100	100	100	100	100	100	100	100	100	100	100	100	100	70	100	100	100	100	100	100	100	100	100	100	100	100

[1] volunteer or recruitment vegetation found within sampling plots

Table VIII (continued). Stem counts for each species arranged by plot.

Species	Plots															Year 2 Totals	Year 1 Totals	Survival %[2]
	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138			
Shrubs																		
Baccharis halimifolia [1]	0	2	4	0	0	0	0	0	0	0	0	0	0	0	0	**16**	-	-
Cephalanthus occidentalis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**3**	-	-
Cornus amomum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**53**	-	-
Cornus sericea [1]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**19**	-	-
Cornus sp. [1]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**2**	-	-
Symphoricarpos orbiculatus [1]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**1**	-	-
Trees																		
Acer negundo [1]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**9**	-	-
Acer rubrum [1]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**13**	-	-
Betula nigra	0	0	4	2	0	0	0	1	0	0	4	3	0	0	0	**178**	**24**	**46**
Betula nigra [1]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**2**	-	-
Diospyros virginiana [1]	0	0	0	0	0	4	0	1	0	0	0	0	0	0	0	**180**	-	-
Fraxinus pennsylvanica	0	0	0	1	0	3	5	0	4	1	4	1	0	0	1	**259**	**40**	**100**
Fraxinus pennsylvanica [1]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**68**	-	-
Liquidambar styraciflua [1]	1	0	0	0	0	0	0	0	3	0	0	0	0	0	0	**118**	-	-
Populus deltoides [1]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**1**	-	-
Quercus falcata var. pagoda	0	0	0	0	1	1	5	0	3	1	0	0	0	0	0	**162**	-	-
Quercus laurifolia	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	**70**	**2**	**1200**
Quercus lyrata	0	0	0	2	1	0	0	4	0	1	0	1	1	0	2	**270**	**31**	**229**
Quercus michauxii	1	3	2	1	0	1	1	0	0	3	2	0	0	1	0	**191**	**17**	**129**
Quercus phellos	1	0	0	0	0	1	0	1	0	0	0	0	0	1	0	**98**	**18**	**89**
Salix nigra	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**26**	-	-
Salix nigra [1]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**5**	-	-
Ulmus alata [1]	0	0	0	0	0	0	0	0	2	0	1	0	0	0	0	**28**	-	-
Ulmus sp. [1]	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	**7**	-	-
Total Trees per Plot	3	3	6	8	2	10	11	7	12	6	16	5	1	2	3			
Total Herbaceous Cover per Plot (%)	100	100	100	100	100	100	100	100	100	100	100	95	100	100	100			

[1] volunteer or recruitment vegetation found within sampling plots

[2] results calculated by comparing species-specific values reported for 2004 from vegetation sampling plots 1 through 8 (original NCDOT vegetation plots)

5. Vegetation Plot Photos

Representative photographs of individual vegetation sample plots are provided in Appendix A3.

B. Stream Assessment

1. Stream Problem Areas Plan View

The only stream problem feature observed at the site was bank scour behind two root wads on the outside of the same meander bend (Appendix B1). This meander bend appears to constrict flow during over bank events. The bank at the upstream-most root wad (Sta. 44+70) is vertical, extending from the in-stream end of the structure along the structure arm. Erosion observed along the bank at this location is evidence of an eddy present during high flows. A small area of scour has developed behind the downstream root wad (45+20 to 45+40) from over bank events flowing over and around the arm of the root wad. No maintenance is recommended for either structure, as light scour around the edges of natural root wads and streams are naturally-occurring features. If the scour pocket should expand in subsequent monitoring years, then maintenance will be warranted.

Stream problem features, respective station numbers, and probable causes are summarized in Table IX.

Table IX. Stream Problem Areas
Project Number .00013 (Key Branch Mitigation Site)

Feature Issue	Station Numbers	Suspected Cause	Photo #
Aggradation/ Bar Formation	N/A	N/A	N/A
Bank Scour	44+70	channel constriction	VPA 1
	45+20 - 45+40	channel constriction	VPA 2, VPA 3
Engineered Structures	N/A	N/A	N/A
Others	N/A	N/A	N/A

2. Stream Problem Areas Photos

Representative photographs of each structure/problem area are provided in Appendix B3.

3. Stability Assessment

Stability assessments of categorical stream features are summarized in Table X.

Table X. Categorical Stream Feature Visual Stability Assessment
Project Number .00013 (Key Branch Mitigation Site)

Feature	Initial	MY-01	MY-02	MY-03	MY-04	MY-05
A. Riffles	NA*	100%	100%			
B. Pools	NA*	100%	100%			
C. Thalweg	NA*	100%	99%			
D. Meanders	NA*	100%	99%			
E. Bed General	NA*	100%	100%			
F. Channel General	NA*	100%	100%			
G. Banks	NA*	100%	100%			
H. Vanes / J Hooks etc.	NA*	100%	100%			
I. Wads and Boulders	NA*	97%	97%			

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

4. Quantitative Measurements

Survey data from 2004 and 2005 at Cross Section 3, 5, 6, 8, and 12 correspond well in both horizontal and vertical directions, indicating that the stream is stable. Cross Sections 1, 7, 9, and 11 demonstrate slight shifts, while Cross Sections 2, 4, 7, and 10 demonstrate dramatic horizontal and vertical shifts. The considerable dissimilarity within the latter four cross sections suggests that errors exist in the 2004 data. Field observations that corroborate the deduction that the stream is stable, as observed in the aligned overlain cross sections, include: (1) well established vegetation along the stream banks and floodplain; (2) the lack of evidence of scour; (3) the lack of evidence of excessive deposition of sediment or wrack on the floodplain; and (4) the fact that clear bankfull indicators were identified at the lip of the floodplain, which serves as an indication that the channel has not aggraded or degraded.

Other factors that support the suggestion that the dissimilarity in the overlain cross sections is a function of errors in the 2004 data rather than indicators of an unstable channel include: (1) left and right bank pins are not at the same station and/or elevation in several cross sections; (2) features represented in the 2004 surveys, such as the one-foot rise on the left bank in Cross Section 2, were not observed during the 2005 survey; and (3) the vertical and horizontal shifts depicted in 8 of the 12 cross section do not show a trend - the shifted cross sections are interspersed by non-shifted cross sections and the vertical and horizontal shifts within the data do not have similar magnitude and/or direction.

Overall there has been very little change in cross sectional area and channel dimension within comparable cross sections. The mean depth at bankfull and bankfull width at all

comparable cross sections is approximately the same as in monitoring year 1. The dimension of the channel appears stable throughout the restored reach.

Baseline morphology and pre-restoration hydraulic conditions are summarized in Table XI. Current morphology and hydraulic monitoring information is summarized in Table XII.

Graphical interpretations of cross-sectional data and representative photographs are provided in Appendix B5. Longitudinal plot data and profile are provided in Appendix B6.

Table XI. Baseline Morphology and Hydraulic Summary
Project Number .00013 (Key Branch Mitigation Site)

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)	NA*	NA*	NA*							27		35	22		25	NA*	NA*	NA*
Floodprone Width (ft)	NA*	NA*	NA*							>200		>200	>150		>150	NA*	NA*	NA*
BF Cross Sectional Area (ft^2)	NA*	NA*	NA*							35		37	17		21	NA*	NA*	NA*
BF Mean Depth (ft)	NA*	NA*	NA*							1.01		1.16	0.65		0.93	NA*	NA*	NA*
BF Max Depth (ft)	NA*	NA*	NA*							1.75		2.17	1.15		1.74	NA*	NA*	NA*
Width/Depth Ratio	NA*	NA*	NA*							27		34	27		34	NA*	NA*	NA*
Entrenchment Ratio	NA*	NA*	NA*							>7		>7	>7		>7	NA*	NA*	NA*
Wetted Perimeter (ft)	NA*	NA*	NA*													NA*	NA*	NA*
Hydraulic Radius (ft)	NA*	NA*	NA*													NA*	NA*	NA*
Pattern																		
Channel Beltwidth (ft)	NA*	NA*	NA*										160	180	NA*	NA*	NA*	NA*
Radius of Curvature (ft)	NA*	NA*	NA*							50.0		72.8	35	60	NA*	NA*	NA*	NA*
Meander Wavelength (ft)	NA*	NA*	NA*							370		465	265	378	NA*	NA*	NA*	NA*
Meander Width ratio	NA*	NA*	NA*							6.3		8.1	6.3	8.1	NA*	NA*	NA*	NA*
Profile																		
Riffle length (ft)	NA*	NA*	NA*													NA*	NA*	NA*
Riffle slope (ft/ft)	NA*	NA*	NA*													NA*	NA*	NA*
Pool length (ft)	NA*	NA*	NA*													NA*	NA*	NA*
Pool spacing (ft)	NA*	NA*	NA*													NA*	NA*	NA*
Substrate																		
d50 (mm)	NA*	NA*	NA*													NA*	NA*	NA*
d84 (mm)	NA*	NA*	NA*													NA*	NA*	NA*
Additional Reach Parameters																		
Valley Length (ft)										1590			4149					
Channel Length (ft)										1065			6182					
Sinuosity										1.49			1.49					
Water Surface Slope (ft/ft)										0.19			0.005					
BF slope (ft)																		
Rosgen Classification										C6			C6					
Number of Bankfill Events																		
Extent of BF floodplain (acres)										115+			115+					
*BEHI																		
*Habitat Index																		
*Macrobenthos																		

* Inclusion will be project specific and determined primarily by As-built monitoring plan/success criteria 35
NA* - Historical project documents necessary to provide this data were unavailable at the time of this report

Table XII. Morphology and Hydraulic Monitoring Summary
Project Number .00013 (Key Branch Mitigation Site)

Parameter	Cross Section 1 - Glide					Cross Section 2 - Run					Cross Section 3 - Pool					Cross Section 4 - Pool					Cross Section 5 - Riffle					Cross Section 6 - Glide				
Dimension	MY1	MY2	MY3	MY4	MY5	MY1	MY2	MY3	MY4	MY5	MY1	MY2	MY3	MY4	MY5	MY1	MY2	MY3	MY4	MY5	MY1	MY2	MY3	MY4	MY5	MY1	MY2	MY3	MY4	MY5
BF Width (ft)	18.6	18.4				20.2	23.8				18.1	28.3				17.3	21.3				20.9	22.9				19.7	21.0			
Floodprone Width (ft)	>100	>100				>100	>100				>100	>100				>100	>100				>100	>100				>100	>100			
BF Cross Sectional Area (ft^2)	13.0	16.2				22.2	35.2				18.1	33.4				20.8	24.2				20.9	23.3				21.7	23.8			
BF Mean Depth (ft)	0.7	0.9				1.1	1.5				1.0	1.2				1.2	1.1				1.0	1.0				1.1	1.1			
BF Max Depth (ft)	1.5	1.6				2.0	2.6				1.9	2.5				2.2	2.1				1.8	2.8				2.0	2.1			
Width/Depth Ratio	26.6	20.9				18.4	16.1				18.1	24.0				14.4	18.7				20.9	22.5				17.9	18.5			
Entrenchment Ratio	>5	>5				>5	>5				>5	>5				>5	>5				>5	>5				>5	>5			
Wetted Perimeter (ft)	NA*	18.7				NA*	24.6				NA*	29.2				NA*	22.1				NA*	23.3				NA*	21.5			
Hydraulic Radius (ft)	NA*	0.9				NA*	1.4				NA*	1.1				NA*	1.1				NA*	1.0				NA*	1.1			
Substrate																														
d50 (mm)	0.1	0.1				0.1	0.1				0.1	0.1				0.1	0.1				0.1	0.1				0.1	0.1			
d84 (mm)	0	0				0	0				0	0				0	0				0	0				0	0			

Parameter	Cross Section 7 - Run					Cross Section 8 - Pool					Cross Section 9 - Glide					Cross Section 10 - Riffle					Cross Section 11 - Run					Cross Section 12 - Riffle				
Dimension	MY1	MY2	MY3	MY4	MY5	MY1	MY2	MY3	MY4	MY5	MY1	MY2	MY3	MY4	MY5	MY1	MY2	MY3	MY4	MY5	MY1	MY2	MY3	MY4	MY5	MY1	MY2	MY3	MY4	MY5
BF Width (ft)	22.9	19.9				21.9	19.9				20.0	19.9				21.1	20.0				27.6	26.0				26.9	22.9			
Floodprone Width (ft)	>100	>100				>100	>100				>100	>100				>100	>100				>100	>100				>100	>100			
BF Cross Sectional Area (ft^2)	25.2	23.6				25.9	24.1				26.0	23.8				19.0	20.5				30.4	31.9				26.9	20.5			
BF Mean Depth (ft)	1.1	1.2				1.2	1.2				1.3	1.2				0.9	1.0				1.1	1.2				1.0	0.9			
BF Max Depth (ft)	2.0	1.8				2.3	2.3				2.2	2.0				1.6	1.7				2.2	2.4				2.1	1.9			
Width/Depth Ratio	20.8	16.8				18.5	16.4				15.4	16.6				23.4	19.5				25.1	21.2				26.9	25.6			
Entrenchment Ratio	>5	>5				>5	>5				>5	>5				>5	>5				>5	>5				>5	>5			
Wetted Perimeter (ft)	NA*	20.4				NA*	20.6				NA*	20.5				NA*	20.3				NA*	26.6				NA*	23.4			
Hydraulic Radius (ft)	NA*	1.2				NA*	1.2				NA*	1.2				NA*	1.0				NA*	1.2				NA*	0.9			
Substrate																														
d50 (mm)	0.1	0.1				0.1	0.1				0.1	0.1				0.1	0.1				0.1	0.1				0.1	0.1			
d84 (mm)	0	0				0	0				0	0				0	0				0	0				0	0			

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

Table XII. Morphology and Hydraulic Monitoring Summary (continued)
Project Number .00013 (Key Branch Mitigation Site)

Parameter	MY-01 (2004)			MY-02 (2005)			MY-03 (2006)			MY-04 (2007)			MY-05 (2008)			MY+ (XXXX)		
Pattern	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med
Channel Beltwidth (ft)	NA*	NA*	NA*	91	144	118												
Radius of Curvature (ft)	NA*	NA*	NA*	12	37	26												
Meander Wavelength (ft)	NA*	NA*	NA*	179	215	189												
Meander Width ratio	NA*	NA*	NA*	N/A	N/A	5.3												
Profile																		
Riffle length (ft)	NA*	NA*	NA*	11	120	61												
Riffle slope (ft/ft)	NA*	NA*	NA*	0.000	0.037	0.006												
Pool length (ft)	NA*	NA*	NA*	22	70	46												
Pool spacing (ft)	NA*	NA*	NA*	39	252	113												
Additional Reach Parameters																		
Valley Length (ft)				2003														
Channel Length (ft)				3023														
Sinuosity				1.5														
Water Surface Slope (ft/ft)				0.00041														
BF slope (ft)				0.000245														
Rosgen Classification				C6														
Number of Bankfill Events				6 / 0														
Extent of BF floodplain (acres)				115+														
*BEHI																		
*Habitat Index																		
*Macrobenthos																		

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

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

C. Wetland Assessment

1. Wetland Criteria Attainment

Three of the 14 monitoring gauges met the wetland criteria, with the upper 12 inches of the soil surface remaining saturated for more than 30 consecutive days, or 12.5 percent of the growing season. The remaining monitoring gauges failed before July 2005, resulting in an incomplete description of hydrological activity during the growing season. Comparative analysis of 2004 data found that six of the failed monitoring gauges in 2005 (KBMGs 1, 6, 7, 8, 11, 12) met the wetland hydrology criteria in 2004. Gauges that did not meet the criteria in both monitoring years (KBMGs 9, 10, 13, 14) appeared to be saturated for longer periods in 2005. Therefore, it is possible that had the six gauges performed properly, the results would illustrate that the hydrological regime for the site is indicative of a wetland.

In addition, 3 of the 5 wetland reference gauges met the wetland hydrology criteria in monitoring year 2, with two of the gauges (WRGWs 1, 3) failing during the beginning of the growing season. As with the monitoring gauges, the three wetland reference gauges that did meet the wetland hydrology criteria (WRGWs 2, 4, 5) appeared to be saturated for longer periods than in monitoring year 1. It is possible that, after comparing monitoring year 1 results with monitoring year 2 data, the two wetland reference gauges would have met the wetland hydrology criteria during the growing season if gauges had functioned properly.

Monitoring gauge and vegetation sampling plot results are summarized in Table XIII for the wetland restoration area.

Table XIII. Wetland Criteria Attainment

Tract Mean	Well ID	Well Hydrology Threshold Met?	Tract Mean	Vegetation Plot ID	Vegetation Density Threshold Met?	Tract Mean	Vegetation Plot ID	Vegetation Density Threshold Met?	Tract Mean	Vegetation Plot ID	Vegetation Density Threshold Met?	Tract Mean	Vegetation Plot ID	Vegetation Density Threshold Met?	Tract Mean	Vegetation Plot ID	Vegetation Density Threshold Met?	Tract Mean	Vegetation Plot ID	Vegetation Density Threshold Met?	Tract Mean	Vegetation Plot ID	Vegetation Density Threshold Met?	Tract Mean
	KBMG-1	N/A		1	Y		21	Y		41	N		61	Y		81	N		101	Y		121	Y	
	KBMG-2	Y		2	Y		22	N		42	N		62	Y		82	Y		102	Y		122	Y	
	KBMG-3	Y		3	Y		23	Y		43	Y		63	Y		83	Y		103	Y		123	N	
	KBMG-4	N/A		4	N		24	N		44	Y		64	Y		84	Y		104	Y		124	N	
	KBMG-5	Y		5	Y		25	Y		45	Y		65	Y		85	Y		105	N		125	N	
	KBMG-6	N/A		6	Y		26	Y		46	N		66	Y		86	Y		106	N		126	Y	
	KBMG-7	N/A		7	Y		27	Y		47	N		67	Y		87	Y		107	N		127	Y	
	KBMG-8	N/A		8	Y		28	N		48	Y		68	Y		88	Y		108	N		128	N	
	KBMG-9	N/A		9	Y		29	N		49	Y		69	Y		89	Y		109	N		129	Y	
	KBMG-10	N/A		10	N		30	Y		50	N		70	Y		90	Y		110	Y		130	Y	
	KBMG-11	N/A		11	Y		31	Y		51	N		71	Y		91	N		111	Y		131	Y	
	KBMG-12	N/A		12	N		32	Y		52	Y		72	Y		92	N		112	Y		132	Y	
	KBMG-13	N/A		13	N		33	Y		53	Y		73	N		93	N		113	Y		133	Y	
	KBMG-14	N/A		14	Y		34	Y		54	Y		74	N		94	Y		114	Y		134	Y	
				15	N		35	Y		55	Y		75	Y		95	Y		115	N		135	N	
				16	N		36	Y		56	Y		76	Y		96	Y		116	N		136	N	
				17	N		37	Y		57	Y		77	Y		97	Y		117	Y		137	N	
				18	Y		38	Y		58	Y		78	Y		98	Y		118	Y		138	N	
				19	Y		39	Y		59	Y		79	Y		99	Y		119	N				
				20	N		40	Y		60	Y		80	N		100	Y		120	Y				

N/A indicates monitoring gauge failure during growing season

2. Wetland Problem Areas Plan View

The location of each wetland problem area is shown on Figures 4A and 4B in Appendix C1.

IV. Methodology Section

No deviations regarding established vegetation plot sampling procedures occurred.

Upon initial inspection of monitoring gauges in July 2005 it was noted and reported to EEP that the gauges had not been sealed at the ground surface with a bentonite seal. By late September all of the monitoring gauges had been properly sealed.

APPENDIX A

VEGETATION RAW DATA

A1. Vegetation Survey Data Tables

EEP Stem Count Data Sheet

EEP Project #:	.00013	**Date:**	9/13/2005
Project Name:	Key Branch	**Staff Name(s):**	
Monitoring Contractor:	The Louis Berger Group		E. Samanns
County:	Anson		T. McAulliffe
8 Digit Catalog Unit:	03040104		
Stream/Wetland Name:	Brown Creek		

Plot Location: Veg Plot 1 (NCDOT)

Plot ID	Species	Stem #
1	*Quercus laurifolia*	2
1	*Betula nigra*	6
1	*Fraxinus pennsylvanica*	10
1	*Quercus phellos*	2
1	*Quercus michauxii*	11
1	*Quercus lyrata*	2
1	*Quercus pagoda*	1
	VOLUNTEER	
1	*Diospyros virginiana*	5
1	*Liquidambar styraciflua*	3
1	*Ulmus alata*	1

Plot Location: Veg Plot 2 (NCDOT)

Plot ID	Species	Stem #
2	*Quercus lyrata*	17
2	*Quercus laurifolia*	7
2	*Quercus phellos*	2
2	*Quercus michauxii*	2
2	*Fraxinus pennsylvanica*	3

Plot Location: Veg Plot 3 (NCDOT)

Plot ID	Species	Stem #
3	*Fraxinus pennsylvanica*	11
3	*Quercus lyrata*	11
3	*Betula nigra*	3
3	*Quercus phellos*	1
	VOLUNTEER	
3	*Fraxinus pennsylvanica*	8
3	*Betula nigra*	1
3	*Ulmus alata*	4

Plot Location: Veg Plot 4 (NCDOT)

Plot ID	Species	Stem #
4	*Fraxinus pennsylvanica*	1
4	*Betula nigra*	1
	VOLUNTEER	
4	*Salix nigra*	1

EEP Stem Count Data Sheet

EEP Project #:	.00013	**Date:**	9/13/2005
Project Name:	Key Branch	**Staff Name(s):**	
Monitoring Contractor:	The Louis Berger Group		E. Samanns
County:	Anson		T. McAulliffe
8 Digit Catalog Unit:	03040104		
Stream/Wetland Name:	Brown Creek		

Plot Location: Veg Plot 5 (NCDOT)

Plot ID	Species	Stem #
5	*Quercus pagoda*	8
5	*Quercus michauxii*	2
5	*Quercus lyrata*	4

Plot Location: Veg Plot 7 (NCDOT)

Plot ID	Species	Stem #
7	*Quercus lyrata*	10
7	*Quercus phellos*	7
7	*Quercus laurifolia*	15
7	*Quercus michauxii*	3
7	*Fraxinus pennsylvanica*	1
	VOLUNTEER	
7	*Fraxinus pennsylvanica*	5
7	*Liquidambar styraciflua*	2
7	*Baccharis halimifolia*	1
7	*Diospyros virginiana*	1

Plot Location: Veg Plot 6 (NCDOT)

Plot ID	Species	Stem #
6	*Quercus lyrata*	28
6	*Fraxinus pennsylvanica*	10
6	*Quercus laurifolia*	2
6	*Quercus phellos*	5
	VOLUNTEER	
6	*Liquidambar styraciflua*	1

Plot Location: Veg Plot 8 (NCDOT)

Plot ID	Species	Stem #
8	*Quercus pagoda*	7
8	*Quercus michauxii*	4
8	*Betula nigra*	1
8	*Fraxinus pennsylvanica*	4

EEP Stem Count Data Sheet

EEP Project #:	.00013	**Date:**	9/14/2005
Project Name:	Key Branch	**Staff Name(s):**	
Monitoring Contractor:	The Louis Berger Group		J. Brunton
County:	Anson		R. Bolton
8 Digit Catalog Unit:	03040104		
Stream/Wetland Name:	Brown Creek		

Plot Location: Veg Plot 9 (riparian)

Plot ID	Species	Stem #
9	*Betula nigra*	3
9	*Cephalanthus occidentalis*	1
9	*Salix nigra*	6
9	*Cornus amomum*	1

Plot Location: Veg Plot 11 (riparian)

Plot ID	Species	Stem #
11	*Quercus pagoda*	1
11	*Cornus amomum*	16
	VOLUNTEER	
11	*Diospyros virginiana*	36

Plot Location: Veg Plot 10 (riparian)

Plot ID	Species	Stem #
10	*Betula nigra*	1
10	*Cornus amomum*	13
	VOLUNTEER	
10	*Liquidambar styraciflua*	2

Plot Location: Veg Plot 12 (riparian)

Plot ID	Species	Stem #
12	*Fraxinus pennsylvanica*	1
12	*Quercus michauxii*	1
12	*Cornus amomum*	8

EEP Stem Count Data Sheet

EEP Project #:	.00013	**Date:**	9/14/2005
Project Name:	Key Branch	**Staff Name(s):**	
Monitoring Contractor:	The Louis Berger Group		J. Brunton
County:	Anson		R. Bolton
8 Digit Catalog Unit:	03040104		
Stream/Wetland Name:	Brown Creek		

Plot Location: Veg Plot 13 (riparian)

Plot ID	Species	Stem #
13	*Fraxinus pennsylvanica*	1
13	*Quercus michauxii*	1
	VOLUNTEER	
13	*Liquidambar styraciflua*	1
13	*Diospyros virginiana*	1

Plot Location: Veg Plot 15 (riparian)

Plot ID	Species	Stem #
15	*Betula nigra*	1
15	*Quercus pagoda*	2
15	*Cornus sericea*	10
15	*Quercus michauxii*	1

Plot Location: Veg Plot 14 (riparian)

Plot ID	Species	Stem #
14	*Quercus michauxii*	1
14	*Cornus amomum*	12
	VOLUNTEER	
14	*Liquidambar styraciflua*	1
14	*Diospyros virginiana*	9
14	*Acer rubrum*	1

Plot Location: Veg Plot 16 (riparian)

Plot ID	Species	Stem #
16	*Cornus amomum*	3

EEP Stem Count Data Sheet

EEP Project #:	.00013	**Date:**	9/14/2005
Project Name:	Key Branch	**Staff Name(s):**	
Monitoring Contractor:	The Louis Berger Group		J. Brunton
County:	Anson		R. Bolton
8 Digit Catalog Unit:	03040104		
Stream/Wetland Name:	Brown Creek		

Plot Location: Veg Plot 17 (riparian)

Plot ID	Species	Stem #
17	*Salix nigra*	2

Plot Location: Veg Plot 19 (riparian)

Plot ID	Species	Stem #
19	*Betula nigra*	1
19	*Fraxinus pennsylvanica*	1
19	*Quercus pagoda*	1
19	*Salix nigra*	1
	VOLUNTEER	
19	*Liquidambar styraciflua*	5

Plot Location: Veg Plot 18 (riparian)

Plot ID	Species	Stem #
18	*Quercus pagoda*	4
18	*Fraxinus pennsylvanica*	1
18	*Salix nigra*	7

Plot Location: Veg Plot 20 (riparian)

Plot ID	Species	Stem #
20	*Fraxinus pennsylvanica*	1
20	*Salix nigra*	1
20	*Cornus sericea*	9
20	*Quercus pagoda*	1
	VOLUNTEER	
20	*Liquidambar styraciflua*	1

EEP Stem Count Data Sheet

EEP Project #:	.00013	**Date:**	9/15/2005
Project Name:	Key Branch	**Staff Name(s):**	
Monitoring Contractor:	The Louis Berger Group		J. Brunton
County:	Anson		R. Bolton
8 Digit Catalog Unit:	03040104		
Stream/Wetland Name:	Brown Creek		

Plot Location: Veg Plot 21 (riparian)

Plot ID	Species	Stem #
21	*Quercus pagoda*	1
21	*Fraxinus pennsylvanica*	3
21	*Cornus sp.*	2
21	*Salix nigra*	2

Plot Location: Veg Plot 23 (riparian)

Plot ID	Species	Stem #
23	*Quercus phellos*	1
23	*Betula nigra*	5
23	*Salix nigra*	3
	VOLUNTEER	
23	*Diospyros virginiana*	1

Plot Location: Veg Plot 22 (riparian)

Plot ID	Species	Stem #
22	*Cornus sericea*	2
22	*Salix nigra*	3
22	*Quercus pagoda*	1

Plot Location: Veg Plot 24 (riparian)

Plot ID	Species	Stem #
24	*Quercus michauxii*	1
24	*Fraxinus pennsylvanica*	1
24	*Quercus pagoda*	1

EEP Stem Count Data Sheet

EEP Project #:	.00013	**Date:**	9/15/2005
Project Name:	Key Branch	**Staff Name(s):**	
Monitoring Contractor:	The Louis Berger Group	J. Brunton	
County:	Anson	R. Bolton	
8 Digit Catalog Unit:	03040104	E. Samanns	
Stream/Wetland Name:	Brown Creek	T. McAulliffe	

Plot Location: Veg Plot 25 (riparian)

Plot ID	Species	Stem #
25	*Betula nigra*	1
25	*Quercus pagoda*	3
25	*Quercus phellos*	1
25	*Quercus michauxii*	1

Plot Location: Veg Plot 27

Plot ID	Species	Stem #
27	*Quercus lyrata*	3
27	*Quercus michauxii*	3
27	*Fraxinus pennsylvanica*	3
	VOLUNTEER	
27	*Baccharis halimifolia*	2
27	*Fraxinus pennsylvanica*	2

Plot Location: Veg Plot 26 (riparian)

Plot ID	Species	Stem #
26	*Quercus pagoda*	1
26	*Betula nigra*	2
26	*Salix nigra*	1
26	*Cornus sericea*	3
	VOLUNTEER	
26	*Diospyros virginiana*	2

Plot Location: Veg Plot 28

Plot ID	Species	Stem #
28	*Fraxinus pennsylvanica*	1
28	*Quercus lyrata*	1
28	*Quercus michauxii*	1

EEP Stem Count Data Sheet

EEP Project #:	.00013	**Date:**	9/15/2005
Project Name:	Key Branch	**Staff Name(s):**	
Monitoring Contractor:	The Louis Berger Group		E. Samanns
County:	Anson		T. McAulliffe
8 Digit Catalog Unit:	03040104		
Stream/Wetland Name:	Brown Creek		

Plot Location: Veg Plot 29

Plot ID	Species	Stem #
29	*Quercus lyrata*	3
29	*Betula nigra*	1

Plot Location: Veg Plot 31

Plot ID	Species	Stem #
31	*Betula nigra*	3
31	*Quercus lyrata*	1
31	*Quercus laurifolia*	2

Plot Location: Veg Plot 30

Plot ID	Species	Stem #
30	*Betula nigra*	3
30	*Quercus lyrata*	5
30	*Quercus laurifolia*	1

Plot Location: Veg Plot 32

Plot ID	Species	Stem #
32	*Betula nigra*	1
32	*Quercus laurifolia*	2
32	*Quercus lyrata*	7
32	*Fraxinus pennsylvanica*	2

EEP Stem Count Data Sheet

EEP Project #:	.00013	**Date:**	9/16/2005
Project Name:	Key Branch	**Staff Name(s):**	
Monitoring Contractor:	The Louis Berger Group		E. Samanns
County:	Anson		T. McAulliffe
8 Digit Catalog Unit:	03040104		
Stream/Wetland Name:	Brown Creek		

Plot Location: Veg Plot 33

Plot ID	Species	Stem #
33	*Quercus phellos*	2
33	*Quercus michauxii*	4
33	*Quercus lyrata*	2
	VOLUNTEER	
33	*Diospyros virginiana*	1
33	*Acer rubrum*	1

Plot Location: Veg Plot 35

Plot ID	Species	Stem #
35	*Quercus michauxii*	2
35	*Fraxinus pennsylvanica*	2
35	*Betula nigra*	1
35	*Quercus lyrata*	1
	VOLUNTEER	
35	*Liquidambar styraciflua*	4

Plot Location: Veg Plot 34

Plot ID	Species	Stem #
34	*Quercus michauxii*	3
34	*Betula nigra*	2
34	*Quercus lyrata*	1

Plot Location: Veg Plot 36

Plot ID	Species	Stem #
36	*Quercus michauxii*	4
36	*Quercus laurifolia*	1
36	*Betula nigra*	2
36	*Quercus phellos*	1
36	*Fraxinus pennsylvanica*	1
	VOLUNTEER	
36	*Liquidambar styraciflua*	8

EEP Stem Count Data Sheet

EEP Project #:	.00013	**Date:**	9/16/2005
Project Name:	Key Branch	**Staff Name(s):**	
Monitoring Contractor:	The Louis Berger Group		E. Samanns
County:	Anson		T. McAulliffe
8 Digit Catalog Unit:	03040104		
Stream/Wetland Name:	Brown Creek		

Plot Location: Veg Plot 37

Plot ID	Species	Stem #
37	*Quercus michauxii*	3
37	*Quercus laurifolia*	2
37	*Betula nigra*	2
37	*Fraxinus pennsylvanica*	1
37	*Quercus lyrata*	1
	VOLUNTEER	
37	*Liquidambar styraciflua*	12
37	*Ulmus alata*	1

Plot Location: Veg Plot 38

Plot ID	Species	Stem #
38	*Quercus pagoda*	3
38	*Quercus phellos*	3
38	*Quercus lyrata*	1
38	*Fraxinus pennsylvanica*	4
	VOLUNTEER	
38	*Liquidambar styraciflua*	5
38	*Ulmus alata*	9

Plot Location: Veg Plot 39

Plot ID	Species	Stem #
39	*Quercus lyrata*	9
39	*Fraxinus pennsylvanica*	4
39	*Betula nigra*	2
	VOLUNTEER	
39	*Liquidambar styraciflua*	2
39	*Acer rubrum*	2
39	*Ulmus alata*	1
39	*Diospyros virginiana*	1

Plot Location: Veg Plot 40

Plot ID	Species	Stem #
40	*Quercus phellos*	3
40	*Fraxinus pennsylvanica*	2
40	*Betula nigra*	1
40	*Quercus lyrata*	4
40	*Quercus michauxii*	5
	VOLUNTEER	
40	*Ulmus alata*	1

EEP Stem Count Data Sheet

EEP Project #:	.00013	**Date:**	11/7/2005
Project Name:	Key Branch	**Staff Name(s):**	
Monitoring Contractor:	The Louis Berger Group		E. Samanns
County:	Anson		M. O'Rourke
8 Digit Catalog Unit:	03040104		A. Kornacki
Stream/Wetland Name:	Brown Creek		

Plot Location: Veg Plot 41

Plot ID	Species	Stem #
	no	
	trees/shrubs	

Plot Location: Veg Plot 43

Plot ID	Species	Stem #
43	*Betula nigra*	3
43	*Quercus pagoda*	1
43	*Quercus phellos*	1
43	*Quercus lyrata*	2

Plot Location: Veg Plot 42

Plot ID	Species	Stem #
42	*Quercus lyrata*	2

Plot Location: Veg Plot 44

Plot ID	Species	Stem #
44	*Fraxinus pennsylvanica*	3
44	*Quercus lyrata*	2
44	*Betula nigra*	1
44	*Cephalanthus occidentalis*	1

EEP Stem Count Data Sheet

EEP Project #:	.00013	**Date:**	11/7/2005
Project Name:	Key Branch	**Staff Name(s):**	
Monitoring Contractor:	The Louis Berger Group		E. Samanns
County:	Anson		M. O'Rourke
8 Digit Catalog Unit:	03040104		A. Kornacki
Stream/Wetland Name:	Brown Creek		

Plot Location: Veg Plot 45

Plot ID	Species	Stem #
45	*Quercus michauxii*	2
45	*Fraxinus pennsylvanica*	4
45	*Quercus pagoda*	1

Plot Location: Veg Plot 47

Plot ID	Species	Stem #
47	*Betula nigra*	1

Plot Location: Veg Plot 46

Plot ID	Species	Stem #
46	*Fraxinus pennsylvanica*	1

Plot Location: Veg Plot 48

Plot ID	Species	Stem #
48	*Quercus lyrata*	3
48	*Quercus michauxii*	2
48	*Quercus laurifolia*	3
	VOLUNTEER	
48	*Diospyros virginiana*	1

EEP Stem Count Data Sheet

EEP Project #:	.00013	**Date:**	11/7/2005
Project Name:	Key Branch	**Staff Name(s):**	
Monitoring Contractor:	The Louis Berger Group		E. Samanns
County:	Anson		M. O'Rourke
8 Digit Catalog Unit:	03040104		A. Kornacki
Stream/Wetland Name:	Brown Creek		

Plot Location: Veg Plot 49

Plot ID	Species	Stem #
49	*Quercus michauxii*	3
49	*Betula nigra*	1
49	*Quercus laurifolia*	1
	VOLUNTEER	
49	*Acer negundo*	5
49	*Liquidambar styraciflua*	1

Plot Location: Veg Plot 51

Plot ID	Species	Stem #
51	*Quercus pagoda*	2
51	*Quercus lyrata*	1
51	*Betula nigra*	2

Plot Location: Veg Plot 50

Plot ID	Species	Stem #
50	*Betula nigra*	3
50	*Quercus lyrata*	1
50	*Quercus michauxii*	1

Plot Location: Veg Plot 52

Plot ID	Species	Stem #
52	*Quercus pagoda*	1
52	*Fraxinus pennsylvanica*	1
52	*Betula nigra*	1
	VOLUNTEER	
52	*Diospyros virginiana*	31

EEP Stem Count Data Sheet

EEP Project #:	.00013	**Date:**	11/7/2005
Project Name:	Key Branch	**Staff Name(s):**	
Monitoring Contractor:	The Louis Berger Group		E. Samanns
County:	Anson		M. O'Rourke
8 Digit Catalog Unit:	03040104		A. Kornacki
Stream/Wetland Name:	Brown Creek		

Plot Location: Veg Plot 53

Plot ID	Species	Stem #
53	*Quercus pagoda*	1
53	*Fraxinus pennsylvanica*	1
53	*Betula nigra*	2
53	*Quercus michauxii*	1
	VOLUNTEER	
53	*Acer negundo*	1
53	*Diospyros virginiana*	14

Plot Location: Veg Plot 55

Plot ID	Species	Stem #
55	*Quercus lyrata*	1
55	*Quercus phellos*	4
55	*Quercus michauxii*	5
55	*Quercus pagoda*	3
55	*Fraxinus pennsylvanica*	4

