Little Beaver Creek (EEP #221)
Stream and Wetland Restoration Site
2010 Annual Monitoring Report (Year 3)

Wake County
EEP Project No. 221
Design Firm: Earthtech
Construction Completed 2005

May 2010

Prepared for:

NCDENR

Ecosystem Enhancement PROGRAM

NCDENR/ Ecosystem Enhancement Program
1619 Mail Service Center
Raleigh, NC 27699-1619

Prepared by:

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APPENDICES

I. Executive Summary

The Little Beaver Creek stream and wetland restoration project consists of 3712 linear feet of stream restoration, 1,913 linear feet of stream preservation, and 2.4 acres of wetland restoration. Little Beaver Creek is located in Wake County southwest of Apex, North Carolina at the end of Olive Farm Road (SR 1178). Construction of the site was conducted between July 2005 and November 2005. The goals and objectives for the Little Beaver Creek (EEP #221) stream and wetland restoration are:

Goals

- Improve water quality and reduce erosion
- Improve aquatic habitat
- Re-establish connectivity of the stream with its floodplain
- Restore characteristic natural plant communities/wildlife habitat and hydrologic regime to disturbed wetlands

Objectives

- Implementation of stream stabilization techniques
- Improve aquatic habitat through the implementation of natural structures such as rootwads, rock vanes, woody debris, and the planting of a riparian buffer
- Provide aesthetic value, wildlife habitat, and bank stability through the creation or enhancement of a riparian zone with plantings
- Provide a stable stream channel that neither aggrades or degrades while maintaining its dimension, pattern, and profile, with the capacity to transport

Eight vegetation monitoring plots (2, 5, 7, 8, 9, 10, 11, and 14) were monitored for MY3. Of these eight, 38% of the plots (VP 5, 7, & 11) are meeting the vegetation success criteria. Including all eight monitoring plots, there are 5139 stems/acre including natural and planted stems. The success criterion for planted woody species is 320 stems/acre after MY-03. A mortality rate of ten percent will be allowed after MY-04 (288 stems/acre), with another ten percent allowed after MY-05 (260 stems/acre). Currently the vegetation criteria are being met with 379 planted stems/acre. Bare banks, benches, and floodplains as well as invasive exotics are the only notable vegetation problem areas for MY-03. Invasive exotics within the conservation easement include tall fescue (*Schedonurus arundinaceus*), Gill over the ground (*Glechoma hederacea*), Japanese honeysuckle (*Lonicera japonica*), Japanese stiltgrass (*Microstegium vimineum*), multiflora rose (*Rosa multiflora*), and Chinese privet (*Ligustrum sinense*). Although these species have been given different ranks of severity, the functionality of the project is not expected to be impaired significantly. It is likely that all of these species were present in and adjacent to the conservation easement previous to construction. The fescue appears to be inhibiting some growth of planted stems and there is little evidence of natural succession in these fescue dominated areas (Figure 2). For additional information relating to vegetation, see Appendix C.

The project is divided into three separate reaches (Reach 1, Reach 2, and Reach 3) for the purposes of the design. Reach 1 and 2 consist of Priority 1 and 2 stream restoration. Priority 1 restoration involves the re-establishment of the bankfull stage at the historical floodplain elevation. Priority 2 involves the creation of a new floodplain and stream pattern with the streambed remaining at the present elevation. In order to accomplish this type of restoration, a combination of bedform transformation, channel dimension adjustments, pattern alterations, and the structure installation was performed. Natural meander patterns were restored and grade control rock vanes and rootwads were incorporated for aquatic habitat enhancement and bed and bank stability. Tributaries were restored using Priority 1 restoration. Due to bedrock constraints,

the restoration of Reach 3 below the road crossing was abandoned. This portion of Reach 3 (i.e. Reach 3b) is preserved within the permanent conservation easement.

The upper portion of Little Beaver Creek, Reach 1 (station 10+00-19+90), remains in stable condition with some isolated minor bank erosion. From station 19+90 to 23+50, the project continues to be stable. The state of the stream, however, begins to degrade significantly at station 23+50 and continues through station 38+00. The stream's vertical profile is not significantly different from the previous monitoring year through this stream segment, however worsening bank erosion is evident. The failing structures throughout this steep gradient stream length continue to adversely impact the stream banks located adjacent to and directly below the structures. The structural failures have produced significant increases in the stream cross sectional area through accelerated bank erosion caused by increased shear stresses. Little Beaver Creek below station 38+00 to the culvert at the end of the restored reach is stable and well vegetated. Two tributaries located on the project site tie into the north bank of Little Beaver Creek. Tributary 1 is exhibiting some isolated bank stability issues, with the most significant occurring just downstream of a long and steep riffle at the head of the restoration reach. Tributary 2 is very stable with vegetation that has established throughout the channel bed and banks.

Currently there are eight RDS groundwater gauges (2, 3, 4, 5, 6, 7, 8, & 9) within the conservation easement. By recommendation from EEP, these gauges were installed on June 25, 2008 to replace an older set of gauges. In January of 2010, four gauges (2, 3, 4, and 5) were relocated upstream to more appropriate locations. At this time, a complete growing season's data set has not been collected but gauge 3 has already met hydrological requirements. Five of the eight groundwater gauges (Gauge 3, 6, 7, 8, and 9) are meeting hydrological requirements. Gauges 6-9 are located in the proposed wetland restoration areas of Reach 1, and Gauge 3 is located in Reach 2 in an unmapped wetland within the conservation easement approximately 0.2 acre in size. Additional features included in this report that were not previously mapped include two ponds totaling 0.16 acres in size, and two ditches (Figure 2). Two bankfull events have been recorded to date. One was recorded as a result of Tropical Storm Hannah passing over the area on September 6, 2008 which created a rain event of greater than four inches in Apex. The flooding eroded many areas which were already noted as stream problem areas in the monitoring report for year one, two, and three. The other bankfull event was recorded from evidence of overbank flooding (i.e. wrack lines) in September 2008.

Summary information/data related to the occurrences of items such as beaver or encroachment, and statistics related to performance of various project and monitoring elements, can be found in the tables and figures in the report appendices. Narrative background and supporting information formerly found in these reports can be found in the mitigation plan and restoration plan documents available on EEPs website. All raw data supporting the tables and figures in the appendices is available from EEP upon request.

II. Methodology

Methodologies follow the current EEP monitoring report template (Version 1.2-11/16/06) and guidelines (Lee et al 2006). Photos were taken with a digital camera. A Trimble Geo XT handheld unit with sub-meter accuracy was used to collect groundwater gauge locations, vegetation monitoring plot origins, and problem area locations. Cross sectional and longitudinal surveys were conducted using total station survey equipment. Data was entered into Microstation to obtain dimensions of the cross sections and parameters applicable to the longitudinal profile. Reports were then generated to display summaries of the stream survey.

A. Vegetation Methodologies

Eight representative vegetation monitoring plots were chosen out of the original fifteen plots established in Reach 1, 2 and 3 during the as built survey data collection. Level II of the EEP/CVS protocol Version 4.0 was used to collect data for monitoring year two. Data collected for these plots are in Appendix A.

B. Stream Methodologies

Stream profile and cross-sections were surveyed using total station equipment and methods. The survey data was plotted using AutoCAD Civil3D. The longitudinal profile was generated using the design baseline alignment provided by Earth Tech. This was determined to be the alignment that was used for the mitigation plan and MY-01 monitoring report. Cross sectional data was extracted based on a linear alignment between the end pins of MY-02 alignment. Dimensional data was generated using in-house designed spreadsheets based on the Rosgen dimension criteria and equations. The pattern parameter values remained the same as MY-02 as there was not any significant lateral migration of the stream centerline.

C. Wetland Methodologies

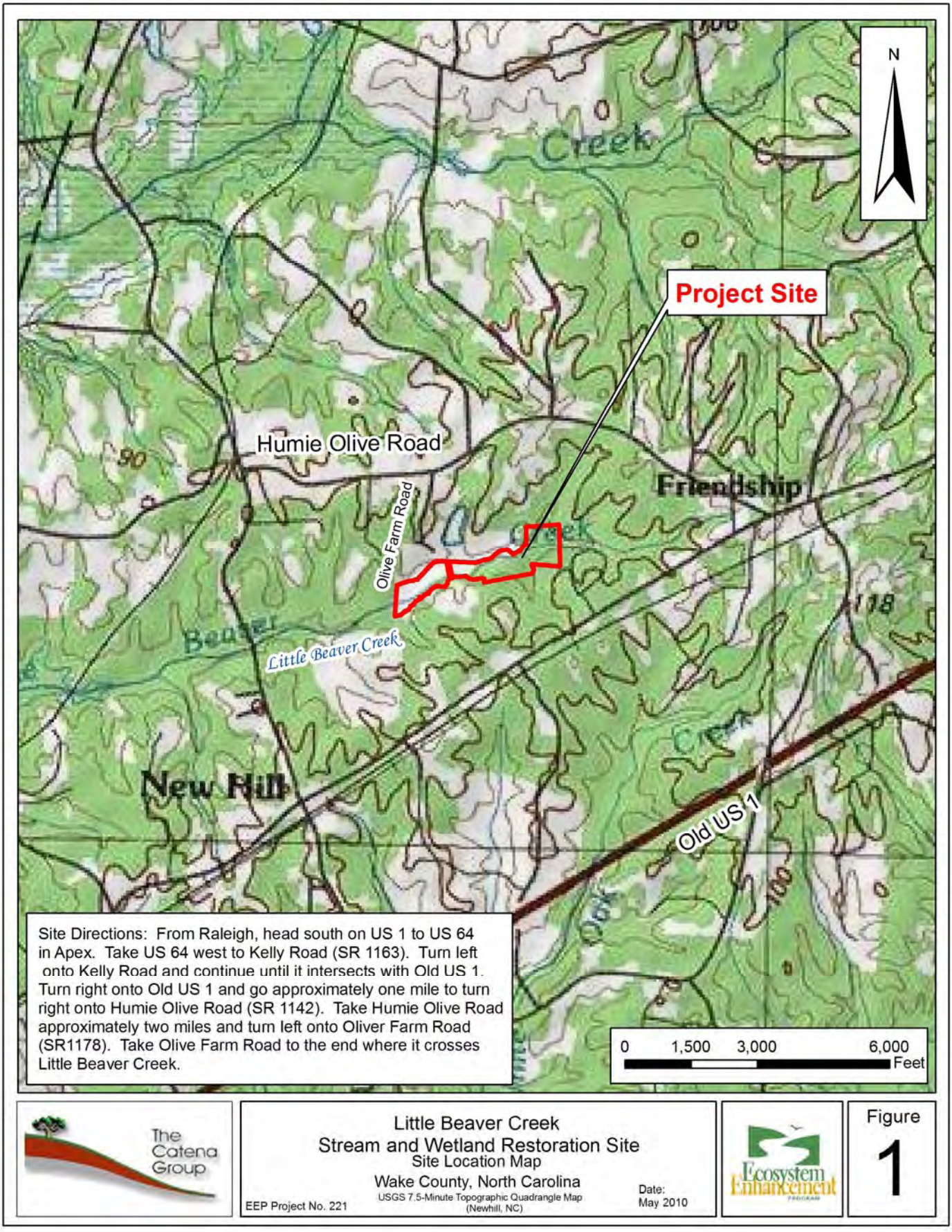
Eight RDS groundwater monitoring gauges (2, 3, 4, 5, 6, 7, 8, & 9) were downloaded monthly to ensure proper function throughout the growing season. Gauges 2, 3, 4, and 5 were relocated to more appropriate locations upstream on January 15, 2010. Data was exported into Excel spreadsheet along with incorporation of local rainfall data provided by the NC State Climate Office (Appendix C).

III. References

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

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

Appendix A. General Figures and Plan View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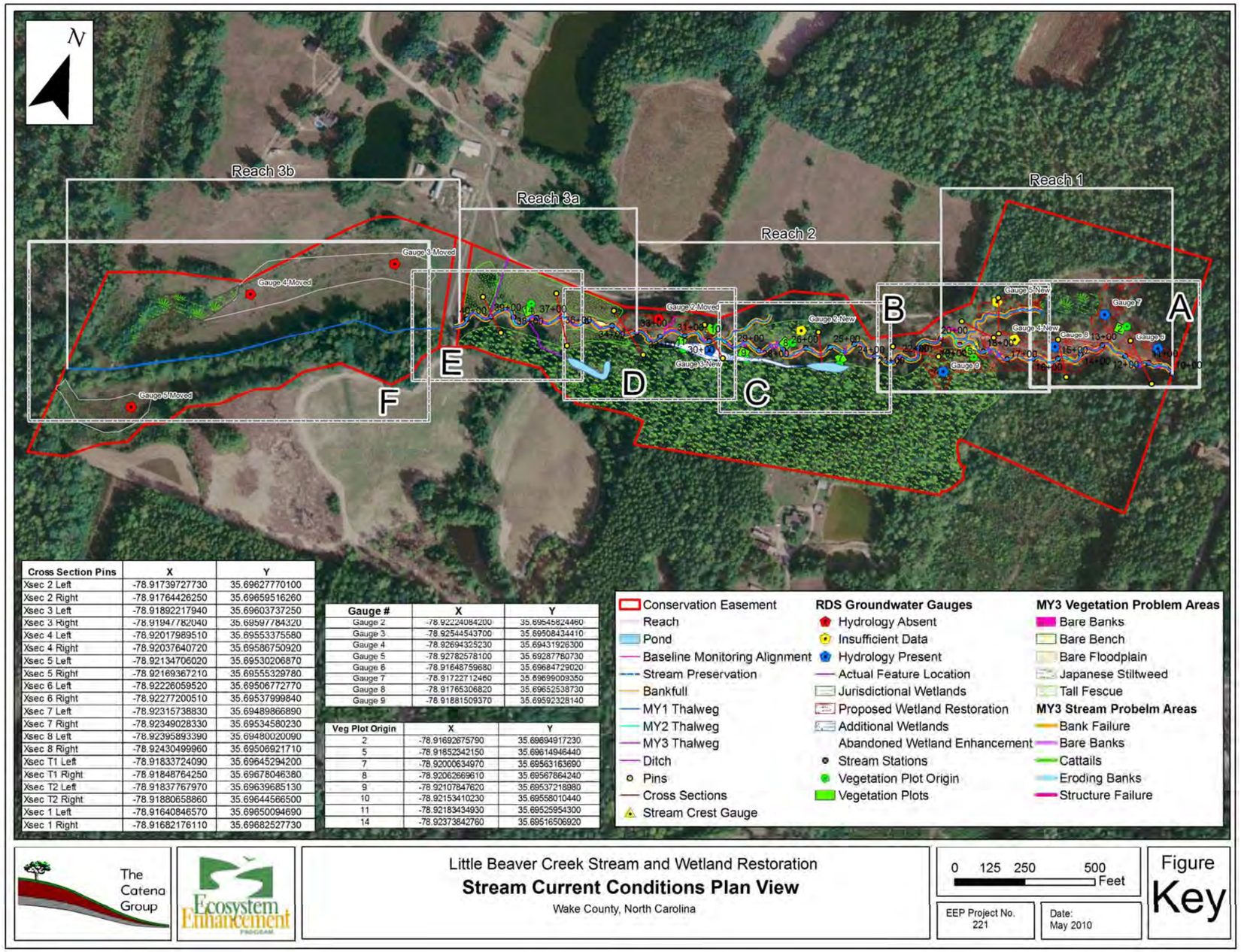
Project Site
Humie Olive Road
Friendship
Olive Farm Road
Little Beaver Creek
New Hill
Old US 1
Site Directions: From Raleigh, head south on US 1 to US 64 in Apex. Take US 64 west to Kelly Road (SR 1163). Turn left onto Kelly Road and continue until it intersects with Old US 1. Turn right onto Old US 1 and go approximately one mile to turn right onto Humie Olive Road (SR 1142). Take Humie Olive Road approximately two miles and turn left onto Oliver Farm Road (SR1178). Take Olive Farm Road to the end where it crosses Little Beaver Creek.
0 1,500 3,000 6,000
Feet
The Catena Group
Little Beaver Creek
Stream and Wetland Restoration Site
Site Location Map
Wake County, North Carolina
USGS 7.5-Minute Topographic Quadrangle Map (Newhill, NC)
EEP Project No. 221
Date: May 2010
Ecosystem Enhancement
Figure 1

Figure 2A-E. Consolidated Current Conditions Plan View



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Xsec 3 Right	-78.91947782040	35.69597784320
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Xsec 4 Right	-78.92037640720	35.69586750920
Xsec 5 Left	-78.92134706020	35.69530206870
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Xsec T2 Right	-78.91880658860	35.69644566500
Xsec 1 Left	-78.91640846570	35.69650094690
Xsec 1 Right	-78.91682176110	35.69682527730

Gauge #	X	Y
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Gauge 3	-78.92544543700	35.69508434410
Gauge 4	-78.92694325230	35.69431926300
Gauge 5	-78.92782578100	35.69287780730
Gauge 6	-78.91648759680	35.69684729020
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Gauge 8	-78.91765306820	35.69652538730
Gauge 9	-78.91881509370	35.69592328140

Veg Plot Origin	X	Y
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14	-78.92373842760	35.69516506920

The Catena Group

Ecosystem Enhancement Program

Little Beaver Creek Stream and Wetland Restoration

Stream Current Conditions Plan View

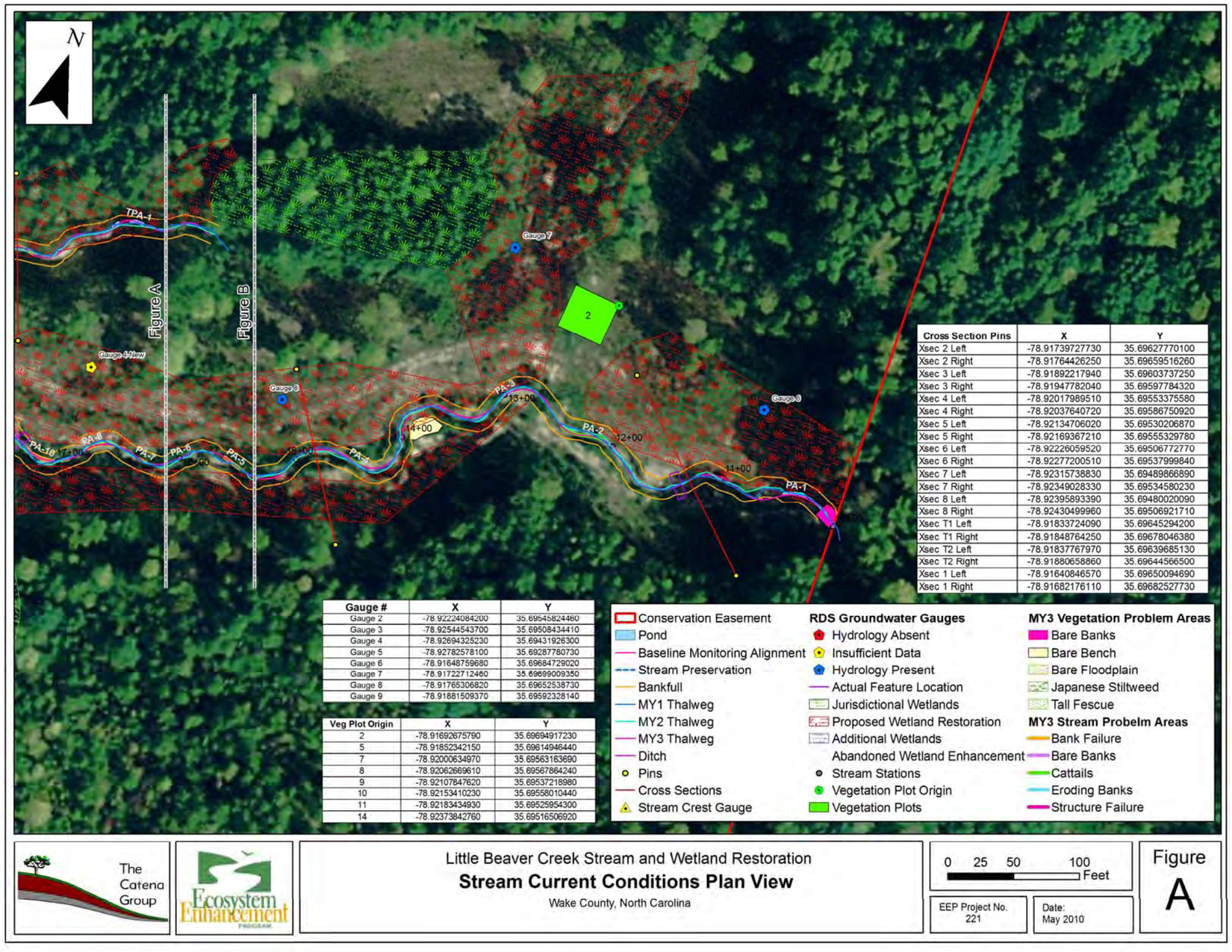
Wake County, North Carolina

0 125 250 500 Feet

EEP Project No. 221

Date: May 2010

Figure Key



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Conservation Easement
Pond
Baseline Monitoring Alignment
Stream Preservation
Bankfull
MY1 Thalweg
MY2 Thalweg
MY3 Thalweg
Ditch
Pins
Cross Sections
Stream Crest Gauge

RDS Groundwater Gauges
Hydrology Absent
Insufficient Data
Hydrology Present
Actual Feature Location
Jurisdictional Wetlands
Proposed Wetland Restoration
Additional Wetlands
Abandoned Wetland Enhancement
Stream Stations
Vegetation Plot Origin
Vegetation Plots

MY3 Vegetation Problem Areas
Bare Banks
Bare Bench
Bare Floodplain
Japanese Stiltweed
Tall Fescue

MY3 Stream Probelm Areas
Bank Failure
Bare Banks
Cattails
Eroding Banks
Structure Failure

The Catena Group

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Stream Current Conditions Plan View

Wake County, North Carolina

0 25 50 100 Feet

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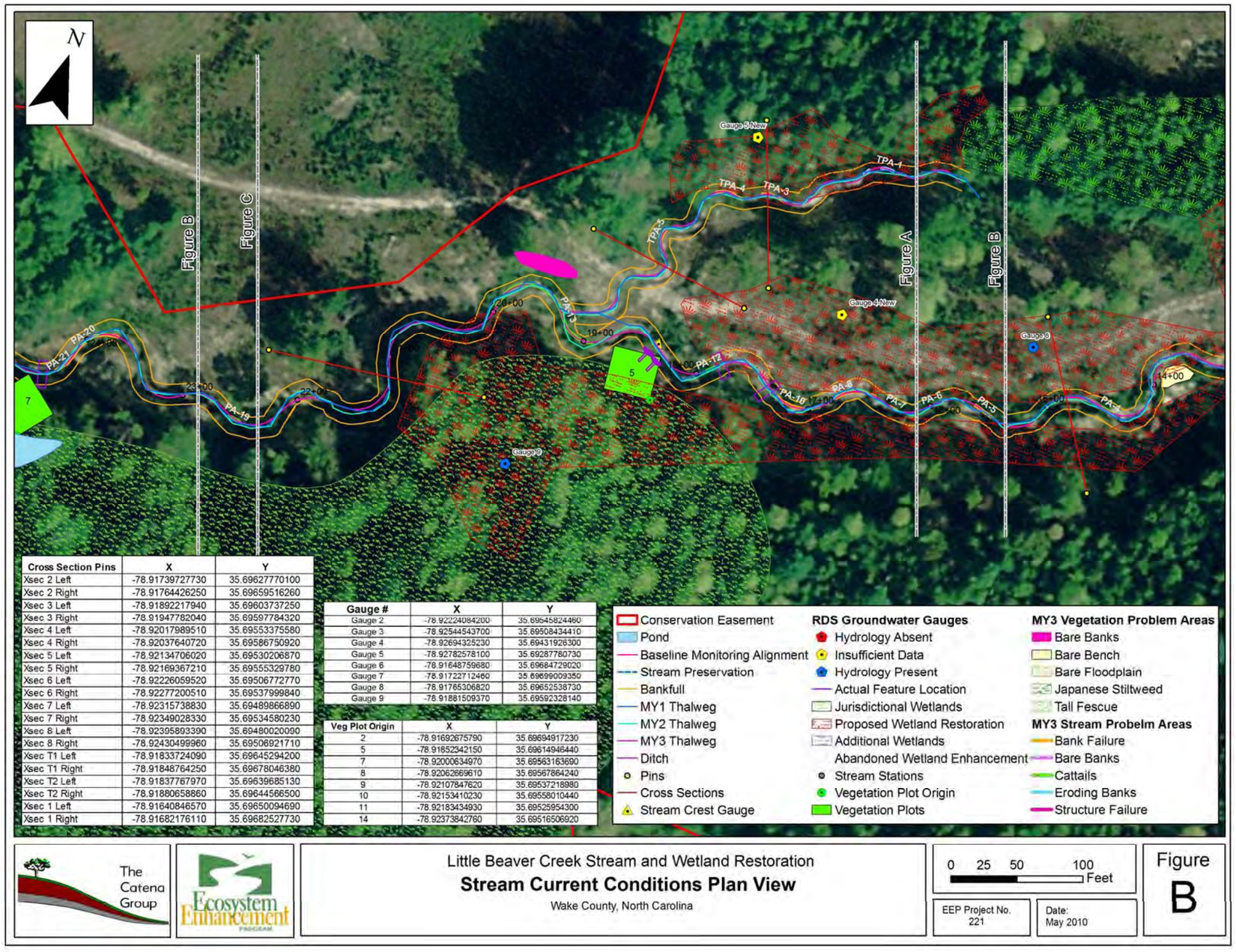
Figure A



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- Conservation Easement
- Pond
- Baseline Monitoring Alignment
- Stream Preservation
- Bankfull
- MY1 Thalweg
- MY2 Thalweg
- MY3 Thalweg
- Ditch
- Pins
- Cross Sections
- Stream Crest Gauge

RDS Groundwater Gauges

- Hydrology Absent
- Insufficient Data
- Hydrology Present
- Actual Feature Location
- Jurisdictional Wetlands
- Proposed Wetland Restoration
- Additional Wetlands
- Abandoned Wetland Enhancement
- Stream Stations
- Vegetation Plot Origin
- Vegetation Plots

MY3 Vegetation Problem Areas

- Bare Banks
- Bare Bench
- Bare Floodplain
- Japanese Stiltweed
- Tall Fescue

MY3 Stream Probelm Areas

- Bank Failure
- Bare Banks
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- Structure Failure

The Catena Group

Ecosystem Enhancement Program

Little Beaver Creek Stream and Wetland Restoration

Stream Current Conditions Plan View

Wake County, North Carolina

0 25 50 100 Feet

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Figure B

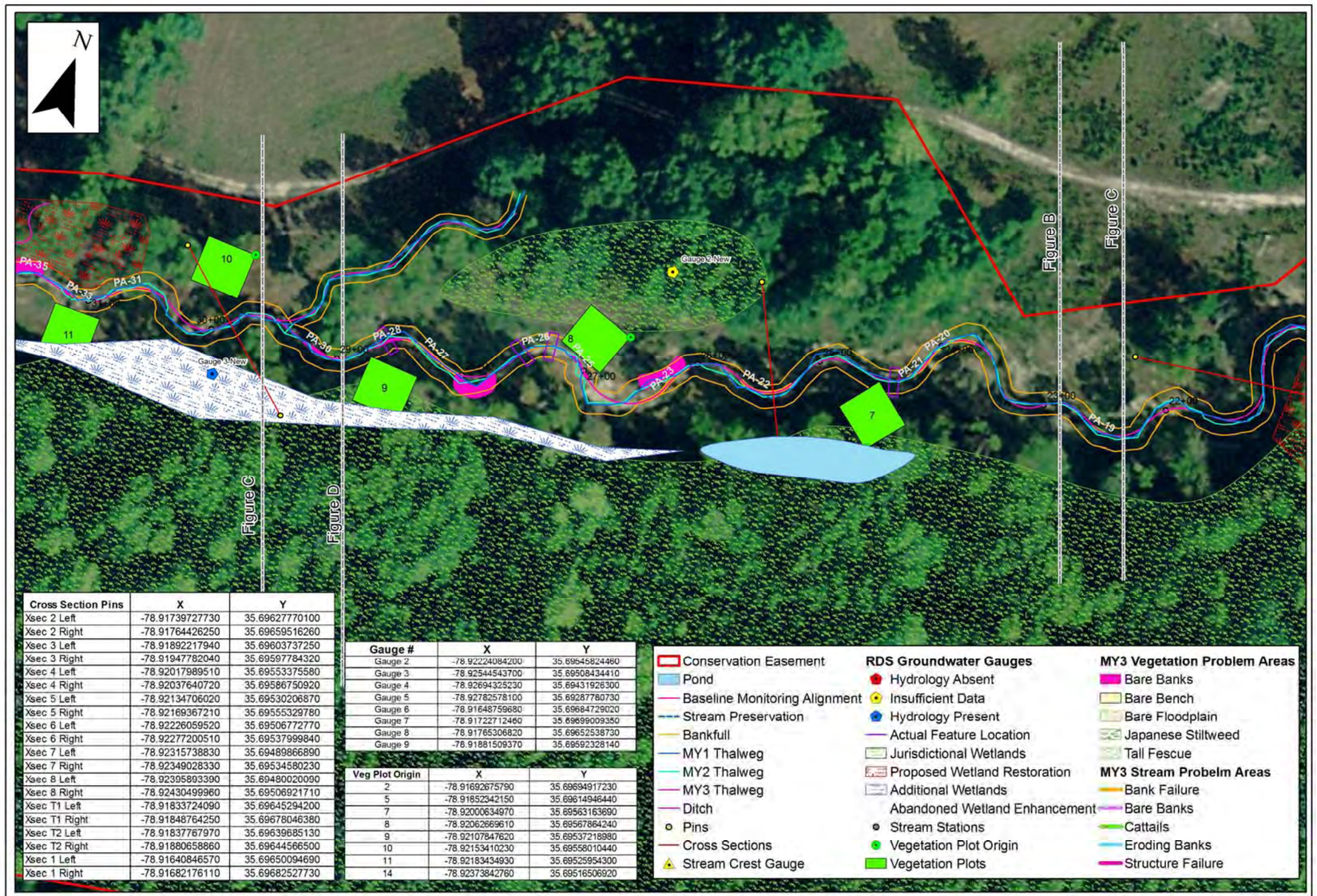
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Figure C
Figure D
Figure B
Figure C
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Gauge 3 New
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Stream Current Conditions Plan View
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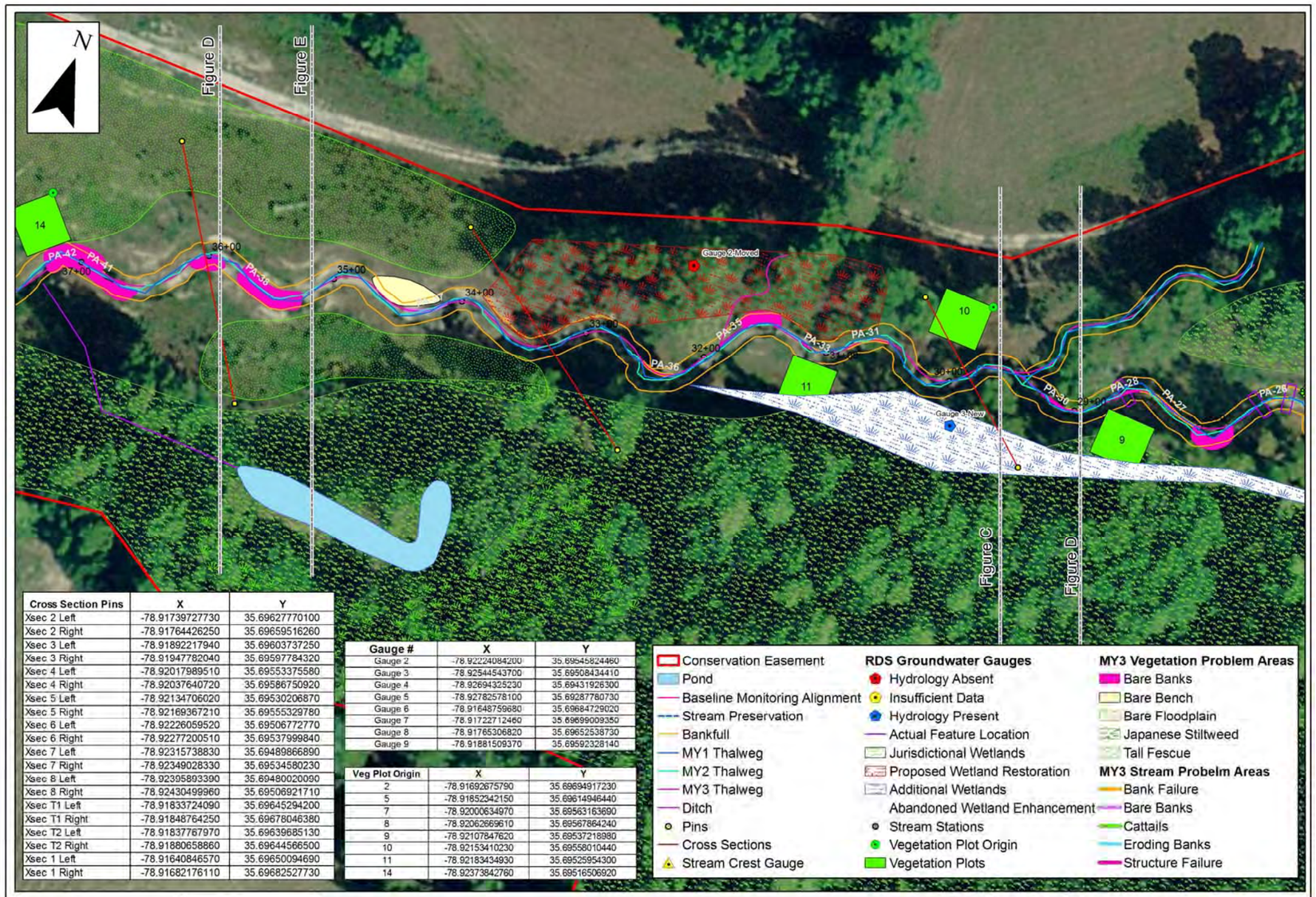
Figure C