Plot Location: Veg Plot 54

Plot ID	Species	Stem #
54	*Quercus pagoda*	3
54	*Quercus lyrata*	4
54	*Quercus phellos*	4
54	*Betula nigra*	3
54	*Fraxinus pennsylvanica*	3
54	*Quercus michauxii*	1

Plot Location: Veg Plot 56

Plot ID	Species	Stem #
56	*Quercus pagoda*	6
56	*Fraxinus pennsylvanica*	3
56	*Quercus phellos*	2
56	*Quercus michauxii*	3
56	*Betula nigra*	3
56	*Quercus lyrata*	1
	VOLUNTEER	
56	*Diospyros virginiana*	6

EEP Stem Count Data Sheet

EEP Project #:	.00013	**Date:**	11/7/2005
Project Name:	Key Branch	**Staff Name(s):**	
Monitoring Contractor:	The Louis Berger Group		E. Samanns
County:	Anson		M. O'Rourke
8 Digit Catalog Unit:	03040104		A. Kornacki
Stream/Wetland Name:	Brown Creek		

Plot Location: Veg Plot 57

Plot ID	Species	Stem #
57	*Quercus pagoda*	4
57	*Quercus lyrata*	8
57	*Quercus phellos*	4
57	*Fraxinus pennsylvanica*	2
57	*Quercus michauxii*	3
57	*Quercus laurifolia*	1
	VOLUNTEER	
57	*Liquidambar styraciflua*	1

Plot Location: Veg Plot 59

Plot ID	Species	Stem #
59	*Quercus pagoda*	4
59	*Fraxinus pennsylvanica*	16
59	*Quercus lyrata*	1
59	*Betula nigra*	1
59	*Quercus michauxii*	6
	VOLUNTEER	
59	*Diospyros virginiana*	4

Plot Location: Veg Plot 58

Plot ID	Species	Stem #
58	*Quercus michauxii*	7
58	*Quercus lyrata*	2
58	*Quercus phellos*	1
58	*Betula nigra*	1
	VOLUNTEER	
58	*Liquidambar styraciflua*	1

Plot Location: Veg Plot 60

Plot ID	Species	Stem #
60	*Quercus michauxii*	3
60	*Quercus phellos*	1
60	*Quercus pagoda*	7
60	*Fraxinus pennsylvanica*	3
60	*Betula nigra*	1
	VOLUNTEER	
60	*Ulmus sp.*	1
60	*Diospyros virginiana*	4

EEP Stem Count Data Sheet

EEP Project #:	.00013	**Date:**	11/8/2005
Project Name:	Key Branch	**Staff Name(s):**	
Monitoring Contractor:	The Louis Berger Group		E. Samanns
County:	Anson		M. O'Rourke
8 Digit Catalog Unit:	03040104		A. Kornacki
Stream/Wetland Name:	Brown Creek		

Plot Location: Veg Plot 61

Plot ID	Species	Stem #
61	*Fraxinus pennsylvanica*	4
61	*Quercus michauxii*	5
61	*Quercus pagoda*	2
	VOLUNTEER	
61	*Diospyros virginiana*	1

Plot Location: Veg Plot 63

Plot ID	Species	Stem #
63	*Quercus pagoda*	2
63	*Betula nigra*	4
63	*Fraxinus pennsylvanica*	13
	VOLUNTEER	
63	*Diospyros virginiana*	15

Plot Location: Veg Plot 62

Plot ID	Species	Stem #
62	*Fraxinus pennsylvanica*	5
62	*Quercus pagoda*	3
62	*Betula nigra*	2

Plot Location: Veg Plot 64

Plot ID	Species	Stem #
64	*Quercus pagoda*	6
64	*Quercus phellos*	2
	VOLUNTEER	
64	*Diospyros virginiana*	8

EEP Stem Count Data Sheet

EEP Project #:	.00013	**Date:**	11/8/2005
Project Name:	Key Branch	**Staff Name(s):**	
Monitoring Contractor:	The Louis Berger Group		E. Samanns
County:	Anson		M. O'Rourke
8 Digit Catalog Unit:	03040104		A. Kornacki
Stream/Wetland Name:	Brown Creek		

Plot Location: Veg Plot 65

Plot ID	Species	Stem #
65	*Quercus pagoda*	4
65	*Fraxinus pennsylvanica*	1
65	*Quercus michauxii*	4
65	*Quercus lyrata*	4
65	*Quercus phellos*	1
	VOLUNTEER	
65	*Diospyros virginiana*	2

Plot Location: Veg Plot 67

Plot ID	Species	Stem #
67	*Betula nigra*	2
67	*Fraxinus pennsylvanica*	5
67	*Quercus pagoda*	3
67	*Quercus michauxii*	5
67	*Quercus lyrata*	7
67	*Quercus phellos*	2
67	*Quercus laurifolia*	1

Plot Location: Veg Plot 66

Plot ID	Species	Stem #
66	*Quercus pagoda*	3
66	*Quercus michauxii*	4
66	*Quercus phellos*	2
66	*Fraxinus pennsylvanica*	2

Plot Location: Veg Plot 68

Plot ID	Species	Stem #
68	*Quercus lyrata*	9
68	*Quercus michauxii*	1
68	*Quercus phellos*	1
68	*Fraxinus pennsylvanica*	7
68	*Betula nigra*	1
	VOLUNTEER	
68	*Liquidambar styraciflua*	1

EEP Stem Count Data Sheet

EEP Project #:	.00013	**Date:**	11/8/2005
Project Name:	Key Branch	**Staff Name(s):**	
Monitoring Contractor:	The Louis Berger Group		E. Samanns
County:	Anson		M. O'Rourke
8 Digit Catalog Unit:	03040104		A. Kornacki
Stream/Wetland Name:	Brown Creek		

Plot Location: Veg Plot 69

Plot ID	Species	Stem #
69	*Quercus pagoda*	3
69	*Quercus michauxii*	1
69	*Fraxinus pennsylvanica*	5
	VOLUNTEER	
69	*Ulmus sp.*	1

Plot Location: Veg Plot 71

Plot ID	Species	Stem #
71	*Quercus michauxii*	1
71	*Quercus pagoda*	5
	VOLUNTEER	
71	*Acer rubrum*	1

Plot Location: Veg Plot 70

Plot ID	Species	Stem #
70	*Quercus lyrata*	1
70	*Quercus phellos*	3
70	*Betula nigra*	1
70	*Quercus pagoda*	1

Plot Location: Veg Plot 72

Plot ID	Species	Stem #
72	*Quercus pagoda*	2
72	*Quercus lyrata*	2
72	*Fraxinus pennsylvanica*	4
72	*Quercus phellos*	2
72	*Quercus michauxii*	2
	VOLUNTEER	
72	*Diospyros virginiana*	1
72	*Acer rubrum*	1

EEP Stem Count Data Sheet

EEP Project #:	.00013	**Date:**	11/8/2005
Project Name:	Key Branch	**Staff Name(s):**	
Monitoring Contractor:	The Louis Berger Group		E. Samanns
County:	Anson		M. O'Rourke
8 Digit Catalog Unit:	03040104		A. Kornacki
Stream/Wetland Name:	Brown Creek		

Plot Location: Veg Plot 73

Plot ID	Species	Stem #
73	*Fraxinus pennsylvanica*	4
	VOLUNTEER	
73	*Liquidambar styraciflua*	1

Plot Location: Veg Plot 75

Plot ID	Species	Stem #
75	*Betula nigra*	2
75	*Quercus michauxii*	4

Plot Location: Veg Plot 74

Plot ID	Species	Stem #
74	*Quercus michauxii*	1
74	*Quercus lyrata*	1
74	*Fraxinus pennsylvanica*	1
	VOLUNTEER	
74	*Baccharis halimifolia*	1

Plot Location: Veg Plot 76

Plot ID	Species	Stem #
76	*Quercus lyrata*	3
76	*Quercus michauxii*	1
76	*Betula nigra*	2

EEP Stem Count Data Sheet

EEP Project #:	.00013	**Date:**	11/8/2005
Project Name:	Key Branch	**Staff Name(s):**	
Monitoring Contractor:	The Louis Berger Group		E. Samanns
County:	Anson		M. O'Rourke
8 Digit Catalog Unit:	03040104		A. Kornacki
Stream/Wetland Name:	Brown Creek		

Plot Location: Veg Plot 77

Plot ID	Species	Stem #
77	*Quercus laurifolia*	4
77	*Quercus lyrata*	2
77	*Fraxinus pennsylvanica*	1
77	*Quercus phellos*	1
	VOLUNTEER	
77	*Ulmus alata*	1

Plot Location: Veg Plot 79

Plot ID	Species	Stem #
79	*Fraxinus pennsylvanica*	10
79	*Quercus phellos*	2
79	*Quercus michauxii*	2
79	*Quercus pagoda*	1
79	*Quercus lyrata*	3
	VOLUNTEER	
79	*Ulmus alata*	1

Plot Location: Veg Plot 78

Plot ID	Species	Stem #
78	*Quercus phellos*	3
78	*Fraxinus pennsylvanica*	25
78	*Quercus michauxii*	2
78	*Quercus lyrata*	3
78	*Betula nigra*	3
78	*Quercus laurifolia*	1
	VOLUNTEER	
78	*Fraxinus pennsylvanica*	25
78	*Ulmus alata*	1

Plot Location: Veg Plot 80

Plot ID	Species	Stem #
80	*Quercus lyrata*	3
80	*Quercus phellos*	1
80	*Quercus laurifolia*	1

EEP Stem Count Data Sheet

EEP Project #:	.00013	**Date:**	11/8/2005
Project Name:	Key Branch	**Staff Name(s):**	
Monitoring Contractor:	The Louis Berger Group		E. Samanns
County:	Anson		M. O'Rourke
8 Digit Catalog Unit:	03040104		A. Kornacki
Stream/Wetland Name:	Brown Creek		

Plot Location: Veg Plot 81

Plot ID	Species	Stem #
81	*Quercus lyrata*	1

Plot Location: Veg Plot 83

Plot ID	Species	Stem #
83	*Quercus michauxii*	5
83	*Fraxinus pennsylvanica*	5
83	*Quercus pagoda*	7
83	*Quercus phellos*	6
83	*Betula nigra*	3
	VOLUNTEER	
83	*Ulmus alata*	3
83	*Fraxinus pennsylvanica*	1

Plot Location: Veg Plot 82

Plot ID	Species	Stem #
82	*Quercus lyrata*	10
82	*Quercus michauxii*	1
82	*Fraxinus pennsylvanica*	3

Plot Location: Veg Plot 84

Plot ID	Species	Stem #
84	*Quercus pagoda*	7
84	*Quercus phellos*	3
84	*Fraxinus pennsylvanica*	1
84	*Betula nigra*	2
	VOLUNTEER	
84	*Liquidambar styraciflua*	2

EEP Stem Count Data Sheet

EEP Project #:	.00013	**Date:**	11/8/2005
Project Name:	Key Branch	**Staff Name(s):**	
Monitoring Contractor:	The Louis Berger Group		E. Samanns
County:	Anson		M. O'Rourke
8 Digit Catalog Unit:	03040104		A. Kornacki
Stream/Wetland Name:	Brown Creek		

Plot Location: Veg Plot 85

Plot ID	Species	Stem #
85	*Fraxinus pennsylvanica*	8
85	*Quercus michauxii*	2
85	*Quercus phellos*	2
85	*Betula nigra*	3
85	*Quercus pagoda*	9
	VOLUNTEER	
85	*Liquidambar styraciflua*	2
85	*Fraxinus pennsylvanica*	6

Plot Location: Veg Plot 87

Plot ID	Species	Stem #
87	*Betula nigra*	4
87	*Fraxinus pennsylvanica*	3
87	*Quercus pagoda*	5
87	*Quercus michauxii*	3
	VOLUNTEER	
87	*Liquidambar styraciflua*	23
87	*Fraxinus pennsylvanica*	1

Plot Location: Veg Plot 86

Plot ID	Species	Stem #
86	*Quercus pagoda*	7
86	*Quercus michauxii*	4
86	*Betula nigra*	2
86	*Fraxinus pennsylvanica*	1
	VOLUNTEER	
86	*Ulmus alata*	1
86	*Acer rubrum*	1

Plot Location: Veg Plot 88

Plot ID	Species	Stem #
88	*Fraxinus pennsylvanica*	5
88	*Betula nigra*	3
88	*Quercus michauxii*	2
88	*Quercus pagoda*	1
	VOLUNTEER	
88	*Acer rubrum*	3
88	*Liquidambar styraciflua*	5
88	*Fraxinus pennsylvanica*	2

EEP Stem Count Data Sheet

EEP Project #:	.00013	**Date:**	11/9/2005
Project Name:	Key Branch	**Staff Name(s):**	
Monitoring Contractor:	The Louis Berger Group		E. Samanns
County:	Anson		M. O'Rourke
8 Digit Catalog Unit:	03040104		A. Kornacki
Stream/Wetland Name:	Brown Creek		

Plot Location: Veg Plot 89

Plot ID	Species	Stem #
89	*Quercus michauxii*	3
89	*Quercus pagoda*	2
89	*Quercus phellos*	2
89	*Betula nigra*	3
89	*Fraxinus pennsylvanica*	1
	VOLUNTEER	
89	*Liquidambar styraciflua*	5
89	*Fraxinus pennsylvanica*	1
89	*Ulmus alata*	1
89	*Acer negundo*	1

Plot Location: Veg Plot 91

Plot ID	Species	Stem #
91	*Betula nigra*	1
91	*Fraxinus pennsylvanica*	2
	VOLUNTEER	
91	*Salix nigra*	1

Plot Location: Veg Plot 90

Plot ID	Species	Stem #
90	*Quercus pagoda*	6
90	*Betula nigra*	1
	VOLUNTEER	
90	*Liquidambar styraciflua*	1
90	*Fraxinus pennsylvanica*	1

Plot Location: Veg Plot 92

Plot ID	Species	Stem #
92	*Salix nigra*	4
92	*Fraxinus pennsylvanica*	2
	VOLUNTEER	
92	*Acer rubrum*	1

EEP Stem Count Data Sheet

EEP Project #:	.00013	**Date:**	11/9/2005
Project Name:	Key Branch	**Staff Name(s):**	
Monitoring Contractor:	The Louis Berger Group		E. Samanns
County:	Anson		M. O'Rourke
8 Digit Catalog Unit:	03040104		A. Kornacki
Stream/Wetland Name:	Brown Creek		

Plot Location: Veg Plot 93

Plot ID	Species	Stem #
93	*Fraxinus pennsylvanica*	2

Plot Location: Veg Plot 95

Plot ID	Species	Stem #
95	*Quercus michauxii*	2
95	*Fraxinus pennsylvanica*	3
95	*Quercus pagoda*	1

Plot Location: Veg Plot 94

Plot ID	Species	Stem #
94	*Quercus michauxii*	3
94	*Fraxinus pennsylvanica*	5

Plot Location: Veg Plot 96

Plot ID	Species	Stem #
96	*Quercus michauxii*	3
96	*Quercus lyrata*	3
	VOLUNTEER	
96	*Fraxinus pennsylvanica*	1
96	*Liquidambar styraciflua*	3
96	*Acer rubrum*	1

EEP Stem Count Data Sheet

EEP Project #:	.00013	**Date:**	11/9/2005
Project Name:	Key Branch	**Staff Name(s):**	
Monitoring Contractor:	The Louis Berger Group		E. Samanns
County:	Anson		M. O'Rourke
8 Digit Catalog Unit:	03040104		A. Kornacki
Stream/Wetland Name:	Brown Creek		

Plot Location: Veg Plot 97

Plot ID	Species	Stem #
97	*Betula nigra*	5
97	*Fraxinus pennsylvanica*	2
97	*Quercus michauxii*	1
97	*Quercus lyrata*	2
97	*Quercus pagoda*	1
	VOLUNTEER	
97	*Acer rubrum*	1

Plot Location: Veg Plot 99

Plot ID	Species	Stem #
99	*Betula nigra*	5
99	*Quercus lyrata*	7
99	*Quercus laurifolia*	2
99	*Fraxinus pennsylvanica*	1
99	*Quercus pagoda*	1
	VOLUNTEER	
99	*Liquidambar styraciflua*	2
99	*Symphoricarpos orbiculatus*	1

Plot Location: Veg Plot 98

Plot ID	Species	Stem #
98	*Quercus lyrata*	3
98	*Quercus michauxii*	5
98	*Quercus phellos*	2
98	*Quercus laurifolia*	1
	VOLUNTEER	
98	*Liquidambar styraciflua*	2

Plot Location: Veg Plot 100

Plot ID	Species	Stem #
100	*Quercus michauxii*	2
100	*Quercus lyrata*	2
100	*Quercus phellos*	3
100	*Quercus laurifolia*	1

EEP Stem Count Data Sheet

EEP Project #:	.00013	**Date:**	11/9/2005
Project Name:	Key Branch	**Staff Name(s):**	
Monitoring Contractor:	The Louis Berger Group		E. Samanns
County:	Anson		M. O'Rourke
8 Digit Catalog Unit:	03040104		A. Kornacki
Stream/Wetland Name:	Brown Creek		

Plot Location: Veg Plot 101

Plot ID	Species	Stem #
101	*Fraxinus pennsylvanica*	1
101	*Quercus michauxii*	4
101	*Quercus laurifolia*	1
	VOLUNTEER	
101	*Salix nigra*	1
101	*Acer negundo*	1

Plot Location: Veg Plot 103

Plot ID	Species	Stem #
103	*Quercus phellos*	1
103	*Quercus laurifolia*	3
103	*Quercus michauxii*	1
103	*Quercus lyrata*	2
103	*Betula nigra*	1
	VOLUNTEER	
103	*Liquidambar styraciflua*	1

Plot Location: Veg Plot 102

Plot ID	Species	Stem #
102	*Quercus phellos*	4
102	*Quercus lyrata*	4
102	*Quercus laurifolia*	1

Plot Location: Veg Plot 104

Plot ID	Species	Stem #
104	*Quercus lyrata*	18
104	*Fraxinus pennsylvanica*	1
104	*Betula nigra*	1
104	*Quercus michauxii*	1
104	*Betula nigra*	1

EEP Stem Count Data Sheet

EEP Project #:	.00013	**Date:**	11/9/2005
Project Name:	Key Branch	**Staff Name(s):**	
Monitoring Contractor:	The Louis Berger Group		E. Samanns
County:	Anson		M. O'Rourke
8 Digit Catalog Unit:	03040104		A. Kornacki
Stream/Wetland Name:	Brown Creek		

Plot Location: Veg Plot 105

Plot ID	Species	Stem #
	no	
	trees/shrubs	

Plot Location: Veg Plot 107

Plot ID	Species	Stem #
107	*Quercus michauxii*	2
	VOLUNTEER	
107	*Diospyros virginiana*	1

Plot Location: Veg Plot 106

Plot ID	Species	Stem #
106	*Quercus michauxii*	2
106	*Quercus lyrata*	3
106	*Cephalanthus occidentalis*	1

Plot Location: Veg Plot 118

Plot ID	Species	Stem #
118	*Betula nigra*	2
118	*Quercus laurifolia*	1
118	*Quercus phellos*	2

EEP Stem Count Data Sheet

EEP Project #:	.00013	**Date:**	11/9/2005
Project Name:	Key Branch	**Staff Name(s):**	
Monitoring Contractor:	The Louis Berger Group		E. Samanns
County:	Anson		M. O'Rourke
8 Digit Catalog Unit:	03040104		A. Kornacki
Stream/Wetland Name:	Brown Creek		

Plot Location: Veg Plot 109

Plot ID	Species	Stem #
109	*Quercus lyrata*	1
109	*Betula nigra*	1
	VOLUNTEER	
109	*Diospyros virginiana*	1

Plot Location: Veg Plot 111

Plot ID	Species	Stem #
111	*Betula nigra*	2
111	*Quercus lyrata*	5
	VOLUNTEER	
111	*Liquidambar styraciflua*	1

Plot Location: Veg Plot 110

Plot ID	Species	Stem #
110	*Betula nigra*	3
110	*Quercus lyrata*	4
110	*Quercus michauxii*	1

Plot Location: Veg Plot 112

Plot ID	Species	Stem #
112	*Quercus michauxii*	3
112	*Quercus lyrata*	2
112	*Betula nigra*	4

EEP Stem Count Data Sheet

EEP Project #:	.00013	**Date:**	11/9/2005 - 11/10/2005
Project Name:	Key Branch	**Staff Name(s):**	
Monitoring Contractor:	The Louis Berger Group		E. Samanns
County:	Anson		M. O'Rourke
8 Digit Catalog Unit:	03040104		A. Kornacki
Stream/Wetland Name:	Brown Creek		

Plot Location: Veg Plot 113

Plot ID	Species	Stem #
113	*Fraxinus pennsylvanica*	6
113	*Quercus lyrata*	1
113	*Betula nigra*	2
113	*Quercus laurifolia*	2
113	*Quercus phellos*	3
	VOLUNTEER	
113	*Liquidambar styraciflua*	3
113	*Acer rubrum*	1
113	*Baccharis halimifolia*	3

Plot Location: Veg Plot 115

Plot ID	Species	Stem #
115	*Betula nigra*	1
115	*Quercus lyrata*	2

Plot Location: Veg Plot 114

Plot ID	Species	Stem #
114	*Quercus lyrata*	3
114	*Quercus michauxii*	2
114	*Quercus phellos*	1

Plot Location: Veg Plot 116

Plot ID	Species	Stem #
116	*Quercus laurifolia*	1
116	*Betula nigra*	1
116	*Fraxinus pennsylvanica*	1

EEP Stem Count Data Sheet

EEP Project #:	.00013	**Date:**	11/10/2005
Project Name:	Key Branch	**Staff Name(s):**	
Monitoring Contractor:	The Louis Berger Group		E. Samanns
County:	Anson		M. O'Rourke
8 Digit Catalog Unit:	03040104		A. Kornacki
Stream/Wetland Name:	Brown Creek		

Plot Location: Veg Plot 117

Plot ID	Species	Stem #
117	*Betula nigra*	5
117	*Quercus lyrata*	1
117	*Quercus phellos*	1
	VOLUNTEER	
117	*Salix nigra*	1

Plot Location: Veg Plot 119

Plot ID	Species	Stem #
119	*Betula nigra*	4

Plot Location: Veg Plot 118

Plot ID	Species	Stem #
118	*Betula nigra*	5
118	*Fraxinus pennsylvanica*	3

Plot Location: Veg Plot 120

Plot ID	Species	Stem #
120	*Quercus laurifolia*	4
120	*Quercus lyrata*	3
120	*Fraxinus pennsylvanica*	1
	VOLUNTEER	
120	*Baccharis halimifolia*	2
120	*Liquidambar styraciflua*	1
120	*Diospyros virginiana*	1

EEP Stem Count Data Sheet

EEP Project #:	.00013	**Date:**	11/10/2005
Project Name:	Key Branch	**Staff Name(s):**	
Monitoring Contractor:	The Louis Berger Group		E. Samanns
County:	Anson		M. O'Rourke
8 Digit Catalog Unit:	03040104		A. Kornacki
Stream/Wetland Name:	Brown Creek		

Plot Location: Veg Plot 121

Plot ID	Species	Stem #
121	*Quercus laurifolia*	5
121	*Quercus michauxii*	1
121	*Quercus lyrata*	1
121	*Betula nigra*	3

Plot Location: Veg Plot 123

Plot ID	Species	Stem #
123	*Fraxinus pennsylvanica*	1
123	*Quercus laurifolia*	2
123	*Quercus lyrata*	1
123	*Quercus pagoda*	1

Plot Location: Veg Plot 122

Plot ID	Species	Stem #
122	*Betula nigra*	4
122	*Quercus lyrata*	4
	VOLUNTEER	
122	*Baccharis halimifolia*	1
122	*Populus deltoides*	1
122	*Liquidambar styraciflua*	1

Plot Location: Veg Plot 124

Plot ID	Species	Stem #
124	*Quercus phellos*	1
124	*Quercus michauxii*	1
	VOLUNTEER	
124	*Liquidambar styraciflua*	1

EEP Stem Count Data Sheet

EEP Project #:	.00013	**Date:**	11/10/2005
Project Name:	Key Branch	**Staff Name(s):**	
Monitoring Contractor:	The Louis Berger Group		E. Samanns
County:	Anson		M. O'Rourke
8 Digit Catalog Unit:	03040104		A. Kornacki
Stream/Wetland Name:	Brown Creek		

Plot Location: Veg Plot 125

Plot ID	Species	Stem #
125	*Quercus michauxii*	3
	VOLUNTEER	
125	*Baccharis halimifolia*	2

Plot Location: Veg Plot 127

Plot ID	Species	Stem #
127	*Quercus lyrata*	2
127	*Betula nigra*	2
127	*Quercus laurifolia*	2
127	*Fraxinus pennsylvanica*	1
127	*Quercus michauxii*	1

Plot Location: Veg Plot 126

Plot ID	Species	Stem #
126	*Betula nigra*	4
126	*Quercus michauxii*	2
	VOLUNTEER	
126	*Baccharis halimifolia*	4

Plot Location: Veg Plot 128

Plot ID	Species	Stem #
128	*Quercus pagoda*	1
128	*Quercus lyrata*	1

EEP Stem Count Data Sheet

EEP Project #:	.00013	**Date:**	11/10/2005
Project Name:	Key Branch	**Staff Name(s):**	
Monitoring Contractor:	The Louis Berger Group		E. Samanns
County:	Anson		M. O'Rourke
8 Digit Catalog Unit:	03040104		A. Kornacki
Stream/Wetland Name:	Brown Creek		

Plot Location: Veg Plot 129

Plot ID	Species	Stem #
129	*Fraxinus pennsylvanica*	3
129	*Quercus phellos*	1
129	*Quercus pagoda*	1
129	*Quercus michauxii*	1
	VOLUNTEER	
129	*Diospyros virginiana*	4

Plot Location: Veg Plot 131

Plot ID	Species	Stem #
131	*Quercus phellos*	1
131	*Betula nigra*	1
131	*Quercus lyrata*	4
	VOLUNTEER	
131	*Diospyros virginiana*	1

Plot Location: Veg Plot 130

Plot ID	Species	Stem #
130	*Fraxinus pennsylvanica*	5
130	*Quercus pagoda*	5
130	*Quercus michauxii*	1

Plot Location: Veg Plot 132

Plot ID	Species	Stem #
132	*Quercus pagoda*	3
132	*Fraxinus pennsylvanica*	4
	VOLUNTEER	
132	*Liquidambar styraciflua*	3
132	*Ulmus alata*	2

EEP Stem Count Data Sheet

EEP Project #:	.00013	**Date:**	11/10/2005
Project Name:	Key Branch	**Staff Name(s):**	
Monitoring Contractor:	The Louis Berger Group		E. Samanns
County:	Anson		M. O'Rourke
8 Digit Catalog Unit:	03040104		A. Kornacki
Stream/Wetland Name:	Brown Creek		

Plot Location: Veg Plot 133

Plot ID	Species	Stem #
133	*Fraxinus pennsylvanica*	1
133	*Quercus pagoda*	1
133	*Quercus lyrata*	1
133	*Quercus michauxii*	3

Plot Location: Veg Plot 135

Plot ID	Species	Stem #
135	*Betula nigra*	3
135	*Fraxinus pennsylvanica*	1
135	*Quercus lyrata*	1

Plot Location: Veg Plot 134

Plot ID	Species	Stem #
134	*Quercus michauxii*	2
134	*Betula nigra*	4
134	*Fraxinus pennsylvanica*	4
	VOLUNTEER	
134	*Ulmus sp.*	5
134	*Ulmus alata*	1

Plot Location: Veg Plot 136

Plot ID	Species	Stem #
136	*Quercus lyrata*	1

EEP Stem Count Data Sheet

EEP Project #:	.00013	**Date:**	11/10/2005
Project Name:	Key Branch	**Staff Name(s):**	
Monitoring Contractor:	The Louis Berger Group		E. Samanns
County:	Anson		M. O'Rourke
8 Digit Catalog Unit:	03040104		A. Kornacki
Stream/Wetland Name:	Brown Creek		

Plot Location: Veg Plot 137

Plot ID	Species	Stem #
137	*Quercus michauxii*	1
137	*Quercus phellos*	1

Plot Location:

Plot ID	Species	Stem #

Plot Location: Veg Plot 138

Plot ID	Species	Stem #
138	*Quercus lyrata*	2
138	*Fraxinus pennsylvanica*	1

Plot Location:

Plot ID	Species	Stem #

A2. Vegetation Problem Areas Photos

A3. Vegetation Monitoring Plot Photos

Vegetation Plot 1 (9/13/2005, MY2005).

Vegetation Plot 2 (9/13/2005, MY2005).

Vegetation Plot 3 (9/13/2005, MY2005).

Vegetation Plot 4 (9/13/2005, MY2005).

Vegetation Plot 5 (9/13/2005, MY2005).

Vegetation Plot 6 (9/13/2005, MY2005).

Vegetation Plot 7 (9/13/2005, MY2005).

Vegetation Plot 8 (9/13/2005, MY2005).

Vegetation Plot 9 (9/14/2005, MY2005).

Vegetation Plot 10 (9/14/2005, MY2005).

Vegetation Plot 11 (9/14/2005, MY2005).

Vegetation Plot 12 (9/14/2005, MY2005).

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Vegetation Plot 21 (9/15/2005, MY2005).

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Vegetation Plot 22 (9/15/2005, MY2005).

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Vegetation Plot 129 (11/10/2005, MY2005).

Vegetation Plot 130 (11/10/2005, MY2005).

Vegetation Plot 131 (11/10/2005, MY2005).

Vegetation Plot 132 (11/10/2005, MY2005).

Vegetation Plot 133 (11/10/2005, MY2005).

Plot

Photo

Missing

Vegetation Plot 134 (11/10/2005, MY2005).

Vegetation Plot 135 (11/10/2005, MY2005).

Vegetation Plot 136 (11/10/2005, MY2005).

Vegetation Plot 137 (11/10/2005, MY2005).

Vegetation Plot 138 (11/10/2005, MY2005).

APPENDIX B

GEOMORPHOLOGIC RAW DATA

B1. Stream Problem Areas Plan View

N

PRESERVED WETLAND
(6 ACRES)

EXISTING FOREST
(NOT PLANTED)

EXISTING FOREST
(NOT PLANTED)

BROWN CREEK

71+82.86
71+00
70+00
69+00
68+00
67+00
66+00
65+00
64+00
63+00
62+00
61+00
60+00
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31+00
30+00
29+00
28+00
27+00
26+00
25+00
24+00

XSECT 12
kb photo 4-5
XSECT 11
XSECT 10
KBMG-12
XSECT 10
XSECT 10
KBMG-10
kb photo 6-7
KBMG-11
XSECT 9
XSECT 9
KBMG-13
VP-3
VP-2
VP-1
XSECT 8
XSECT 8
KBMG-14
XSECT 7
XSECT 7
KBMG-9
XSECT 6
KBMG-2
XSECT 6
KBMG-8
XSECT 5
KBMG-7
XSECT 4
XSECT 4

MATCHLINE 1
MATCHLINE 1

LEGEND

- ROOT WAD
- LOG VANE
- J-HOOK VANE
- STEP POOL
- ROCK CROSS VANE
- XSECT 1 / XSECT 1 — CROSS SECTION
- MONITORING GAUGES
- 2005 GPS THALWEG
- PHOTO LOCATION
- AREA OF IMPAIRMENT

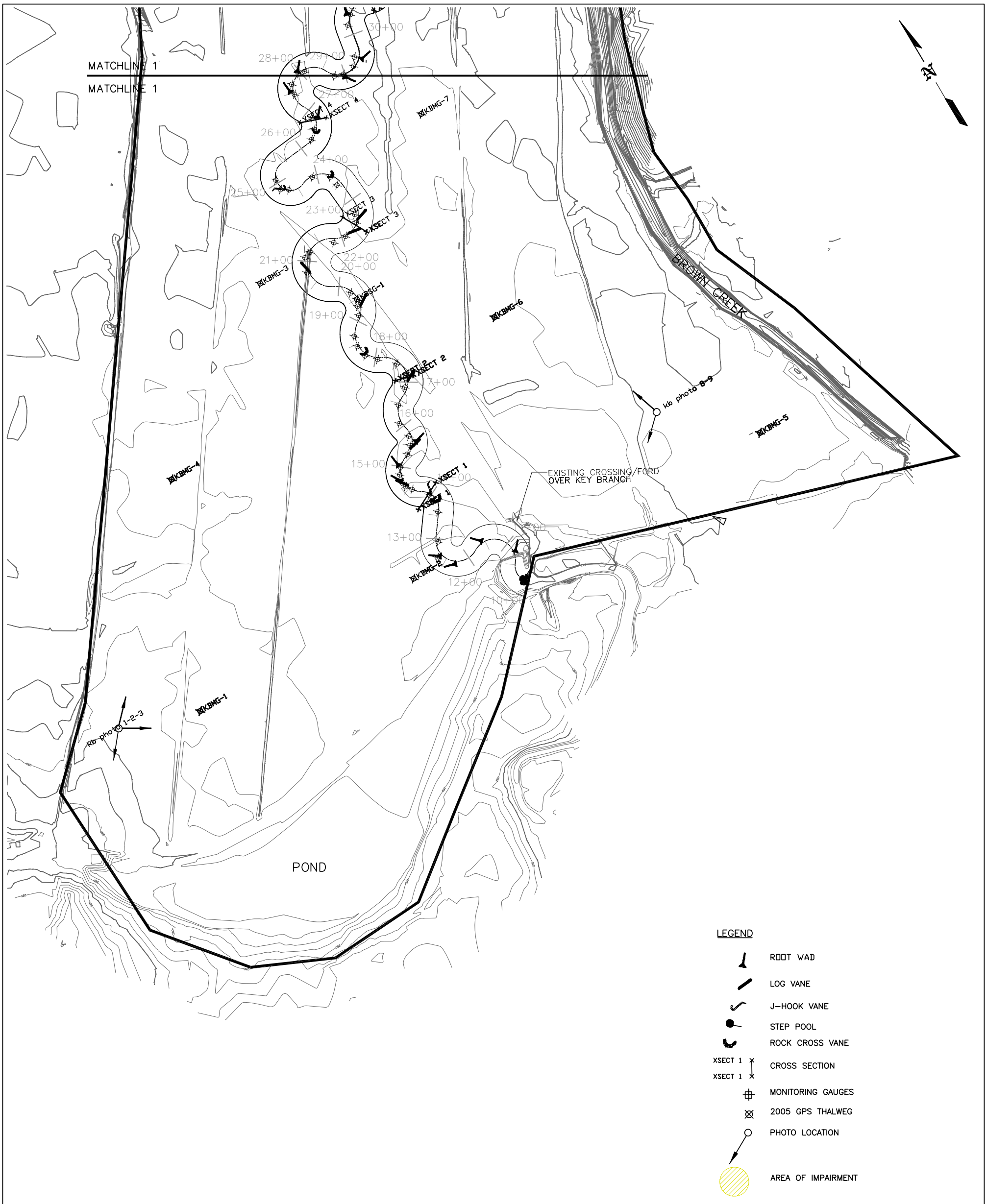
SCALE IN FEET
200 0 100

Ecosystem Enhancement Program

FIGURE 3A
STREAM PROBLEM AREA PLAN VIEW
KEY BRANCH WETLAND & STREAM RESTORATION
Project No. 00013
Monitoring Year 2 of 5
Anson County, North Carolina

THE LOUIS BERGER GROUP, INC
30A Vreeland Road
Florham Park, NJ 07932

December
2005



Ecosystem Enhancement Program

FIGURE 3B
STREAM PROBLEM AREA PLAN VIEW
KEY BRANCH WETLAND & STREAM RESTORATION
Project No. 00013
Monitoring Year 2 of 5
Anson County, North Carolina

THE LOUIS BERGER GROUP, INC
30A Vreeland Road
Florham Park, NJ 07932

December 2005

B2. Representative Stream Problem Area Photos

VPA 1. Station 44+70 - Evidence of eroding vertical banks and exposed root

VPA 2. Station 45+20 to 45+40 - Evidence of bank scour behind root wad.

VPA 3. Station 45+20 to 45+40 - Evidence of bank scour behind root wad.

B3. Stream Photo-station Photos

Photo Station 1.

Photo Station 2.

Photo Station 3.

Photo Station 4.

Photo Station 5.

Photo Station 6.

Photo Station 7.

Photo Station 8.

Photo Station 9.

B4. Exhibit Table B.1 - Qualitative Visual Stability Assessment

Table B1. Qualitative Visual Stability Assessment Project Number .00013 (Key Branch Mitigation Site)						
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?	30	30	N/A	100	
	2. Armor Stable?	30	30	N/A	100	
	3. Facet grade appears stable?	30	30	N/A	100	
	4. Minimal evidence of embedding / fining?	30	30	N/A	100	
	5. Length appropriate?	30	30	N/A	100	100
B. Pools	1. Present?	28	28	N/A		
	2. Sufficient depth?	28	28	N/A		
	3. Length appropriate?	28	28	N/A		
C. Thalweg	1. Upstream of meander bend centering?	48	49	N/A	98	
	2. Downstream of meander bend centering?	49	49	N/A	100	99
D. Meanders	1. Outer bend in state of limited / controlled erosion	47	49	N/A	96	
	2. Of those eroding, # w/concomitant point bar formation?	0	2	N/A	100	
	3. Apparent Rc within spec?	49	49	N/A	100	
	4. Sufficient Floodplain Access and Relief?	49	49	N/A	100	99
E. Bed General	1. General channel bed aggradation areas?	N/A	N/A	0 / 6182	100	
	2. Channel bed degradation?	N/A	N/A	0 / 6182	100	100
F. Vanes	1. Free of back or arm scour?	43	43	N/A	100	
	2. Height appropriate?	43	43	N/A	100	
	3. Angle and geometry appear appropriate?	43	43	N/A	100	
	4. Free of piping or other structural failures?	43	43	N/A	100	100
G. Wads / Boulders	1. Free of Scour?	30	32	N/A	94	
	2. Footing Stable?	32	32	N/A	100	100

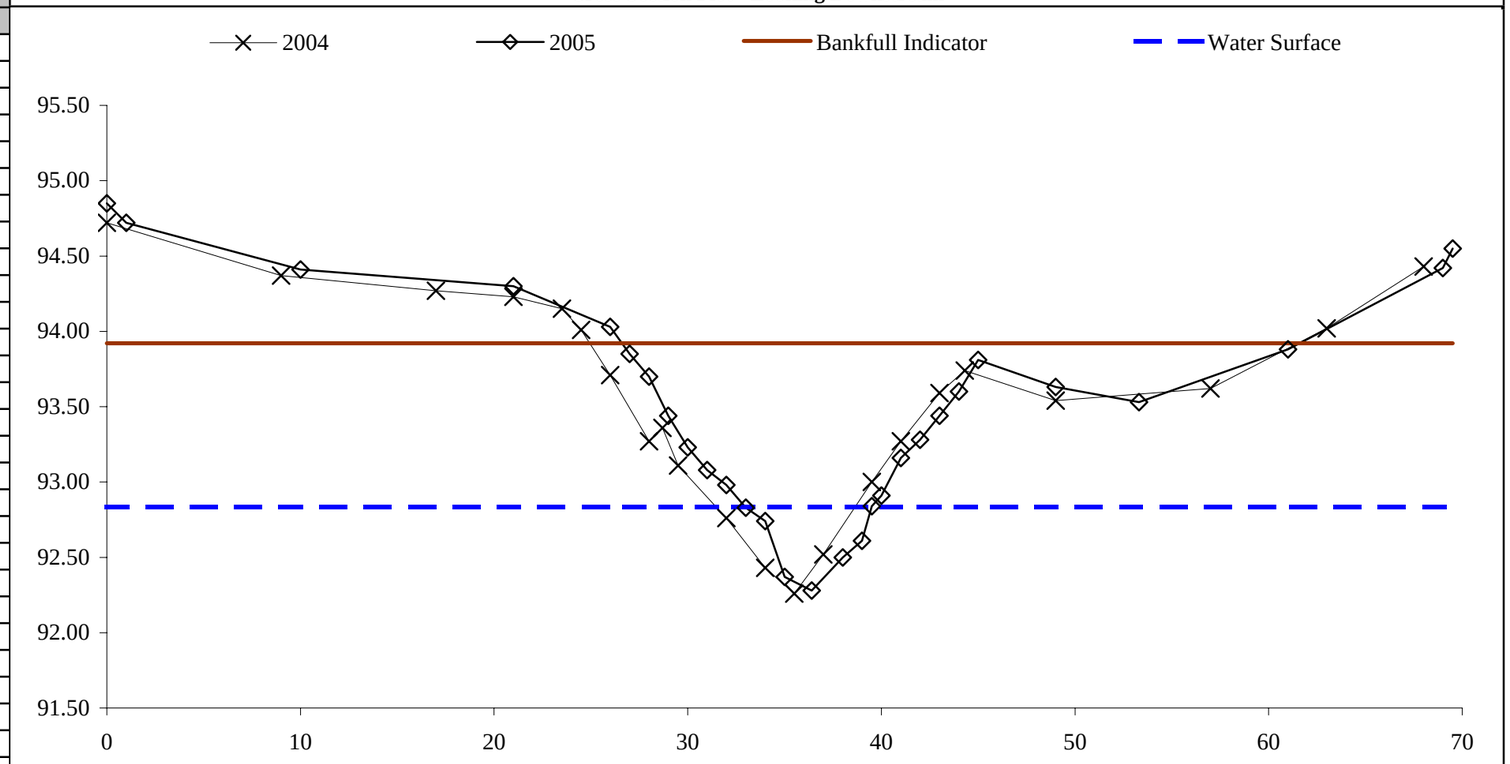
B5. Cross section Plots and Raw Data Tables

Survey Data					
					LEP
Station	Elevation	Station	Foreshot	Elevation	Feature
2004		*2005*			
0.0	94.72	0.0	5.15	94.85	LPIN Metal
9.0	94.37	1.0	5.28	94.72	LPIN Wood (DOT)
17.0	94.27	10.0	5.59	94.41	
21.0	94.23	21.0	5.70	94.30	
23.5	94.15	26.0	5.97	94.03	BKF / LB
24.5	94.01	27.0	6.15	93.85	
26.0	93.71	28.0	6.30	93.70	
28.0	93.27	29.0	6.56	93.44	
28.7	93.36	30.0	6.77	93.23	
29.5	93.11	31.0	6.92	93.08	
32.0	92.76	32.0	7.02	92.98	
34.0	92.43	33.0	7.17	92.83	LEW
35.5	92.26	34.0	7.26	92.74	SB
37.0	92.52	35.0	7.63	92.37	SB
39.5	93.00	36.4	7.72	92.28	CL
41.0	93.27	38.0	7.50	92.50	SB
43.0	93.59	39.0	7.39	92.61	SB
44.3	93.74	39.5	7.16	92.84	REW
49.0	93.54	40.0	7.09	92.91	
57.0	93.62	41.0	6.84	93.16	
63.0	94.02	42.0	6.72	93.28	
68.0	94.43	43.0	6.56	93.44	
		44.0	6.40	93.60	
		45.0	6.19	93.81	BKF / RB
		49.0	6.37	93.63	
		53.3	6.47	93.53	
		61.0	6.12	93.88	
		69.0	5.58	94.42	RPIN Wood (DOT)
		69.5	5.45	94.55	RPIN Metal

Summary Data		
	2004	*2005*
Bankfull Cross Sectional Area (ft^2)	13.0	16.2
Bankfull Width (ft)	18.6	18.4
Bankfull Mean Depth (ft)	0.7	0.9
Bankfull Max Depth (ft)	1.5	1.6
Width/Depth Ratio	26.6	20.9
Entrenchment Ratio	>5	>5
Classification	C6	C6

Cross Section 1 - Glide

Cross Section Plot - Looking Downstream



Cross Section Photo - Looking Downstream

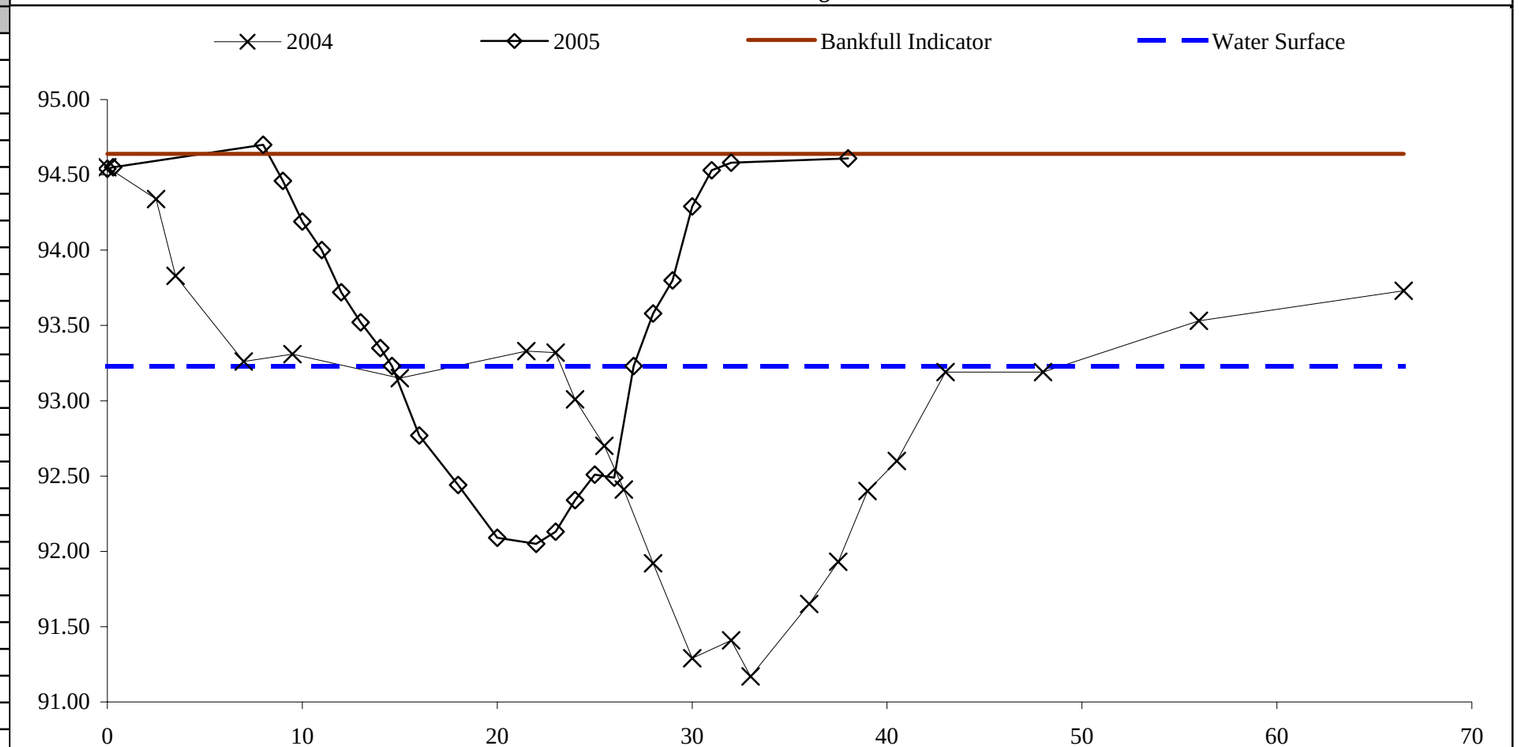
Title	Cross Section 1			
Ecosystem Enhancement Program	**Project**	Key Branch Mitigation Site Anson County, NC	**Project #**	.00013
			Figure	
	Survey Date	**Survey Weather**	**Field Team**	**Location**
	November 30, 2005	Sunny 35°	Michael O'Rourke, Lesley Yaukey	14+00

Survey Data					
					LEP
Station	**Elevation**	**Station**	**Foreshot**	**Elevation**	**Feature**
2004		*2005*			
0.0	94.55	0.0	5.46	94.54	LPIN Metal
2.5	94.34	0.3	5.45	94.55	LPIN Wood (DOT)
3.5	93.83	8.0	5.30	94.70	BKFL / LB
7.0	93.26	9.0	5.54	94.46	
9.5	93.31	10.0	5.81	94.19	
15.0	93.15	11.0	6.00	94.00	
21.5	93.33	12.0	6.28	93.72	
23.0	93.32	13.0	6.48	93.52	
24.0	93.01	14.0	6.65	93.35	
25.5	92.70	14.6	6.77	93.23	LEW
26.5	92.41	16.0	7.23	92.77	SB
28.0	91.92	18.0	7.56	92.44	SB
30.0	91.29	20.0	7.91	92.09	CL
32.0	91.41	22.0	7.95	92.05	SB
33.0	91.17	23.0	7.87	92.13	SB
36.0	91.65	24.0	7.66	92.34	SB
37.5	91.93	25.0	7.49	92.51	SB
39.0	92.40	26.0	7.51	92.49	SB
40.5	92.60	27.0	6.77	93.23	REW
43.0	93.19	28.0	6.42	93.58	
48.0	93.19	29.0	6.20	93.80	
56.0	93.53	30.0	5.71	94.29	
66.5	93.73	31.0	5.47	94.53	
		32.0	5.42	94.58	BKF / RB
		38.0	5.39	94.61	RPIN (Both)

Summary Data		
	2004	*2005*
Bankfull Cross Sectional Area (ft^2)	22.2	35.2
Bankfull Width (ft)	20.2	23.8
Bankfull Mean Depth (ft)	1.1	1.5
Bankfull Max Depth (ft)	2.0	2.6
Width/Depth Ratio	18.4	16.1
Entrenchment Ratio	>5	>5
Classification	C6	C6

Cross Section 2 - Run

Cross Section Plot - Looking Downstream



Cross Section Photo - Looking Downstream

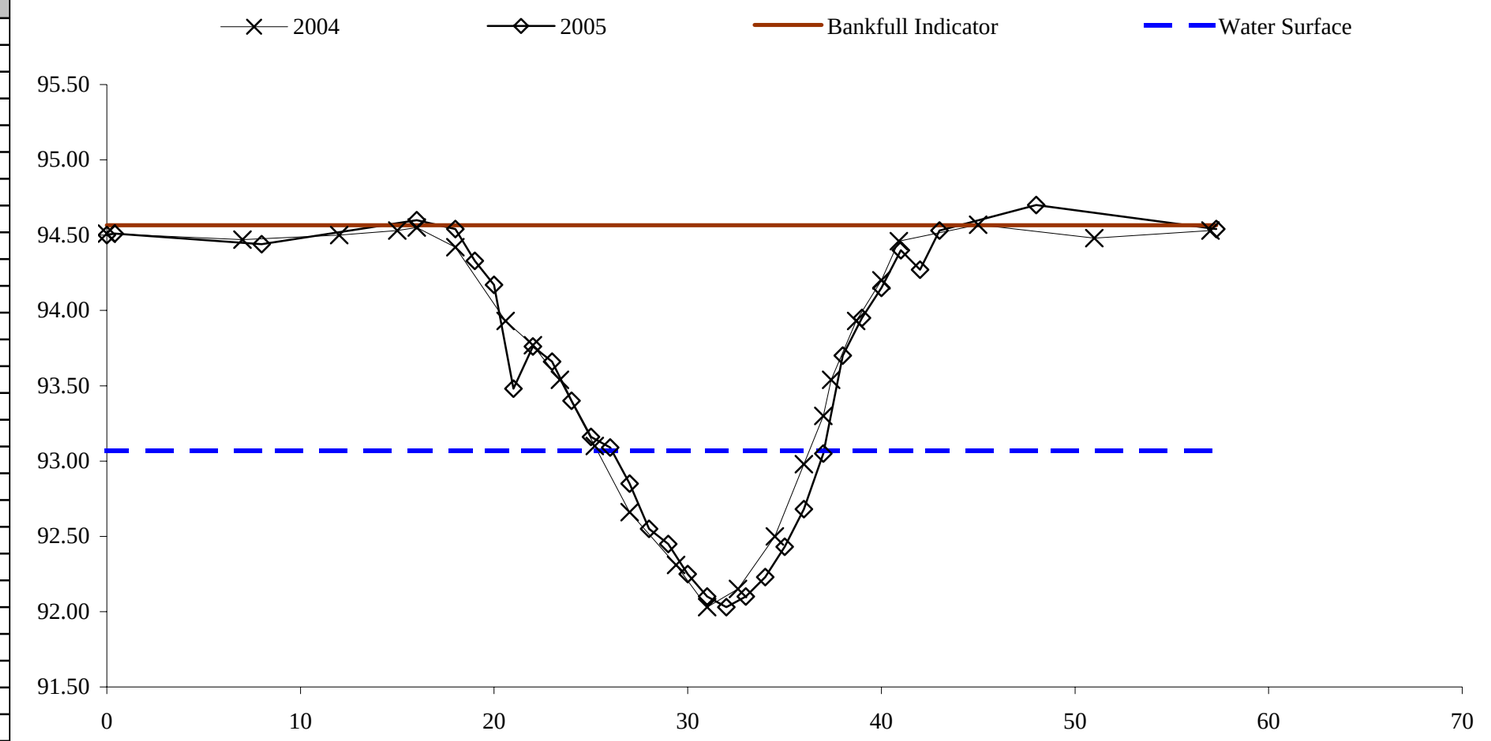
Title	Cross Section 2			
Ecosystem Enhancement Program	**Project**	Key Branch Mitigation Site Anson County, NC	**Project #**	.00013
			Figure	
	Survey Date	**Survey Weather**	**Field Team**	**Location**
	November 30, 2005	Sunny 35°	Michael O'Rourke, Lesley Yaukey	17+00

Survey Data					
					LEP
Station	Elevation	Station	Foreshot	Elevation	Feature
2004		*2005*			
0.0	94.51	0.0	5.50	94.50	LPIN Metal
7.0	94.47	0.4	5.49	94.51	LPIN Wood (DOT)
12.0	94.50	8.0	5.56	94.44	
15.0	94.53	16.0	5.40	94.60	BKF / LB
16.0	94.55	18.0	5.46	94.54	
18.0	94.42	19.0	5.67	94.33	
20.6	93.93	20.0	5.83	94.17	
22.0	93.77	21.0	6.52	93.48	
23.4	93.54	22.0	6.24	93.76	
25.2	93.10	23.0	6.34	93.66	
27.0	92.66	24.0	6.60	93.40	
29.4	92.31	25.0	6.84	93.16	
31.0	92.03	26.0	6.91	93.09	LEW
32.6	92.15	27.0	7.15	92.85	SB
34.5	92.50	28.0	7.45	92.55	SB
36.0	92.98	29.0	7.55	92.45	SB
37.0	93.30	30.0	7.75	92.25	SB
37.4	93.54	31.0	7.90	92.10	SB
38.7	93.93	32.0	7.97	92.03	CL
40.0	94.20	33.0	7.90	92.10	SB
40.9	94.46	34.0	7.77	92.23	SB
45.0	94.57	35.0	7.57	92.43	SB
51.0	94.48	36.0	7.32	92.68	SB
57.0	94.53	37.0	6.95	93.05	REW
		38.0	6.30	93.70	
		39.0	6.05	93.95	
		40.0	5.85	94.15	
		41.0	5.60	94.40	
		42.0	5.73	94.27	
		43	5.47	94.53	BKF / RB
		48	5.30	94.7	
		57.3	5.46	94.54	RPIN (Both)

Summary Data		
	2004	*2005*
Bankfull Cross Sectional Area (ft^2)	18.1	33.4
Bankfull Width (ft)	18.1	28.3
Bankfull Mean Depth (ft)	1.02	1.2
Bankfull Max Depth (ft)	1.9	2.5
Width/Depth Ratio	18.1	24
Entrenchment Ratio	>5	>5
Classification	C6	C6

Cross Section 3 - Pool

Cross Section Plot - Looking Downstream



Cross Section Photo - Looking Downstream

Title	Cross Section 3			
Ecosystem Enhancement Program	**Project**	Key Branch Mitigation Site Anson County, NC	**Project #**	.00013
			Figure	
	Survey Date	**Survey Weather**	**Field Team**	**Location**
	November 30, 2005	Sunny 35°	Michael O'Rourke, Lesley Yaukey	22+50

Survey Data

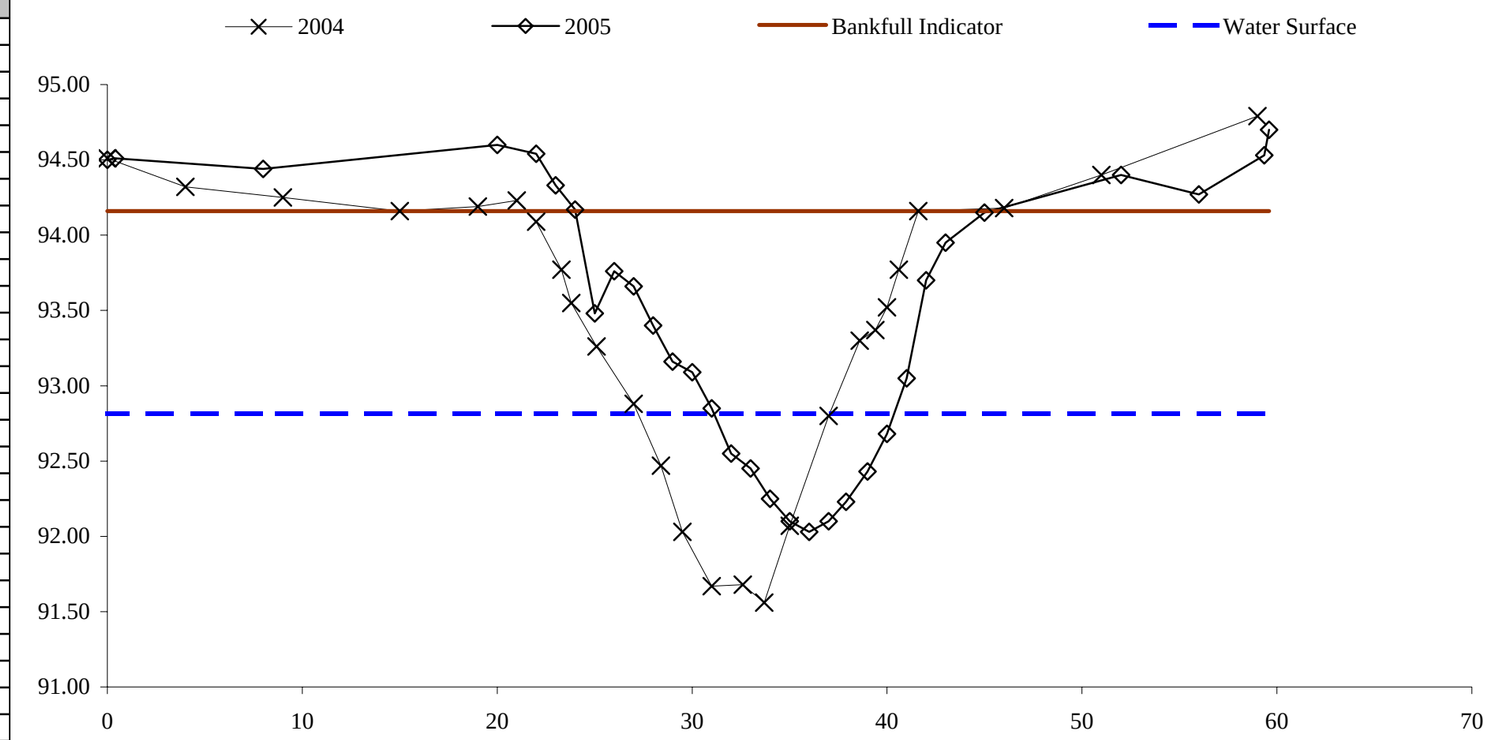
					LEP
Station	**Elevation**	**Station**	**Foreshot**	**Elevation**	**Feature**
2004		*2005*			
0.0	94.51	0.0	5.50	94.50	LPIN Metal
4.0	94.32	0.4	5.49	94.51	LPIN Wood (DOT)
9.0	94.25	8.0	5.56	94.44	
15.0	94.16	20.0	5.40	94.60	
19.0	94.19	22.0	5.46	94.54	
21.0	94.23	23.0	5.67	94.33	
22.0	94.09	24.0	5.83	94.17	BKF / LB
23.3	93.77	25.0	6.52	93.48	
23.8	93.55	26.0	6.24	93.76	
25.1	93.26	27.0	6.34	93.66	
27.0	92.88	28.0	6.60	93.40	LEW
28.4	92.47	29.0	6.84	93.16	SB
29.5	92.03	30.0	6.91	93.09	SB
31.0	91.67	31.0	7.15	92.85	SB
32.6	91.68	32.0	7.45	92.55	SB
33.7	91.56	33.0	7.55	92.45	SB
35.0	92.07	34.0	7.75	92.25	SB
37.0	92.80	35.0	7.90	92.10	SB
38.6	93.30	36.0	7.97	92.03	CL
39.4	93.37	37.0	7.90	92.10	SB
40.0	93.52	37.9	7.77	92.23	REW
40.6	93.77	39.0	7.57	92.43	
41.6	94.16	40.0	7.32	92.68	
46.0	94.18	41.0	6.95	93.05	
51.0	94.40	42.0	6.30	93.70	
59.0	94.79	43.0	6.05	93.95	
		45.0	5.85	94.15	BKF / RB
		52.0	5.60	94.40	
		56.0	5.73	94.27	
		59.35	5.47	94.53	
		59.6	5.30	94.7	RPIN (Both)

Summary Data

	2004	*2005*
Bankfull Cross Sectional Area (ft^2)	20.8	24.2
Bankfull Width (ft)	17.3	21.3
Bankfull Mean Depth (ft)	1.2	1.1
Bankfull Max Depth (ft)	2.2	2.1
Width/Depth Ratio	14.4	18.7
Entrenchment Ratio	>5	>5
Classification	C6	C6

Cross Section 4 - Pool

Cross Section Plot - Looking Downstream



Cross Section Photo - Looking Downstream

Title	Cross Section 4			
Ecosystem Enhancement Program	**Project**	Key Branch Mitigation Site Anson County, NC	**Project #**	.00013
			Figure	
	Survey Date	**Survey Weather**	**Field Team**	**Location**
	November 30, 2005	Sunny 35°	Michael O'Rourke, Lesley Yaukey	26+50

Survey Data

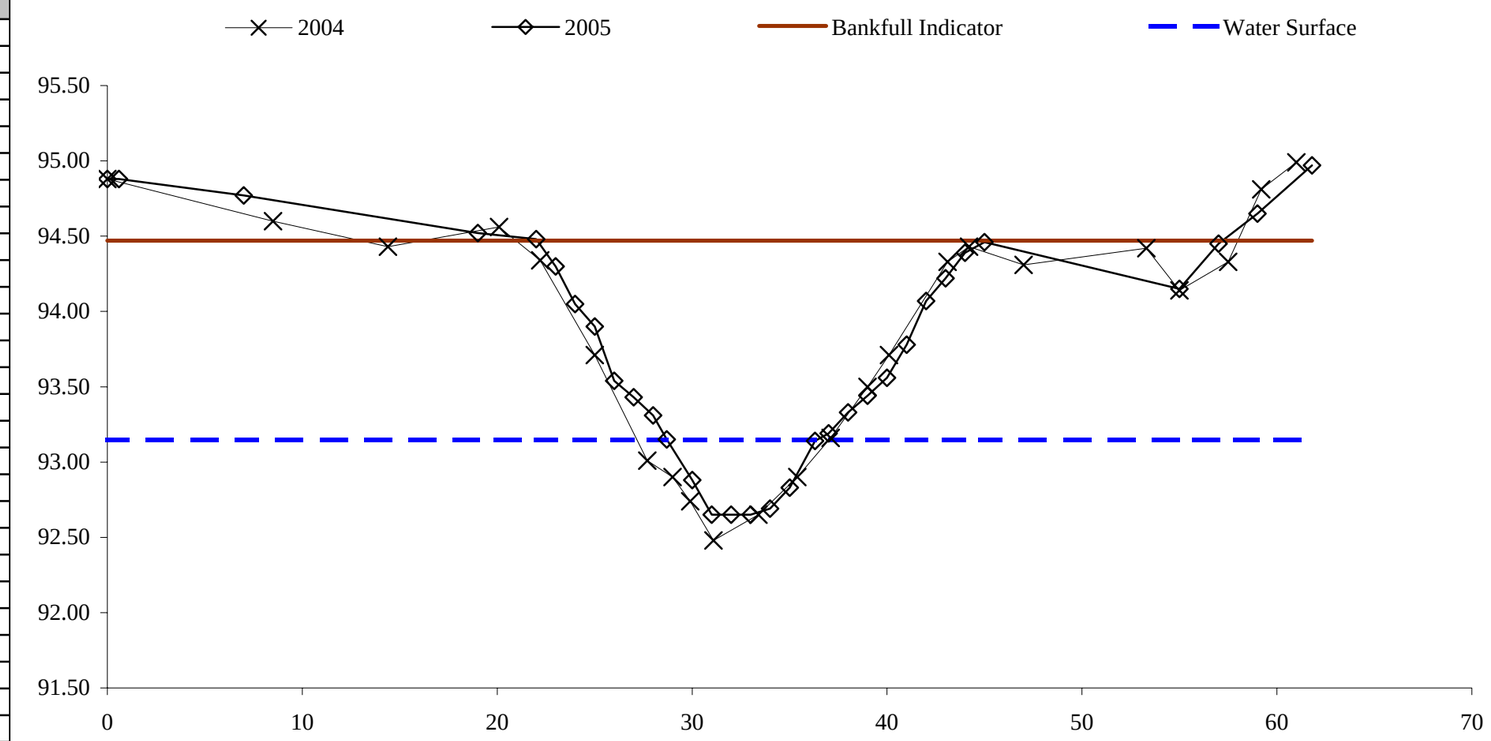
					LEP
Station	**Elevation**	**Station**	**Foreshot**	**Elevation**	**Feature**
2004		*2005*			
0.0	94.88	0.0	5.12	94.88	LPIN Metal
8.5	94.60	0.6	5.12	94.88	LPIN Wood (DOT)
14.4	94.43	7.0	5.23	94.77	
20.1	94.56	19.0	5.48	94.52	
22.2	94.34	22.0	5.52	94.48	BKF / LB
25.0	93.71	23.0	5.70	94.30	
27.7	93.01	24.0	5.95	94.05	
29.0	92.90	25.0	6.10	93.90	
29.9	92.74	26.0	6.46	93.54	
31.1	92.48	27.0	6.57	93.43	
33.4	92.65	28.0	6.69	93.31	
35.4	92.90	28.7	6.85	93.15	LEW
37.1	93.16	30.0	7.12	92.88	SB
39.0	93.50	31.0	7.35	92.65	SB
40.1	93.71	32.0	7.35	92.65	CL
43.1	94.33	33.0	7.35	92.65	SB
44.2	94.43	34.0	7.31	92.69	SB
47.0	94.31	35.0	7.17	92.83	SB
53.3	94.42	36.3	6.86	93.14	REW
55.0	94.14	37.0	6.81	93.19	
57.5	94.33	38.0	6.67	93.33	
59.2	94.81	39.0	6.56	93.44	
61.0	94.99	40.0	6.44	93.56	
		41.0	6.22	93.78	
		42.0	5.93	94.07	
		43.0	5.78	94.22	
		44.0	5.61	94.39	
		45.0	5.54	94.46	BKF / RB
		55.0	5.85	94.15	
		57	5.55	94.45	
		59	5.35	94.65	
		61.8	5.03	94.97	RPIN (Both)

Summary Data

	2004	*2005*
Bankfull Cross Sectional Area (ft^2)	20.9	23.3
Bankfull Width (ft)	20.9	22.9
Bankfull Mean Depth (ft)	1.0	1.0
Bankfull Max Depth (ft)	1.8	2.8
Width/Depth Ratio	20.9	22.5
Entrenchment Ratio	>5	>5
Classification	C6	C6

Cross Section 5 - Riffle

Cross Section Plot - Looking Downstream



Cross Section Photo - Looking Downstream

Title	Cross Section 5			
Ecosystem Enhancement Program	**Project**	Key Branch Mitigation Site Anson County, NC	**Project #**	.00013
			Figure	
	Survey Date	**Survey Weather**	**Field Team**	**Location**
	December 1, 2005	Sunny 35°	Michael O'Rourke, Lesley Yaukey	31+00

Survey Data

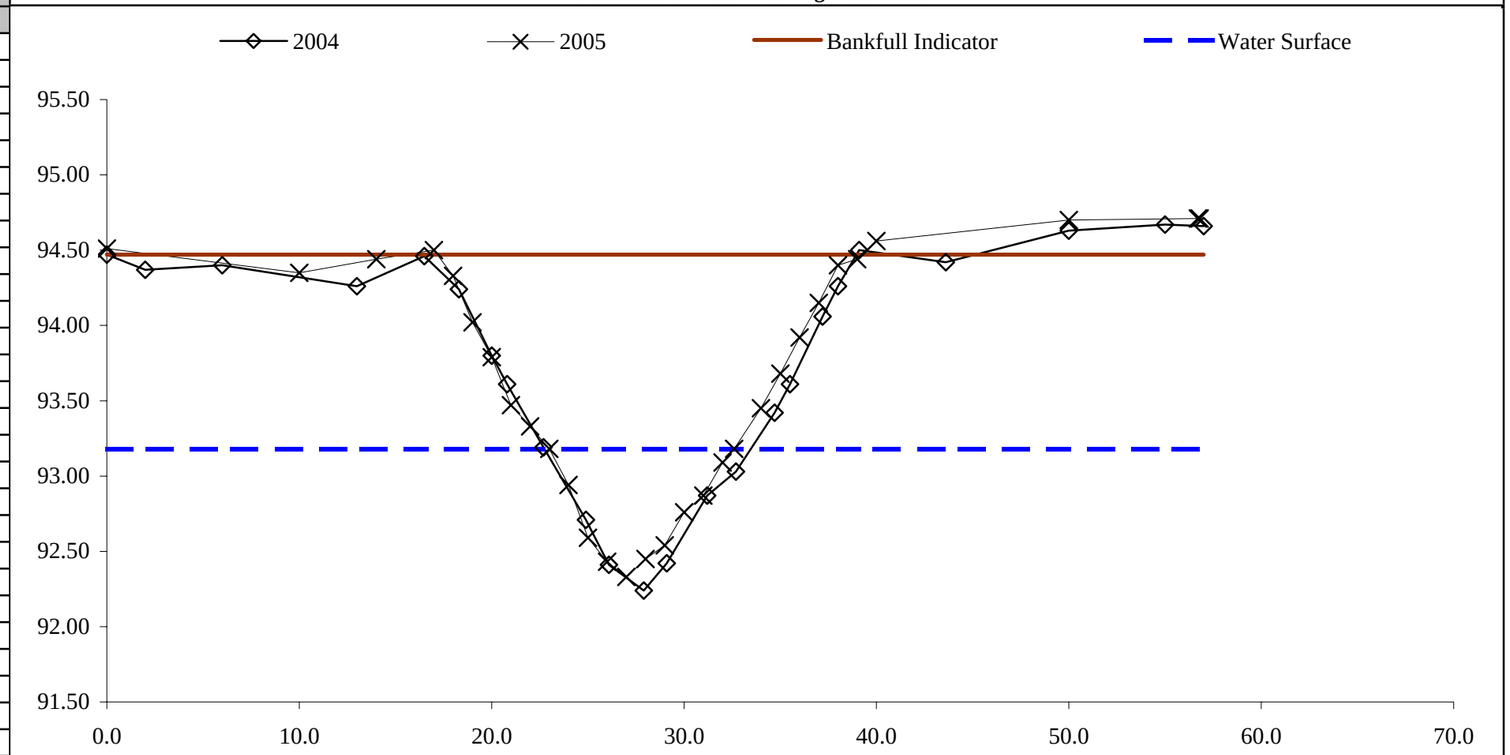
					LEP
Station	**Elevation**	**Station**	**Foreshot**	**Elevation**	**Feature**
2004		*2005*			
0.0	94.47	-0.3	5.53	94.47	LPIN Wood (DOT)
2.0	94.37	0.0	5.49	94.51	LPIN Metal
6.0	94.40	10.0	5.65	94.35	
13.0	94.26	14.0	5.56	94.44	BKF / LB
16.5	94.46	17.0	5.50	94.50	
18.3	94.24	18.0	5.67	94.33	
20.0	93.80	19.0	5.98	94.02	
20.8	93.61	20.0	6.21	93.79	
22.7	93.19	21.0	6.53	93.47	
24.9	92.71	22.0	6.67	93.33	
26.1	92.41	23.0	6.82	93.18	LEW
27.9	92.24	24.0	7.06	92.94	SB
29.1	92.42	25.0	7.41	92.59	SB
31.2	92.87	26.0	7.57	92.43	SB
32.7	93.03	27.0	7.67	92.33	CL
34.7	93.42	28.0	7.55	92.45	SB
35.5	93.61	29.0	7.46	92.54	SB
37.2	94.06	30.0	7.24	92.76	SB
38.0	94.26	31.0	7.13	92.87	SB
39.1	94.50	32.0	6.91	93.09	SB
43.6	94.42	32.6	6.82	93.18	REW
50.0	94.63	34.0	6.55	93.45	
55.0	94.67	35.0	6.32	93.68	
57.0	94.66	36.0	6.08	93.92	
		37.0	5.85	94.15	
		38.0	5.60	94.40	BKF / RB
		39.0	5.56	94.44	
		40.0	5.44	94.56	
		50.0	5.30	94.70	
		56.7	5.29	94.71	RPIN Metal
		56.8	5.29	94.71	RPIN Wood (DOT)

Summary Data

	2004	*2005*
Bankfull Cross Sectional Area (ft^2)	21.7	23.8
Bankfull Width (ft)	19.7	21
Bankfull Mean Depth (ft)	1.1	1.1
Bankfull Max Depth (ft)	2.0	2.1
Width/Depth Ratio	17.9	18.5
Entrenchment Ratio	>5	>5
Classification	C6	C6