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Gauge 7	-78.91722712460	35.69699009350
Gauge 8	-78.91765306820	35.69652538730
Gauge 9	-78.91881509370	35.69592328140

Veg Plot Origin	X	Y
2	-78.91692675790	35.69694917230
5	-78.91852342150	35.69614946440
7	-78.92000634970	35.69563163690
8	-78.92062669610	35.69567864240
9	-78.92107847620	35.69537218980
10	-78.92153410230	35.69558010440
11	-78.92183434930	35.69525954300
14	-78.92373842760	35.69516506920

The Catena Group

Ecosystem Enhancement Program

Little Beaver Creek Stream and Wetland Restoration

Stream Current Conditions Plan View

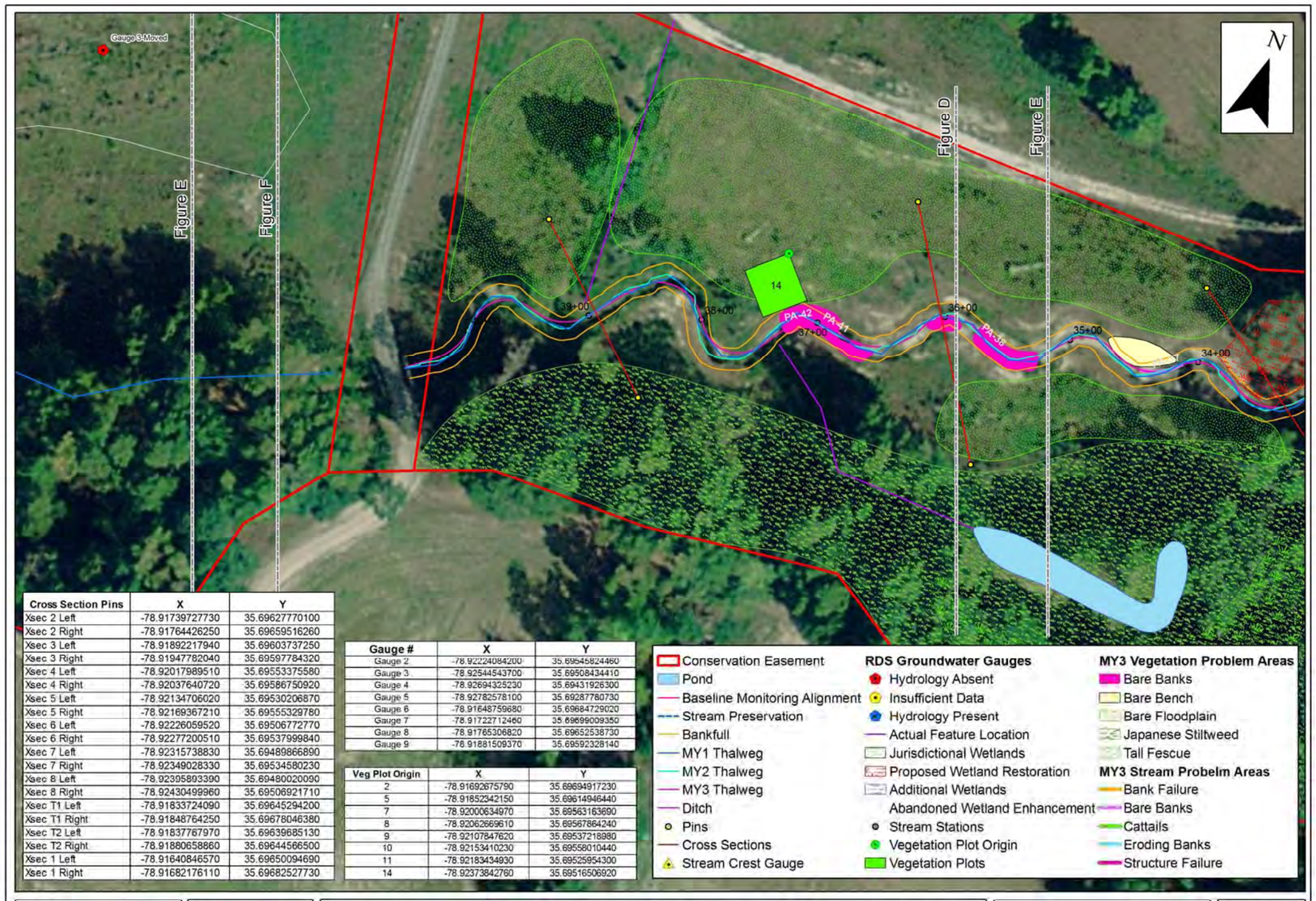
Wake County, North Carolina

0 25 50 100 Feet

EEP Project No. 221

Date: May 2010

Figure D



Cross Section Pins	X	Y
Xsec 2 Left	-78.91739727730	35.69627770100
Xsec 2 Right	-78.91764426250	35.69659516260
Xsec 3 Left	-78.91892217940	35.69603737250
Xsec 3 Right	-78.91947782040	35.69597784320
Xsec 4 Left	-78.92017989510	35.69553375580
Xsec 4 Right	-78.92037640720	35.69586750920
Xsec 5 Left	-78.92134706020	35.69530206870
Xsec 5 Right	-78.92169367210	35.69555329780
Xsec 6 Left	-78.92226059520	35.69506772770
Xsec 6 Right	-78.92277200510	35.69537999840
Xsec 7 Left	-78.92315738830	35.69489866890
Xsec 7 Right	-78.92349028330	35.69534580230
Xsec 8 Left	-78.92395893390	35.69480020090
Xsec 8 Right	-78.92430499960	35.69506921710
Xsec T1 Left	-78.91833724090	35.69645294200
Xsec T1 Right	-78.91848764250	35.69678046380
Xsec T2 Left	-78.91837767970	35.69639685130
Xsec T2 Right	-78.91880658860	35.69644566500
Xsec 1 Left	-78.91640846570	35.69650094690
Xsec 1 Right	-78.91682176110	35.69682527730

Gauge #	X	Y
Gauge 2	-78.92224084200	35.69545824460
Gauge 3	-78.92544543700	35.69508434410
Gauge 4	-78.92694325230	35.69431926300
Gauge 5	-78.92782578100	35.69287780730
Gauge 6	-78.91648759680	35.69684729020
Gauge 7	-78.91722712460	35.69699009350
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10	-78.92153410230	35.69558010440
11	-78.92183434930	35.69525954300
14	-78.92373842760	35.69516506920

- Conservation Easement
- Pond
- Baseline Monitoring Alignment
- Stream Preservation
- Bankfull
- MY1 Thalweg
- MY2 Thalweg
- MY3 Thalweg
- Ditch
- Pins
- Cross Sections
- Stream Crest Gauge

RDS Groundwater Gauges

- Hydrology Absent
- Insufficient Data
- Hydrology Present
- Actual Feature Location
- Jurisdictional Wetlands
- Proposed Wetland Restoration
- Additional Wetlands
- Abandoned Wetland Enhancement
- Stream Stations
- Vegetation Plot Origin
- Vegetation Plots

MY3 Vegetation Problem Areas

- Bare Banks
- Bare Bench
- Bare Floodplain
- Japanese Stiltweed
- Tall Fescue

MY3 Stream Probelm Areas

- Bank Failure
- Bare Banks
- Cattails
- Eroding Banks
- Structure Failure

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Ecosystem Enhancement Program

Little Beaver Creek Stream and Wetland Restoration

Stream Current Conditions Plan View

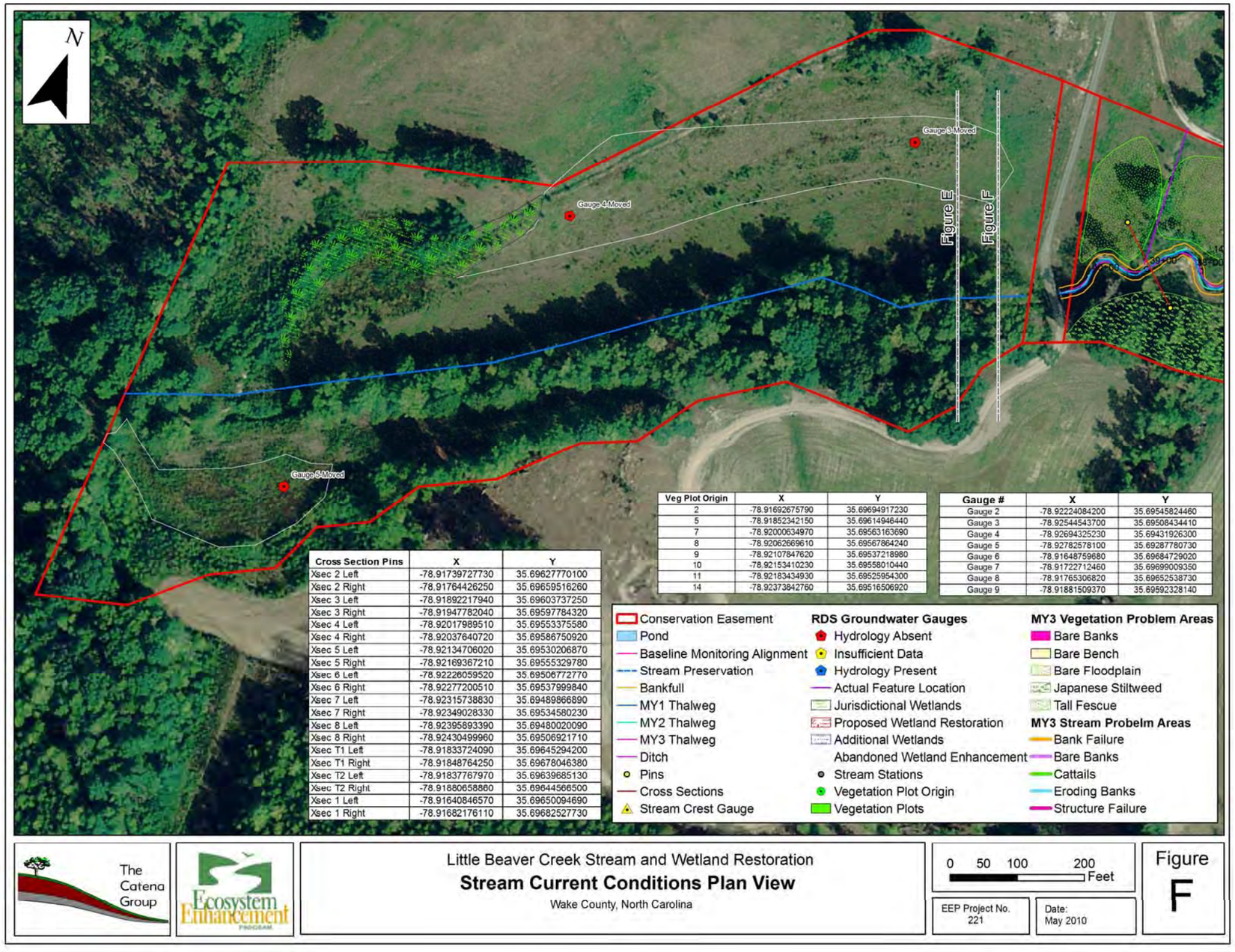
Wake County, North Carolina

0 25 50 100 Feet

EEP Project No. 221

Date: May 2010

Figure E



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Xsec 2 Right	-78.91764426250	35.69659516260
Xsec 3 Left	-78.91892217940	35.69603737250
Xsec 3 Right	-78.91947782040	35.69597784320
Xsec 4 Left	-78.92017989510	35.69553375580
Xsec 4 Right	-78.92037640720	35.69586750920
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Xsec 6 Right	-78.92277200510	35.69537999840
Xsec 7 Left	-78.92315738830	35.69489866890
Xsec 7 Right	-78.92349028330	35.69534580230
Xsec 8 Left	-78.92395893390	35.69480020090
Xsec 8 Right	-78.92430499960	35.69506921710
Xsec T1 Left	-78.91833724090	35.69645294200
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Xsec 1 Left	-78.91640846570	35.69650094690
Xsec 1 Right	-78.91682176110	35.69682527730

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7	-78.92000634970	35.69563163690
8	-78.92062669610	35.69567864240
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Gauge 6	-78.91648759680	35.69684729020
Gauge 7	-78.91722712460	35.69699009350
Gauge 8	-78.91765306820	35.69652538730
Gauge 9	-78.91881509370	35.69592328140

The Catena Group

Ecosystem Enhancement Program

Little Beaver Creek Stream and Wetland Restoration

Stream Current Conditions Plan View

Wake County, North Carolina

0 50 100 200 Feet

EEP Project No. 221

Date: May 2010

Figure F

Appendix B. General Project Tables

Table 1A and B. Project Components and Summations

Table 1a. Project Components Little Beaver Creek /Project No. 221								
Project Component or Reach ID	**Existing Feet/Acres**	**Restoration Level**	**Approach**	**Footage or Acreage**	**Stationing**	**Buffer Acres**	**BMP Elements[1]**	**Comment**
Little Beaver Creek/Reach 1 & 2	2.4 acres	R	N/A	2.4 acres	SEE CCPV	N/A		Wetland Restoration
Little Beaver Creek/Reach 1 & 2	2300 lf	R	P1 & P2	2300 lf	10+00 to 19+91/19+91 to 33+00	N/A		Instream Structure and Vegetated Buffers
Little Beaver Creek/Reach 3a	732 lf	R	P2	732 lf	33+00 to 40+32	N/A		Instream Structure and Vegetated Buffers
Little Beaver Creek/Reach 3b	1913lf	Preservation	N/A	1913lf	48+00 to 63+13	N/A		Instream Structure and Vegetated Buffers
Tributary 1	381 lf	R	P1	381 lf	10+00 to 13+81	N/A		Instream Structure and Vegetated Buffers
Tributary 2	206 lf	R	P1	206 lf	10+00 to 12+06	N/A		Instream Structure and Vegetated Buffers
Tributary 3	93 lf	R	P1 & P2	93 lf	10+00 to 10+92	N/A		Instream Structure and Vegetated Buffers

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

Table 1b. Component Summations

Table 1b. Component Summations Little Beaver Creek/Project No. 221							
Restoration Level	Stream (lf)	Riparian Wetland (Ac)		Non-Ripar (Ac)	Upland (Ac)	Buffer (Ac)	BMP
		Riverine	Non-Riverine				
Restoration	3712	2.4					
Enhancement							
Enhancement I							
Enhancement II							
Creation							
Preservation	1913						
HQ Preservation							
		2.4	0				
Totals	**5625**	**2.4**		**0**	**0**		**Count**
	Non-Applicable						

Table 2. Project Activity and Reporting History

Table 2. Project Activity and Reporting History Little Beaver Creek Stream and Wetland Restoration Site-Project No. 221			
Activity or Reporting	**Scheduled Completion**	**Data Collection Complete**	**Actual Completion Date**
Restoration Plan	2003	2003	March 2003
Final Design-90%	2005	2005	2005
Construction	2005	2005	November 2005
Temporary S&E mix applied to entire project area	2005	2005	2005
Permanent seed mix applied to entire project area	2005	2005	2005
Containerized, B&B, and livestake planting	January 2007	February 2007	February 2007
Mitigation Plan/As-built (Year 0 Monitoring-baseline)	July 2006	March 2006	February 2007
Year 1 Monitoring	Fall 2006	February 2007	November 2007
Year 2 Monitoring	December 2008	Fall 2008	December 2008
Year 3 Monitoring	December 2009*	May 2010*	May 2010*
Year 4 Monitoring	NA	NA	NA
Year 5 Monitoring	NA	NA	NA
* Postedpone due to Scoped Regrading Activities			

Table 3. Project Contact Table

Table 3. Project Contacts Table Little Beaver Creek Stream and Wetland Restoration Site-Project No. 221	
Designer POC	Earth Tech 701 Corporate Center Drive Suite 475 Raleigh, NC 27607 Bill Jenkins PE (919) 854-6200
Construction Contractor	Envirocon, Inc. 651 Corporate Circle Suite 114 Golden, CO 80401 Verne Musser (303) 215-0187
Planting Contractor POC	Seal Brothers 131 West Cleve St. Mt. Airy, NC 27030 Brain Seal (336) 786-2263
Seeding Contractor POC	Seal Brothers 131 West Cleve St. Mt. Airy, NC 27030 Brain Seal (336) 786-2263
Seed Mix Sources	Evergreen Seeding 4792 Rawls Church Rd. Fuquay-Varina, NC 27526
Nursury Stock Suppliers	Mellow March Farm 1312 Woody Store Rd. Siler City, NC 27344 (919) 742-1200
Monitoring Performers	The Catena Group 410-B Millstone Drive Hillsborough, NC 27278
Stream Monitoring	Ward Consulting Engineers 8368 Six Forks Road, Suite 104 Raleigh, North Carolina 27615-5083
Vegetation Monitoring	The Catena Group 410-B Millstone Drive Hillsborough, NC 27278
Wetland Monitoring	The Catena Group 410-B Millstone Drive Hillsborough, NC 27278

Table 4. Project Attribute Table

Table 4. Project Attribute Table Little Beaver Creek Stream and Wetland Restoration Site-Project No. 221	
Project County	Wake
Drainage Area	
Little Beaver Creek	1.1 sq mi
Drainage impervious surface cover estimate (%)	< 5%
Stream Order	
Little Beaver Creek	2nd
Physiographic Region	Piedmont
Ecoregion	Triassic Basin
Rosgen Classification of As-Built	C
Cowardin Classification	Riverine
Dominant Soil Types	Augusta fine sandy loam, Wehadkee silt loam, Worsham sandy loam
USGS HUC for Project	3030002
USGS HUC for Reference	Richland Creek (03030003) and Little Beaver Creek (03030002)
NCDWQ Sub-basin for Project	030605
NCDWQ Sub-basin for Reference Reach	Richland Creek (030610), Little Beaver Creek (030605)
NCDWQ Classification for Project	Little Beaver Creek (WS-IV, NSW)
NCDWQ Classification for Reference	Richland Creek (B), Little Beaver Creek (WS-IV, NSW)
Is any portion of any project segment 303D listed?	No
Is any portion of any project segment upstream of a 303D listed segment?	Yes
Reasons for 303D listing or stressor	Chlorophyll a
% of project easement fenced	0%
NCDWQ Classification for Reference -CB	WS-IV NSW
NCDWQ Classification for Reference -LC	C
Is any portion of any project segment 303D listed?	No
Is 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%

Appendix C. Vegetation Assessment Data

Table 5. Vegetation Plot Mitigation Success Summary Table

Little Beaver Creek (EEP #221)		
Veg Plot ID	**Veg Survival Threshold Met?**	**Tract Mean**
VP2	No	38%
VP5	Yes	
VP7	Yes	
VP8	No	
VP9	No	
VP10	No	
VP11	Yes	
VP14	No	

Vegetation Monitoring Plot Photos

Vegetation Plot 2

Vegetation Plot 5

Vegetation Plot 7

Vegetation Plot 8

Vegetation Plot 9

Vegetation Plot10

Vegetation Plot 11

Vegetation Plot 14

Table 6. Vegetation Metadata Table

Report Prepared By	The Catena Group
database name	Little Beaver Creek cvs-eep-entrytool-v2.2.5.mdb
DESCRIPTION OF WORKSHEETS IN THIS DOCUMENT----------	
Metadata	Description of database file, the report worksheets, and a summary of project(s) and project data.
Proj, planted	Each project is listed with its PLANTED stems per acre, for each year. This excludes live stakes.
Proj, total stems	Each project is listed with its TOTAL stems per acre, for each year. This includes live stakes, all planted stems, and all natural/volunteer stems.
Plots	List of plots surveyed with location and summary data (live stems, dead stems, missing, etc.).
Vigor	Frequency distribution of vigor classes for stems for all plots.
Vigor by Spp	Frequency distribution of vigor classes listed by species.
Damage	List of most frequent damage classes with number of occurrences and percent of total stems impacted by each.
Damage by Spp	Damage values tallied by type for each species.
Damage by Plot	Damage values tallied by type for each plot.
ALL Stems by Plot and spp	A matrix of the count of total living stems of each species (planted and natural volunteers combined) for each plot; dead and missing stems are excluded.
PROJECT SUMMARY----------	
Project Code	221
project Name	Little Beaver Creek
Description	4435 stream restoration, 1560 preservation, 2.4 acres wetland restoration southwest of Apex, NC. Constructed July-Nov. 2005.
River Basin	Cape Fear
length(ft)	4435
stream-to-edge width (ft)	50
area (sq m)	41198.33
Required Plots (calculated)	11
Sampled Plots	0

Table 7. Stem Count Total Planted by Plot and Species

EEP Project Code 221. Project Name: Little Beaver Creek																																
			Current Plot Data (MY3 2009)																										Annual Means					
Scientific Name	Common Name	Species Type	221-01-0002			221-01-0005			221-01-0007			221-01-0008			221-01-0009			221-01-0010			221-01-0011			221-01-0014			MY3 (2009)			MY2 (2008)		
			P-LS	P-all	T	P-LS	P-all	T	P-LS	P-all	T	P-LS	P-all	T	P-LS	P-all	T	P-LS	P-all	T	P-LS	P-all	T	P-LS	P-all	T	P-LS	P-all	T	P-LS	P-all	T
Acer rubrum	red maple	Tree																														15
Acer rubrum var. rubrum	red maple	Tree						1			1			2			15			11			41			1			72			95
Aronia arbutifolia	Red Chokeberry	Shrub					3	3																				3	3		3	3
Baccharis halimifolia	eastern baccharis	Shrub Tree						2			1												3			1			7			2
Betula nigra	river birch	Tree												5			1												6			6
Carpinus caroliniana	American hornbeam	Shrub Tree																														31
Carpinus caroliniana var. caroliniana	Coastal American Hornbeam	Shrub Tree											1	1			1						1					1	3		1	1
Carya	hickory	Tree												1															1			
Cornus florida	flowering dogwood	Shrub Tree																				3	3					3	3		2	2
Diospyros virginiana	common persimmon	Tree																														4
Fraxinus pennsylvanica	green ash	Tree					19	19		5	7					1	1					8	9		2	2		35	38		33	35
Hamamelis virginiana	American witchhazel	Shrub Tree																													5	5
Hamamelis virginiana var. virginiana	American witchhazel									4	4		1	1					3	3					2	2		10	10		6	6
Hypericum	St. Johnswort	Shrub												1															1			9
Liquidambar styraciflua	sweetgum	Tree			12			44			16			113			105			77			51			17			435			453
Liriodendron tulipifera	tuliptree	Tree						1																					1			2
Liriodendron tulipifera var. tulipifera	Tulip-tree, Yellow Poplar, Whitewood	Tree									4						2												6			11
Morella cerifera	wax myrtle	Shrub Tree								10	10		1	1														11	11		10	11
Nyssa sylvatica	blackgum	Tree																		1									1			2
Pinus taeda	loblolly pine	Tree			56			34			57			24			39			64			37			6			317			160
Planera	planertree							3																					3			
Platanus occidentalis	American sycamore	Tree																														1
Platanus occidentalis var. occidentalis	Sycamore, Plane-tree	Tree		1	1						7			1			2											1	11			9
Prunus serotina	black cherry	Shrub Tree																														2
Prunus serotina var. serotina	black cherry	Shrub Tree																		2									2			
Quercus	oak	Shrub Tree																														33
Quercus alba	white oak	Tree																				1	1					1	1		1	1
Quercus lyrata	overcup oak	Tree		1	1		3	3		1	1		2	2		1	1											8	8		6	6
Quercus nigra	water oak	Tree															1			42			1						44			28
Quercus phellos	willow oak	Tree								1	2																	1	2		2	4
Rhus copallinum var. copallinum	flameleaf sumac	Shrub Tree									2						1												3			3

Rosa multiflora	**multiflora rose**	**Shrub Vine**																													**1**
Sambucus canadensis	**Common Elderberry**	**Shrub Tree**																													**1**
Ulmus	**elm**	**Tree**															**5**			**2**			**15**						**22**			**10**
Ulmus rubra	**slippery elm**	**Tree**						**3**			**1**																		**4**			**2**
Viburnum nudum	**possumhaw**	**Shrub Tree**																				**1**	**1**					**1**	**1**		**1**	**1**
Stem count			**0**	**2**	**70**	**0**	**25**	**113**	**0**	**21**	**113**	**0**	**5**	**152**	**0**	**2**	**174**	**0**	**3**	**202**	**0**	**13**	**163**	**0**	**4**	**29**	**0**	**75**	**1016**	**0**	**70**	**955**
size (ares)			**1**			**1**			**1**			**1**			**1**			**1**			**1**			**1**			**8**			**8**		
size (ACRES)			**0.02**			**0.02**			**0.02**			**0.02**			**0.02**			**0.02**			**0.02**			**0.02**			**0.20**			**0.20**		
Species count			**0**	**2**	**4**	**0**	**3**	**10**	**0**	**5**	**13**	**0**	**4**	**11**	**0**	**2**	**12**	**0**	**1**	**8**	**0**	**4**	**11**	**0**	**2**	**6**	**0**	**11**	**27**	**0**	**11**	**33**
Stems per ACRE			**0**	**80.94**	**2833**	**0**	**1012**	**4573**	**0**	**849.8**	**4573**	**0**	**202.3**	**6151**	**0**	**80.94**	**7042**	**0**	**121.4**	**8175**	**0**	**526.1**	**6596**	**0**	**161.9**	**1174**	**0**	**379.4**	**5140**	**0**	**354.1**	**4831**

Appendix D. Stream Assessment Data

Stream Station Photos

Photo 1 CS-1 Looking DS

Photo 4 CS-4 Looking DS

Photo 2 CS-2 Looking DS

Photo 5 CS-5 Looking DS

Photo 3 CS-3 Looking DS

Photo 6 CS-6 Looking DS

Photo 7 CS-7 Looking DS

Photo 10 CS-T2 Looking DS

Photo 8 CS-8 Looking DS

Photo 9 CS-T1 Looking DS

Table 8. Visual Morphological Stability Assessment
Little Beaver Creek Stream Restoration/Project 221
Reaches 1, 2, 3a,: (3032 feet)

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?	31	64	NA	48%	
	2. Armor stable (e.g.no displacement?)	24	64	NA	38%	
	3. Facet grade appears stable?	23	64	NA	36%	
	4. Minimal evidence of embedding/fining?	17	64	NA	27%	
	5. Length appropriate?	18	64	NA	28%	**35%**
B. Pools	1. Present? (e.g. not subject to severe aggrad. Or migrat.?)	41	64	NA	64%	
	2. Sufficiently deep (Max. Pool D:Mean Bkf>1.6?)	38	64	NA	59%	
	3. Length appropriate?	27	64	NA	42%	**55%**
C. Thalweg	1. Upstream of meander bend (run/inflection) centering?	38	64	NA	59%	
	2. Downstream of meander (glide/inflection) centering?	32	64	NA	50%	**55%**
D. Meanders	1. Outer bend in state of limited/controlled erosion?	21	64	NA	33%	
	2. Of those eroding, # w/concomitant point bar formation?	4	43	NA	9%	
	3. Apparent Rc within spec?	38	64	NA	59%	
	4. Sufficient floodplain access and relief?	24	64	NA	38%	**35%**
E. Bed General	1. General channel bed aggradation areas (bar formation)	NA	NA	15/210	93%	
	2. Channel bed degradation-areas of increasing downcutting of head cutting?	NA	NA	4/106	97%	**95%**
F. Bank	1. Actively eroding, wasting, or slumping bank?	NA	NA	22/534	91%	**91%**
G. Cross vanes, sills, single wing vanes	1. Free of back or arm scour?	16	34	NA	47%	
	2. Height appropriate?	18	34	NA	53%	
	3. Angle and geometry appear appropriate?	17	34	NA	50%	
	4. Free of piping or other structural failures?	12	34	NA	35%	**46%**
H. Wads/ Boulders	1. Free of scour?	12	25	NA	48%	
	2. Footing stable?	12	25	NA	48%	**48%**

Table B2. Visual Morphological Stability Assessment
Little Beaver Creek Stream Restoration/Project 221
Tributary 1: (381 feet)

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?	10	11	NA	91%	
	2. Armor stable (e.g.no displacement?)	10	11	NA	91%	
	3. Facet grade appears stable?	10	11	NA	91%	
	4. Minimal evidence of embedding/fining?	8	11	NA	73%	
	5. Length appropriate?	10	11	NA	91%	**87%**
B. Pools	1. Present? (e.g. not subject to severe aggrad. Or migrat.?)	8	11	NA	73%	
	2. Sufficiently deep (Max. Pool D:Mean Bkf>1.6?)	6	11	NA	55%	
	3. Length appropriate?	6	11	NA	55%	**61%**
C. Thalweg	1. Upstream of meander bend (run/inflection) centering?	8	11	NA	73%	
	2. Downstream of meander (glide/inflection) centering?	8	11	NA	73%	**73%**
D. Meanders	1. Outer bend in state of limited/controlled erosion?	4	11	NA	36%	
	2. Of those eroding, # w/concomitant point bar formation?	1	7	NA	14%	
	3. Apparent Rc within spec?	8	11	NA	73%	
	4. Sufficient floodplain access and relief?	8	11	NA	73%	**49%**
E. Bed General	1. General channel bed aggradation areas (bar formation)	NA	NA	0	100%	
	2. Channel bed degradation-areas of increasing downcutting of head cutting?	NA	NA	0	100%	**100%**
F. Bank	1. Actively eroding, wasting, or slumping bank?	NA	NA	6/90	88%	**88%**
G. Cross vanes, sills, single wing vanes	1. Free of back or arm scour?	2	2	NA	100%	
	2. Height appropriate?	2	2	NA	100%	
	3. Angle and geometry appear appropriate?	2	2	NA	100%	
	4. Free of piping or other structural failures?	2	2	NA	100%	**100%**
H. Wads/ Boulders	1. Free of scour?	0	0	NA	NA	
	2. Footing stable?	0	0	NA	NA	**NA**

Table B2. Visual Morphological Stability Assessment Little Beaver Creek Stream Restoration/Project 221 Tributary 2: (200 feet)						
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?	5	5	NA	100%	
	2. Armor stable (e.g.no displacement?)	5	5	NA	100%	
	3. Facet grade appears stable?	5	5	NA	100%	
	4. Minimal evidence of embedding/fining?	5	5	NA	100%	
	5. Length appropriate?	5	5	NA	100%	**100%**
B. Pools	1. Present? (e.g. not subject to severe aggrad. Or migrat.?)	5	5	NA	100%	
	2. Sufficiently deep (Max. Pool D:Mean Bkf>1.6?)	5	5	NA	100%	
	3. Length appropriate?	5	5	NA	100%	**100%**
C. Thalweg	1. Upstream of meander bend (run/inflection) centering?	5	5	NA	100%	
	2. Downstream of meander (glide/inflection) centering?	5	5	NA	100%	**100%**
D. Meanders	1. Outer bend in state of limited/controlled erosion?	5	5	NA	100%	
	2. Of those eroding, # w/concomitant point bar formation?	0	0	NA	100%	
	3. Apparent Rc within spec?	5	5	NA	100%	
	4. Sufficient floodplain access and relief?	5	5	NA	100%	**100%**
E. Bed General	1. General channel bed aggradation areas (bar formation)	NA	NA	0	0%	
	2. Channel bed degradation-areas of increasing downcutting of head cutting?	NA	NA	0	0%	**100%**
F. Bank	1. Actively eroding, wasting, or slumping bank?	NA	NA	0	0%	**100%**
G. Cross vanes, sills, single wing vanes	1. Free of back or arm scour?	1	1	NA	100%	
	2. Height appropriate?	1	1	NA	100%	
	3. Angle and geometry appear appropriate?	1	1	NA	100%	
	4. Free of piping or other structural failures?	1	1	NA	100%	**100%**
H. Wads/ Boulders	1. Free of scour?	0	0	NA	NA	
	2. Footing stable?	0	0	NA	NA	**NA**