Cross Section 6 - Glide

Cross Section Plot - Looking Downstream



Cross Section Photo - Looking Downstream

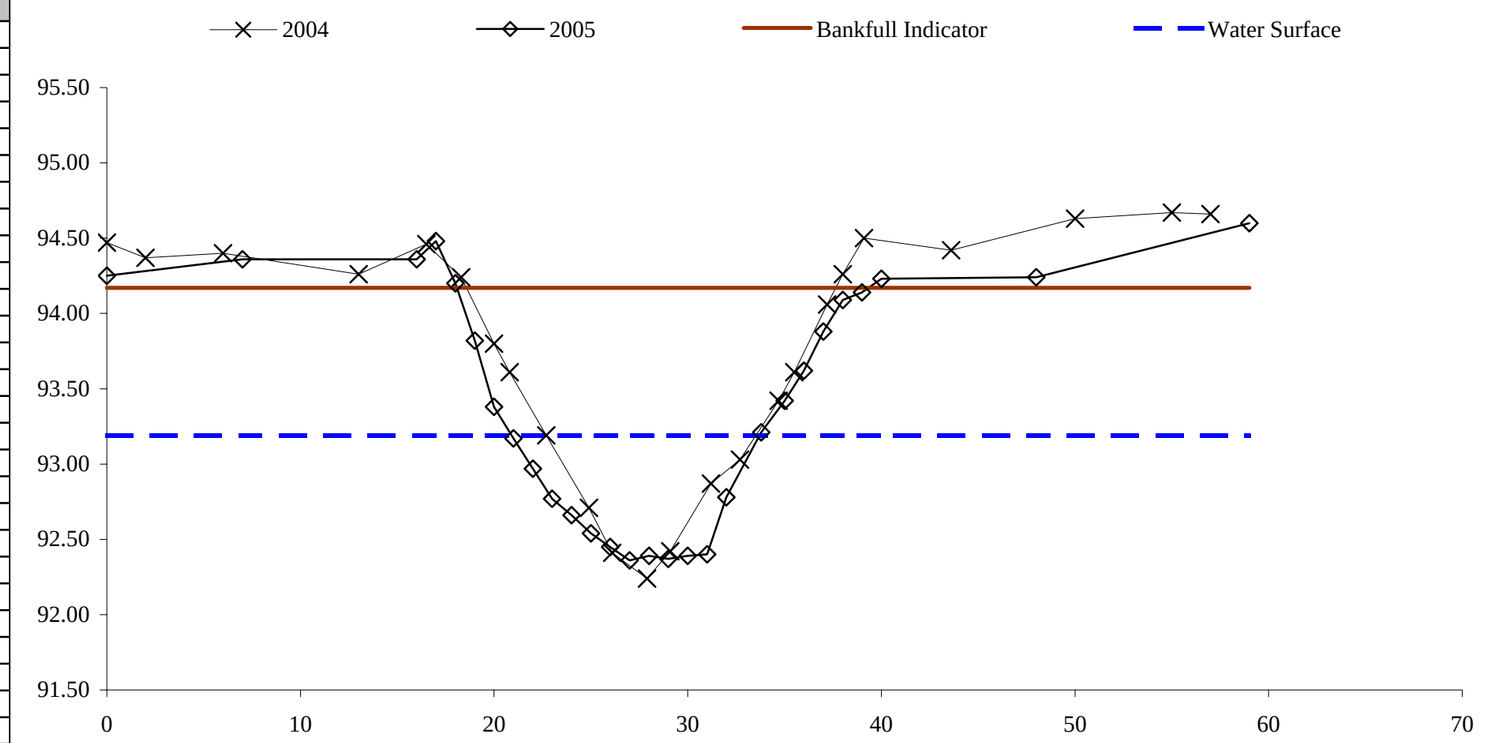
Title	Cross Section 6			
Project	Key Branch Mitigation Site Anson County, NC		**Project #**	.00013
			Figure	
Survey Date	**Survey Weather**	**Field Team**	**Location**	
December 1, 2005	Sunny 35°	Michael O'Rourke, Lesley Yaukey	35+00	

Survey Data					
					LEP
Station	**Elevation**	**Station**	**Foreshot**	**Elevation**	**Feature**
2004		*2005*			
0.0	94.47	0.0	5.75	94.25	LPIN (Both)
2.0	94.37	7.0	5.64	94.36	
6.0	94.40	16.0	5.64	94.36	
13.0	94.26	17.0	5.52	94.48	
16.5	94.46	18.0	5.80	94.20	BKF / LB
18.3	94.24	19.0	6.18	93.82	
20.0	93.80	20.0	6.62	93.38	
20.8	93.61	21.0	6.83	93.17	LEW
22.7	93.19	22.0	7.03	92.97	SB
24.9	92.71	23.0	7.23	92.77	SB
26.1	92.41	24.0	7.34	92.66	SB
27.9	92.24	25.0	7.46	92.54	SB
29.1	92.42	26.0	7.55	92.45	SB
31.2	92.87	27.0	7.64	92.36	SB
32.7	93.03	28.0	7.61	92.39	CL
34.7	93.42	29.0	7.63	92.37	SB
35.5	93.61	30.0	7.61	92.39	SB
37.2	94.06	31.0	7.60	92.40	SB
38.0	94.26	32.0	7.22	92.78	SB
39.1	94.50	33.8	6.79	93.21	REW
43.6	94.42	35.0	6.58	93.42	
50.0	94.63	36.0	6.38	93.62	
55.0	94.67	37.0	6.12	93.88	
57.0	94.66	38.0	5.91	94.09	
		39.0	5.86	94.14	BKF / RB
		40.0	5.77	94.23	
		48.0	5.76	94.24	
		59.0	5.40	94.60	RPIN (Both)

Summary Data		
	2004	*2005*
Bankfull Cross Sectional Area (ft^2)	25.2	23.6
Bankfull Width (ft)	22.9	19.9
Bankfull Mean Depth (ft)	1.1	1.2
Bankfull Max Depth (ft)	2	1.8
Width/Depth Ratio	20.8	16.8
Entrenchment Ratio	>5	>5
Classification	C6	C6

Cross Section 7 - Run

Cross Section Plot - Looking Downstream



Cross Section Photo - Looking Downstream

Title	Cross Section 7			
Ecosystem Enhancement Program	**Project**	Key Branch Mitigation Site Anson County, NC	**Project #**	.00013
			Figure	
	Survey Date	**Survey Weather**	**Field Team**	**Location**
	December 1, 2005	Sunny 35°	Michael O'Rourke, Lesley Yaukey	38+00

Survey Data

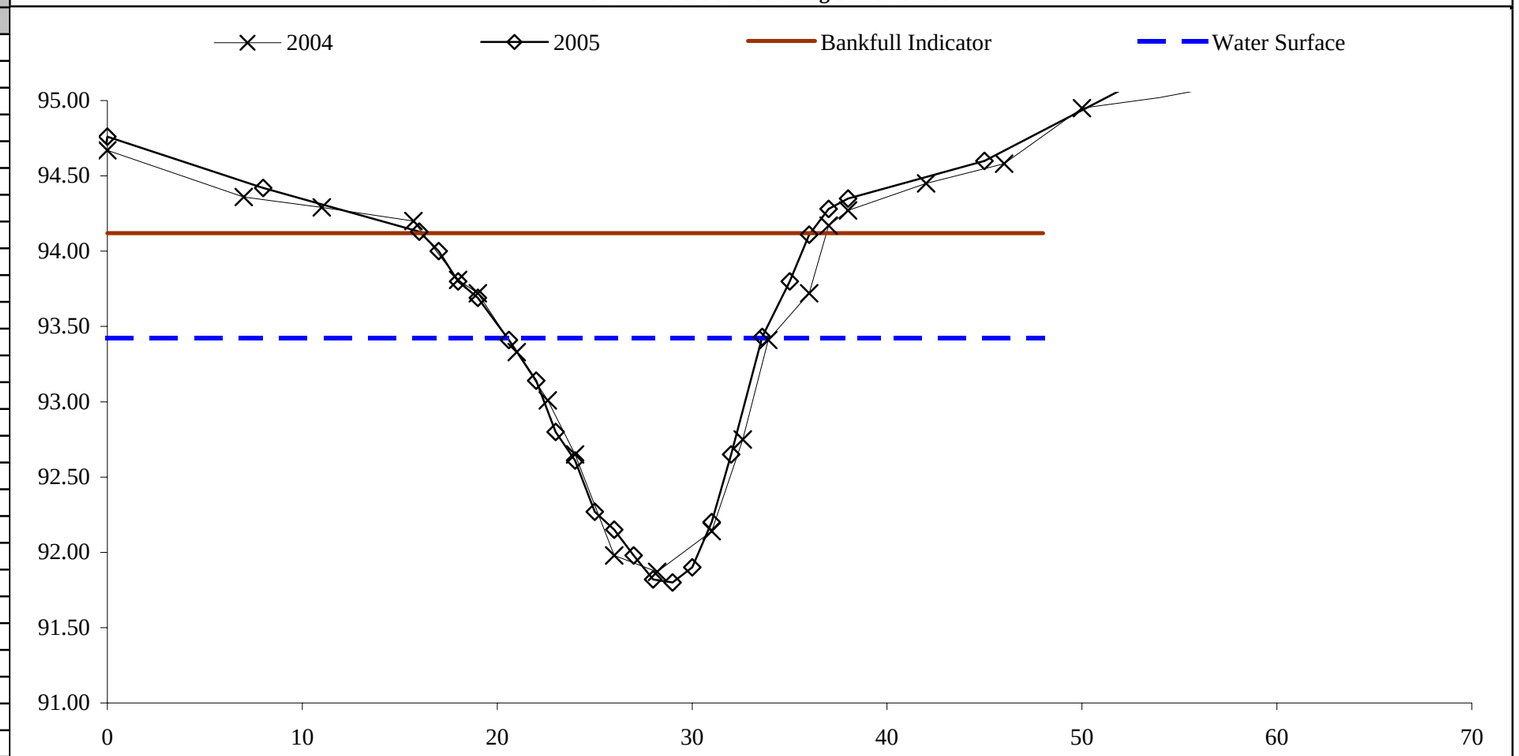
					LEP
Station	**Elevation**	**Station**	**Foreshot**	**Elevation**	**Feature**
2004		*2005*			
0.0	94.67	-0.1	5.28	94.72	LPIN Metal
7.0	94.36	0.0	5.24	94.76	LPIN Wood (DOT)
11.0	94.29	8.0	5.58	94.42	
15.7	94.20	16.0	5.87	94.13	BKF / LB
18.0	93.81	17.0	6.00	94.00	
19.0	93.72	18.0	6.20	93.80	
21.0	93.33	19.0	6.31	93.69	
22.6	93.01	20.6	6.59	93.41	LEW
24.0	92.65	22.0	6.86	93.14	SB
26.0	91.98	23.0	7.20	92.80	SB
28.2	91.87	24.0	7.39	92.61	SB
31.0	92.14	25.0	7.73	92.27	SB
32.6	92.75	26.0	7.85	92.15	SB
33.9	93.41	27.0	8.02	91.98	CL
36.0	93.72	28.0	8.18	91.82	SB
37.0	94.17	29.0	8.20	91.80	SB
38.0	94.27	30.0	8.10	91.90	SB
42.0	94.45	31.0	7.80	92.20	SB
46.0	94.58	32.0	7.35	92.65	SB
50.0	94.95	33.6	6.57	93.43	REW
54.0	95.02	35.0	6.20	93.80	
57.7	95.11	36.0	5.89	94.11	BKF / RB
		37.0	5.72	94.28	
		38.0	5.65	94.35	
		45.0	5.40	94.60	
		52.0	4.93	95.07	
		57.5	4.73	95.27	RPIN (Both)

Summary Data

	2004	*2005*
Bankfull Cross Sectional Area (ft^2)	25.9	24.1
Bankfull Width (ft)	21.9	19.9
Bankfull Mean Depth (ft)	1.2	1.2
Bankfull Max Depth (ft)	2.3	2.3
Width/Depth Ratio	18.5	16.4
Entrenchment Ratio	>5	>5
Classification	C6	C6

Cross Section 8 - Pool

Cross Section Plot - Looking Downstream



Cross Section Photo - Looking Downstream

Title	Cross Section 8			
Ecosystem Enhancement Program	**Project**	Key Branch Mitigation Site Anson County, NC	**Project #**	.00013
			Figure	
	Survey Date	**Survey Weather**	**Field Team**	**Location**
	December 1, 2005	Sunny 35°	Michael O'Rourke, Lesley Yaukey	44+00

Survey Data

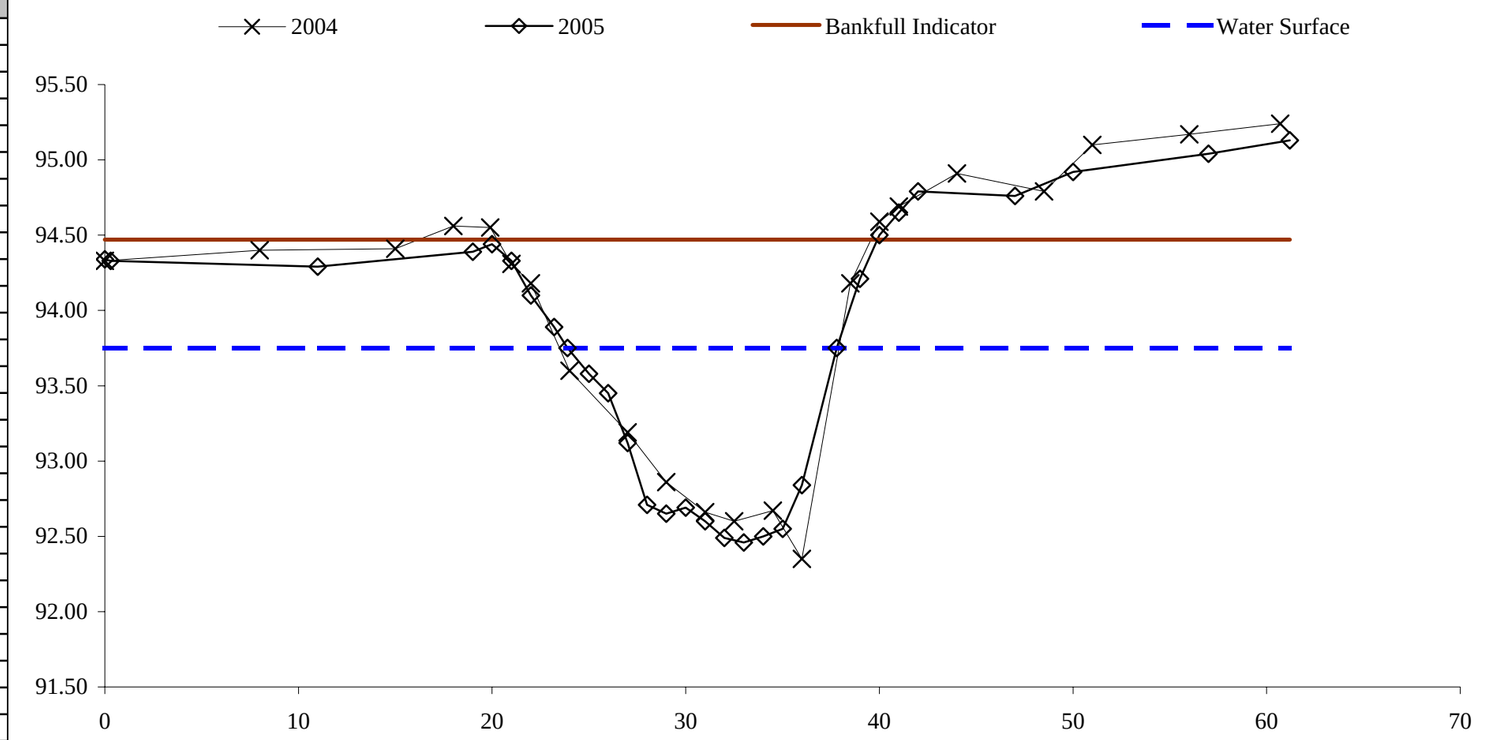
					LEP
Station	**Elevation**	**Station**	**Foreshot**	**Elevation**	**Feature**
2004		*2005*			
0.0	94.33	0.0	5.66	94.34	LPIN Metal
8.0	94.40	0.3	5.67	94.33	LPIN Wood (DOT)
15.0	94.41	11.0	5.71	94.29	
18.0	94.56	19.0	5.61	94.39	
19.9	94.55	20.0	5.56	94.44	BKF / LB
21.0	94.31	21.0	5.67	94.33	
22.0	94.18	22.0	5.90	94.10	
24.0	93.60	23.2	6.11	93.89	
27.0	93.19	23.9	6.25	93.75	LEW
29.0	92.86	25.0	6.42	93.58	SB
31.0	92.66	26.0	6.55	93.45	SB
32.5	92.60	27.0	6.88	93.12	SB
34.5	92.67	28.0	7.29	92.71	SB
36.0	92.35	29.0	7.35	92.65	CL
38.5	94.18	30.0	7.31	92.69	SB
40.0	94.59	31.0	7.40	92.60	SB
41.0	94.69	32.0	7.51	92.49	SB
44.0	94.91	33.0	7.54	92.46	SB
48.5	94.79	34.0	7.50	92.50	SB
51.0	95.10	35.0	7.45	92.55	SB
56.0	95.17	36.0	7.16	92.84	SB
60.7	95.24	37.8	6.25	93.75	REW
		39.0	5.79	94.21	
		40.0	5.50	94.50	BKF / RB
		41.0	5.35	94.65	
		42.0	5.21	94.79	
		47.0	5.24	94.76	RPIN (Both)
		50.0	5.08	94.92	
		57.0	4.96	95.04	
		61.2	4.87	95.13	

Summary Data

	2004	*2005*
Bankfull Cross Sectional Area (ft^2)	26.0	23.8
Bankfull Width (ft)	20.0	19.9
Bankfull Mean Depth (ft)	1.3	1.2
Bankfull Max Depth (ft)	2.2	2.0
Width/Depth Ratio	15.4	16.6
Entrenchment Ratio	>5	>5
Classification	C6	C6

Cross Section 9 - Glide

Cross Section Plot - Looking Downstream



Cross Section Photo - Looking Downstream

Title	Cross Section 9			
Ecosystem Enhancement Program	**Project**	Key Branch Mitigation Site Anson County, NC	**Project #**	.00013
			Figure	
	Survey Date	**Survey Weather**	**Field Team**	**Location**
	December 2, 2005	Sunny 35°	Michael O'Rourke, Lesley Yaukey	48+00

Survey Data

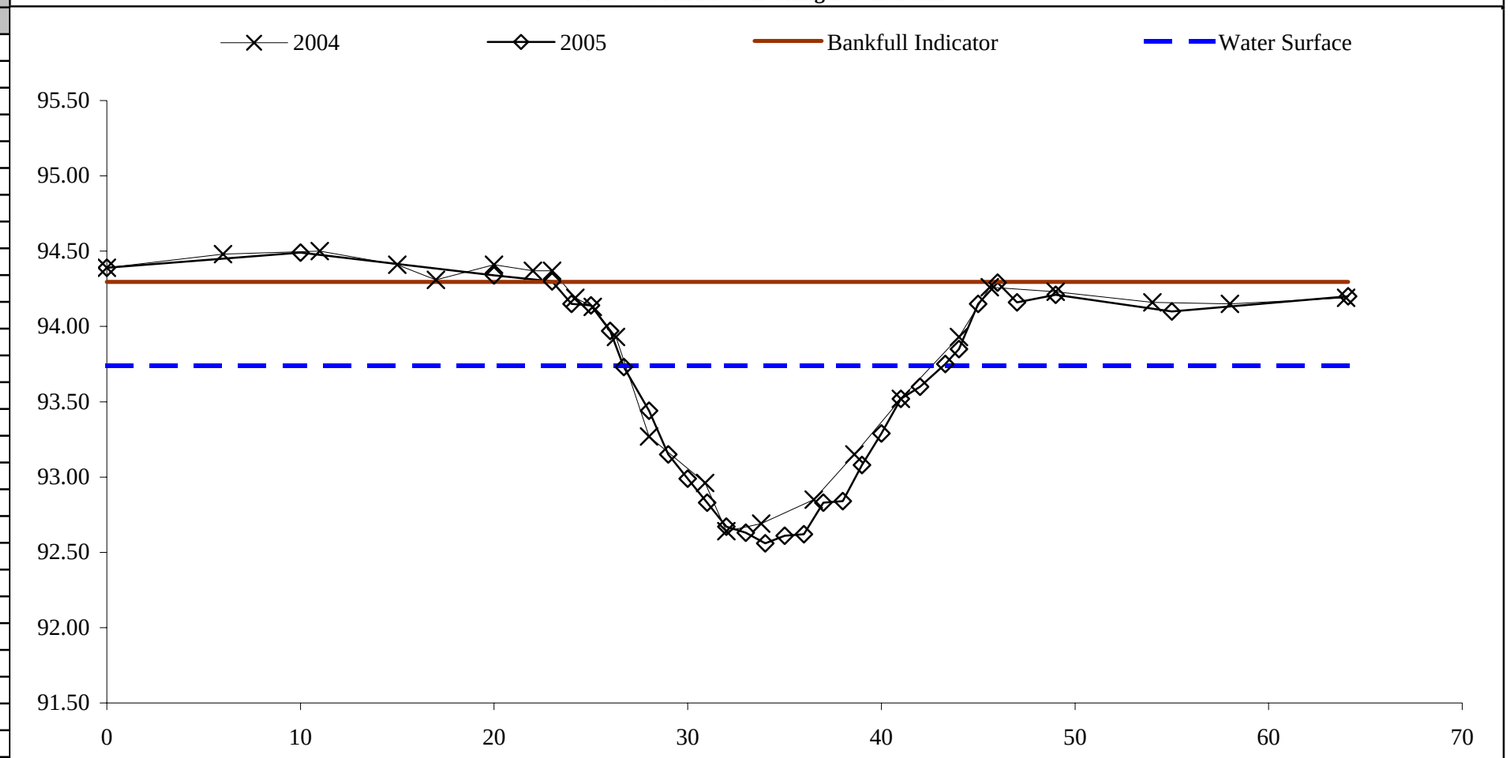
					LEP
Station	**Elevation**	**Station**	**Foreshot**	**Elevation**	**Feature**
2004		*2005*			
0.0	94.39	0.0	5.61	94.39	LPIN (Both)
6.0	94.48	10.0	5.51	94.49	
11.0	94.50	20.0	5.66	94.34	
15.0	94.41	23.0	5.70	94.30	BKF / LB
17.0	94.31	24.0	5.85	94.15	
20.0	94.41	25.0	5.86	94.14	
22.0	94.37	26.0	6.03	93.97	
23.0	94.37	26.7	6.27	93.73	LEW
24.2	94.19	28.0	6.56	93.44	SB
25.1	94.13	29.0	6.85	93.15	SB
26.3	93.93	30.0	7.01	92.99	SB
28.0	93.27	31.0	7.17	92.83	SB
30.9	92.96	32.0	7.33	92.67	SB
32.0	92.64	33.0	7.37	92.63	SB
33.8	92.69	34.0	7.44	92.56	CL
36.5	92.85	35.0	7.39	92.61	SB
38.6	93.15	36.0	7.38	92.62	SB
41.0	93.52	37.0	7.17	92.83	SB
44.0	93.93	38.0	7.16	92.84	SB
45.6	94.26	39.0	6.92	93.08	SB
49.0	94.23	40.0	6.71	93.29	SB
54.0	94.16	41.0	6.48	93.52	SB
58.0	94.15	42.0	6.40	93.60	SB
64.0	94.19	43.3	6.25	93.75	REW
		44.0	6.15	93.85	
		45.0	5.85	94.15	
		46.0	5.71	94.29	BKF / RB
		47.0	5.84	94.16	
		49.0	5.79	94.21	
		55	5.90	94.1	
		64.1	5.80	94.2	RPIN (Both)

Summary Data

	2004	*2005*
Bankfull Cross Sectional Area (ft^2)	19.0	20.5
Bankfull Width (ft)	21.1	20.0
Bankfull Mean Depth (ft)	0.9	1.0
Bankfull Max Depth (ft)	1.6	1.7
Width/Depth Ratio	23.4	19.5
Entrenchment Ratio	>5	>5
Classification	C6	C6

Cross Section 10 - Riffle

Cross Section Plot - Looking Downstream



Cross Section Photo - Looking Downstream

Title	Cross Section 10			
Ecosystem Enhancement Program	**Project**	Key Branch Mitigation Site Anson County, NC	**Project #**	.00013
			Figure	
	Survey Date	**Survey Weather**	**Field Team**	**Location**
	December 2, 2005	Sunny 35°	Michael O'Rourke, Lesley Yaukey	53+00

Survey Data

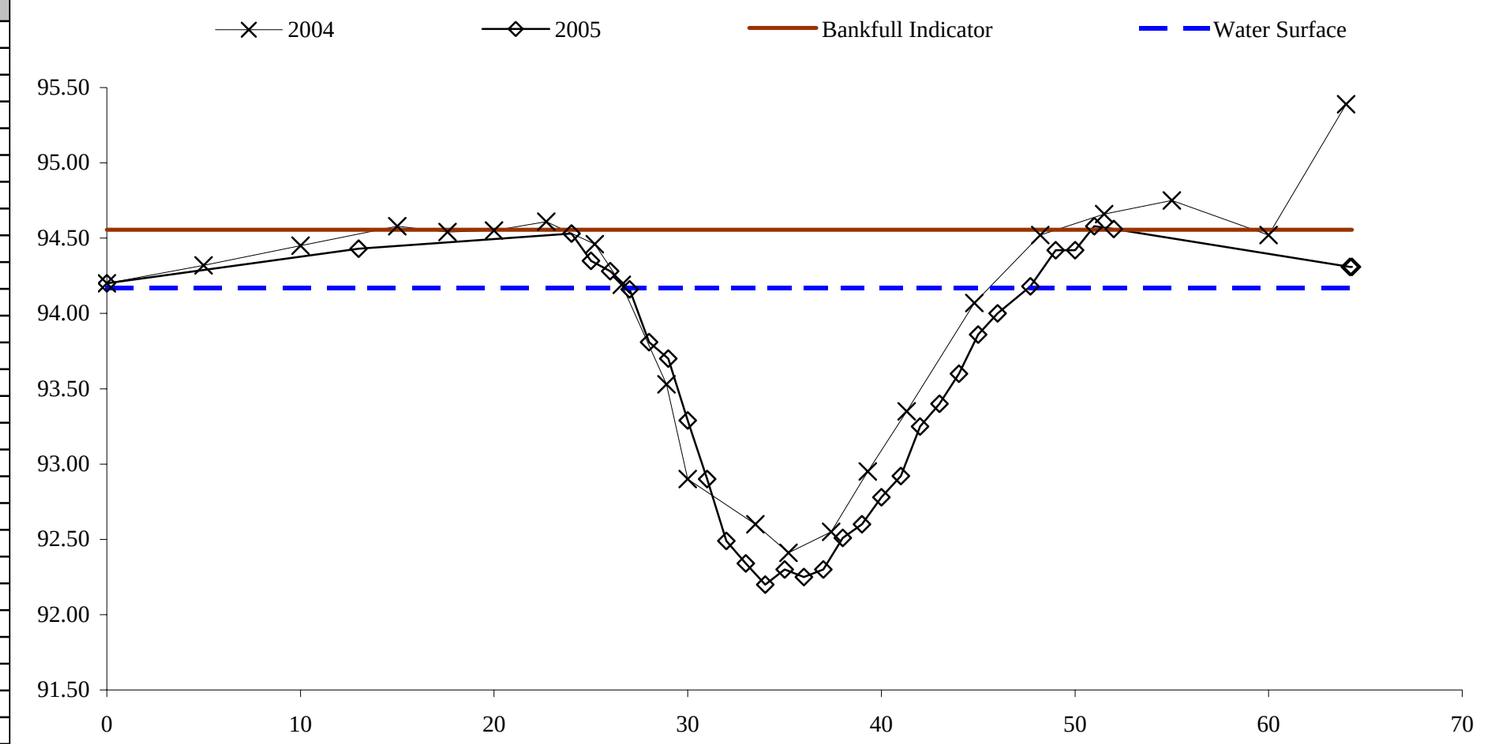
					LEP
Station	**Elevation**	**Station**	**Foreshot**	**Elevation**	**Feature**
2004		*2005*			
0.0	94.20	0.0	5.80	94.20	LPIN (Both)
5.0	94.32	13.0	5.57	94.43	
10.0	94.45	24.0	5.47	94.53	BKF / LB
15.0	94.58	25.0	5.65	94.35	
17.6	94.54	26.0	5.72	94.28	
20.0	94.55	27.0	5.84	94.16	LEW
22.7	94.61	28.0	6.19	93.81	SB
25.2	94.46	29.0	6.30	93.70	SB
26.6	94.19	30.0	6.71	93.29	SB
28.9	93.53	31.0	7.10	92.90	SB
30.0	92.90	32.0	7.51	92.49	SB
33.5	92.60	33.0	7.66	92.34	SB
35.2	92.41	34.0	7.80	92.20	SB
37.4	92.55	35.0	7.70	92.30	SB
39.3	92.95	36.0	7.75	92.25	CL
41.3	93.35	37.0	7.70	92.30	SB
44.8	94.07	38.0	7.49	92.51	SB
48.2	94.52	39.0	7.40	92.60	SB
51.5	94.66	40.0	7.22	92.78	SB
55.0	94.75	41.0	7.08	92.92	SB
60.0	94.52	42.0	6.75	93.25	SB
64.0	95.39	43.0	6.60	93.40	SB
		44.0	6.40	93.60	SB
		45.0	6.14	93.86	SB
		46.0	6.00	94.00	SB
		47.7	5.82	94.18	REW
		49.0	5.58	94.42	
		50.0	5.58	94.42	
		51.0	5.42	94.58	BKF / RB
		52	5.44	94.56	
		64.2	5.69	94.31	RPIN Metal
		64.3	5.69	94.31	RPIN Wood (DOT)

Summary Data

	2004	*2005*
Bankfull Cross Sectional Area (ft^2)	30.4	31.9
Bankfull Width (ft)	27.6	26.0
Bankfull Mean Depth (ft)	1.1	1.2
Bankfull Max Depth (ft)	2.2	2.4
Width/Depth Ratio	25.1	21.2
Entrenchment Ratio	>5	>5
Classification	C6	C6

Cross Section 11 - Run

Cross Section Plot - Looking Downstream



Cross Section Photo - Looking Downstream

Title	Cross Section 11			
Ecosystem Enhancement Program	**Project**	Key Branch Mitigation Site Anson County, NC	**Project #**	.00013
			Figure	
	Survey Date	**Survey Weather**	**Field Team**	**Location**
	December 2, 2005	Sunny 35°	Michael O'Rourke, Lesley Yaukey	57+00

Survey Data

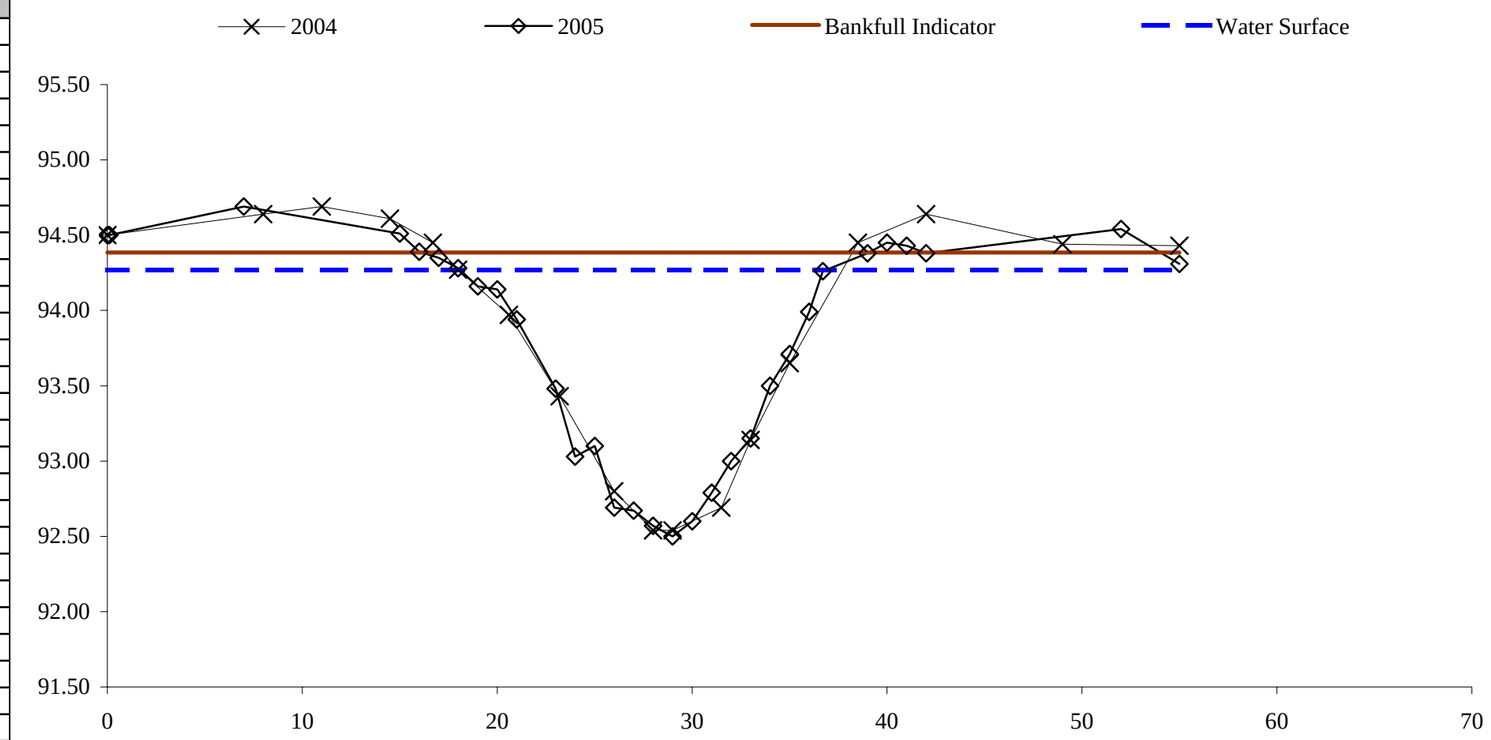
					LEP
Station	**Elevation**	**Station**	**Foreshot**	**Elevation**	**Feature**
2004		*2005*			
0.0	94.50	0.0	5.50	94.50	LPIN (Both)
8.0	94.64	0.1	5.50	94.50	
11.0	94.69	7.0	5.31	94.69	
14.5	94.61	15.0	5.49	94.51	
16.7	94.45	16.0	5.61	94.39	BKF / LB
18.0	94.27	17.0	5.65	94.35	
20.6	93.97	18.0	5.72	94.28	LEW
23.2	93.43	19.0	5.84	94.16	SB
26.0	92.80	20.0	5.86	94.14	SB
28.0	92.54	21.0	6.06	93.94	SB
29.0	92.54	23.0	6.52	93.48	SB
31.5	92.69	24.0	6.97	93.03	SB
33.0	93.14	25.0	6.90	93.10	SB
35.0	93.65	26.0	7.31	92.69	SB
38.5	94.45	27.0	7.33	92.67	SB
42.0	94.64	28.0	7.43	92.57	SB
49.0	94.44	29.0	7.50	92.50	CL
55.0	94.43	30.0	7.40	92.60	SB
		31.0	7.21	92.79	SB
		32.0	7.00	93.00	SB
		33.0	6.85	93.15	SB
		34.0	6.50	93.50	SB
		35.0	6.29	93.71	SB
		36.0	6.01	93.99	SB
		36.7	5.74	94.26	REW
		39.0	5.62	94.38	BKF / RB
		40.0	5.55	94.45	
		41.0	5.57	94.43	
		42.0	5.62	94.38	
		52.0	5.46	94.54	
		55.0	5.69	94.31	RPIN (Both)

Summary Data

	2004	*2005*
Bankfull Cross Sectional Area (ft^2)	26.9	20.5
Bankfull Width (ft)	26.9	22.9
Bankfull Mean Depth (ft)	1.0	0.9
Bankfull Max Depth (ft)	2.1	1.9
Width/Depth Ratio	26.9	25.6
Entrenchment Ratio	>5	>5
Classification	C6	C6

Cross Section 12 - Riffle

Cross Section Plot - Looking Downstream



Cross Section Photo - Looking Downstream

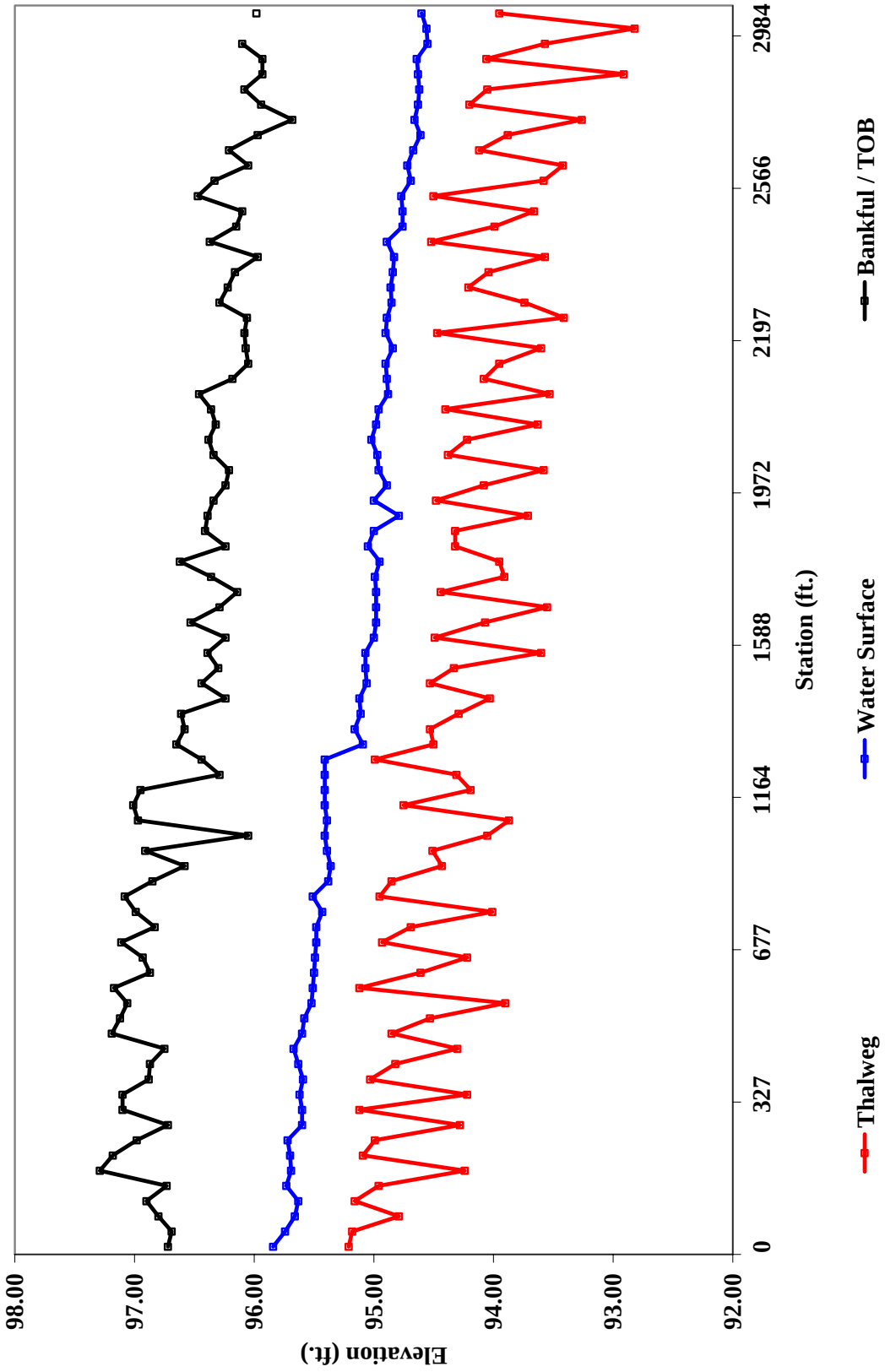
Title	Cross Section 12			
Ecosystem Enhancement Program	**Project**	Key Branch Mitigation Site Anson County, NC	**Project #**	.00013
			Figure	
	Survey Date	**Survey Weather**	**Field Team**	**Location**
	December 2, 2005	Sunny 35°	Michael O'Rourke, Lesley Yaukey	61+00