Table 8. Verification of Bankfull Events

Table 9. Verification of Bankfull Events Little Beaver Creek Stream and Wetland Restoration Site-Project No. 221			
Date of Data Collection	**Date of Occurrence**	**Method**	**Photo #**
2006	14-Jun-06	Visual	N/A
September 18, 2008	September 7, 2008	Visual (i.e. wrack lines)	N/A

Figure 3. Cross-Section 1

Project:	Little Beaver Creek
Cross Section:	Cross Section 1
Feature	Riffle
Station:	11+25
Date:	4/8/10
Crew:	BW, RL, SV, ZP

Summary (bankfull)

	MY0	MY1	MY2	MY3
A (BKF)	N/A	25.1	22.4	25.1
W (BKF)	N/A	13.8	15.4	13.9
Max d	N/A	3.4	2.9	3.1
Mean d	N/A	1.9	1.5	1.8
W/D	N/A	7.5	10.6	7.7

MY1-2007			MY2-2008			MY3-2009		
Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes
0	295.22		0.00	296.27	LPIN	0.00	296.36	X 1 LP
5	295.69		11.04	295.47		7.24	295.73	
10	295.75		20.11	294.88		17.43	294.82	
14	295.13		31.79	294.84		33.70	294.85	
17	294.91		41.33	294.71		49.41	294.70	
20	294.83		47.43	294.65		54.44	293.66	
22.5	294.51		52.75	294.10		58.05	292.03	
24	294.71		56.75	292.71		66.60	291.85	
29	294.74		60.95	292.00		72.45	291.86	BKF
35	294.73		70.58	291.82	BKF	77.04	290.21	
40	294.56		73.54	291.09		77.81	288.96	
49.5	294.69		76.60	290.15	Toe L	80.17	288.59	TW
54	293.96		77.63	288.93		82.30	288.87	
57	292.42		79.11	288.77	TW	83.23	290.10	
58.5	292.04		80.98	288.85		86.73	291.72	BKF
65	291.9		81.84	289.10		99.57	291.37	
70	291.93		82.52	290.33	TOE R	109.31	292.67	
73.3	291.9	BKF	83.73	290.51		122.20	292.90	
76.3	290.55		84.94	290.69		148.91	292.70	
77.2	289.96		86.67	291.65	BKF	167.52	292.72	X 1 RP
78	289.62		91.51	291.41				
78.2	289.38	lew	101.45	291.36				
78.2	288.67		107.37	292.20				
80	288.81		111.16	292.53				
81	288.59		117.06	292.83				
81.9	288.44	TW	131.38	292.79				
83	288.64		142.99	292.91				
83.1	289.97		155.43	292.93				
87.2	291.79	BKF	167.26	292.80	RPIN			

Photo of XS-1, Sta 11+25 looking in the downstream direction

*This cross section was moved after MY0 , therefore MY0 is not represented on this plot.

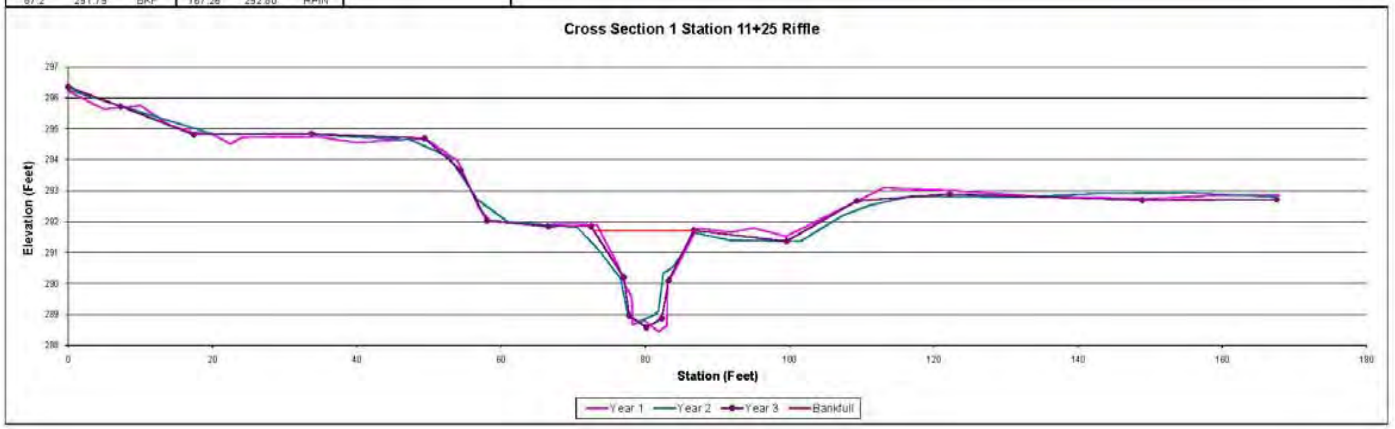


Figure 4. Cross-Section 2

Project:	Little Beaver Creek
Cross Section:	Cross Section 2
Feature:	Pool
Station:	14+85
Date:	4/8/10
Crew:	BW, RL, SV, ZP

Summary (bankfull)

	MY0	MY1	MY2	MY3
A (BKF)	34.2	17.2	18.4	18.0
W (BKF)	29.7	17.4	19.1	21.3
Max d	2.3	2.2	2.2	2.1
Mean d	1.2	1.0	1.0	0.8
W/d	25.7	17.5	19.9	25.2

MY1-2007			MY2-2008			MY3-2009		
Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes
1.089	291.083	X2	-5.433	291.409	LP	-5.678	291.68	X 2 LP
14.6	290.474	X2	-1.413	290.919		1.012	291.03	
35.299	290.055	X2	5.387	290.429		8.942	290.89	
99.125	289.036	X2	16.537	290.389		24.892	290.21	
56.522	288.929	X2	27.087	290.189		37.382	290.02	
62.625	287.794	X2BKF	36.757	289.909		45.672	289.85	
70.82	286.597	X2EOW	45.937	289.799		53.112	286.56	
72.483	285.579	X2TW	50.487	288.859		55.882	287.61	
73.532	285.331	X2	55.827	287.509		58.502	288.1	BKF
75.785	286.036	X2TW	57.397	287.919		63.272	287.65	
78.618	286.564	X2EOW	60.397	287.879	BKF L	69.042	287.72	
81.881	288.466	X2BKF	64.377	287.239		70.612	286.49	
92.898	288.735	X2	68.727	287.629		72.482	286.13	
98.697	290.068	X2	70.717	286.249	TOE L	74.062	285.96	TW
103.321	289.902	X2	73.207	285.639	TW	75.992	286.36	
108.642	290.052	X2	75.217	285.969		78.152	287.69	
116.767	289.669	X2	76.707	286.289	TOE R	81.652	288.54	BKF
126.755	289.992	X2	77.827	287.419		86.672	288.94	
136.617	290.359	X2RPIN	80.807	288.229		89.092	289.17	
			83.527	288.869	BKF L R	92.102	288.92	
			86.557	289.139		97.672	290.01	
			93.187	288.989		104.922	290.11	
			97.547	289.979		123.942	289.73	
			105.227	290.089		136.862	290.32	X 2 RP
			116.767	289.639				
			136.617	290.359	RP			

Photo of XS-2, Sta 14+85 looking in the downstream direction

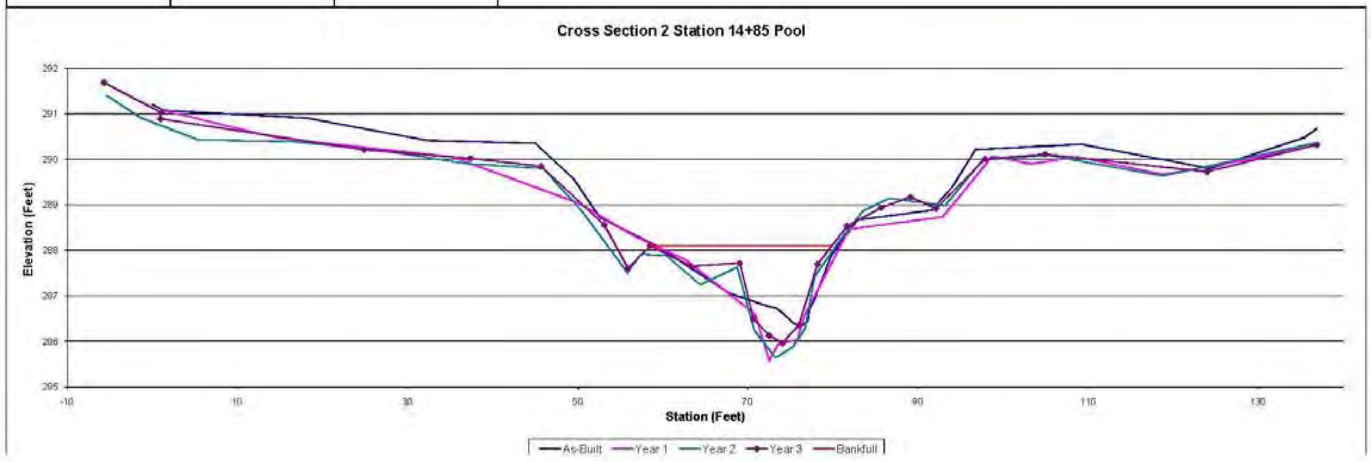


Figure 5. Cross-Section 3

Project:	Little Beaver Creek
Cross Section:	Cross Section 3
Feature:	Riffle
Station:	21+16
Date:	4/8/10
Crew:	BW, RL, SV, ZP

Summary (bankfull)

	MY0	MY1	MY2	MY3
A (BKF)	17.9	19.1	18.5	16.1
W (BKF)	21.1	16.4	16.7	16.6
Max d	1.9	2.3	2.4	2.3
Mean d	0.8	1.2	1.1	1.0
W/D	25.0	14.1	15.0	17.1

MY1-2007			MY2-2008			MY3-2009		
Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes
0.043	288.436	X3L	0.00	288.44	RP	0.60	288.44	X3LP
26.603	287.908	XS3	17.50	287.93		20.16	288.27	
50.259	287.387	XS3	34.63	287.56		36.88	287.46	
57.458	284.146	XS3	44.52	287.66		47.43	287.47	
66.395	284.432	XS3	48.45	287.29		57.25	284.32	
70.363	282.821	XS3BKF	57.10	284.54		64.79	284.25	BKF
71.88	282.652	XS3EOW	64.33	284.34	BKF	68.97	283.53	
72.745	282.008	XS3TW	68.70	283.71		71.45	282.81	
74.544	282.239	XS3	72.44	282.68	TOE L	72.74	282.12	
76.507	282.433	XS3EOW	73.24	282.23		73.69	281.91	TW
77.864	283.225	XS3BKF	74.01	281.95	TW	74.68	282.09	
81.703	284.22	XS3	75.66	282.10		75.79	283.12	
92.955	284.433	XS3	76.30	282.70	TOE R	78.39	283.56	
108.805	287.28	XS3	78.40	283.40		82.24	284.45	BKF
135.877	288.007	XS3	81.19	284.31	BKF	93.50	284.57	
			85.97	284.31		107.80	287.00	
			94.40	284.48		122.63	287.74	
			105.56	286.81		148.82	287.30	
			115.27	287.30		166.50	287.19	X3RP
			135.36	286.90				
			153.35	286.25				
			166.66	287.19	RP			

Photo of XS-3, Sta 21+16 looking in the downstream direction

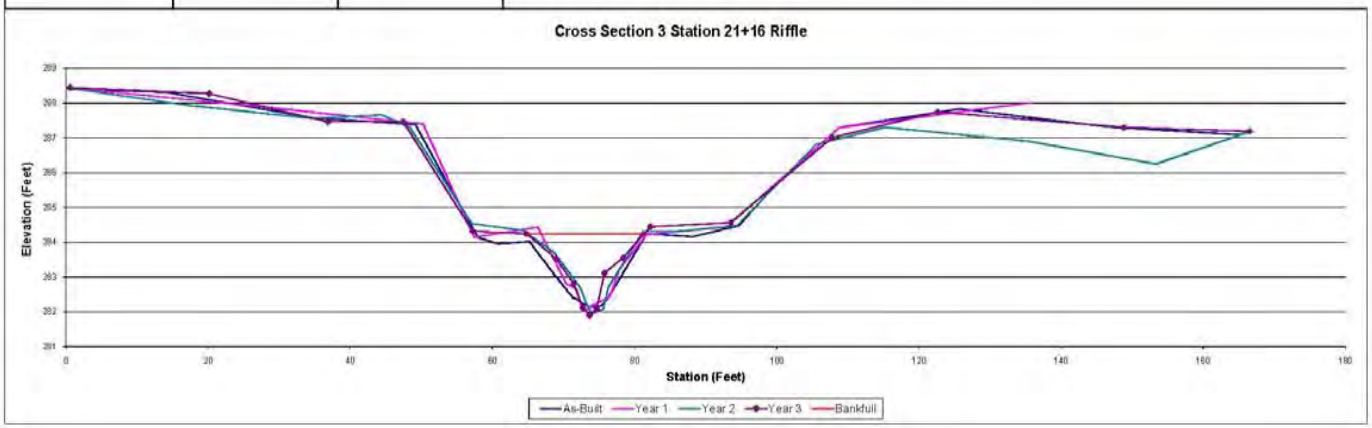


Figure 6. Cross-Section 4

Project:	Little Beaver Creek
Cross Section	Cross Section 4
Feature	Pool
Station	25+40
Date	4/8/10
Crew	BW, RL, SV, ZP

Summary (bankfull)

	MY0	MY1	MY2	MY3
A (BKF)	20.4	23.9	26.9	28.2
W (BKF)	15.4	19.4	21.6	21.6
Max d	2.5	2.7	2.7	2.9
Mean d	1.3	1.2	1.2	1.3
WD	11.5	15.8	17.8	16.5

MY1-2007			MY2-2008			MY3-2009		
Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes
4.378	285.334	XS4	0.00	283.72	LP	0.00	285.66	X4 LP
11.69	285.752	XS4	9.32	285.50		5.43	285.37	
26.393	286.008	XS4	22.94	286.36		16.39	285.92	
36.189	284.101	XS4	29.27	283.78		21.65	285.91	
48.166	283.553	XS4BKF	34.09	284.46		26.06	286.23	
50.03	281.889	XS4EOW	37.89	284.01		31.50	285.18	
52.311	280.847	XS4TW	43.16	284.17		35.72	284.12	
54.918	281.546	XS4TW	47.07	284.18	BKF	45.34	284.99	BKF
57.971	281.831	XS4EOW	48.47	283.44		48.44	283.53	
63.563	283.404	XS4BKF	50.26	281.96	TOE L	49.47	282.95	
75.146	283.843	XS4	51.28	281.21		50.28	281.68	
81.117	285.473	XS4	52.39	281.11	TW	51.72	281.03	
101.114	285.125	XS4	54.21	281.27		53.49	281.17	TW
			56.92	281.82		55.54	281.21	
			58.34	282.02	TOE R	58.33	281.77	
			58.79	282.49		59.73	282.65	
			59.87	282.75		61.44	282.92	
			61.26	282.90		64.72	283.54	
			63.34	283.40	BKF	69.12	283.78	
			67.06	283.72		73.00	283.78	BKF
			73.71	283.92		79.41	285.06	
			75.81	284.25		82.05	285.61	
			78.38	284.96		92.78	285.57	
			81.63	285.48		109.32	285.13	
			86.89	285.66		124.61	284.79	
			103.94	285.33		135.09	284.72	X4 RP
			123.27	284.82				
			135.06	284.77	RP			

Photo of XS-4, Sta 25+40 looking in the downstream direction

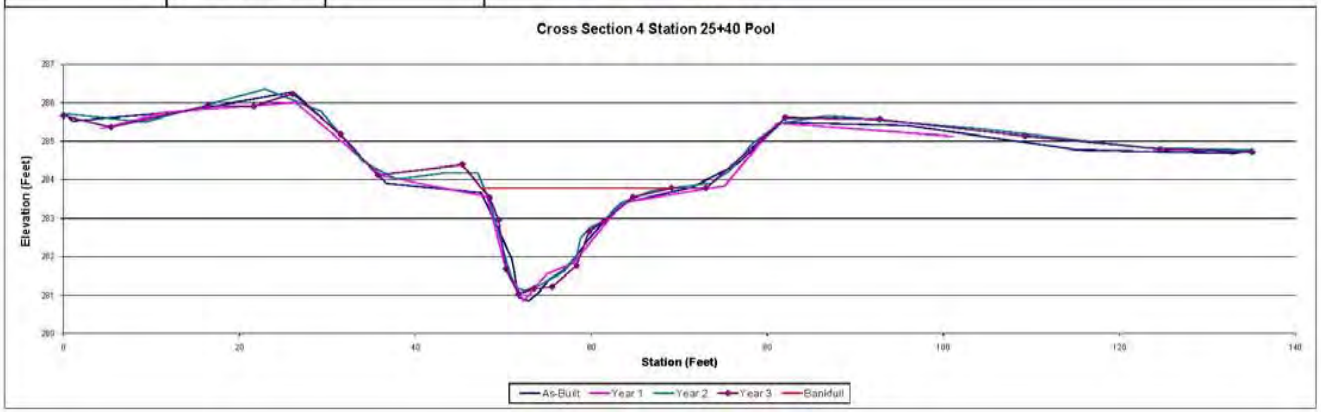


Figure 7. Cross-Section 5

Project:	Little Beaver Creek
Cross Section:	Cross Section 5
Feature	Riffle
Station:	29+86
Date:	4/8/10
Crew:	BW, RL, SV, ZP