B6. Longitudinal Plots and Raw Data Tables

Survey for Longitudinal Profile – Monitoring Year 2 (2005)			
Project Name	Key Branch Mitigation Site	**Date**	11/30/2005 - 12/2/2005
Task	Long Profile	**Crew**	M. O'Rourke, L. Yaukey
Reach			

Station	Elevation		
	Thalweg	Water Surface	Bankfull / TOB
0	95.21	95.84	96.72
82	95.18	95.74	96.69
90	94.79	95.66	96.80
116	95.16	95.63	96.90
149	94.96	95.73	96.73
163	94.24	95.69	97.29
208	95.09	95.70	97.18
240	94.99	95.72	96.98
263	94.28	95.60	96.72
295	95.12	95.60	97.10
327	94.22	95.62	97.10
351	95.03	95.59	96.88
404	94.82	95.63	96.87
418	94.30	95.67	96.75
459	94.85	95.60	97.19
523	94.53	95.58	97.12
536	93.90	95.52	97.06
560	95.12	95.51	97.17
628	94.61	95.50	96.87
645	94.22	95.49	96.93
677	94.93	95.48	97.11
754	94.69	95.48	96.83
795	94.01	95.43	96.99
822	94.95	95.51	97.08
901	94.85	95.38	96.85
931	94.43	95.36	96.58
968	94.51	95.39	96.91
1052	94.05	95.41	96.05
1063	93.87	95.39	96.97
1097	94.75	95.41	97.01
1164	94.19	95.41	96.95
1167	94.31	95.41	96.29
1186	94.99	95.41	96.44
1307	94.50	95.09	96.65
1351	94.53	95.16	96.58
1416	94.29	95.11	96.61
1430	94.03	95.12	96.24
1462	94.53	95.06	96.44
1539	94.33	95.07	96.30
1559	93.60	95.07	96.39
1588	94.49	95.00	96.24

Station	Elevation		
	Thalweg	Water Surface	Bankfull / TOB
1678	94.07	94.98	96.53
1687	93.55	94.98	96.29
1724	94.44	94.98	96.14
1774	93.91	94.99	96.36
1785	93.95	94.95	96.62
1821	94.32	95.05	96.24
1880	94.32	95.00	96.41
1889	93.71	94.79	96.39
1918	94.48	95.00	96.34
1972	94.08	94.89	96.24
1983	93.58	94.96	96.21
2002	94.38	94.97	96.34
2049	94.22	95.02	96.38
2066	93.63	94.98	96.32
2088	94.40	94.96	96.36
2137	93.53	94.88	96.46
2158	94.08	94.89	96.18
2169	93.95	94.90	96.05
2181	93.60	94.84	96.07
2197	94.47	94.90	96.08
2227	93.41	94.89	96.06
2237	93.74	94.85	96.29
2266	94.21	94.86	96.22
2386	94.04	94.84	96.16
2414	93.57	94.83	95.97
2430	94.52	94.89	96.37
2467	93.99	94.76	96.15
2481	93.66	94.76	96.10
2505	94.50	94.77	96.47
2566	93.58	94.69	96.33
2579	93.42	94.72	96.05
2604	94.12	94.67	96.21
2686	93.88	94.61	95.97
2712	93.26	94.66	95.68
2741	94.20	94.63	95.94
2825	94.05	94.62	96.08
2842	92.91	94.63	95.93
2869	94.06	94.64	95.93
2958	93.57	94.55	96.10
2984	92.82	94.56	
3000	93.95	94.60	95.98


98.00
97.00
96.00
95.00
94.00
93.00
92.00
Elevation (ft.)
0
327
677
1164
1588
1972
2197
2566
2984
Station (ft.)
Bankful / TOB
Water Surface
Thalweg

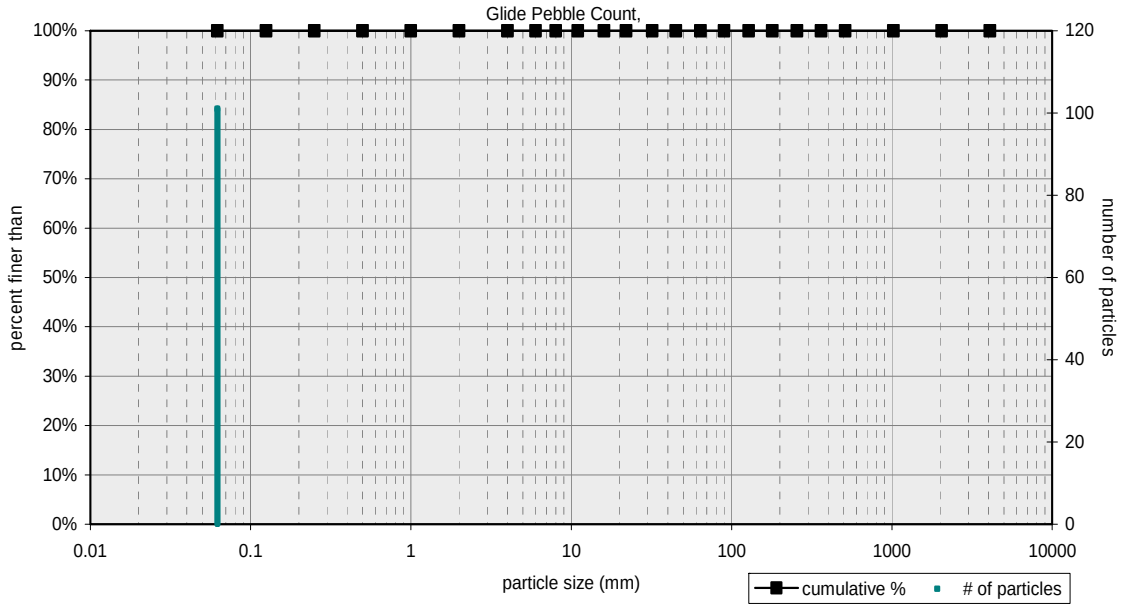
B7. Pebble Count Plots and Raw Data Tables

Glide – Station 14+00

Material	Size Range (mm)		Count	
silt/clay	0	0.062	**101**	#
very fine sand	0.062	0.13		#
fine sand	0.13	0.25		#
medium sand	0.25	0.5		#
coarse sand	0.5	1		#
very coarse sand	1	2		#
very fine gravel	2	4		#
fine gravel	4	6		#
fine gravel	6	8		#
medium gravel	8	11		#
medium gravel	11	16		#
coarse gravel	16	22		#
coarse gravel	22	32		#
very coarse gravel	32	45		#
very coarse gravel	45	64		#
small cobble	64	90		#
medium cobble	90	128		#
large cobble	128	180		#
very large cobble	180	256		#
small boulder	256	362		#
small boulder	362	512		#
medium boulder	512	1024		#
large boulder	1024	2048		#
very large boulder	2048	4096		#
		total particle count:	101	

bedrock		
clay hardpan		
detritus/wood		
artificial		
	total count:	101

Note:



based on sediment particles only	size percent less than (mm)						particle size distribution		
	D16	D35	D50	D65	D84	D95	gradation	geo mean	std dev
	0.062	0.06	0.1	0	0	0	1.0	0.1	1.0

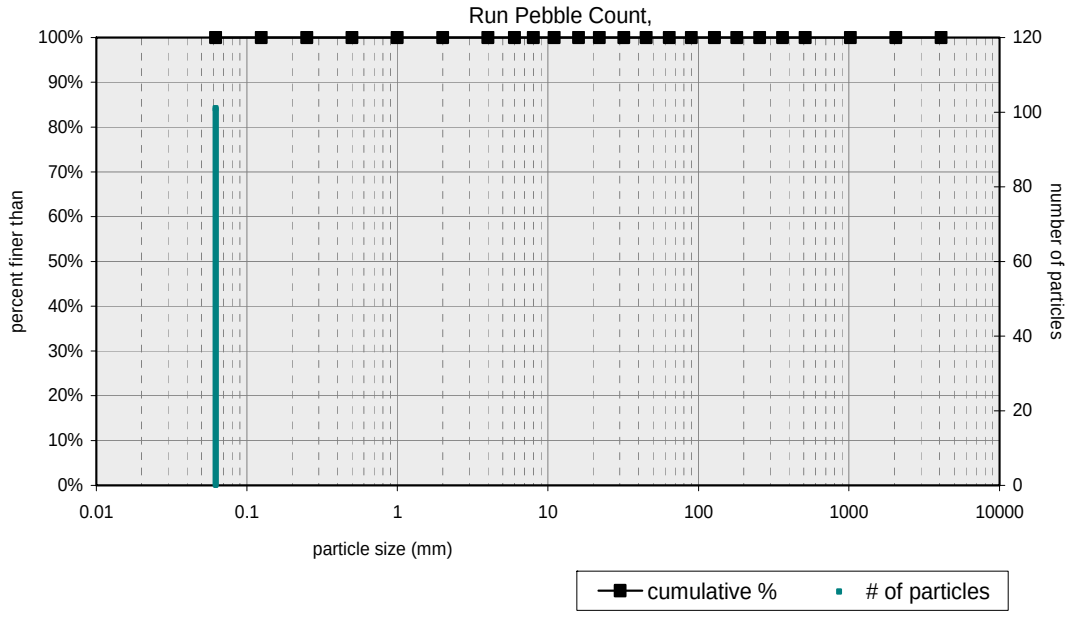
based on total count	percent by substrate type								
	silt/clay	sand	gravel	cobble	boulder	bedrock	hardpan	wood/det	artificial
	100%	0%	0%	0%	0%	0%	0%	0%	0%

Run – Station 17+00

Material	Size Range (mm)		Count	
silt/clay	0	0.062	**101**	#
very fine sand	0.062	0.13		#
fine sand	0.13	0.25		#
medium sand	0.25	0.5		#
coarse sand	0.5	1		#
very coarse sand	1	2		#
very fine gravel	2	4		#
fine gravel	4	6		#
fine gravel	6	8		#
medium gravel	8	11		#
medium gravel	11	16		#
coarse gravel	16	22		#
coarse gravel	22	32		#
very coarse gravel	32	45		#
very coarse gravel	45	64		#
small cobble	64	90		#
medium cobble	90	128		#
large cobble	128	180		#
very large cobble	180	256		#
small boulder	256	362		#
small boulder	362	512		#
medium boulder	512	1024		#
large boulder	1024	2048		#
very large boulder	2048	4096		#
		total particle count:	101	

bedrock		
clay hardpan		
detritus/wood		
artificial		
	total count:	101

Note:



based on sediment particles only	size percent less than (mm)						particle size distribution		
	D16	D35	D50	D65	D84	D95	gradation	geo mean	std dev
	0.062	0.06	0.1	0	0	0	1.0	0.1	1.0

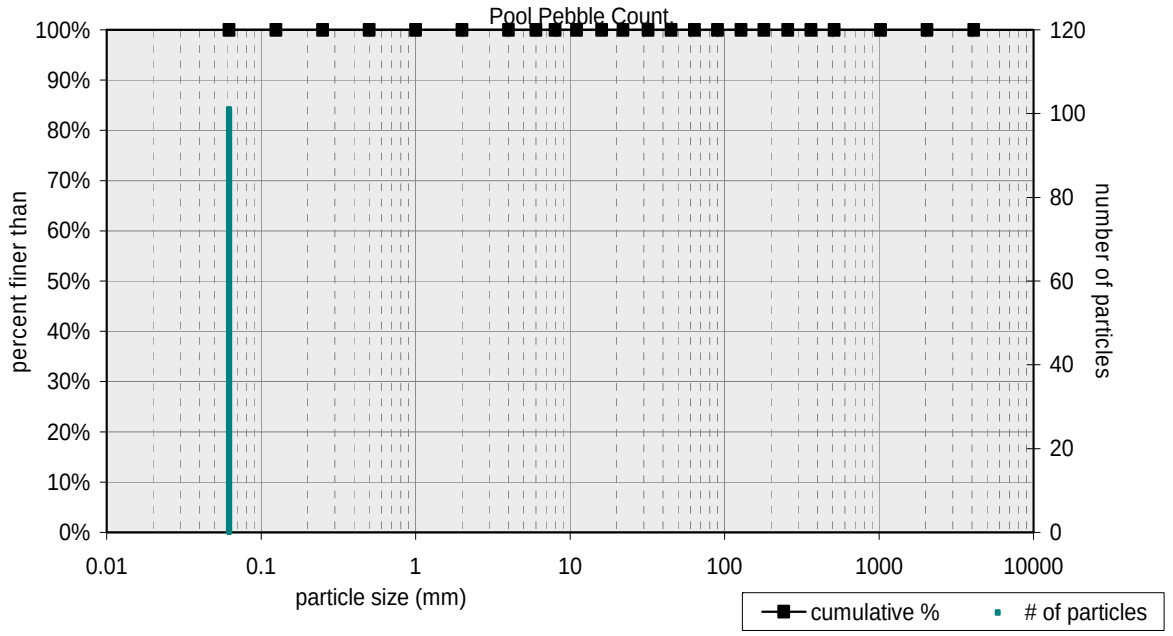
based on total count	percent by substrate type								
	silt/clay	sand	gravel	cobble	boulder	bedrock	hardpan	wood/det	artificial
	100%	0%	0%	0%	0%	0%	0%	0%	0%

Pool - Station 22+50

Material	Size Range (mm)		Count	
silt/clay	0	0.062	**101**	#
very fine sand	0.062	0.13		#
fine sand	0.13	0.25		#
medium sand	0.25	0.5		#
coarse sand	0.5	1		#
very coarse sand	1	2		#
very fine gravel	2	4		#
fine gravel	4	6		#
fine gravel	6	8		#
medium gravel	8	11		#
medium gravel	11	16		#
coarse gravel	16	22		#
coarse gravel	22	32		#
very coarse gravel	32	45		#
very coarse gravel	45	64		#
small cobble	64	90		#
medium cobble	90	128		#
large cobble	128	180		#
very large cobble	180	256		#
small boulder	256	362		#
small boulder	362	512		#
medium boulder	512	1024		#
large boulder	1024	2048		#
very large boulder	2048	4096		#
	total particle count:		101	

bedrock			**1**
clay hardpan			
detritus/wood			
artificial			
	total count:		102

Note:



based on sediment particles only	size percent less than (mm)						particle size distribution		
	D16	D35	D50	D65	D84	D95	gradation	geo mean	std dev
	0.062	0.06	0.1	0	0	0	1.0	0.1	1.0

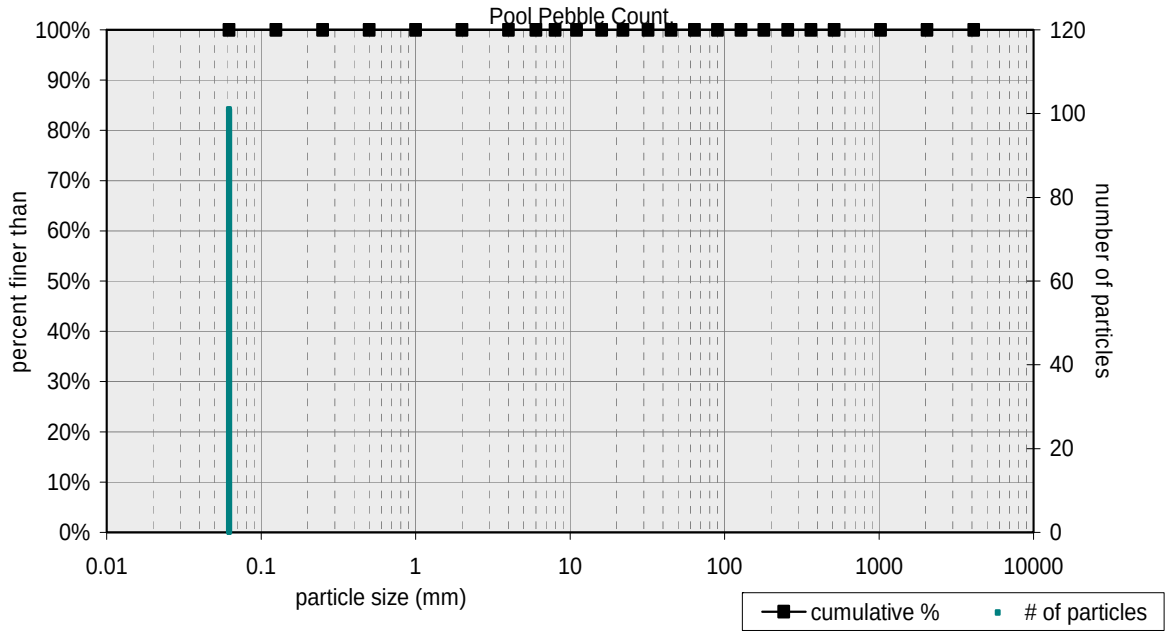
based on total count	percent by substrate type								
	silt/clay	sand	gravel	cobble	boulder	bedrock	hardpan	wood/det	artificial
	99%	0%	0%	0%	0%	1%	0%	0%	0%

Pool - Station 26+50

Material	Size Range (mm)		Count	
silt/clay	0	0.062	**101**	#
very fine sand	0.062	0.13		#
fine sand	0.13	0.25		#
medium sand	0.25	0.5		#
coarse sand	0.5	1		#
very coarse sand	1	2		#
very fine gravel	2	4		#
fine gravel	4	6		#
fine gravel	6	8		#
medium gravel	8	11		#
medium gravel	11	16		#
coarse gravel	16	22		#
coarse gravel	22	32		#
very coarse gravel	32	45		#
very coarse gravel	45	64		#
small cobble	64	90		#
medium cobble	90	128		#
large cobble	128	180		#
very large cobble	180	256		#
small boulder	256	362		#
small boulder	362	512		#
medium boulder	512	1024		#
large boulder	1024	2048		#
very large boulder	2048	4096		#
	total particle count:		101	

bedrock			**1**
clay hardpan			
detritus/wood			
artificial			
	total count:		102

Note:



based on sediment particles only	size percent less than (mm)						particle size distribution		
	D16	D35	D50	D65	D84	D95	gradation	geo mean	std dev
	0.062	0.06	0.1	0	0	0	1.0	0.1	1.0

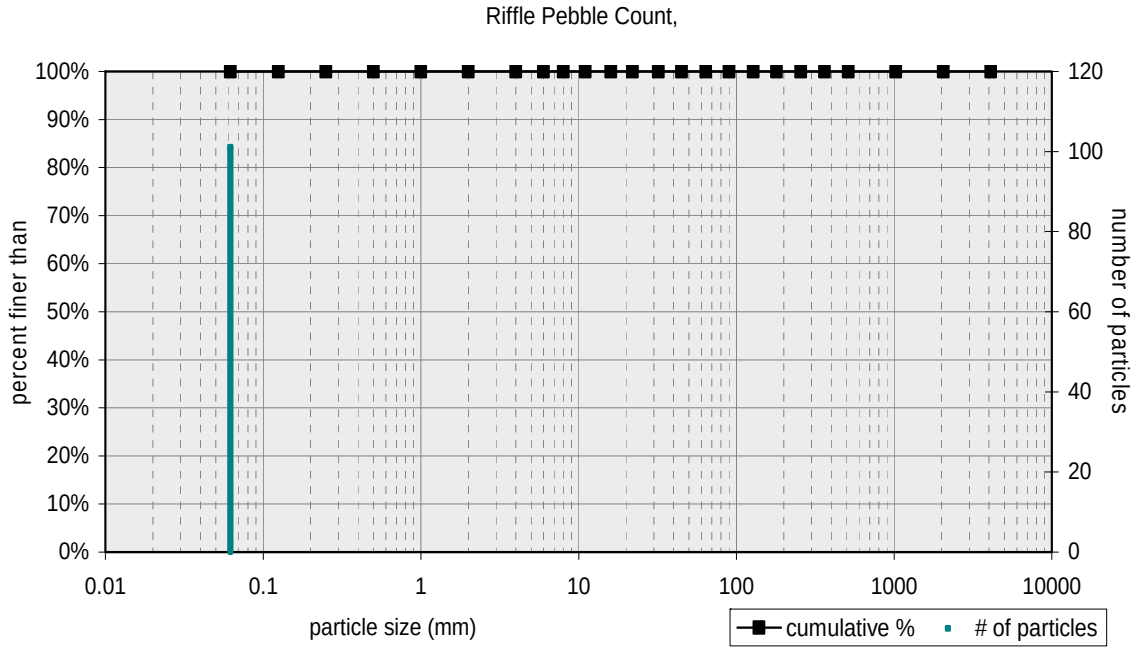
based on total count	percent by substrate type								
	silt/clay	sand	gravel	cobble	boulder	bedrock	hardpan	wood/det	artificial
	99%	0%	0%	0%	0%	1%	0%	0%	0%

Riffle - Station 31+00

Material	Size Range (mm)		Count	
silt/clay	0	0.062	**101**	#
very fine sand	0.062	0.13		#
fine sand	0.13	0.25		#
medium sand	0.25	0.5		#
coarse sand	0.5	1		#
very coarse sand	1	2		#
very fine gravel	2	4		#
fine gravel	4	6		#
fine gravel	6	8		#
medium gravel	8	11		#
medium gravel	11	16		#
coarse gravel	16	22		#
coarse gravel	22	32		#
very coarse gravel	32	45		#
very coarse gravel	45	64		#
small cobble	64	90		#
medium cobble	90	128		#
large cobble	128	180		#
very large cobble	180	256		#
small boulder	256	362		#
small boulder	362	512		#
medium boulder	512	1024		#
large boulder	1024	2048		#
very large boulder	2048	4096		#
	total particle count:		101	

bedrock		
clay hardpan		
detritus/wood		
artificial		
	total count:	101

Note:



based on sediment particles only	size percent less than (mm)						particle size distribution		
	D16	D35	D50	D65	D84	D95	gradation	geo mean	std dev
	0.062	0.06	0.1	0	0	0	1.0	0.1	1.0

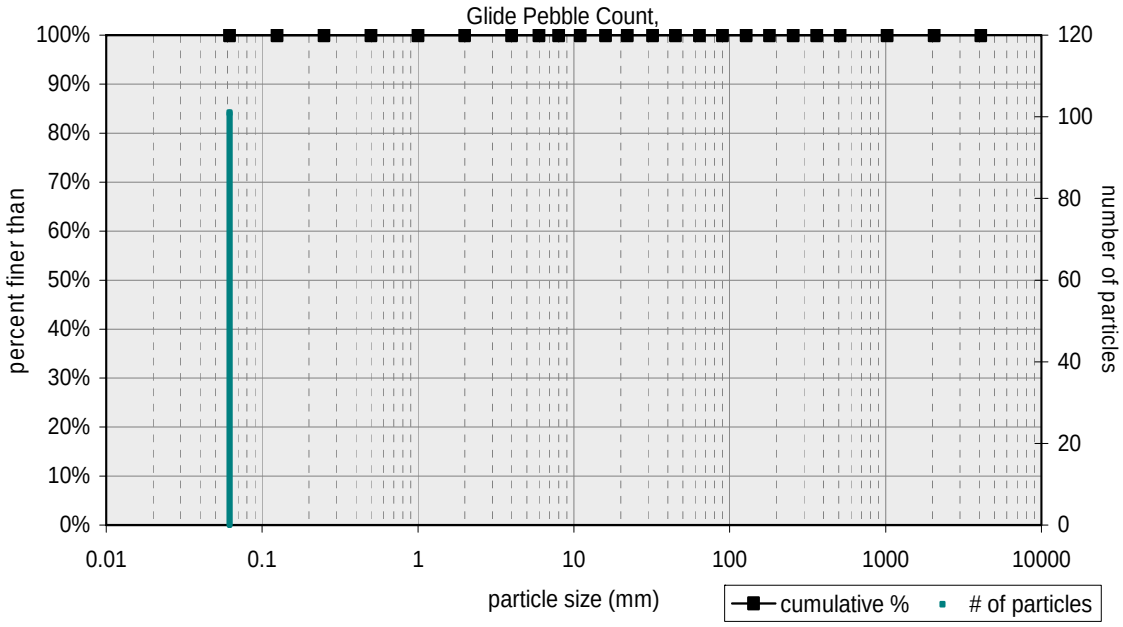
based on total count	percent by substrate type								
	silt/clay	sand	gravel	cobble	boulder	bedrock	hardpan	wood/det	artificial
	100%	0%	0%	0%	0%	0%	0%	0%	0%

Glide - Station 35+00

Material	Size Range (mm)		Count	
silt/clay	0	0.062	**101**	#
very fine sand	0.062	0.13		#
fine sand	0.13	0.25		#
medium sand	0.25	0.5		#
coarse sand	0.5	1		#
very coarse sand	1	2		#
very fine gravel	2	4		#
fine gravel	4	6		#
fine gravel	6	8		#
medium gravel	8	11		#
medium gravel	11	16		#
coarse gravel	16	22		#
coarse gravel	22	32		#
very coarse gravel	32	45		#
very coarse gravel	45	64		#
small cobble	64	90		#
medium cobble	90	128		#
large cobble	128	180		#
very large cobble	180	256		#
small boulder	256	362		#
small boulder	362	512		#
medium boulder	512	1024		#
large boulder	1024	2048		#
very large boulder	2048	4096		#
	total particle count:		101	

bedrock		
clay hardpan		
detritus/wood		
artificial		
total count:		101

Note:



based on sediment particles only	size percent less than (mm)						particle size distribution		
	D16	D35	D50	D65	D84	D95	gradation	geo mean	std dev
	0.062	0.06	0.1	0	0	0	1.0	0.1	1.0

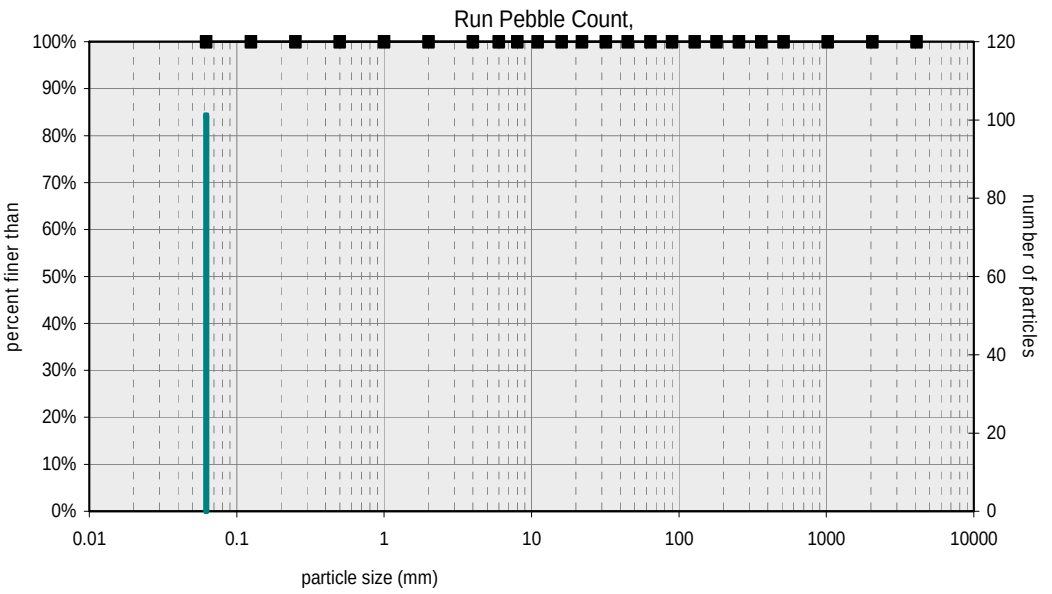
based on total count	percent by substrate type								
	silt/clay	sand	gravel	cobble	boulder	bedrock	hardpan	wood/det	artificial
	100%	0%	0%	0%	0%	0%	0%	0%	0%

Run - Station 38+00

Material	Size Range (mm)		Count	
silt/clay	0	0.062	**101**	#
very fine sand	0.062	0.13		#
fine sand	0.13	0.25		#
medium sand	0.25	0.5		#
coarse sand	0.5	1		#
very coarse sand	1	2		#
very fine gravel	2	4		#
fine gravel	4	6		#
fine gravel	6	8		#
medium gravel	8	11		#
medium gravel	11	16		#
coarse gravel	16	22		#
coarse gravel	22	32		#
very coarse gravel	32	45		#
very coarse gravel	45	64		#
small cobble	64	90		#
medium cobble	90	128		#
large cobble	128	180		#
very large cobble	180	256		#
small boulder	256	362		#
small boulder	362	512		#
medium boulder	512	1024		#
large boulder	1024	2048		#
very large boulder	2048	4096		#
	total particle count:		101	

bedrock		
clay hardpan		
detritus/wood		
artificial		
total count:		101

Note:



based on sediment particles only	size percent less than (mm)						particle size distribution		
	D16	D35	D50	D65	D84	D95	gradation	geo mean	std dev
	0.062	0.06	0.1	0	0	0	1.0	0.1	1.0

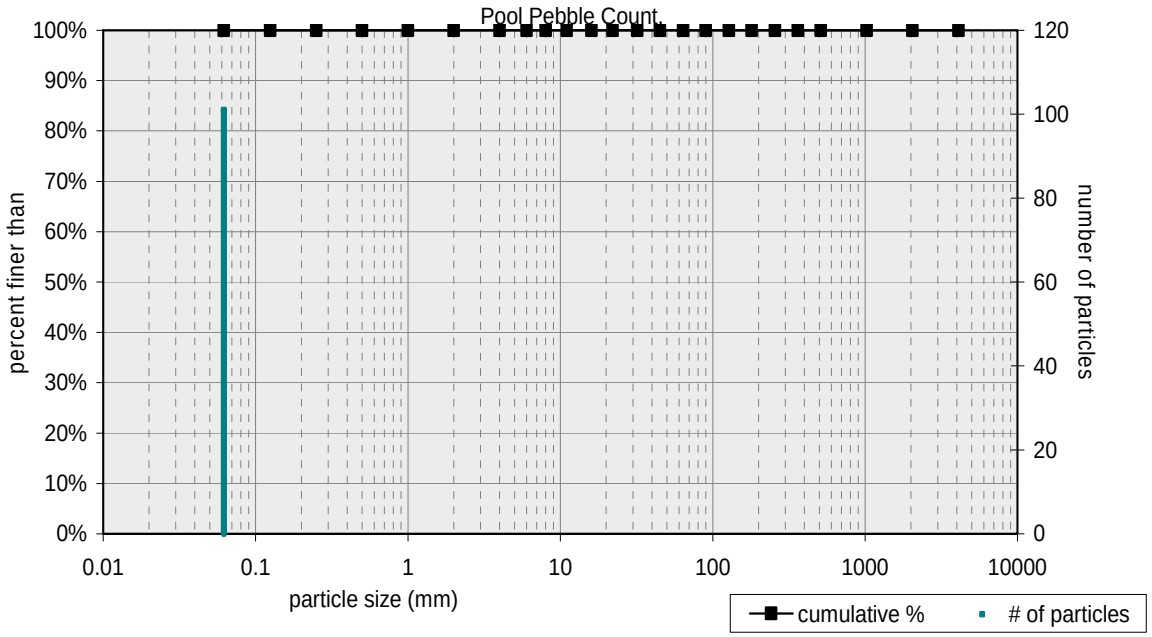
based on total count	percent by substrate type								
	silt/clay	sand	gravel	cobble	boulder	bedrock	hardpan	wood/det	artificial
	100%	0%	0%	0%	0%	0%	0%	0%	0%

Pool - Station 44+00

Material	Size Range (mm)		Count	
silt/clay	0	0.062	**101**	#
very fine sand	0.062	0.13		#
fine sand	0.13	0.25		#
medium sand	0.25	0.5		#
coarse sand	0.5	1		#
very coarse sand	1	2		#
very fine gravel	2	4		#
fine gravel	4	6		#
fine gravel	6	8		#
medium gravel	8	11		#
medium gravel	11	16		#
coarse gravel	16	22		#
coarse gravel	22	32		#
very coarse gravel	32	45		#
very coarse gravel	45	64		#
small cobble	64	90		#
medium cobble	90	128		#
large cobble	128	180		#
very large cobble	180	256		#
small boulder	256	362		#
small boulder	362	512		#
medium boulder	512	1024		#
large boulder	1024	2048		#
very large boulder	2048	4096		#
		total particle count:	101	

bedrock		**1**
clay hardpan		
detritus/wood		
artificial		
	total count:	102

Note:



based on sediment particles only	size percent less than (mm)						particle size distribution		
	D16	D35	D50	D65	D84	D95	gradation	geo mean	std dev
	0.062	0.06	0.1	0	0	0	1.0	0.1	1.0

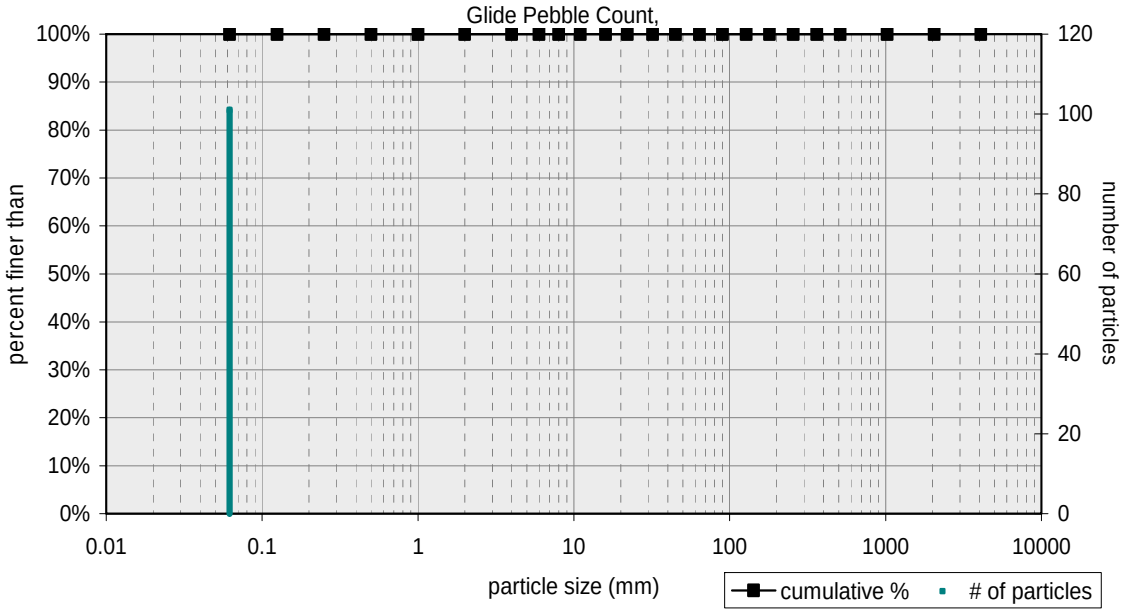
based on total count	percent by substrate type								
	silt/clay	sand	gravel	cobble	boulder	bedrock	hardpan	wood/det	artificial
	99%	0%	0%	0%	0%	1%	0%	0%	0%

Glide - Station 48+00

Material	Size Range (mm)		Count	
silt/clay	0	0.062	**101**	#
very fine sand	0.062	0.13		#
fine sand	0.13	0.25		#
medium sand	0.25	0.5		#
coarse sand	0.5	1		#
very coarse sand	1	2		#
very fine gravel	2	4		#
fine gravel	4	6		#
fine gravel	6	8		#
medium gravel	8	11		#
medium gravel	11	16		#
coarse gravel	16	22		#
coarse gravel	22	32		#
very coarse gravel	32	45		#
very coarse gravel	45	64		#
small cobble	64	90		#
medium cobble	90	128		#
large cobble	128	180		#
very large cobble	180	256		#
small boulder	256	362		#
small boulder	362	512		#
medium boulder	512	1024		#
large boulder	1024	2048		#
very large boulder	2048	4096		#
		total particle count:	101	

bedrock		
clay hardpan		
detritus/wood		
artificial		
	total count:	101

Note:



based on sediment particles only	size percent less than (mm)						particle size distribution		
	D16	D35	D50	D65	D84	D95	gradation	geo mean	std dev
	0.062	0.06	0.1	0	0	0	1.0	0.1	1.0