Summary (bankfull)

	MY0	MY1	MY2	MY3
A (BKF)	22.8	44.0	39.0	36.9
W (BKF)	17.1	28.2	30.7	19.4
Max d	2.5	3.9	3.8	3.7
Mean d	1.3	1.6	1.3	1.9
WD	12.8	18.1	24.1	10.3

MY1-2007			MY2-2008			MY3-2009		
Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes
9.759	282.698	XS5	0.00	281.44	LP	0.00	281.43	X5 LP
18.551	282.059	XS5	4.16	281.45		1.60	281.59	
43.367	281.937	XS5	10.87	282.85		4.41	281.69	
53.092	281.674	XS5	19.52	281.96		8.21	282.98	
70.014	279.871	XS5BKF	35.77	281.67		16.13	282.61	
70.926	279.271	XS5	44.29	282.19		18.27	282.16	
72.217	277.638	XS5	52.89	281.67		35.12	281.71	
74.647	276.22	XS5	61.74	281.50	BKF	43.91	282.31	
77.751	279.004	XS5EOW	64.15	280.98		52.05	281.70	
82.766	281.471	XS5BKF	67.25	280.77		53.32	281.61	
100.074	281.419	XS5	69.23	279.99		67.03	281.32	BKF
115.409	283.557	XS5	70.18	279.67		69.27	280.68	
135.854	283.753	XS5	70.75	278.03	TOE L	70.63	278.23	
			73.75	277.86		73.38	277.78	
			75.46	277.69	TW	74.75	277.90	TW
			77.48	278.22		77.56	278.07	
			77.61	278.35	TOER	78.61	279.83	
			78.32	279.56		80.90	280.38	
			79.80	279.82		84.20	281.50	BKF
			81.46	280.58		98.10	281.68	
			83.50	281.43	BKF	98.13	281.69	
			93.87	281.47		107.86	282.92	
			101.20	281.88		117.43	283.65	
			110.84	283.19		129.61	283.86	
			122.73	283.63		137.91	283.93	X5 RP
			130.67	283.79				
			136.98	283.94				
			137.81	283.92	RP			

Photo of XS-5, Sta 29+86 looking in the downstream direction

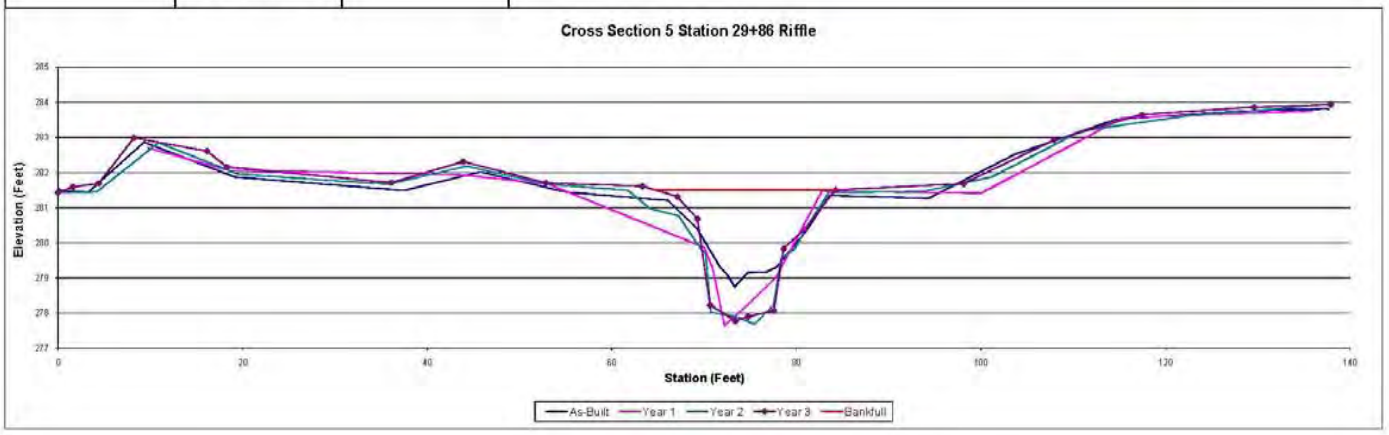


Figure 8. Cross-Section 6

Project:	Little Beaver Creek
Cross Section:	Cross Section 6
Feature:	Riffle
Station:	33+28
Date:	4/8/10
Crew:	BW, RL, SV, ZP

Summary (bankfull)

	MY0	MY1	MY2	MY3
A (BKF)	20.1	25.5	20.8	19.0
W (BKF)	18.6	21.7	19.5	19.9
Max d	1.8	2.3	1.8	1.7
Mean d	1.1	1.2	1.1	1.0
W/D	17.2	18.4	18.2	20.9

MY1-2007			MY2-2008			MY3-2009		
Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes
13.282	282.021	X6	0.00	281.73	LP	0.00	281.76	X6 LP
33.612	281.877	X6	12.51	282.05		1.62	282.00	
55.538	280.599	X6	36.06	281.59		21.24	282.07	
65.114	278.96	X6BKF	46.26	281.20		39.11	281.69	
77.748	278.462	X6	58.49	280.72		53.78	281.11	
83.532	276.312	X6	64.05	279.71		59.38	280.66	
85.261	276.122	X6TW	67.61	278.80		71.27	278.53	
88.145	276.199	X6	80.05	278.25	BKF	79.17	278.26	BKF
89.949	276.653	X6EOW	83.66	277.22		81.89	277.79	
94.856	278.008	X6	85.37	277.17		84.59	277.27	
110.636	278.842	X6	86.43	276.57	TOEL	85.73	277.31	
120.705	280.324	X6	89.13	276.46	TW	86.41	276.87	
125.486	280.422	X6	91.70	276.57	TOE R	87.95	276.60	TW
138.128	279.874	X6	94.01	277.07		90.45	276.66	
152.535	281.293	X6	101.28	278.69	BKF	91.87	276.80	
189.328	281.717	X6RPIN	115.97	278.81		92.40	276.99	
			134.98	279.45		93.67	277.14	
			153.02	281.31		100.42	278.56	BKF
			172.91	281.76		107.66	278.53	
			186.18	281.93		113.57	278.85	
			189.99	281.85	RP	117.49	278.95	
						128.91	279.48	
						141.96	280.00	
						154.92	281.32	
						173.80	281.85	
						188.24	281.83	
						190.03	281.83	X6 RP

Photo of XS-6, Sta 33+28 looking in the downstream direction

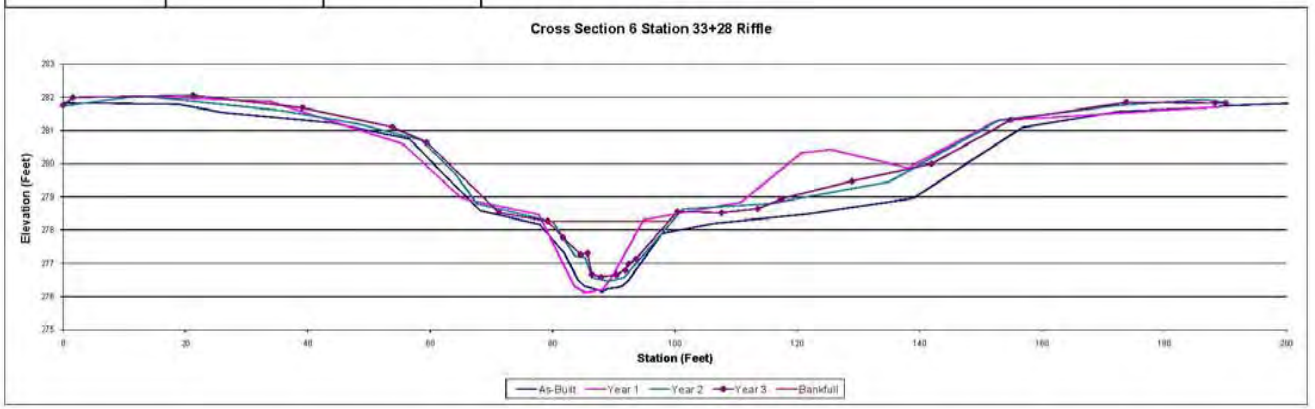


Figure 9. Cross-Section 7

Project:	Little Beaver Creek
Cross Section:	Cross Section 7
Feature:	Pool
Station:	36+03
Date:	4/8/10
Crew:	BW, RL, SV, ZP

Summary (bankfull)

	MY0	MY1	MY2	MY3
A (BKF)	33.6	38.1	34.7	48.3
W (BKF)	18.8	19.9	17.7	19.4
Max d	3.2	4.3	4.7	5.8
Mean d	1.8	1.9	2.0	2.6
WD	10.5	10.4	9.0	7.6

MY1-2007			MY2-2008			MY3-2009		
Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes
0	278.836	X7LPIN	0.00	279.00	LP	0.00	278.90	X7 LP
33.871	279.486	X7	10.98	279.04		0.78	278.97	
80.043	279.431	X7	27.27	279.46		9.10	279.03	
82.978	279.174	X7	51.48	279.82		30.67	279.56	
93.22	278.001	X7	64.37	279.69		47.46	279.88	
95.724	277.739	X7BKF	79.27	279.73		59.29	279.41	
98.349	276.99	X7	84.35	278.44		78.35	279.82	
99.368	276.863	X7	93.18	278.09		83.08	278.54	
100.513	276.5	X7	98.41	277.36	BKF	90.66	278.31	
104.615	276.711	X7	100.05	276.62		94.59	278.12	
105.514	275.836	X7EOW	104.88	275.89		96.51	277.84	BKF
107.136	274.455	X7	106.12	275.59		97.53	277.64	
109.075	273.707	X7TW	106.98	273.56	TOEL	100.27	276.91	
110.653	274.181	X7	108.65	272.99	TW	102.39	276.73	
112.523	276.792	X7	109.62	274.05		103.97	276.51	
113.122	278.052	X7	111.04	274.57		104.82	275.88	
124.51	278.205	BFF	113.90	278.05	BKF	105.08	273.67	
128.632	278.601	X7	119.43	278.21		106.95	272.78	
133.265	280.31	X7	128.11	278.74		109.27	272.10	TW
176.974	280.341	X7	133.95	280.45		110.89	272.72	
190.038	280.536	X7RPIN	139.75	280.91		114.35	278.03	BKF
			152.76	280.79		128.12	278.69	
			175.17	280.20		133.87	280.50	
			189.83	280.53	RP	150.92	280.96	
						176.60	280.58	
						189.07	280.57	
						190.59	280.52	X7 RP

Photo of XS-7, Sta 36+03 looking in the downstream direction

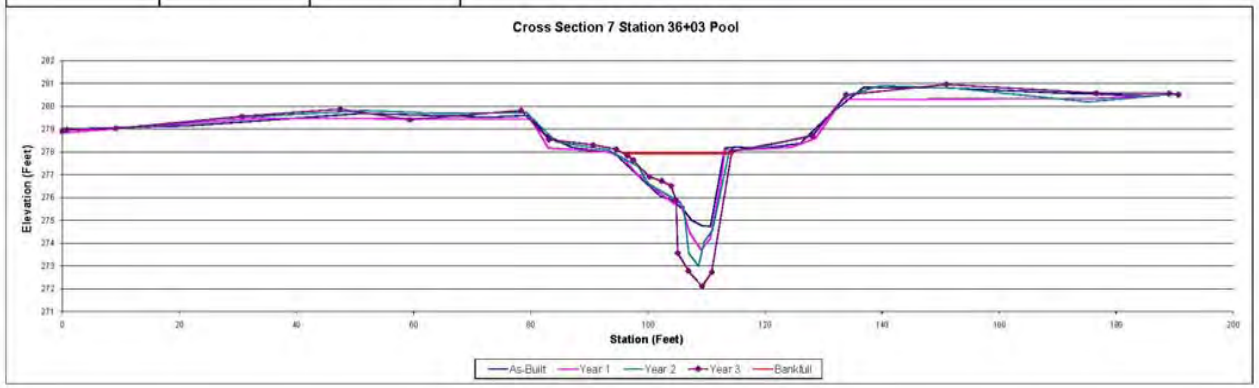


Figure 10. Cross-Section 8

Project:	Little Beaver Creek
Cross Section:	Cross Section 8
Feature	Riffle
Station:	38+95
Date	4/8/10
Crew:	BW, RL, SV, ZP

Summary (bankfull)

	MY0	MY1	MY2	MY3
A (BKF)	22.9	23.6	27.6	26.5
W (BKF)	16.9	19.5	19.3	20.6
Max d	2.3	2.7	2.7	2.8
Mean d	1.4	1.2	1.4	1.3
WD	12.5	16.0	13.5	16.0

MY1-2007			MY2-2008			MY3-2009		
Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes
0	278.133	X8LPIN	0.00	278.15	LP	-0.02	278.13	X8 LP
25.324	277.526	X8	2.47	278.11		18.03	277.85	
40.752	276.877	X8	9.65	277.93		39.42	277.38	
49.89	274.594	X8	22.03	277.64		44.68	276.72	
57.682	273.864	X8BKF	31.79	277.58		50.67	274.44	
61.183	273.676	X8	38.64	277.39		57.06	274.31	BKF
64.709	271.887	X8	44.38	276.75		59.93	273.99	
66.921	271.478	X8	50.52	274.61		63.01	273.17	
69.9	271.212	X8TW	52.39	274.23		64.65	272.44	
70.922	272.187	X8EOW	58.74	274.18	BKF	65.79	271.65	
76.163	273.83	X8EOW	61.64	273.66		68.12	271.38	TW
82.659	274.11	X8	63.35	272.96		69.99	271.31	
89.153	274.343	X8	65.41	272.25		70.78	271.50	
96.616	275.246	X8	66.23	271.57	TOEL	71.64	272.40	
104.537	274.307	X8	68.42	271.39	TW	72.81	272.80	
104.3	274.305	X8	71.24	271.44	TOER	75.80	273.66	
106.021	272.985	X8	72.72	272.41		79.62	274.09	BKF
111.011	274.269	X8	73.29	272.74		99.32	274.33	
117.843	276.998	X8	76.73	274.06	BKF	94.89	274.94	
			83.12	274.09		106.57	273.39	
			88.92	274.30		110.63	274.28	
			92.04	274.85		121.02	277.53	
			95.62	275.12		134.12	277.59	
			98.59	274.86		142.08	277.68	X8 RP
			101.86	274.15				
			104.80	273.44				
			110.58	274.27				
			115.42	276.02				
			118.97	277.14				

Photo of XS-8, Sta 38+95 looking in the downstream direction

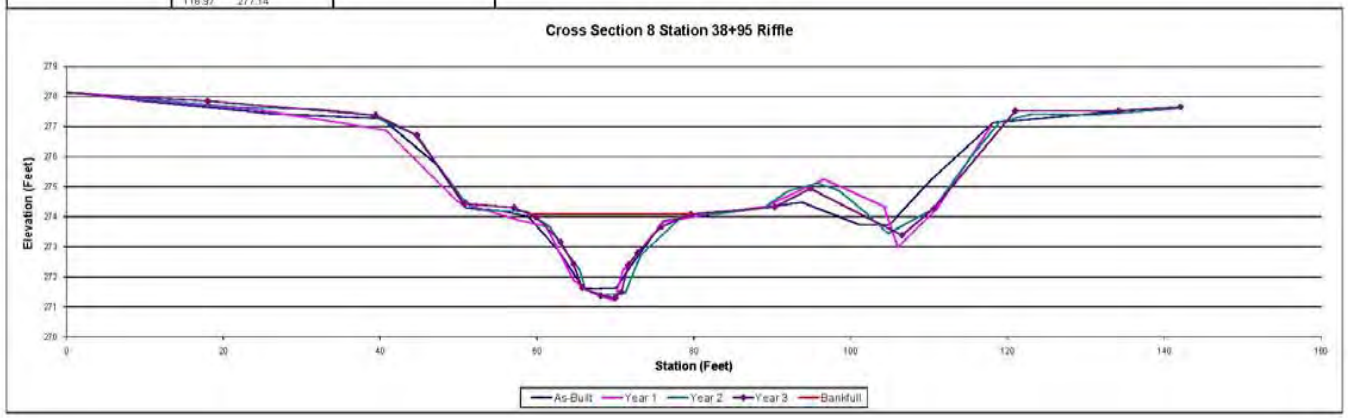


Figure 11. Cross-Section T1

Project:	Little Beaver Creek
Cross Section:	Cross Section T1 (Tributary)
Feature	Riffle
Station:	11+63
Date:	4/8/10
Crew:	BW, RL, SV, ZP

Summary (bankfull)

	MY0	MY1	MY2	MY3
A (BKF)	6.0	10.7	8.8	9.2
W (BKF)	9.4	12.5	14.0	15.1
Max d	1.1	2.0	1.6	1.5
Mean d	0.6	0.9	0.6	0.6
WD	14.8	14.8	22.2	24.6

MY1-2007			MY2-2008			MY3-2009		
Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes
0	290.686	XT1LPRN	0.00	290.69	LP	0.07	290.68	XT1 LP
19.646	291.124	XT1	11.94	291.21		19.84	291.21	
38.653	291.332	XT1	24.13	291.26		39.00	291.36	
47.673	289.254	XT1	34.65	291.43		56.56	287.25	
54.181	287.428	XT1	40.39	291.22		64.95	286.96	BKF
54.276	287.415	XT1	46.09	290.03		67.90	286.56	
63.34	287.019	XT1BKF	53.82	287.74		68.70	286.39	
67.412	286.556	XT1	57.40	287.14		69.22	285.71	
67.498	286.002	XT1EOW	64.23	287.03	BKF	71.06	285.58	TW
67.551	285.018	XT1EOW	68.85	286.45		72.26	285.83	
68.876	284.979	XT1TW	69.36	285.58	TOE L	74.47	286.78	
70.254	285.407	XT1TW	71.06	285.48	TW	76.82	287.23	BKF
71.042	285.366	XT1TW	72.15	285.78	TOE R	83.45	287.17	
72.563	285.816	XT1EOW	74.08	286.71		93.65	289.61	
73.202	286.682	XT1BKF	75.93	287.11	BKF	114.60	290.29	
77.752	287.263	XT1BKF	79.65	287.07		127.56	290.51	XT1 RP
83.723	287.24	XT1	84.39	287.20				
90.119	289.991	XT1	88.37	288.94				
99.126	290.447	XT1	94.97	290.12				
109.517	290.206	XT1	101.47	290.77				
			107.86	290.12				
			117.09	290.33				
			121.67	290.83				
			124.62	290.59				
			127.63	290.51	RP			

Photo of XS-T1, Sta 11+63 looking in the downstream direction

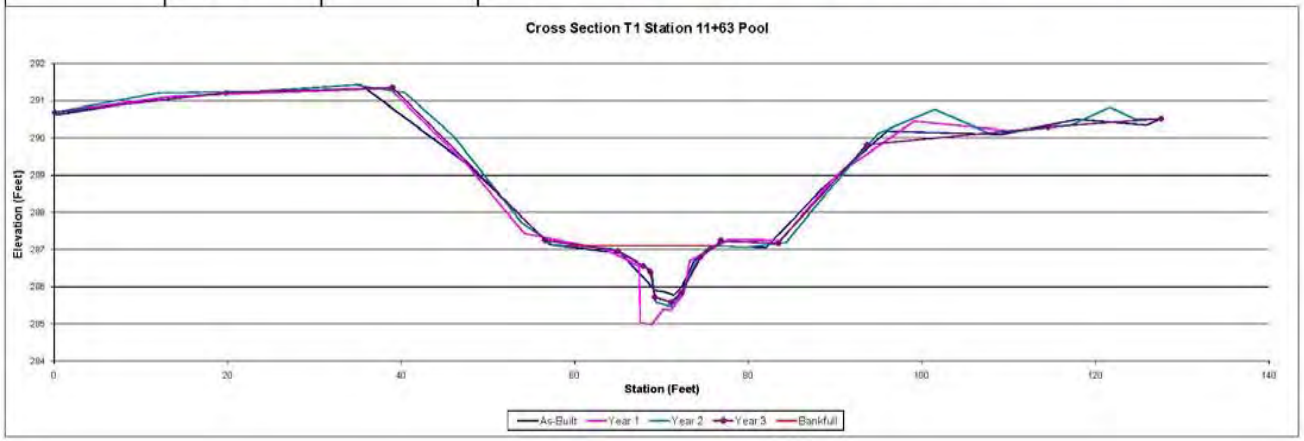


Figure 12. Cross-Section T2

Project:	Little Beaver Creek			Summary (bankfull)			
Cross Section:	Cross Section T2 (Tributary)			MY0	MY1	MY2	MY3
Feature:	Pool		A (BKF)	9.0	6.0	9.1	10.0
Station:	12+89		W (BKF)	11.6	9.5	13.8	12.6
Date:	4/8/10		Max d	1.5	1.3	1.8	1.9
Crew:	BW, RL, SV, ZP		Mean d	0.8	0.6	0.7	0.8
			WPD	15.5	15.0	21.0	15.9

MY1-2007			MY2-2008			MY3-2009		
Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes
29.046	290.148	XT2	0.00	290.32	LP	0.00	290.39	XT 2 LP
46.945	289.665	XT2	4.97	290.18		16.72	290.21	
56.845	286.786	XT2	22.13	290.16		32.94	290.19	
66.579	286.049	XT2BKF	34.82	290.22		47.52	290.05	
68.135	285.394	XT2EOW	47.28	290.07		56.93	286.83	
69.29	284.743	XT2	51.86	288.82		60.65	286.43	
71.111	284.854	XT2	55.59	287.23		64.04	286.39	BKF
71.615	285.313	XT2EOW	57.68	286.69		66.27	286.15	
72.662	285.518	XT2	60.91	286.43		68.81	284.43	TW
77.88	286.337	XT2	65.64	286.26	BKF	68.87	284.41	
93.862	286.144	XT2	67.16	285.80		69.98	284.51	
102.17	286.792	XT2	68.21	285.09	TOE L	72.06	285.69	
113.043	287.853	XT2	68.62	284.61		77.49	286.30	BKF
122.497	288.979	XT2	69.20	284.48	TW	97.56	286.53	
			70.34	284.74		103.98	287.08	
			70.84	285.11	TOE R	122.34	289.13	
			73.06	285.77		130.76	288.98	XT 2 RP
			76.73	286.34	BKF			
			91.66	286.33				
			98.03	286.49				
			113.42	288.08				
			122.83	288.99				
			130.76	288.98	RP			