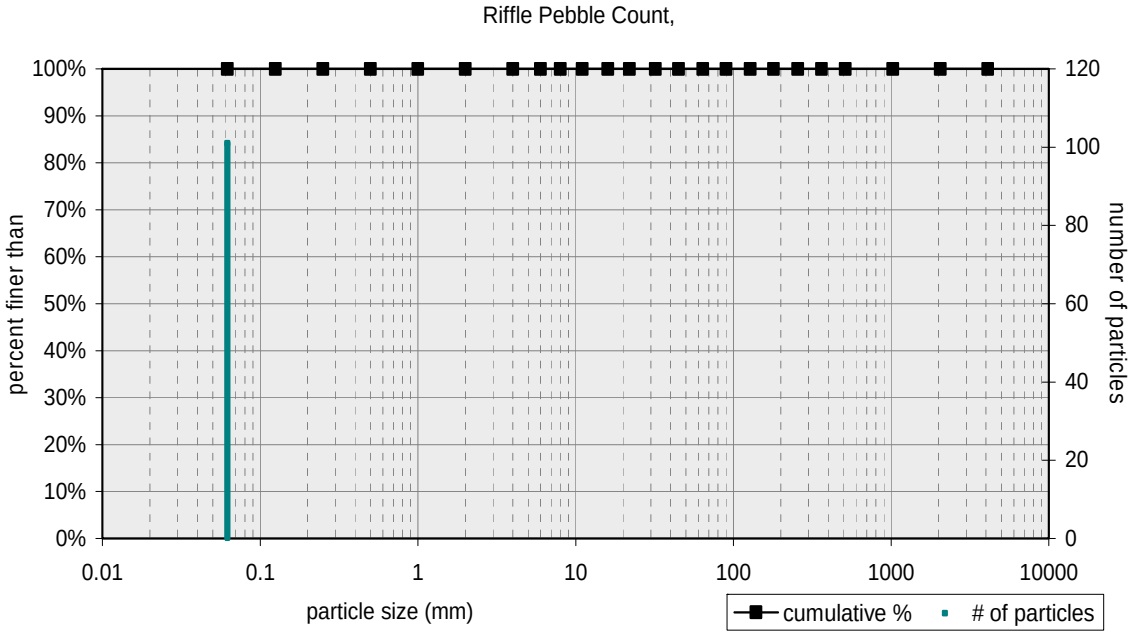
based on total count	percent by substrate type								
	silt/clay	sand	gravel	cobble	boulder	bedrock	hardpan	wood/det	artificial
	100%	0%	0%	0%	0%	0%	0%	0%	0%

Riffle - Station 53+00

Material	Size Range (mm)		Count	
silt/clay	0	0.062	**101**	#
very fine sand	0.062	0.13		#
fine sand	0.13	0.25		#
medium sand	0.25	0.5		#
coarse sand	0.5	1		#
very coarse sand	1	2		#
very fine gravel	2	4		#
fine gravel	4	6		#
fine gravel	6	8		#
medium gravel	8	11		#
medium gravel	11	16		#
coarse gravel	16	22		#
coarse gravel	22	32		#
very coarse gravel	32	45		#
very coarse gravel	45	64		#
small cobble	64	90		#
medium cobble	90	128		#
large cobble	128	180		#
very large cobble	180	256		#
small boulder	256	362		#
small boulder	362	512		#
medium boulder	512	1024		#
large boulder	1024	2048		#
very large boulder	2048	4096		#
	total particle count:		101	

bedrock		
clay hardpan		
detritus/wood		
artificial		
total count:		101

Note:



based on sediment particles only	size percent less than (mm)						particle size distribution		
	D16	D35	D50	D65	D84	D95	gradation	geo mean	std dev
	0.062	0.06	0.1	0	0	0	1.0	0.1	1.0

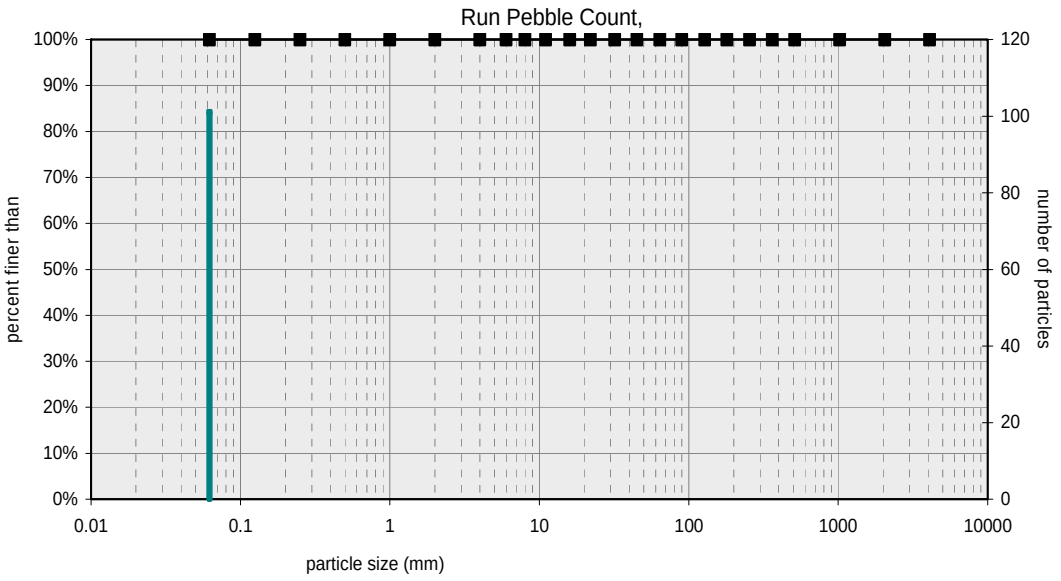
based on total count	percent by substrate type								
	silt/clay	sand	gravel	cobble	boulder	bedrock	hardpan	wood/det	artificial
	100%	0%	0%	0%	0%	0%	0%	0%	0%

Run - Station 57+00

Material	Size Range (mm)		Count	
silt/clay	0	0.062	**101**	#
very fine sand	0.062	0.13		#
fine sand	0.13	0.25		#
medium sand	0.25	0.5		#
coarse sand	0.5	1		#
very coarse sand	1	2		#
very fine gravel	2	4		#
fine gravel	4	6		#
fine gravel	6	8		#
medium gravel	8	11		#
medium gravel	11	16		#
coarse gravel	16	22		#
coarse gravel	22	32		#
very coarse gravel	32	45		#
very coarse gravel	45	64		#
small cobble	64	90		#
medium cobble	90	128		#
large cobble	128	180		#
very large cobble	180	256		#
small boulder	256	362		#
small boulder	362	512		#
medium boulder	512	1024		#
large boulder	1024	2048		#
very large boulder	2048	4096		#
		total particle count:	101	

bedrock		
clay hardpan		
detritus/wood		
artificial		
	total count:	101

Note:



based on sediment particles only	size percent less than (mm)						particle size distribution		
	D16	D35	D50	D65	D84	D95	gradation	geo mean	std dev
	0.062	0.06	0.1	0	0	0	1.0	0.1	1.0

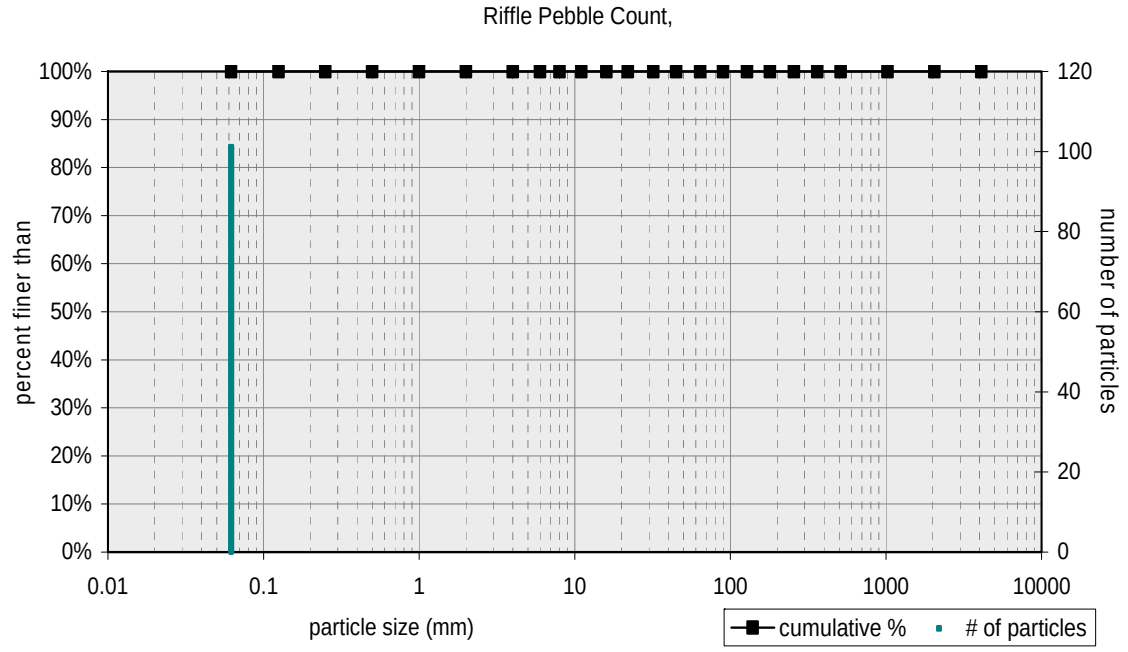
based on total count	percent by substrate type								
	silt/clay	sand	gravel	cobble	boulder	bedrock	hardpan	wood/det	artificial
	100%	0%	0%	0%	0%	0%	0%	0%	0%

Riffle - Station 61+00

Material	Size Range (mm)		Count
silt/clay	0	0.062	**101**
very fine sand	0.062	0.13	
fine sand	0.13	0.25	
medium sand	0.25	0.5	
coarse sand	0.5	1	
very coarse sand	1	2	
very fine gravel	2	4	
fine gravel	4	6	
fine gravel	6	8	
medium gravel	8	11	
medium gravel	11	16	
coarse gravel	16	22	
coarse gravel	22	32	
very coarse gravel	32	45	
very coarse gravel	45	64	
small cobble	64	90	
medium cobble	90	128	
large cobble	128	180	
very large cobble	180	256	
small boulder	256	362	
small boulder	362	512	
medium boulder	512	1024	
large boulder	1024	2048	
very large boulder	2048	4096	
	total particle count:		101

bedrock		
clay hardpan		
detritus/wood		
artificial		
	total count:	101

Note:



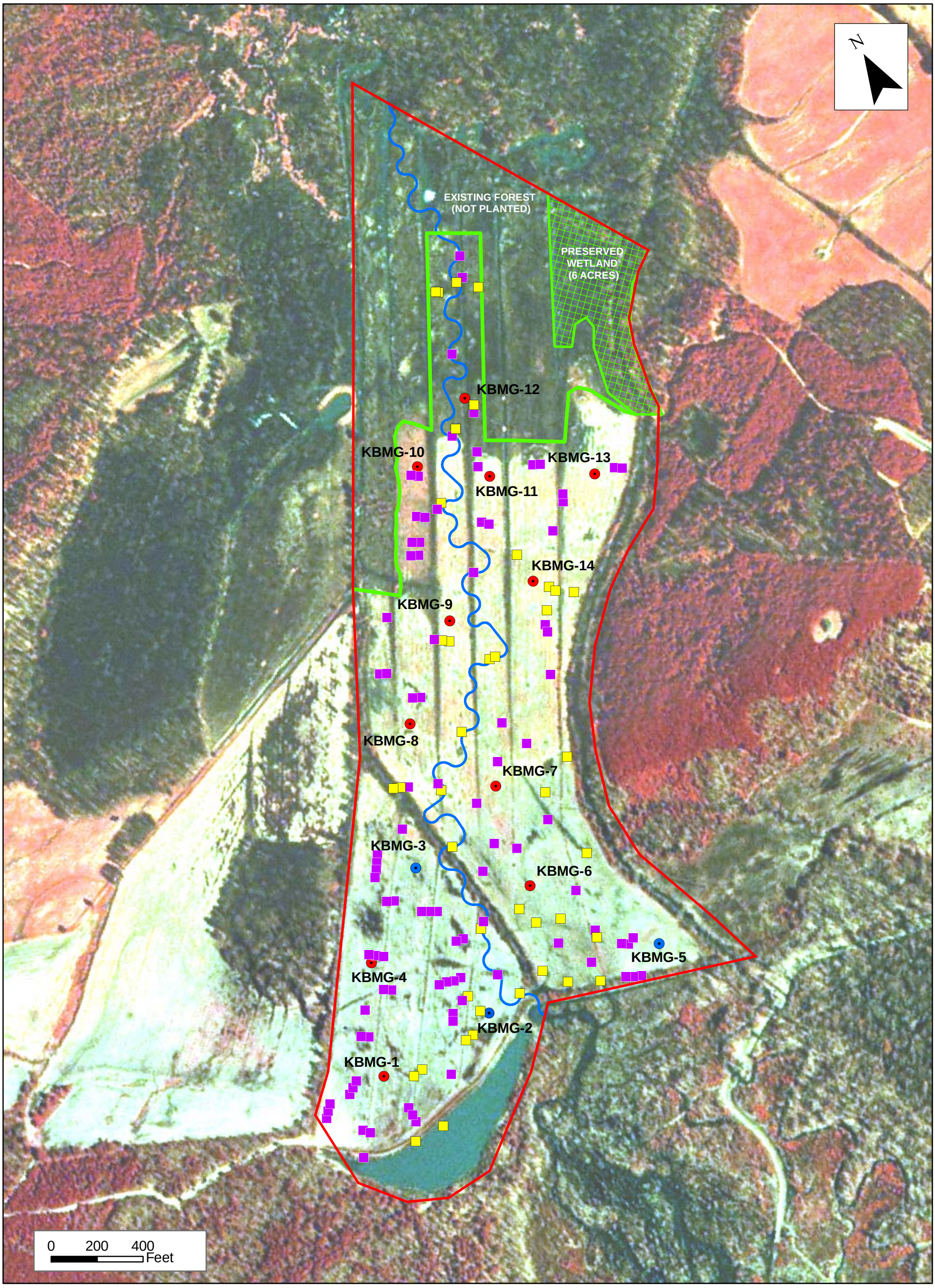
based on sediment particles only	size percent less than (mm)						particle size distribution		
	D16	D35	D50	D65	D84	D95	gradation	geo mean	std dev
	0.062	0.06	0.1	0	0	0	1.0	0.1	1.0

based on total count	percent by substrate type								
	silt/clay	sand	gravel	cobble	boulder	bedrock	hardpan	wood/det	artificial
	100%	0%	0%	0%	0%	0%	0%	0%	0%

APPENDIX C

WETLAND RAW DATA

C1. Wetland Problem Areas Plan View



Legend

- Project Boundary
- Stream

Vegetation Plots

- Met Tree Density Criteria (> 260 trees/acre)
- Did Not Meet Tree Density Criteria (< 260 trees/acre)

Monitoring Gauges

- KBMG-14 Undetermined
- KBMG-2 Met Wetland Criteria (> 12.5% of growing season)

SOURCE:
Base Map: Color infra-red Aerials funded by the NCGS, the NCDOT, the NC Center for Geographic Information and Analysis and the USGS, 1998.

Ecosystem Enhancement Program

FIGURE 4

WETLAND PROBLEM AREA PLAN VIEW
Project No. 00013
Monitoring Year 2 of 5
Anson County, North Carolina

THE LOUIS BERGER GROUP, INC.
30A Vreeland Road
Florham Park, NJ 07932

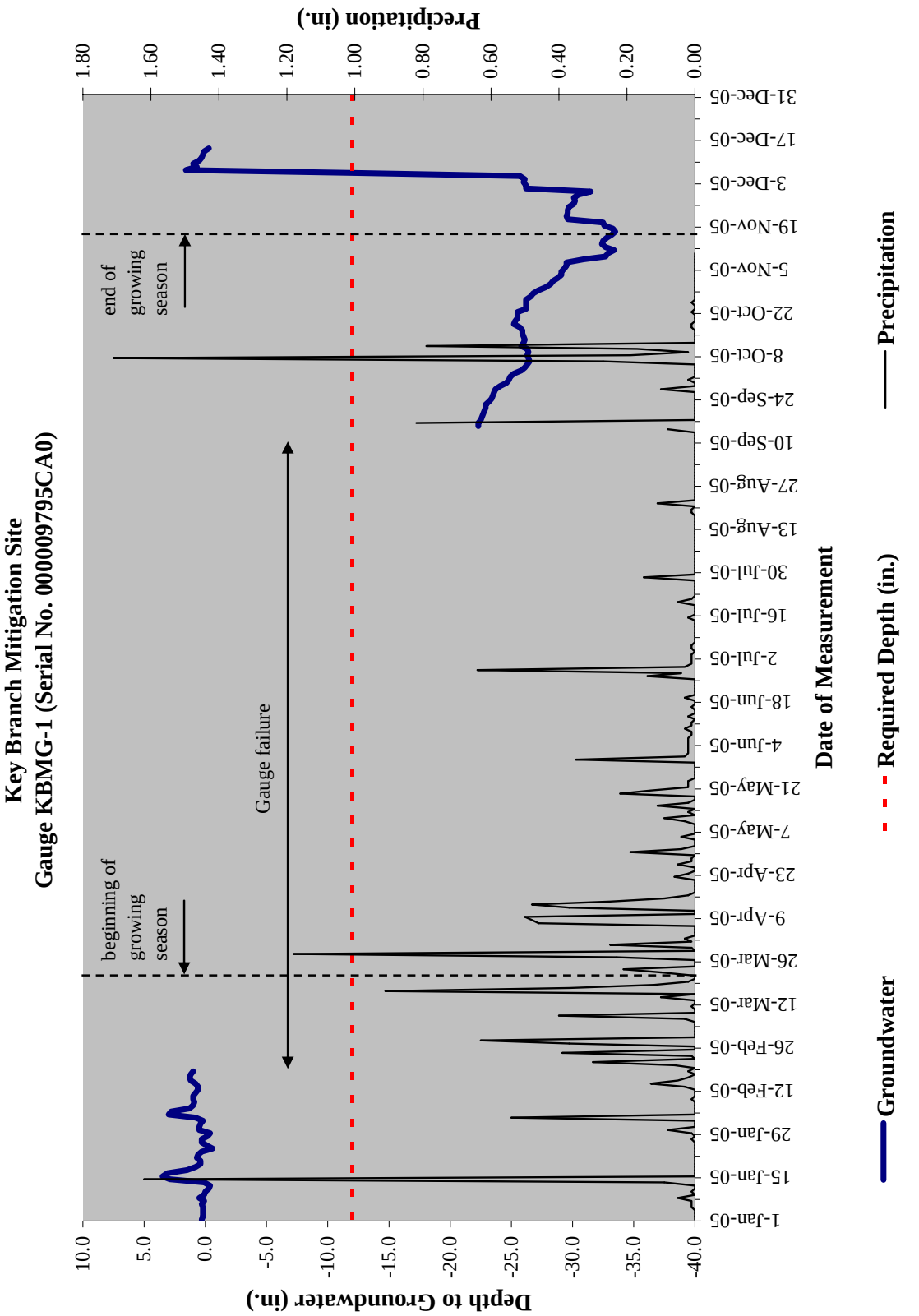
December 2005

C2. Data Tables for Hydrological Data

Hydrological monitoring results for year 2005.						
Monitoring Gauge	**Percentage of Growing Season at Saturation**					**Dates Meeting Success**
	< 5%	**5 - 8%**	**8 - 12.5%**	**> 12.5%**	**Actual**	
KBMG-1 *	X				0.0	
KBMG-2				X	14.7	March 23 - April 26
KBMG-3				X	18.1	March 23 - May 4
KBMG-4*	X					
KBMG-5				X	13.4	March 23 - April 23
KBMG-6 *	X				4.2	
KBMG-7 *		X			5.5	
KBMG-8 *	X				0.4	
KBMG-9 *	X				4.6	
KBMG-10 *			X		9.7	
KBMG-11 *	X				0.4	
KBMG-12 *		X			5.5	
KBMG-13 *	X				2.1	
KBMG-14 *	X				0.0	
Wetland Reference Gauge	**Percentage of Growing Season at Saturation**					**Dates Meeting Success**
	< 5%	**5 - 8%**	**8 - 12.5%**	**> 12.5%**	**Actual**	
WRGW-1 *	X				0.0	
WRGW-2				X	13.4	March 23 - April 23
WRGW-3 *	X				0.0	
WRGW-4				X	14.7	March 23 - April 26
WRGW-5				X	15.1	March 23 - April 27
Stream Gauge	**Percentage of Growing Season at Saturation**					**Dates Meeting Success**
	< 5%	**5 - 8%**	**8 - 12.5%**	**> 12.5%**	**Actual**	
KBSG-1				X	97.9	March 23 - November 10
KBSG-2 *	X				0.0	

* Gauge data for growing season absent due to gauge failure prior July 2005.

C2. Precipitation-Water Level Plots for Each Well


Key Branch Mitigation Site
Gauge KBMG-1 (Serial No. 000009795CA0)
Depth to Groundwater (in.)
Precipitation (in.)
Date of Measurement
Groundwater
Precipitation
Required Depth (in.)
beginning of growing season
end of growing season
Gauge failure
10.0
5.0
0.0
-5.0
-10.0
-15.0
-20.0
-25.0
-30.0
-35.0
-40.0
1.80
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
1-Jan-05
15-Jan-05
29-Jan-05
12-Feb-05
26-Feb-05
12-Mar-05
26-Mar-05
9-Apr-05
23-Apr-05
7-May-05
21-May-05
4-Jun-05
18-Jun-05
2-Jul-05
16-Jul-05
30-Jul-05
13-Aug-05
27-Aug-05
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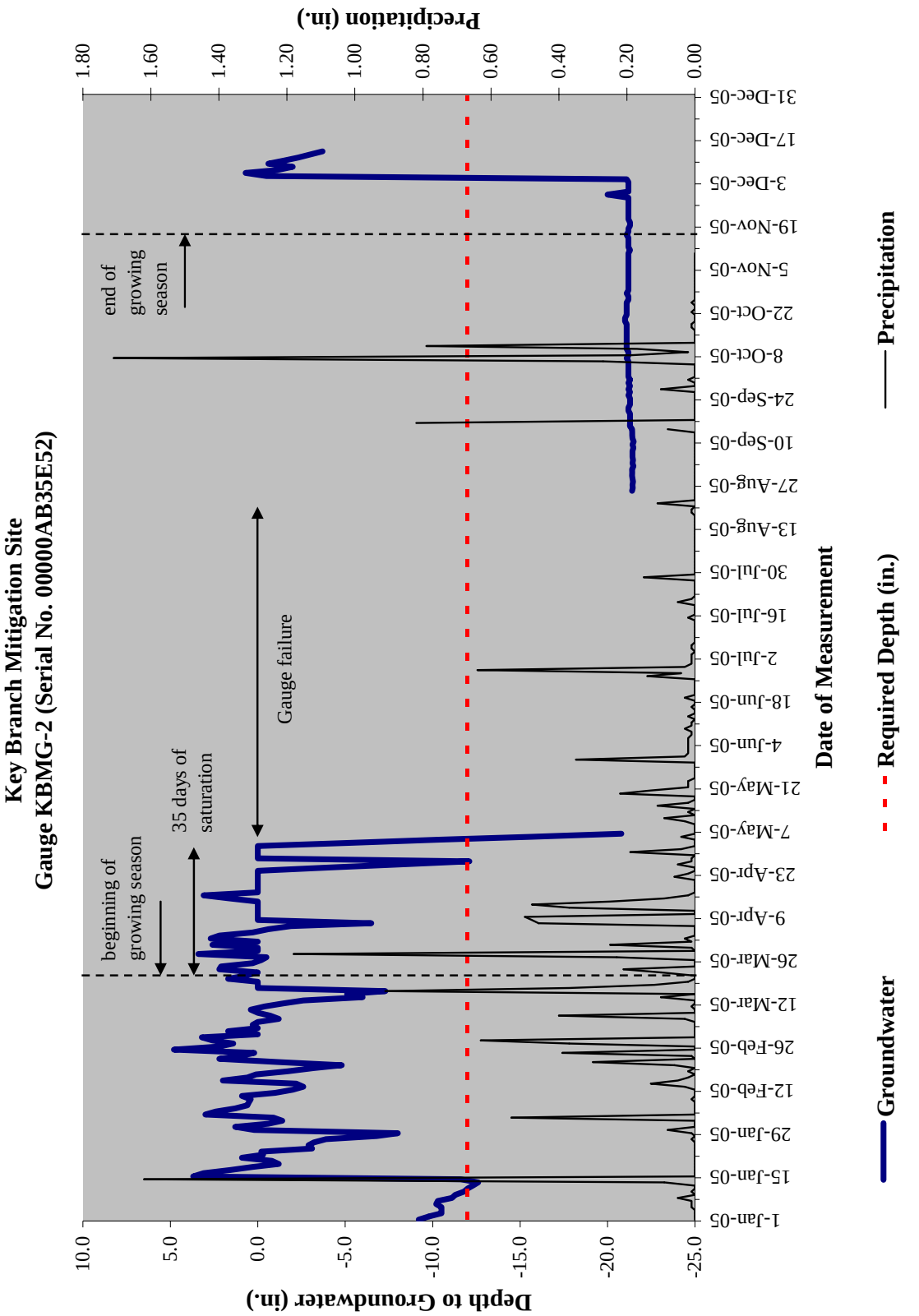
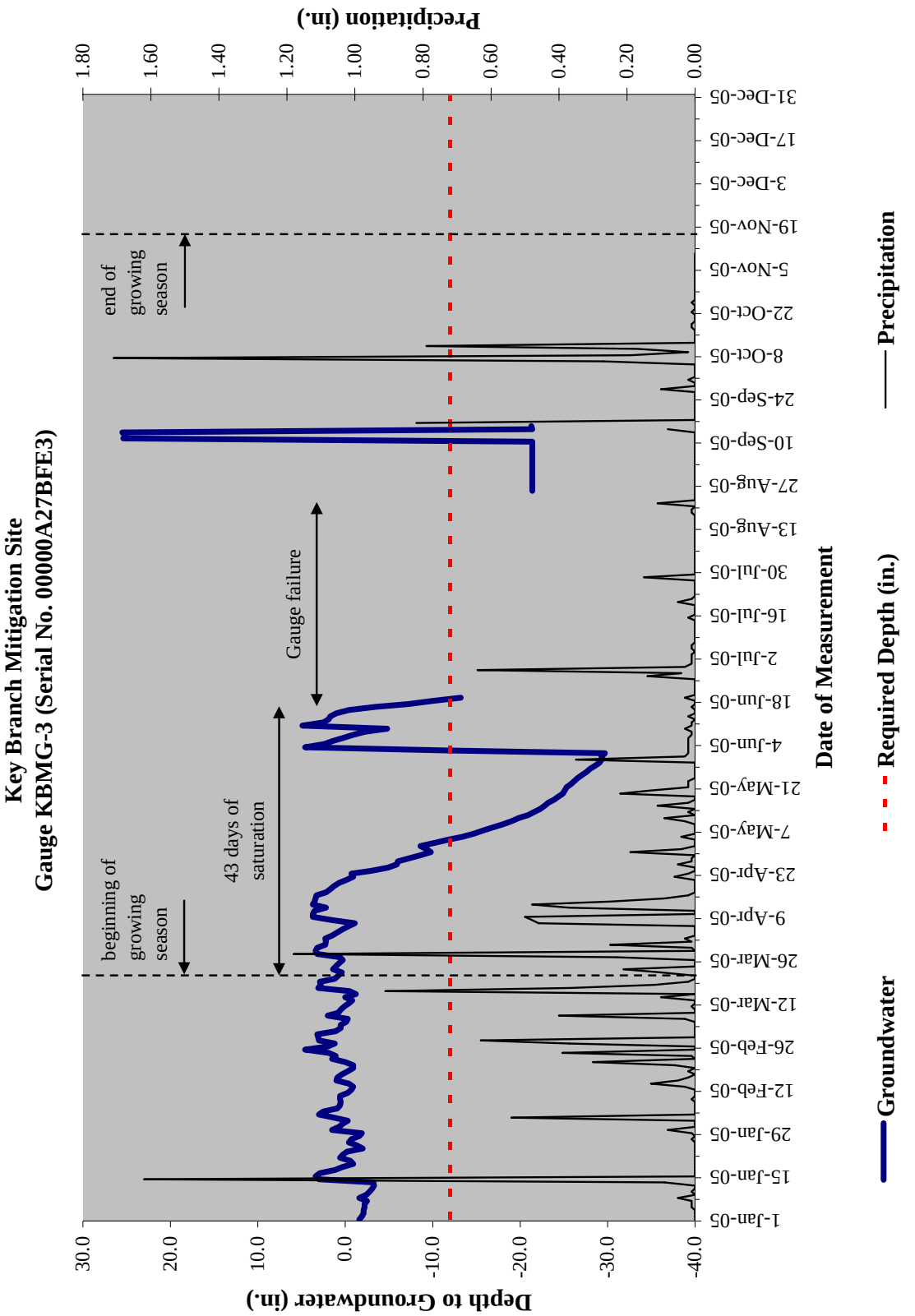
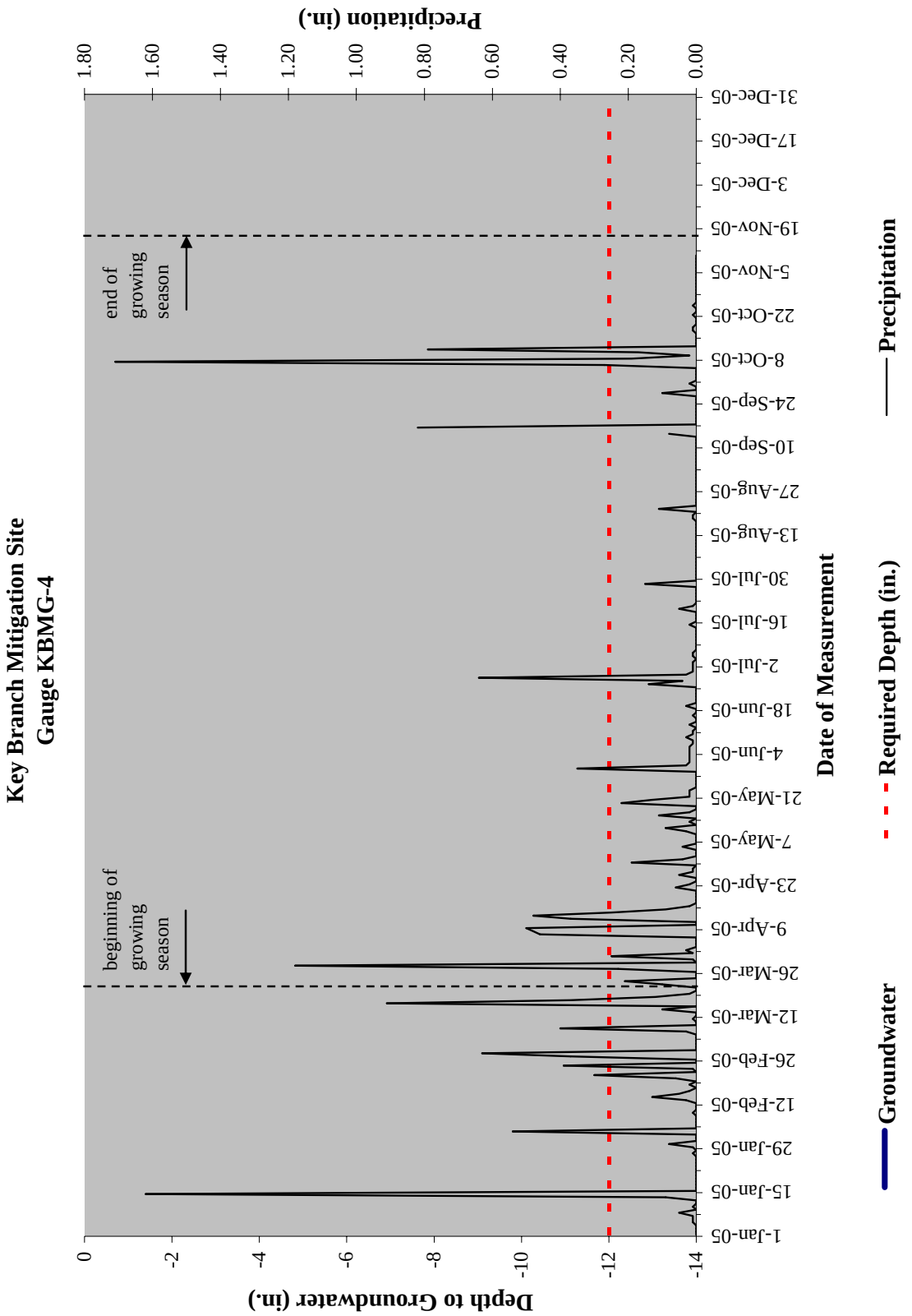
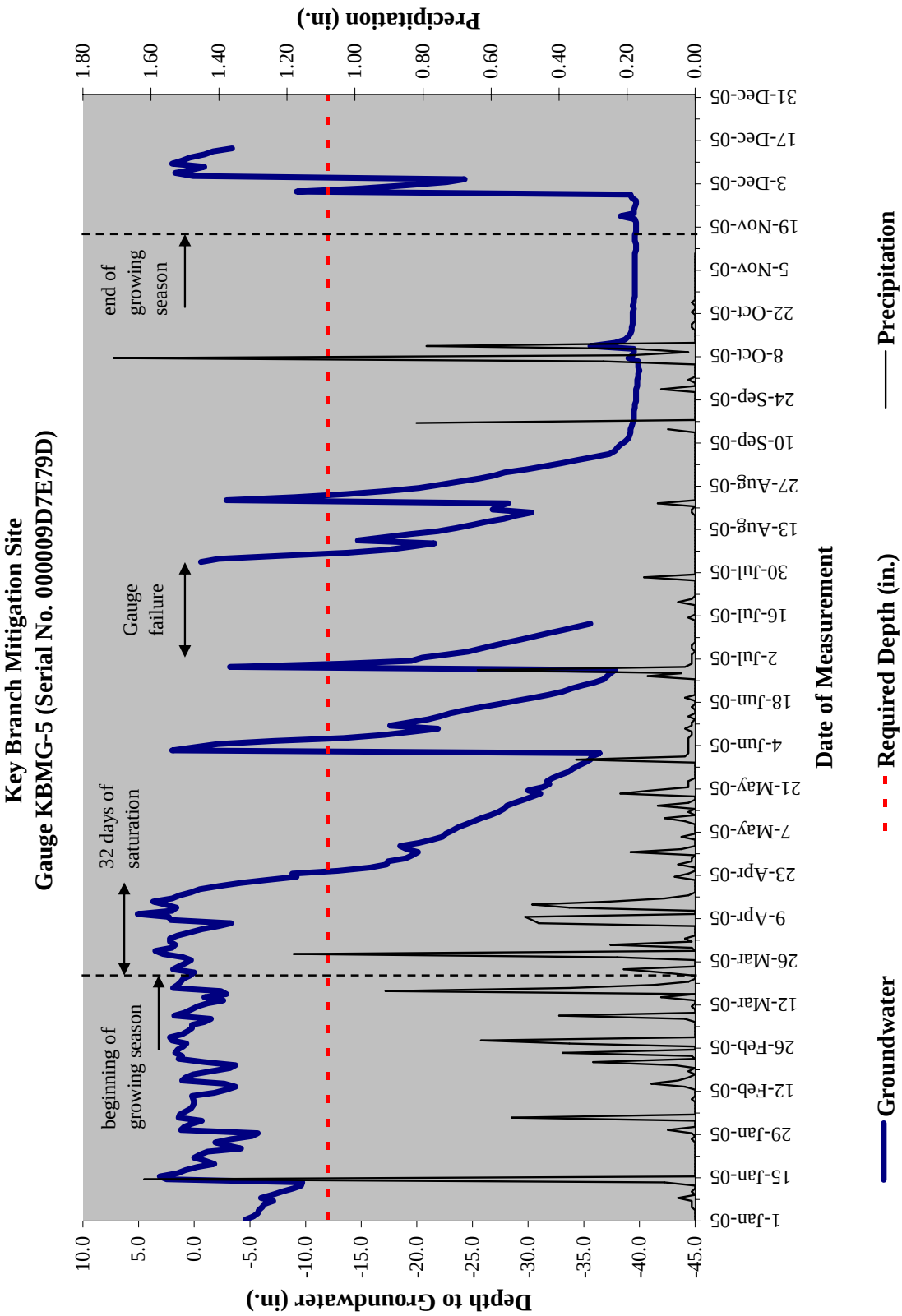
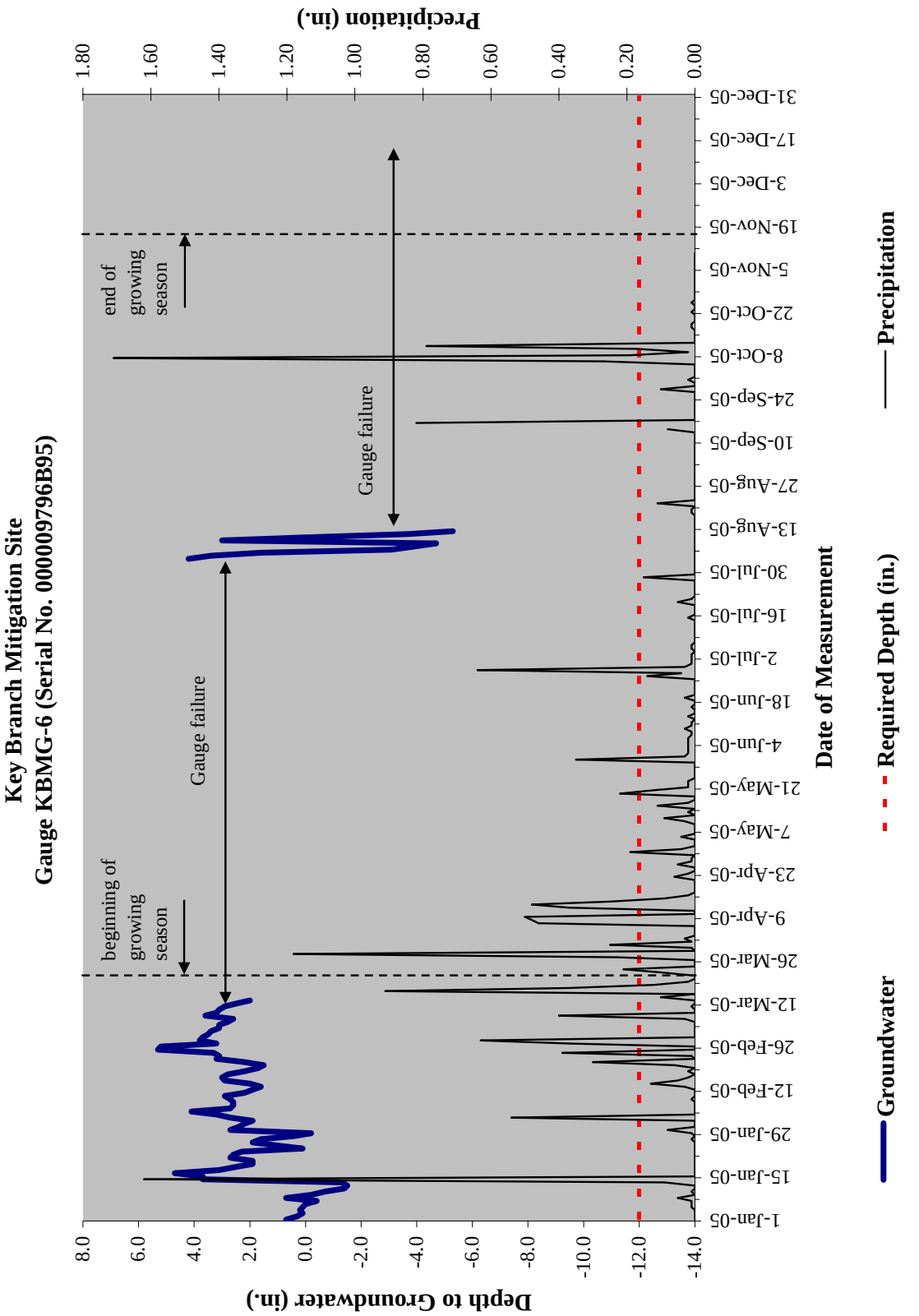
5-Nov-05
19-Nov-05
3-Dec-05
17-Dec-05
31-Dec-05

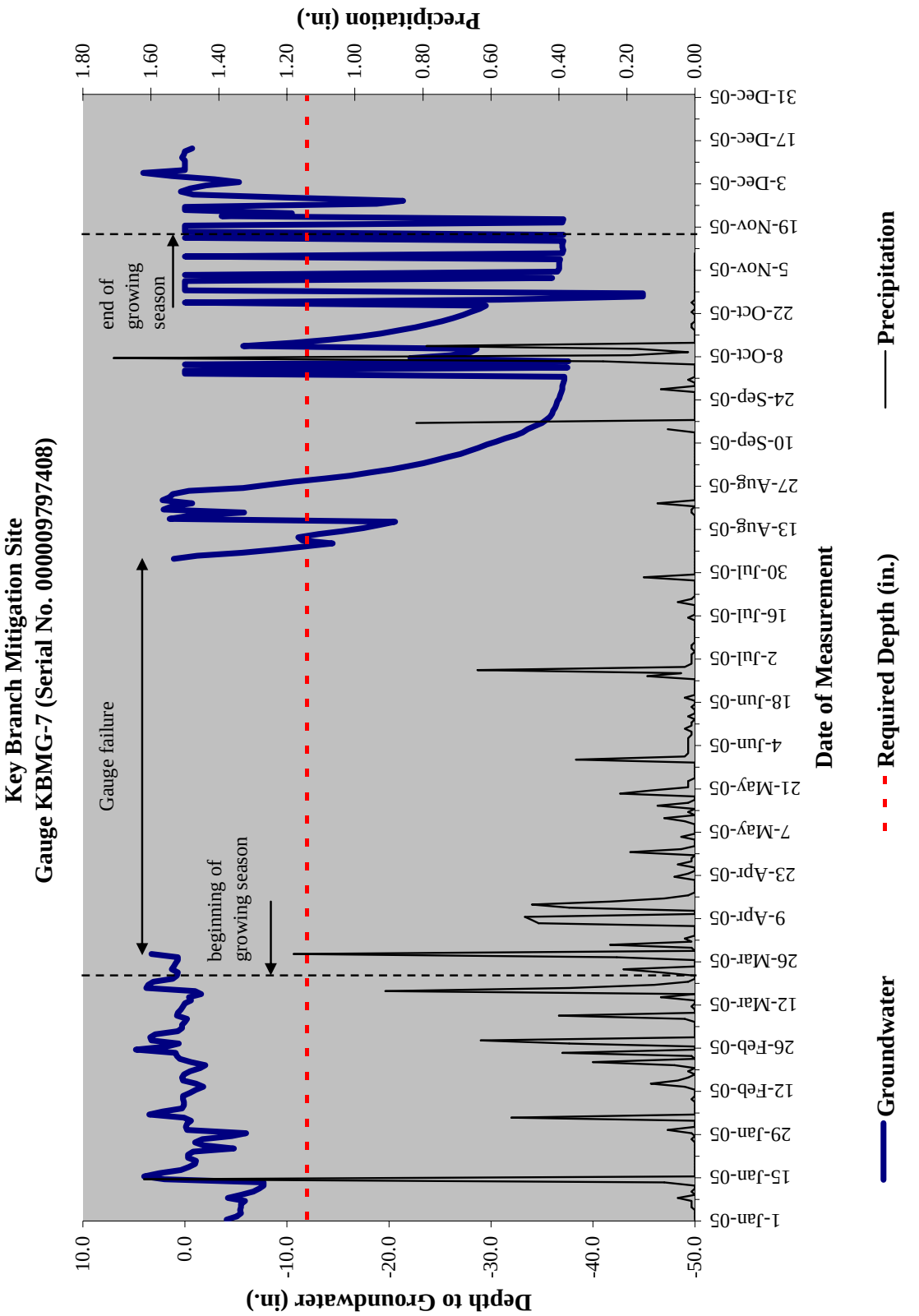

Key Branch Mitigation Site
Gauge KBMG-2 (Serial No. 00000AB35E52)
Precipitation (in.)
1.80
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
Depth to Groundwater (in.)
10.0
5.0
0.0
-5.0
-10.0
-15.0
-20.0
-25.0
1-Jan-05
15-Jan-05
29-Jan-05
12-Feb-05
26-Feb-05
12-Mar-05
26-Mar-05
9-Apr-05
23-Apr-05
7-May-05
21-May-05
4-Jun-05
18-Jun-05
2-Jul-05
16-Jul-05
30-Jul-05
13-Aug-05
27-Aug-05
10-Sep-05
24-Sep-05
8-Oct-05
22-Oct-05
5-Nov-05
19-Nov-05
3-Dec-05
17-Dec-05
31-Dec-05
Date of Measurement
beginning of growing season
35 days of saturation
Gauge failure
end of growing season
Groundwater
Required Depth (in.)
Precipitation


Key Branch Mitigation Site
Gauge KBMG-3 (Serial No. 00000A27BFE3)
Precipitation (in.)
1.80
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
Depth to Groundwater (in.)
30.0
20.0
10.0
0.0
-10.0
-20.0
-30.0
-40.0
Date of Measurement
1-Jan-05
15-Jan-05
29-Jan-05
12-Feb-05
26-Feb-05
12-Mar-05
26-Mar-05
9-Apr-05
23-Apr-05
7-May-05
21-May-05
4-Jun-05
18-Jun-05
2-Jul-05
16-Jul-05
30-Jul-05
13-Aug-05
27-Aug-05
10-Sep-05
24-Sep-05
8-Oct-05
22-Oct-05
5-Nov-05
19-Nov-05
3-Dec-05
17-Dec-05
31-Dec-05
beginning of growing season
43 days of saturation
Gauge failure
end of growing season
Groundwater
Required Depth (in.)
Precipitation


Key Branch Mitigation Site
Gauge KBMG-4
Depth to Groundwater (in.)
Precipitation (in.)
Date of Measurement
Groundwater
Required Depth (in.)
Precipitation
beginning of growing season
end of growing season
0
-2
-4
-6
-8
-10
-12
-14
1.80
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
1-Jan-05
15-Jan-05
29-Jan-05
12-Feb-05
26-Feb-05
12-Mar-05
26-Mar-05
9-Apr-05
23-Apr-05
7-May-05
21-May-05
4-Jun-05
18-Jun-05
2-Jul-05
16-Jul-05
30-Jul-05
13-Aug-05
27-Aug-05
10-Sep-05
24-Sep-05
8-Oct-05
22-Oct-05
5-Nov-05
19-Nov-05
3-Dec-05
17-Dec-05
31-Dec-05


Key Branch Mitigation Site
Gauge KBMG-5 (Serial No. 000009D7E79D)
Precipitation (in.)
Depth to Groundwater (in.)
Date of Measurement
Groundwater
Required Depth (in.)
Precipitation
beginning of growing season
32 days of saturation
Gauge failure
end of growing season


Key Branch Mitigation Site
Gauge KBMG-6 (Serial No. 000009796B95)
Precipitation (in.)
Depth to Groundwater (in.)
Date of Measurement
Groundwater
Required Depth (in.)
Precipitation
beginning of growing season
end of growing season
Gauge failure
Gauge failure
1.80
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
8.0
6.0
4.0
2.0
0.0
-2.0
-4.0
-6.0
-8.0
-10.0
-12.0
-14.0
1-Jan-05
15-Jan-05
29-Jan-05
12-Feb-05
26-Feb-05
12-Mar-05
26-Mar-05
9-Apr-05
23-Apr-05
7-May-05
21-May-05
4-Jun-05
18-Jun-05
2-Jul-05
16-Jul-05
30-Jul-05
13-Aug-05
27-Aug-05
10-Sep-05
24-Sep-05
8-Oct-05
22-Oct-05
5-Nov-05
19-Nov-05
3-Dec-05
17-Dec-05
31-Dec-05


Key Branch Mitigation Site
Gauge KBMG-7 (Serial No. 00000797408)
Depth to Groundwater (in.)
Precipitation (in.)
Date of Measurement
Groundwater
Precipitation
Required Depth (in.)
Gauge failure
beginning of growing season
end of growing season
10.0
0.0
-10.0
-20.0
-30.0
-40.0
-50.0
1.80
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
1-Jan-05
15-Jan-05
29-Jan-05
12-Feb-05
26-Feb-05
12-Mar-05
26-Mar-05
9-Apr-05
23-Apr-05
7-May-05
21-May-05
4-Jun-05
18-Jun-05
2-Jul-05
16-Jul-05
30-Jul-05
13-Aug-05
27-Aug-05
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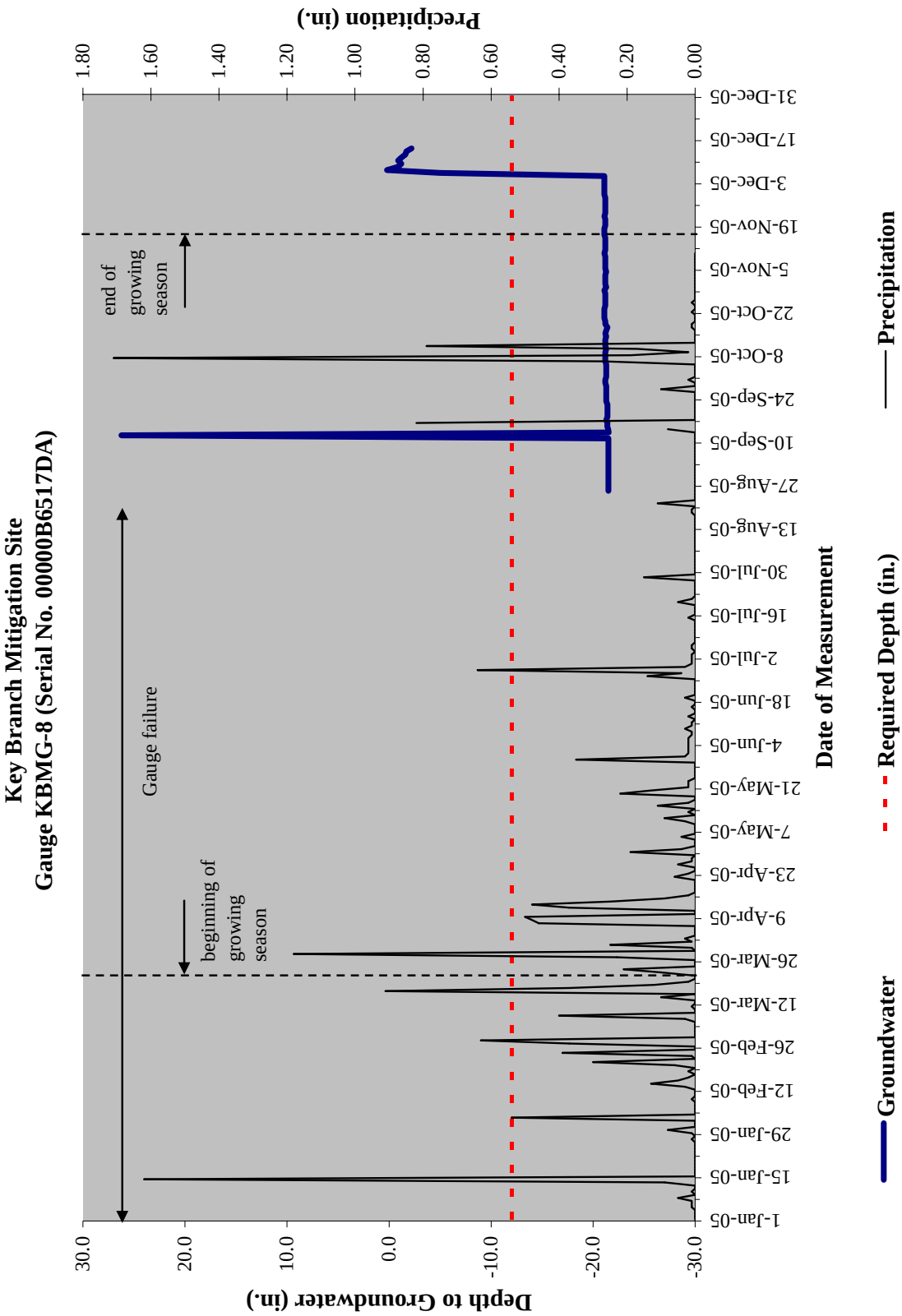
19-Nov-05
3-Dec-05
17-Dec-05
31-Dec-05


Key Branch Mitigation Site
Gauge KBMG-8 (Serial No. 00000B6517DA)
Depth to Groundwater (in.)
Precipitation (in.)
Date of Measurement
Groundwater
Required Depth (in.)
Precipitation
Gauge failure
beginning of growing season
end of growing season
30.0
20.0
10.0
0.0
-10.0
-20.0
-30.0
1.80
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
1-Jan-05
15-Jan-05
29-Jan-05
12-Feb-05
26-Feb-05
12-Mar-05
26-Mar-05
9-Apr-05
23-Apr-05
7-May-05
21-May-05
4-Jun-05
18-Jun-05
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16-Jul-05
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27-Aug-05
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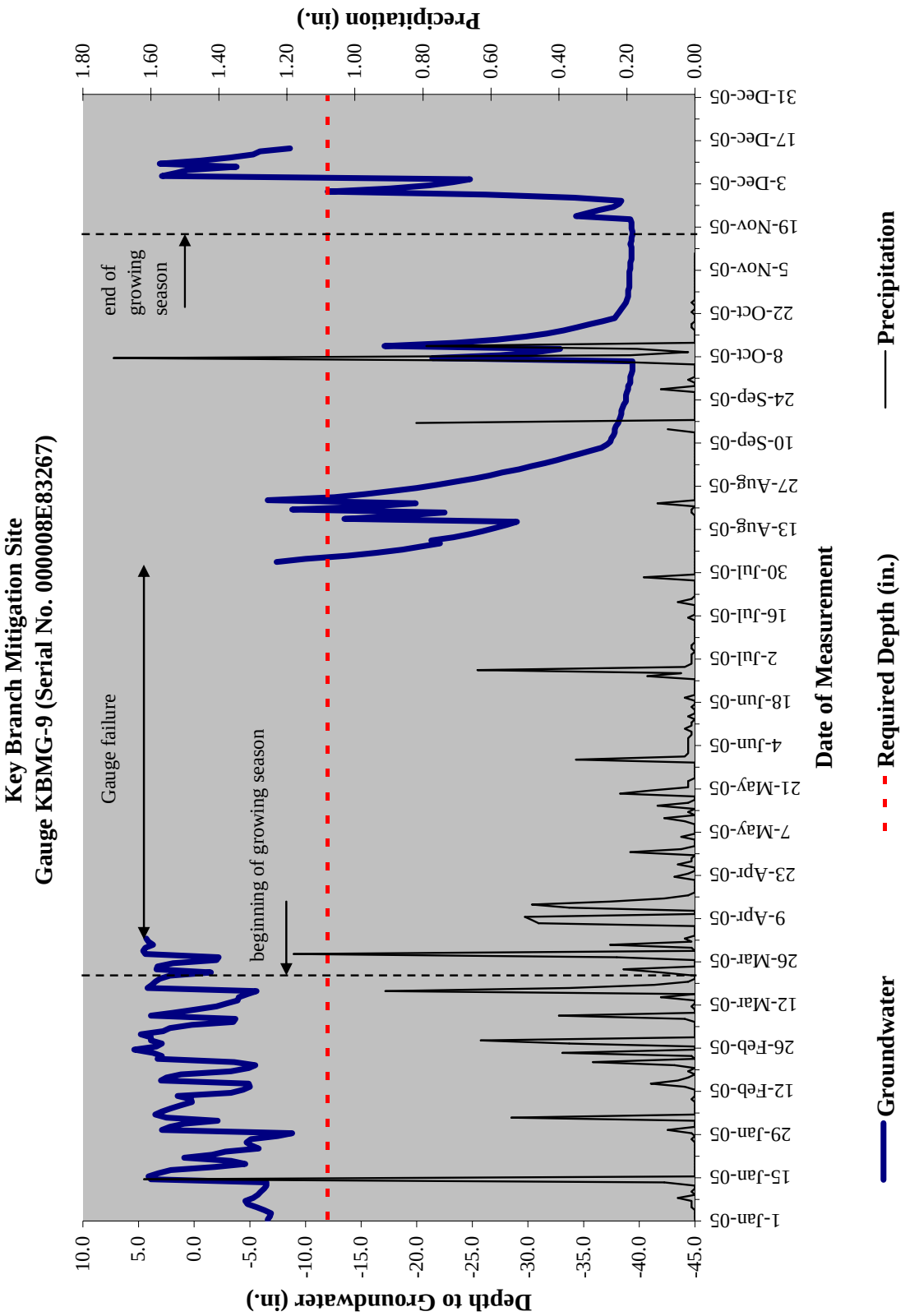
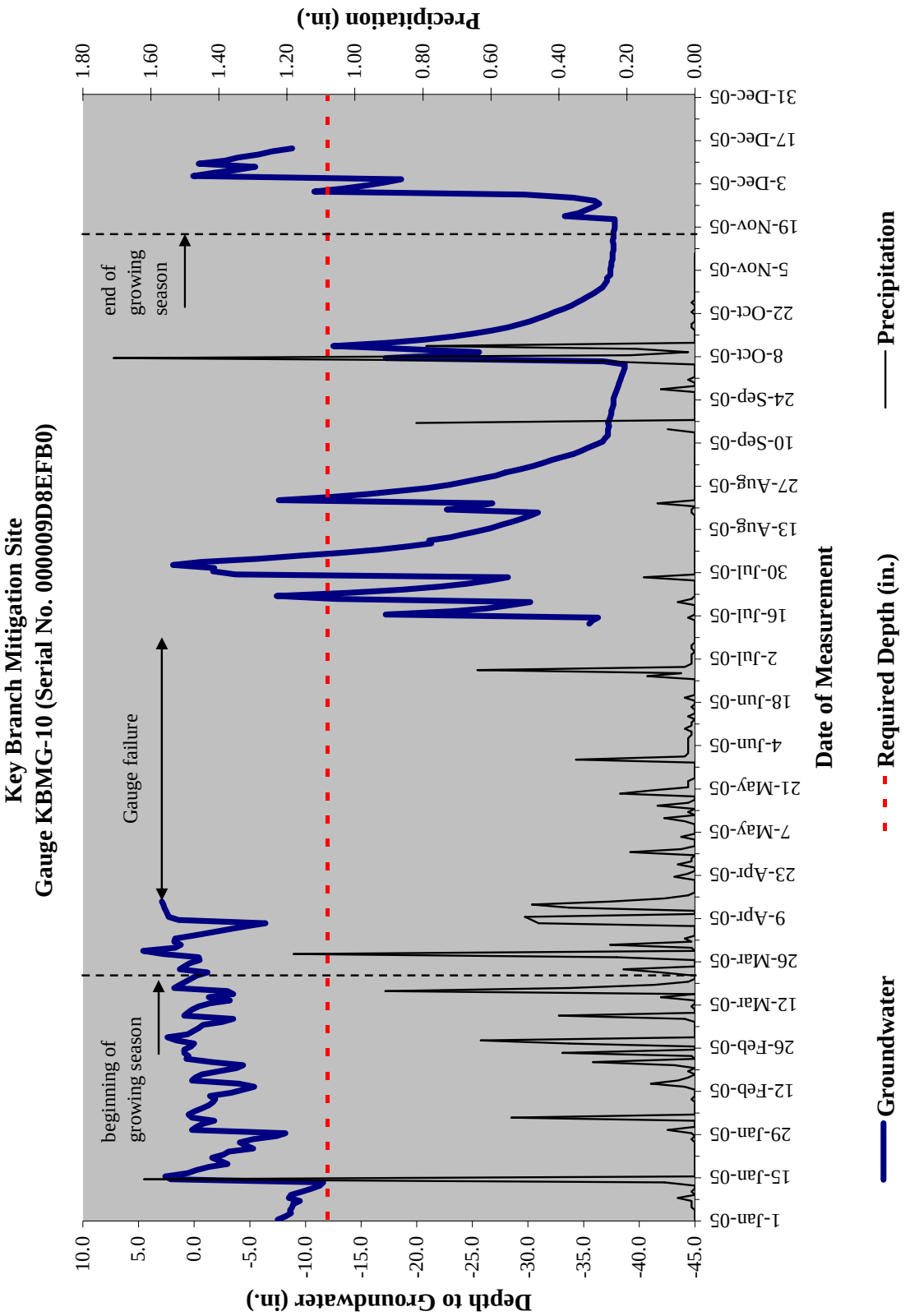
19-Nov-05
3-Dec-05
17-Dec-05
31-Dec-05


Key Branch Mitigation Site
Gauge KBMG-9 (Serial No. 000008E83267)
Precipitation (in.)
Depth to Groundwater (in.)
Date of Measurement
Groundwater
Required Depth (in.)
Precipitation
Gauge failure
beginning of growing season
end of growing season
1.80
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
10.0
5.0
0.0
-5.0
-10.0
-15.0
-20.0
-25.0
-30.0
-35.0
-40.0
-45.0
1-Jan-05
15-Jan-05
29-Jan-05
12-Feb-05
26-Feb-05
12-Mar-05
26-Mar-05
9-Apr-05
23-Apr-05
7-May-05
21-May-05
4-Jun-05
18-Jun-05
2-Jul-05
16-Jul-05
30-Jul-05
13-Aug-05
27-Aug-05
10-Sep-05
24-Sep-05
8-Oct-05
22-Oct-05
5-Nov-05
19-Nov-05
3-Dec-05
17-Dec-05
31-Dec-05


Key Branch Mitigation Site
Gauge KBMG-10 (Serial No. 000009D8EFB0)
Depth to Groundwater (in.)
Precipitation (in.)
Date of Measurement
Groundwater
Required Depth (in.)
Precipitation
beginning of growing season
Gauge failure
end of growing season
10.0
5.0
0.0
-5.0
-10.0
-15.0
-20.0
-25.0
-30.0
-35.0
-40.0
-45.0
1.80
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
1-Jan-05
15-Jan-05
29-Jan-05
12-Feb-05
26-Feb-05
12-Mar-05
26-Mar-05
9-Apr-05
23-Apr-05
7-May-05
21-May-05
4-Jun-05
18-Jun-05
2-Jul-05
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27-Aug-05
10-Sep-05
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8-Oct-05
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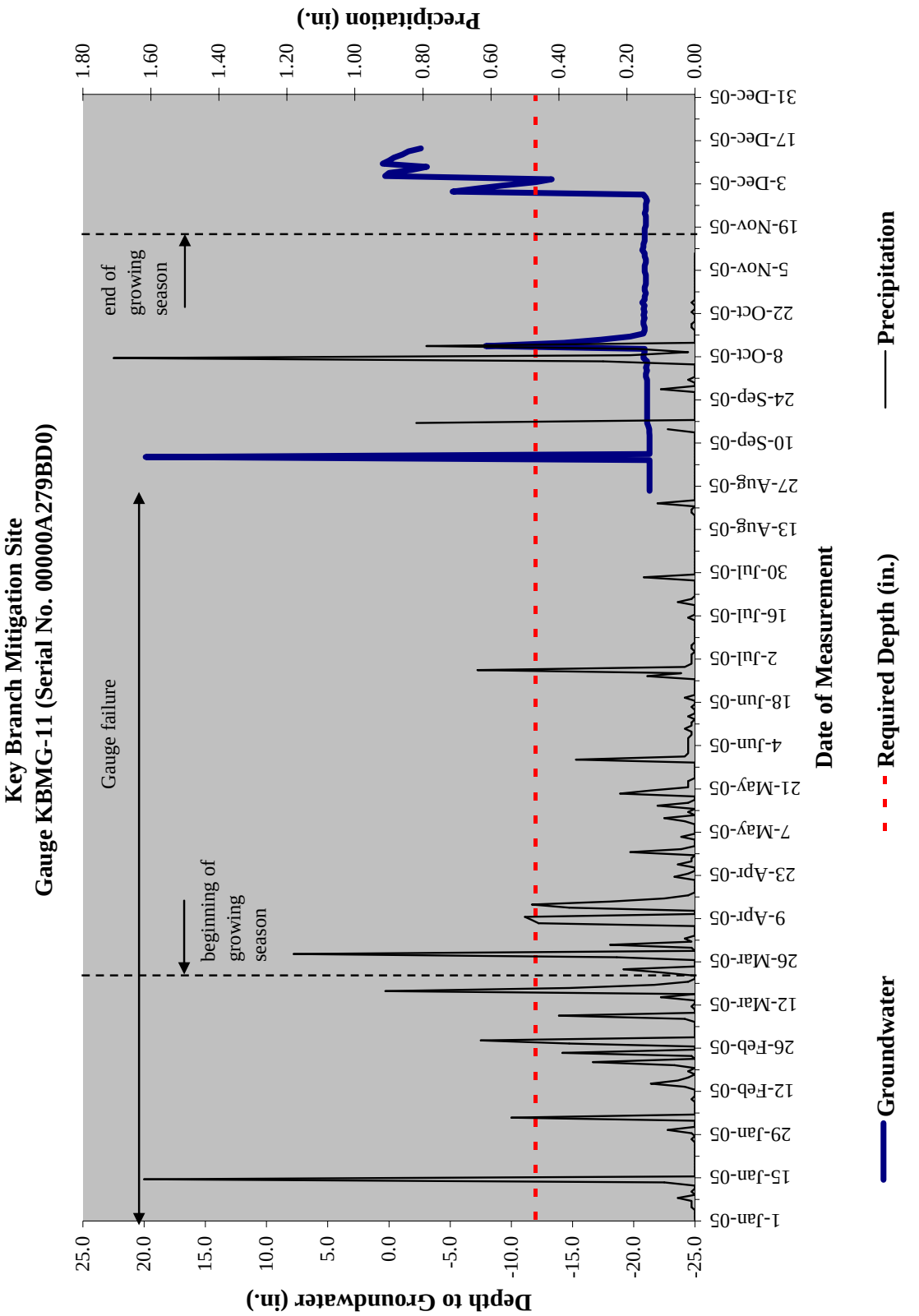
5-Nov-05
19-Nov-05
3-Dec-05
17-Dec-05
31-Dec-05


Key Branch Mitigation Site
Gauge KBMG-11 (Serial No. 00000A279BD0)
Depth to Groundwater (in.)
Precipitation (in.)
Date of Measurement
Groundwater
Precipitation
Required Depth (in.)
Gauge failure
beginning of growing season
end of growing season
25.0
20.0
15.0
10.0
5.0
0.0
-5.0
-10.0
-15.0
-20.0
-25.0
1.80
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
1-Jan-05
15-Jan-05
29-Jan-05
12-Feb-05
26-Feb-05
12-Mar-05
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7-May-05
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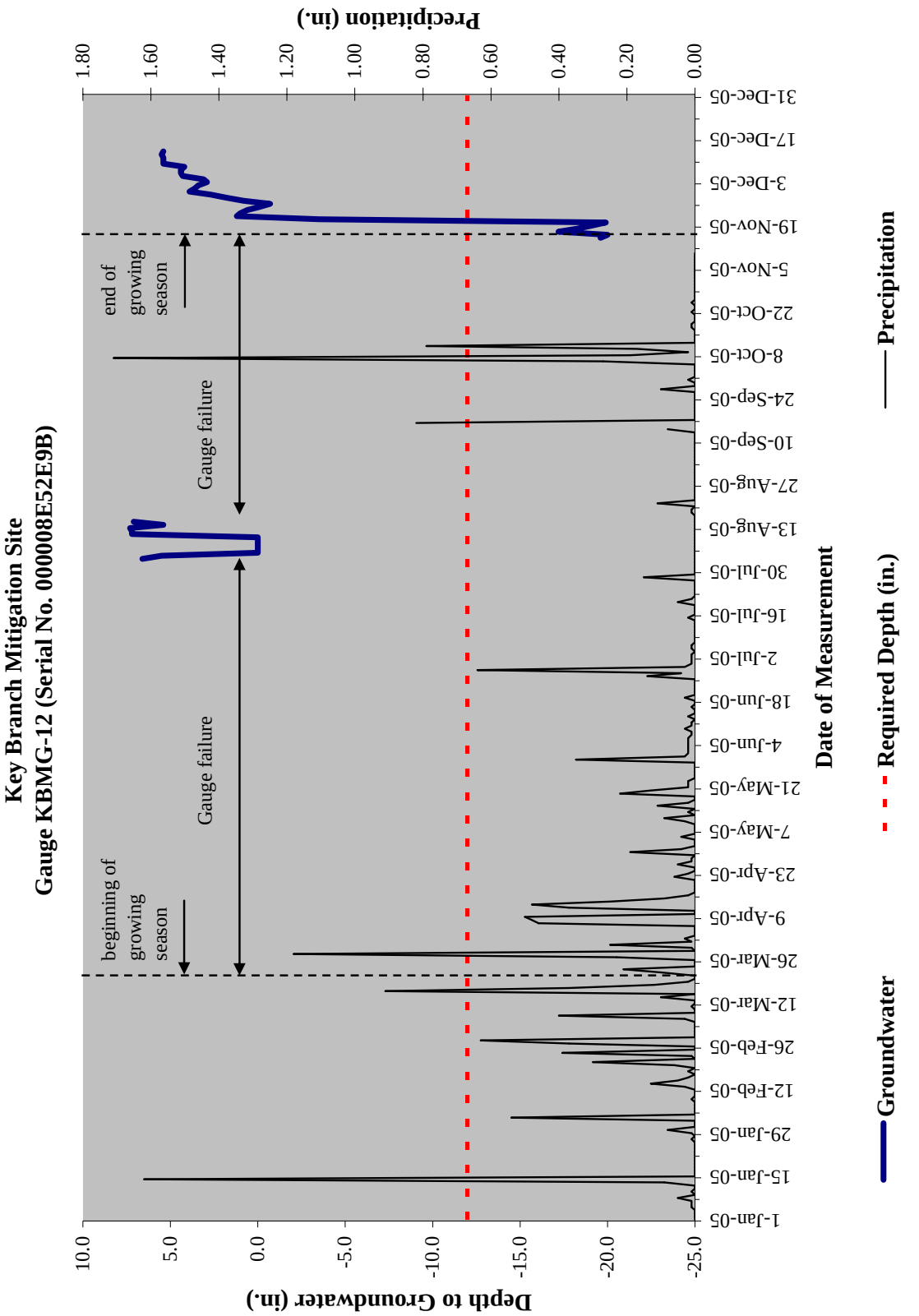
19-Nov-05
3-Dec-05
17-Dec-05
31-Dec-05


Key Branch Mitigation Site
Gauge KBMG-12 (Serial No. 000008E52E9B)
Precipitation (in.)
Depth to Groundwater (in.)
Date of Measurement
Groundwater
Required Depth (in.)
Precipitation
beginning of growing season
end of growing season
Gauge failure
Gauge failure
1.80
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
10.0
5.0
0.0
-5.0
-10.0
-15.0
-20.0
-25.0
1-Jan-05
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26-Feb-05
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23-Apr-05
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4-Jun-05
18-Jun-05
2-Jul-05
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27-Aug-05
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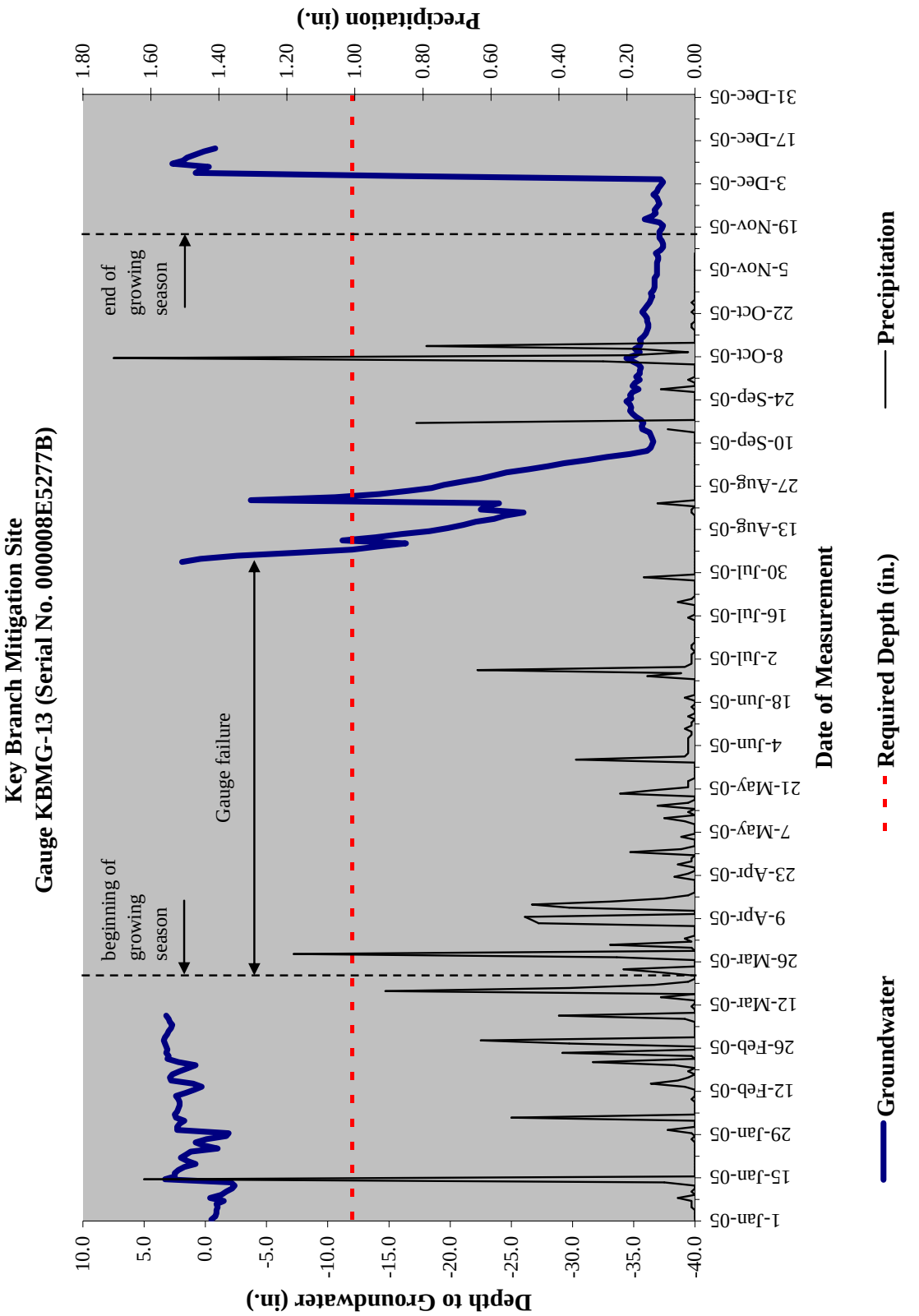
5-Nov-05
19-Nov-05
3-Dec-05
17-Dec-05
31-Dec-05


Key Branch Mitigation Site
Gauge KBMG-13 (Serial No. 000008E5277B)
Precipitation (in.)
Depth to Groundwater (in.)
Date of Measurement
Groundwater
Required Depth (in.)
Precipitation
beginning of growing season
Gauge failure
end of growing season
1.80
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
10.0
5.0
0.0
-5.0
-10.0
-15.0
-20.0
-25.0
-30.0
-35.0
-40.0
1-Jan-05
15-Jan-05
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12-Feb-05
26-Feb-05
12-Mar-05
26-Mar-05
9-Apr-05
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4-Jun-05
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13-Aug-05
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3-Dec-05
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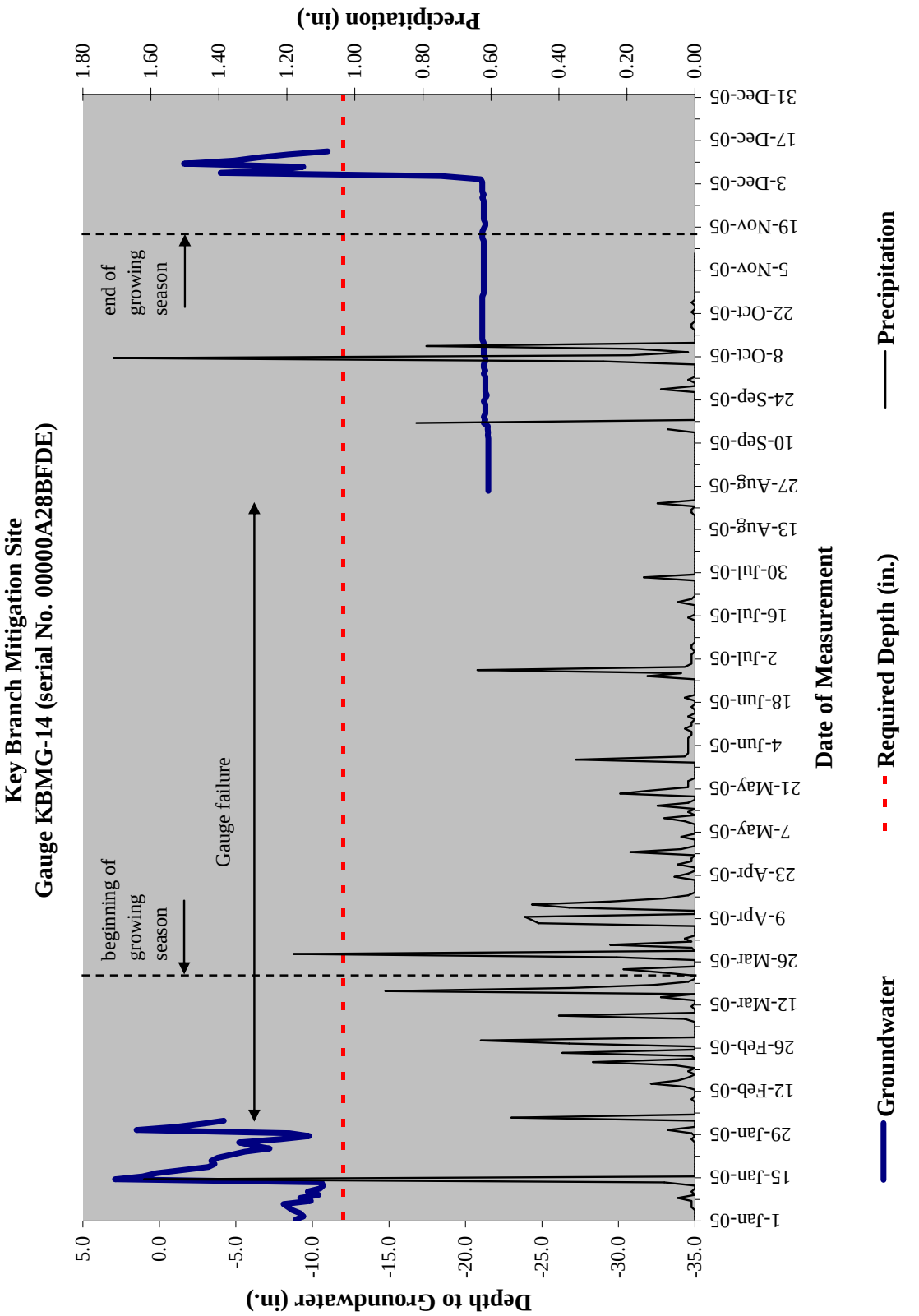
31-Dec-05


Key Branch Mitigation Site
Gauge KBMG-14 (serial No. 00000A28BFDE)
Depth to Groundwater (in.)
Precipitation (in.)
Date of Measurement
Groundwater
Required Depth (in.)
Precipitation
beginning of growing season
Gauge failure
end of growing season
5.0
0.0
-5.0
-10.0
-15.0
-20.0
-25.0
-30.0
-35.0
1.80
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
1-Jan-05
15-Jan-05
29-Jan-05
12-Feb-05
26-Feb-05
12-Mar-05
26-Mar-05
9-Apr-05
23-Apr-05
7-May-05
21-May-05
4-Jun-05
18-Jun-05
2-Jul-05
16-Jul-05
30-Jul-05
13-Aug-05
27-Aug-05
10-Sep-05
24-Sep-05
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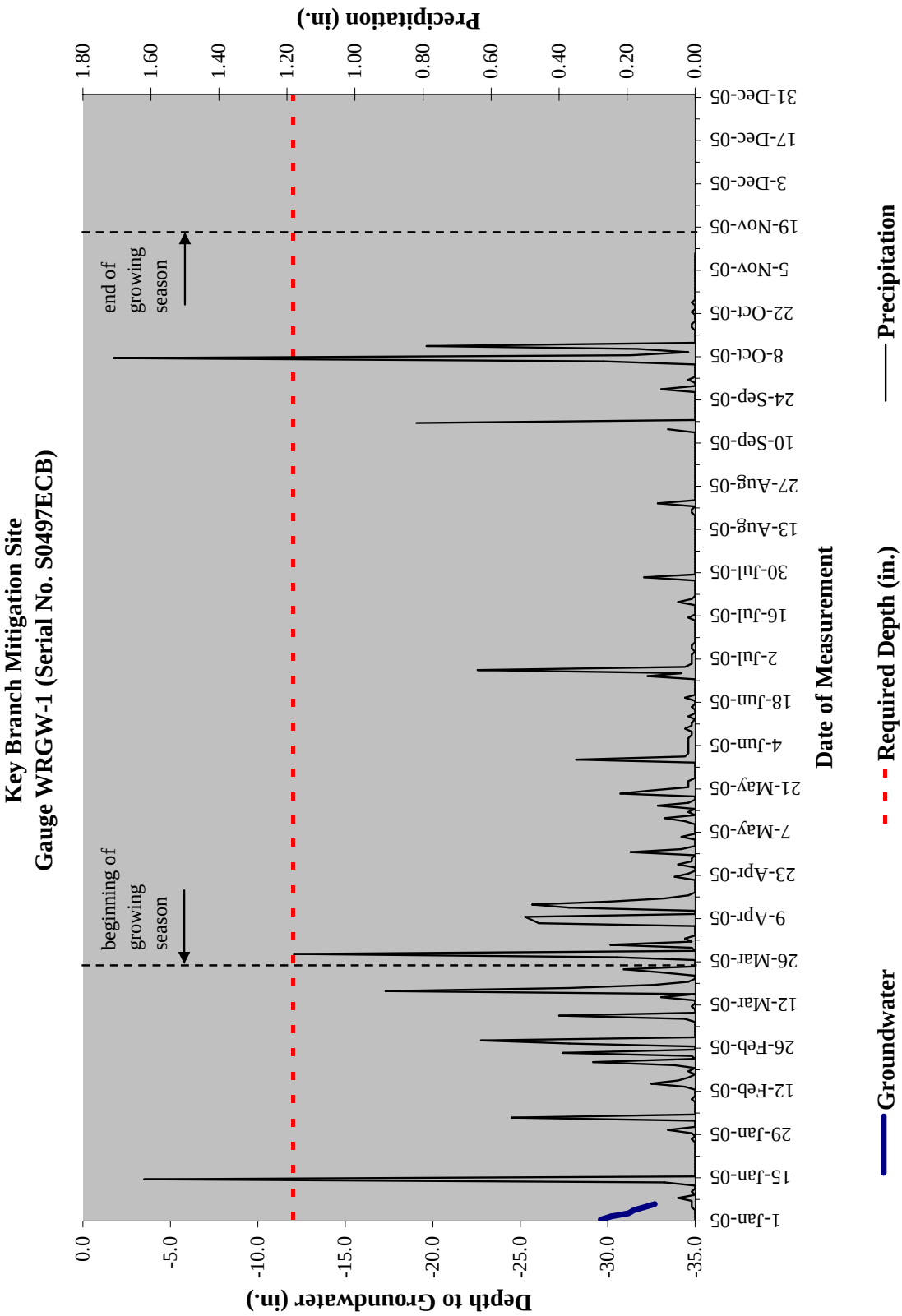
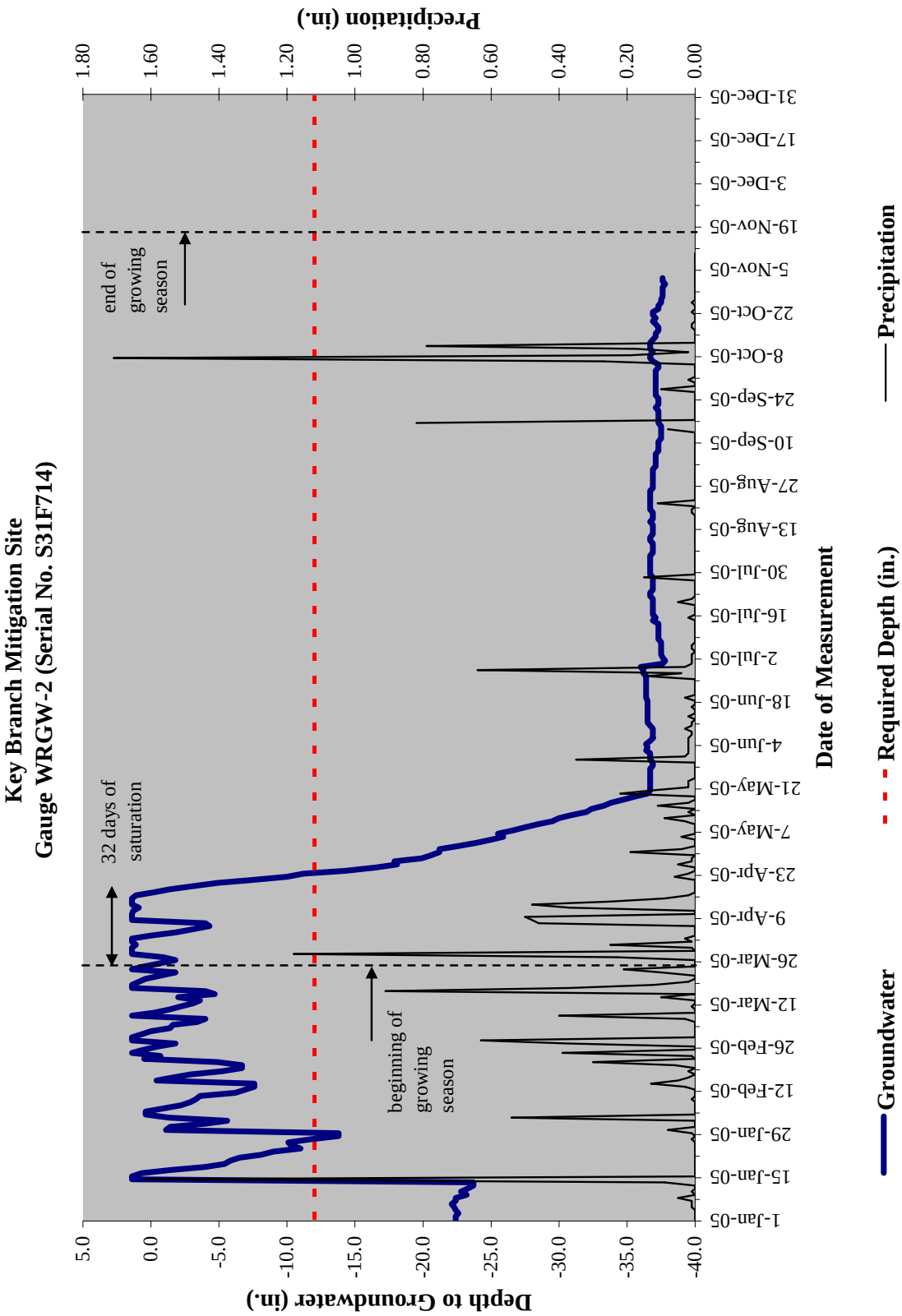
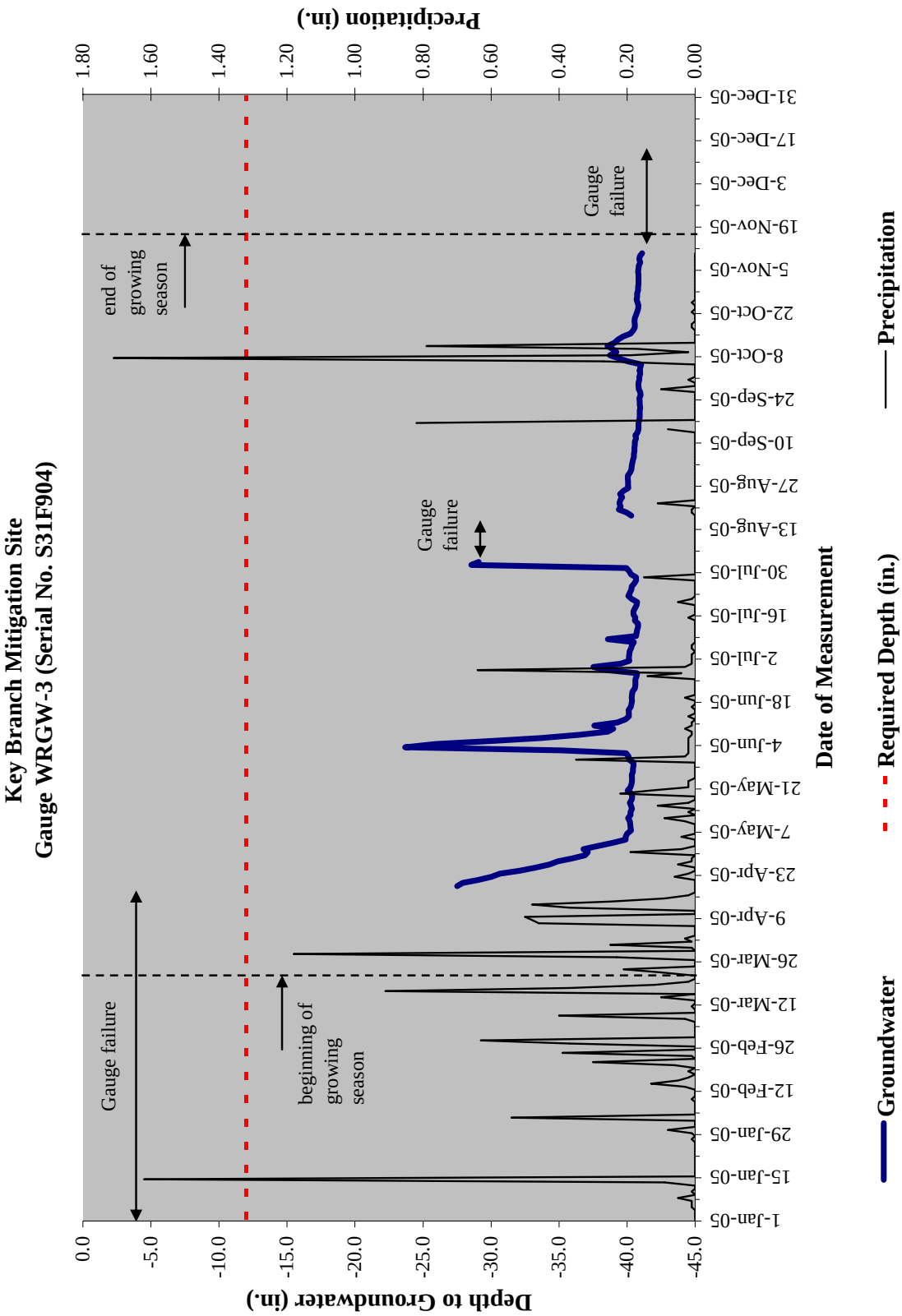
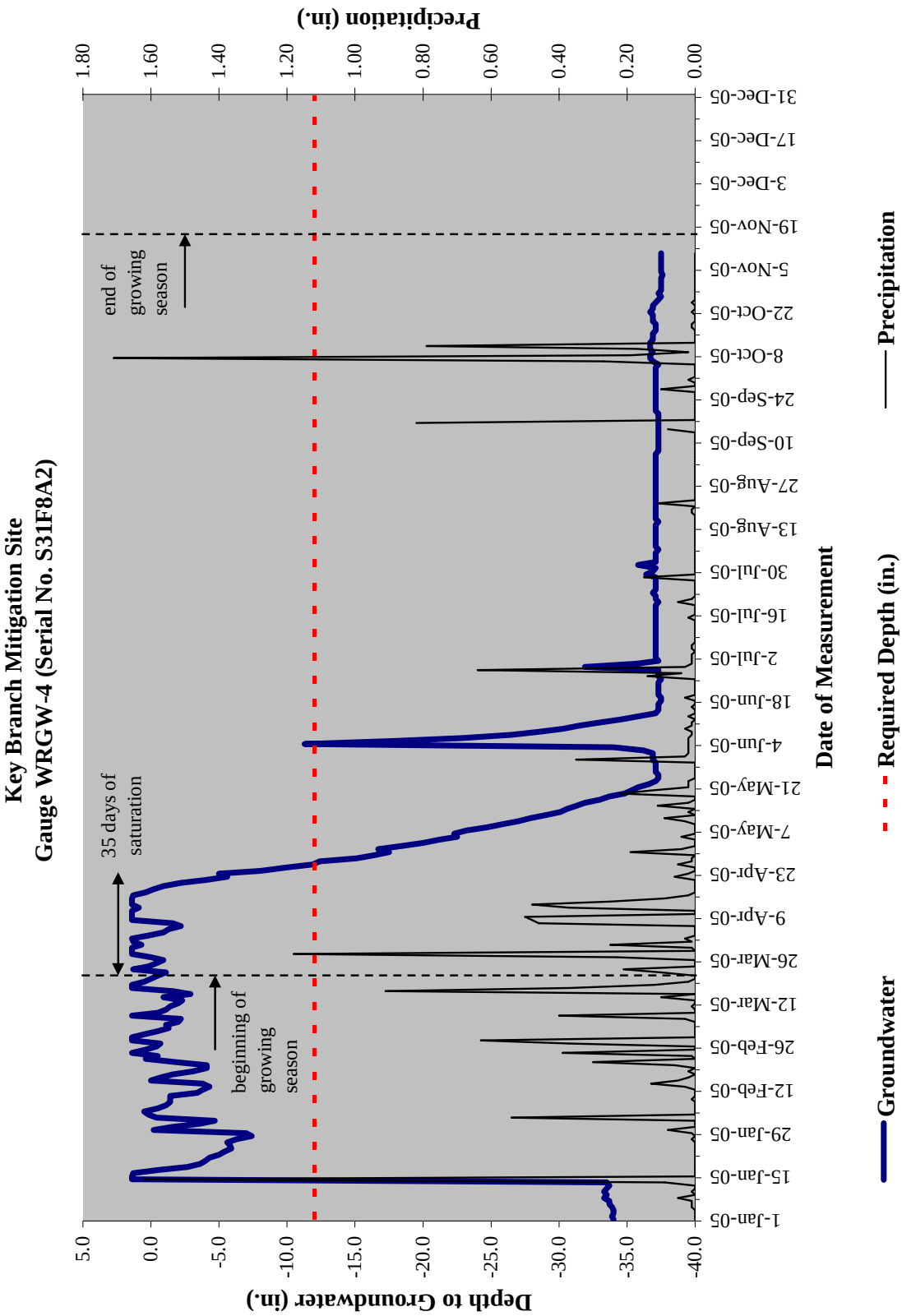
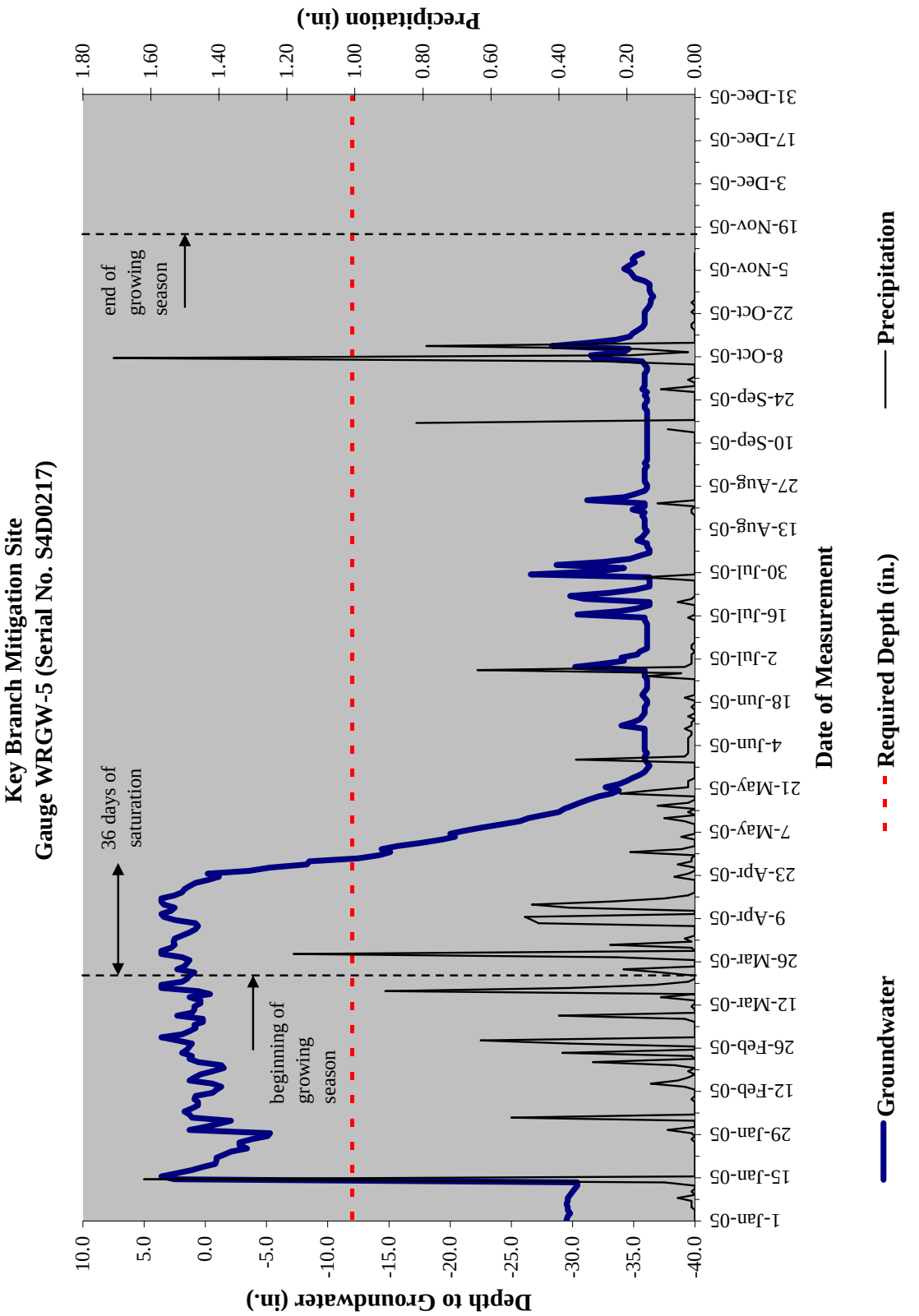
22-Oct-05
5-Nov-05
19-Nov-05
3-Dec-05
17-Dec-05
31-Dec-05


Key Branch Mitigation Site
Gauge WRGW-1 (Serial No. S0497ECB)
Depth to Groundwater (in.)
Precipitation (in.)
Date of Measurement
Groundwater
Required Depth (in.)
Precipitation
beginning of growing season
end of growing season
0.0
-5.0
-10.0
-15.0
-20.0
-25.0
-30.0
-35.0
0.00
0.20
0.40
0.60
0.80
1.00
1.20
1.40
1.60
1.80
1-Jan-05
15-Jan-05
29-Jan-05
12-Feb-05
26-Feb-05
12-Mar-05
26-Mar-05
9-Apr-05
23-Apr-05
7-May-05
21-May-05
4-Jun-05
18-Jun-05
2-Jul-05
16-Jul-05
30-Jul-05
13-Aug-05
27-Aug-05
10-Sep-05
24-Sep-05
8-Oct-05
22-Oct-05
5-Nov-05
19-Nov-05
3-Dec-05
17-Dec-05
31-Dec-05


Key Branch Mitigation Site
Gauge WRGW-2 (Serial No. S31F714)
Depth to Groundwater (in.)
Precipitation (in.)
Date of Measurement
Groundwater
Required Depth (in.)
Precipitation
32 days of saturation
beginning of growing season
end of growing season
5.0
0.0
-5.0
-10.0
-15.0
-20.0
-25.0
-30.0
-35.0
-40.0
1.80
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
1-Jan-05
15-Jan-05
29-Jan-05
12-Feb-05
26-Feb-05
12-Mar-05
26-Mar-05
9-Apr-05
23-Apr-05
7-May-05
21-May-05
4-Jun-05
18-Jun-05
2-Jul-05
16-Jul-05
30-Jul-05
13-Aug-05
27-Aug-05
10-Sep-05
24-Sep-05
8-Oct-05
22-Oct-05
5-Nov-05
19-Nov-05
3-Dec-05
17-Dec-05
31-Dec-05


Key Branch Mitigation Site
Gauge WRGW-3 (Serial No. S31F904)
Depth to Groundwater (in.)
Precipitation (in.)
Date of Measurement
Groundwater
Required Depth (in.)
Precipitation
Gauge failure
beginning of growing season
end of growing season
Gauge failure
Gauge failure
0.0
-5.0
-10.0
-15.0
-20.0
-25.0
-30.0
-35.0
-40.0
-45.0
1.80
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
1-Jan-05
15-Jan-05
29-Jan-05
12-Feb-05
26-Feb-05
12-Mar-05
26-Mar-05
9-Apr-05
23-Apr-05
7-May-05
21-May-05
4-Jun-05
18-Jun-05
2-Jul-05
16-Jul-05
30-Jul-05
13-Aug-05
27-Aug-05
10-Sep-05
24-Sep-05
8-Oct-05
22-Oct-05
5-Nov-05
19-Nov-05
3-Dec-05
17-Dec-05
31-Dec-05


Key Branch Mitigation Site
Gauge WRGW-4 (Serial No. S31F8A2)
Depth to Groundwater (in.)
Precipitation (in.)
Date of Measurement
Groundwater
Required Depth (in.)
Precipitation
35 days of saturation
beginning of growing season
end of growing season
5.0
0.0
-5.0
-10.0
-15.0
-20.0
-25.0
-30.0
-35.0
-40.0
1.80
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
1-Jan-05
15-Jan-05
29-Jan-05
12-Feb-05
26-Feb-05
12-Mar-05
26-Mar-05
9-Apr-05
23-Apr-05
7-May-05
21-May-05
4-Jun-05
18-Jun-05
2-Jul-05
16-Jul-05
30-Jul-05
13-Aug-05
27-Aug-05
10-Sep-05
24-Sep-05
8-Oct-05
22-Oct-05
5-Nov-05
19-Nov-05
3-Dec-05
17-Dec-05
31-Dec-05


Key Branch Mitigation Site
Gauge WRGW-5 (Serial No. S4D0217)
Precipitation (in.)
Depth to Groundwater (in.)
Date of Measurement
Groundwater
Required Depth (in.)
Precipitation
36 days of saturation
beginning of growing season
end of growing season
1.80
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
10.0
5.0
0.0
-5.0
-10.0
-15.0
-20.0
-25.0
-30.0
-35.0
-40.0
1-Jan-05
15-Jan-05
29-Jan-05
12-Feb-05
26-Feb-05
12-Mar-05
26-Mar-05
9-Apr-05
23-Apr-05
7-May-05
21-May-05
4-Jun-05
18-Jun-05
2-Jul-05
16-Jul-05
30-Jul-05
13-Aug-05
27-Aug-05
10-Sep-05
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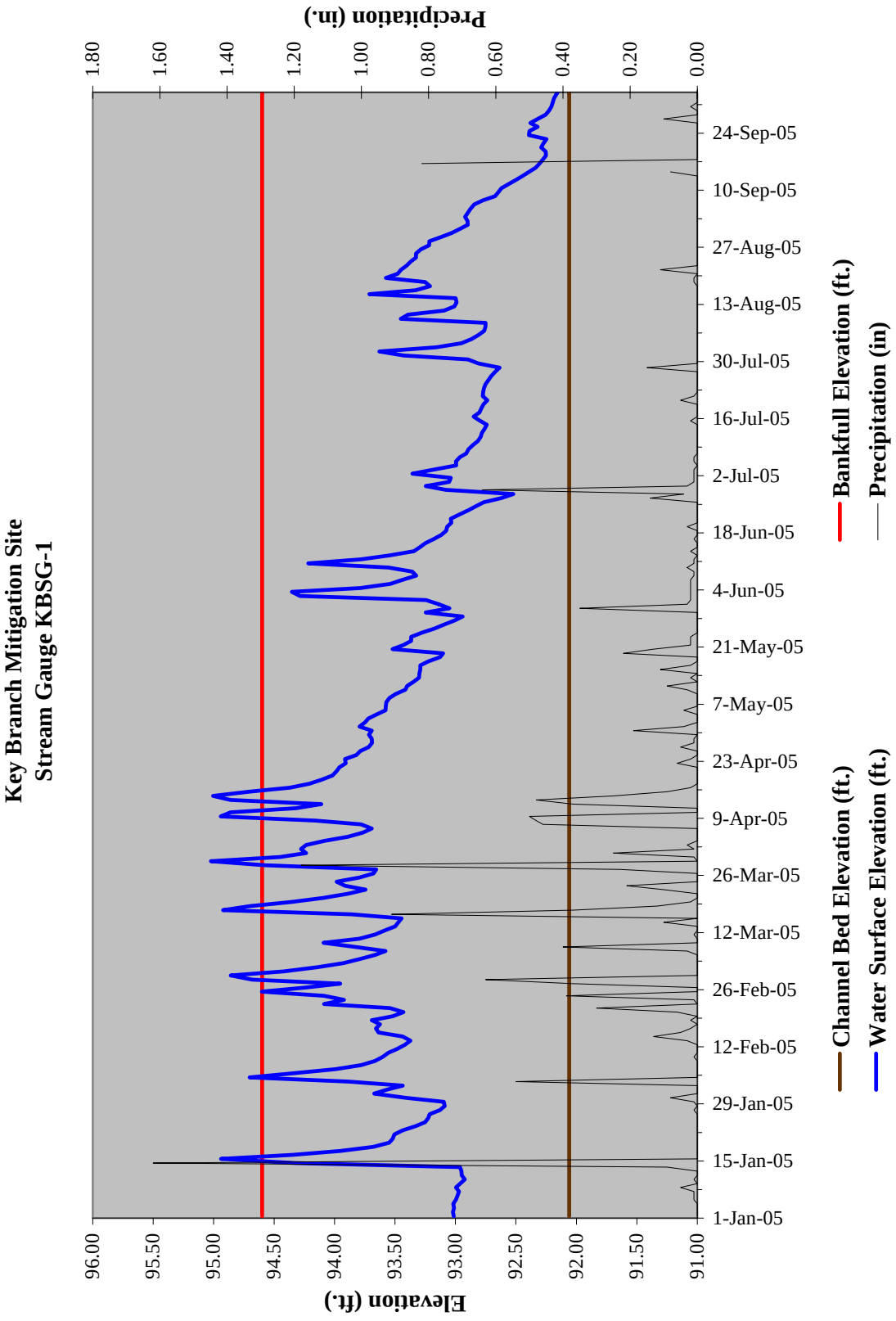
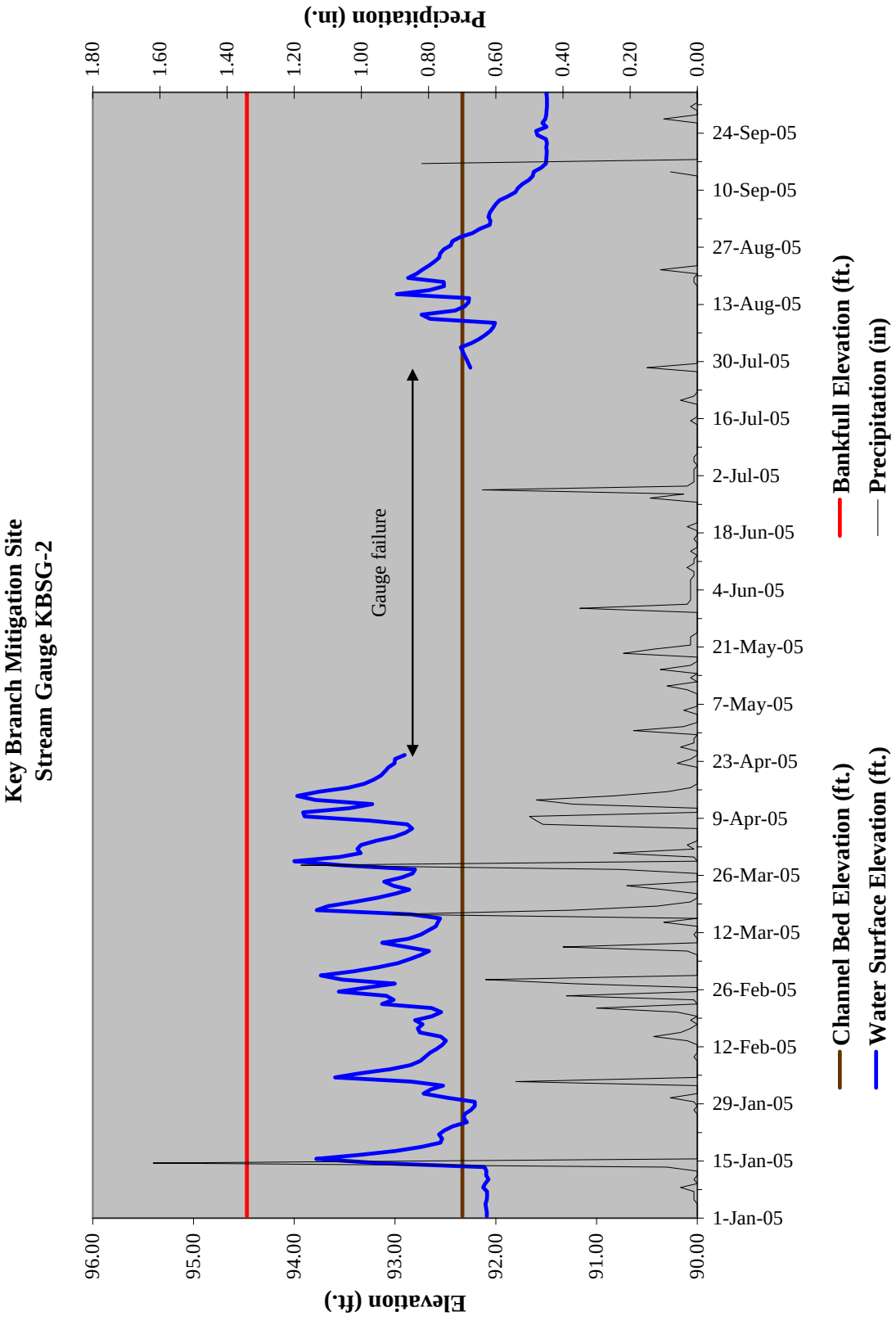
22-Oct-05
5-Nov-05
19-Nov-05
3-Dec-05
17-Dec-05
31-Dec-05


Key Branch Mitigation Site
Stream Gauge KBSG-1
Precipitation (in.)
1.80
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
Elevation (ft.)
96.00
95.50
95.00
94.50
94.00
93.50
93.00
92.50
92.00
91.50
91.00
24-Sep-05
10-Sep-05
27-Aug-05
13-Aug-05
30-Jul-05
16-Jul-05
2-Jul-05
18-Jun-05
4-Jun-05
21-May-05
7-May-05
23-Apr-05
9-Apr-05
26-Mar-05
12-Mar-05
26-Feb-05
12-Feb-05
29-Jan-05
15-Jan-05
1-Jan-05
Bankfull Elevation (ft.)
Precipitation (in)
Channel Bed Elevation (ft.)
Water Surface Elevation (ft.)


Key Branch Mitigation Site
Stream Gauge KBSG-2
Precipitation (in.)
1.80
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
24-Sep-05
10-Sep-05
27-Aug-05
13-Aug-05
30-Jul-05
16-Jul-05
2-Jul-05
18-Jun-05
4-Jun-05
21-May-05
7-May-05
23-Apr-05
9-Apr-05
26-Mar-05
12-Mar-05
26-Feb-05
12-Feb-05
29-Jan-05
15-Jan-05
1-Jan-05
Gauge failure
Bankfull Elevation (ft.)
Precipitation (in)
Channel Bed Elevation (ft.)
Water Surface Elevation (ft.)
96.00
95.00
94.00
93.00
92.00
91.00
90.00
Elevation (ft.)