Photo of XS-T2, Sta 12+89 looking in the downstream direction

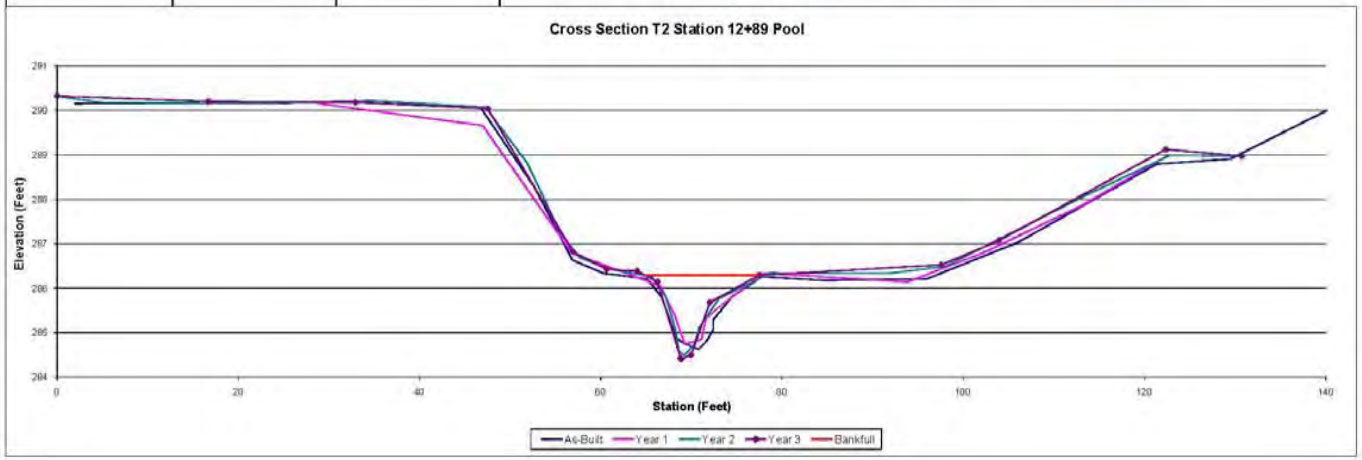


Figure 13. Longitudinal Profile – Main channel Reach 1

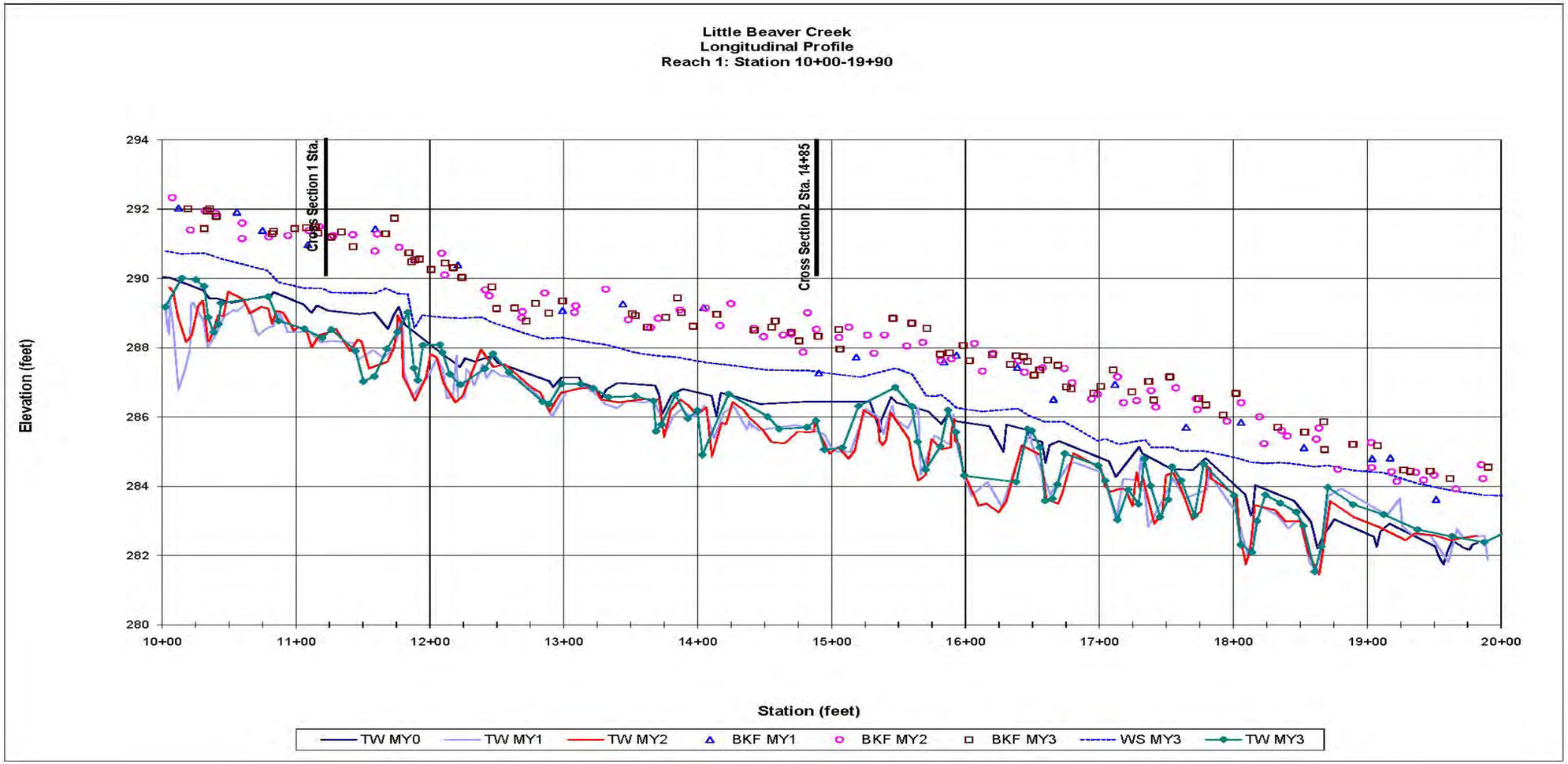


Figure 14. Longitudinal Profile – Main channel Reach 2

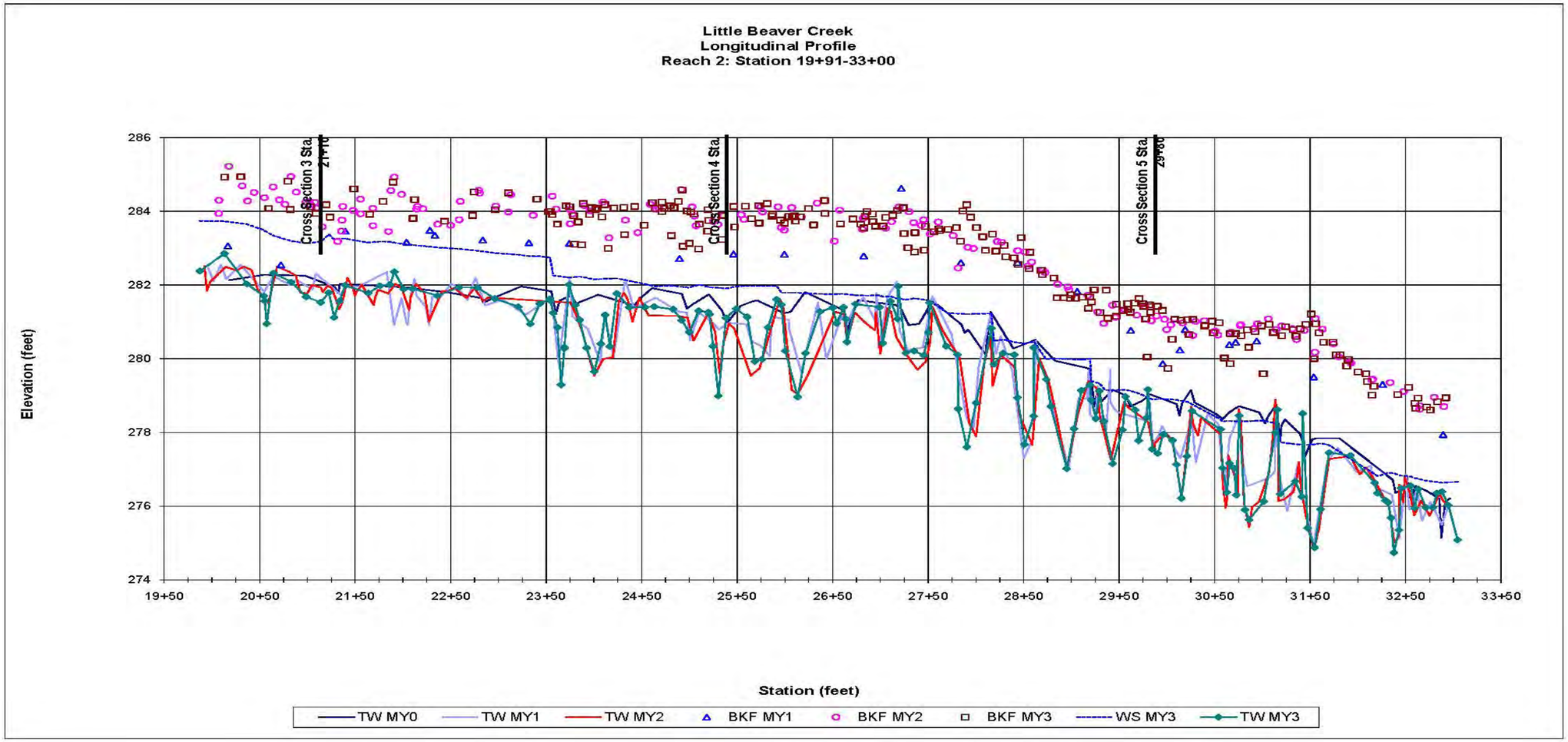


Figure 15. Longitudinal Profile – Main channel Reach 3a

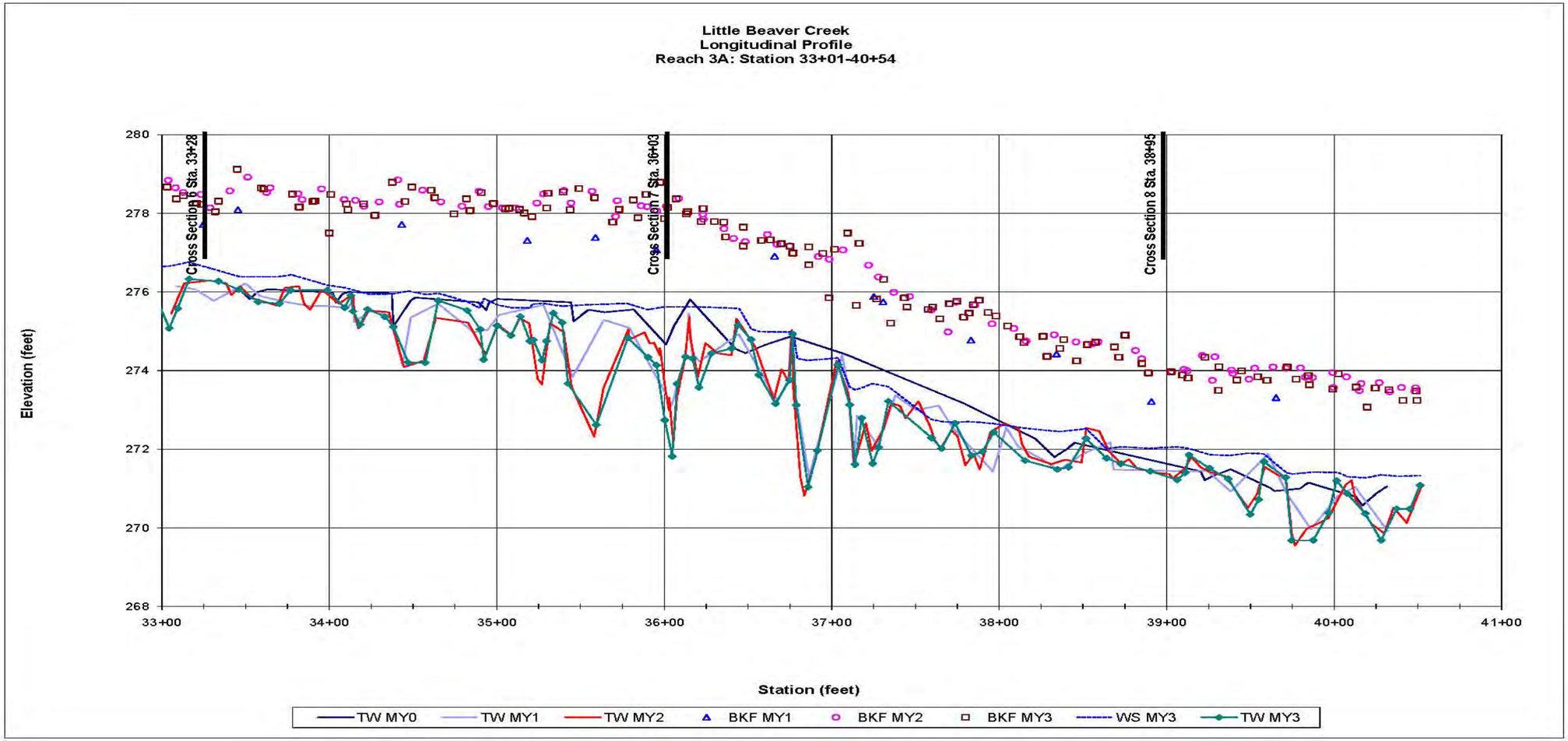


Figure 16. Longitudinal Profile – Main channel Reach T1

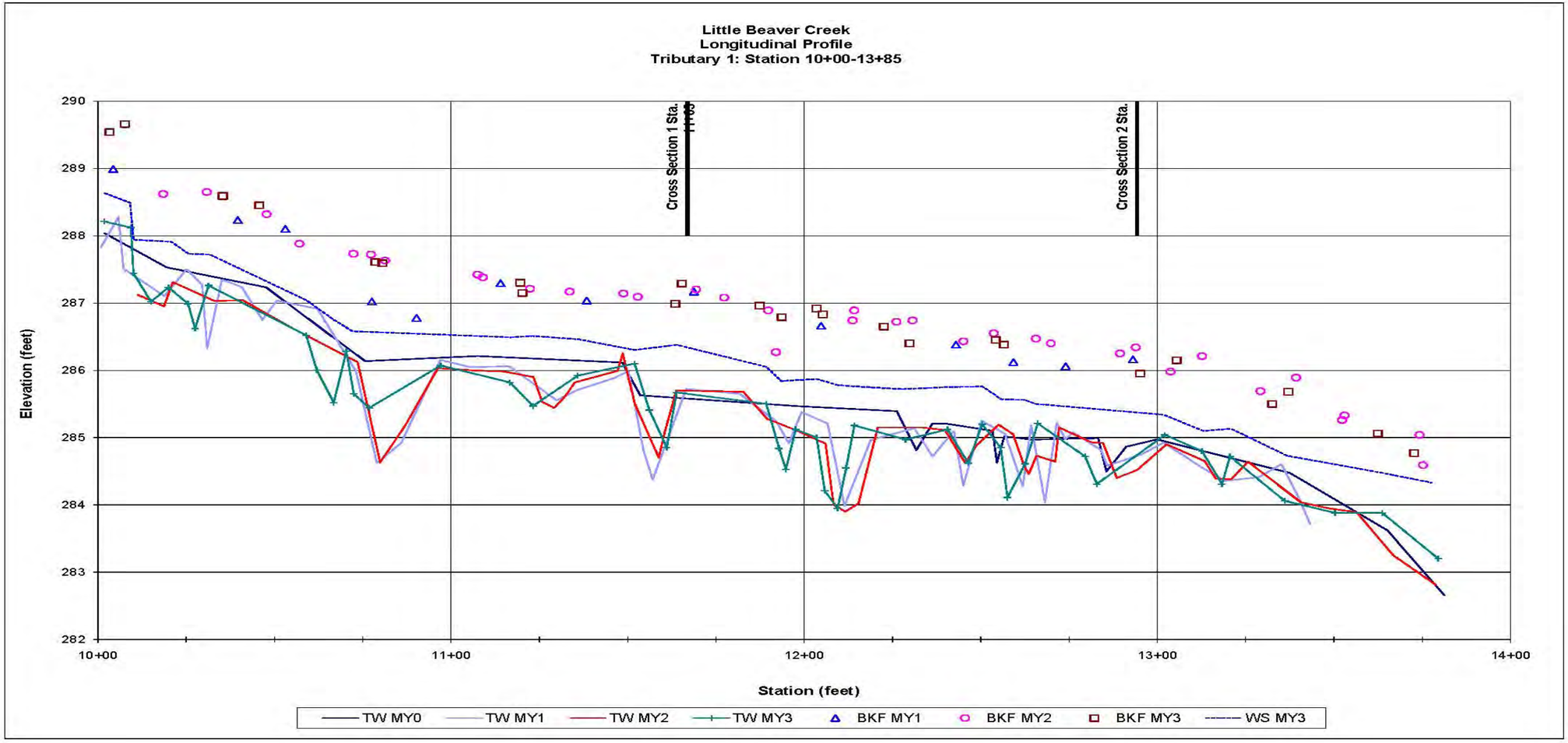


Figure 17. Longitudinal Profile – Main channel Reach T2

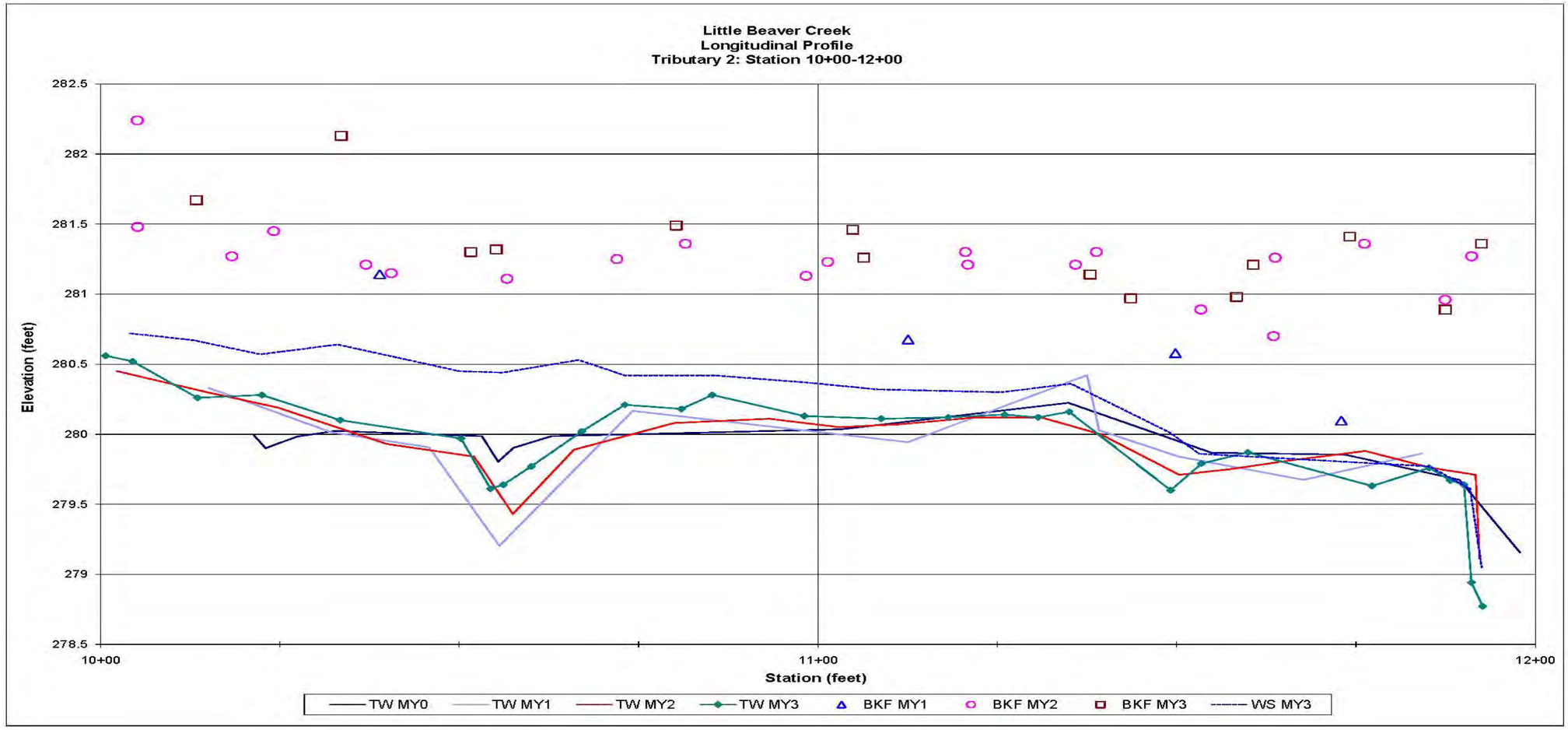
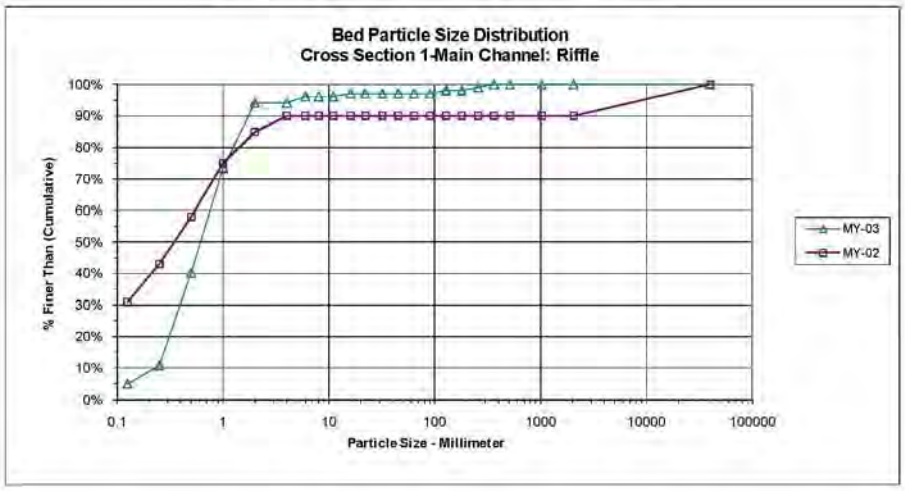


Figure 18. Pebble Count Plots – Little Beaver Creek (EEP

PEBBLE COUNT								
Project:	Little Beaver Creek Monitoring MY-03					**Date:**	4/8/2010	
Location:	Cross Section #1							
				Particle Counts				
Inches	Particle	Millimeter		Riffles	Pools	Total No.	Item %	% Cumulative
	Silt/Clay	< 0.062	S/C	2	0	2	2%	2%
	Very Fine	.062 - .125	S	3	0	3	3%	5%
	Fine	.125 - .25	A	6	0	6	6%	11%
	Medium	.25 - .50	N	30	0	30	29%	40%
	Coarse	.50 - 1.0	D	34	0	34	33%	74%
.04 - .08	Very Coarse	1.0 - 2.0	S	21	0	21	21%	94%
.08 - .16	Very Fine	2.0 - 4.0		0	0	0	0%	94%
.16 - .22	Fine	4.0 - 5.7	G	2	0	2	2%	96%
.22 - .31	Fine	5.7 - 8.0	R	0	0	0	0%	96%
.31 - .44	Medium	8.0 - 11.3	A	0	0	0	0%	96%
.44 - .63	Medium	11.3 - 16.0	V	1	0	1	1%	97%
.63 - .89	Coarse	16.0 - 22.6	E	0	0	0	0%	97%
.89 - 1.26	Coarse	22.6 - 32.0	L	0	0	0	0%	97%
1.26 - 1.77	Very Coarse	32.0 - 45.0	S	0	0	0	0%	97%
1.77 - 2.5	Very Coarse	45.0 - 64.0		0	0	0	0%	97%
2.5 - 3.5	Small	64 - 90	C	0	0	0	0%	97%
3.5 - 5.0	Small	90 - 128	O	1	0	1	1%	98%
5.0 - 7.1	Large	128 - 180	B	0	0	0	0%	98%
7.1 - 10.1	Large	180 - 256	L	1	0	1	1%	99%
10.1 - 14.3	Small	256 - 362	B	1	0	1	1%	100%
14.3 - 20	Small	362 - 512	L	0	0	0	0%	100%
20 - 40	Medium	512 - 1024	D	0	0	0	0%	100%
40 - 80	Lrg- Very Lrg	1024 - 2048	R	0	0	0	0%	100%
	Bedrock		BDRK		0	0	0%	100%
			Totals	**102**	**0**	**102**	**100%**	**100%**

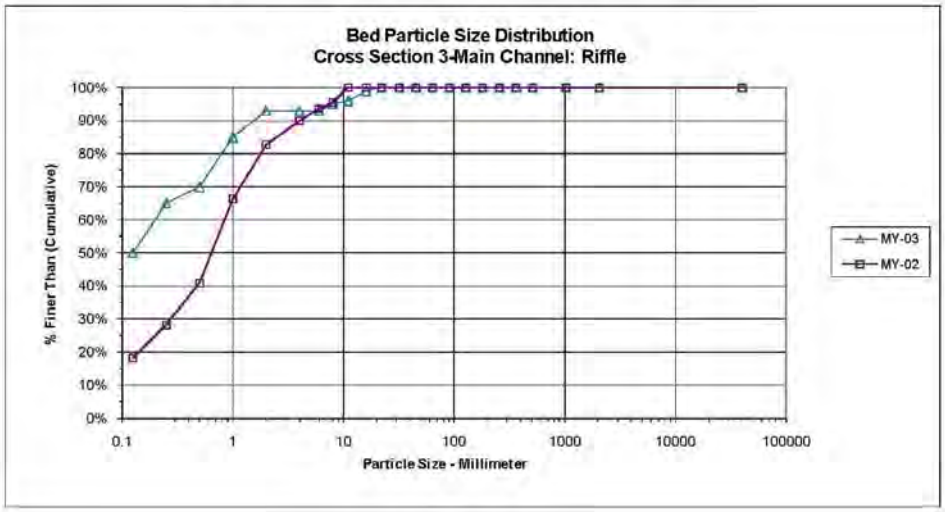
d16	d35	d50	d84	d95
0.3	0.5	0.6	1.5	4.9



#221)

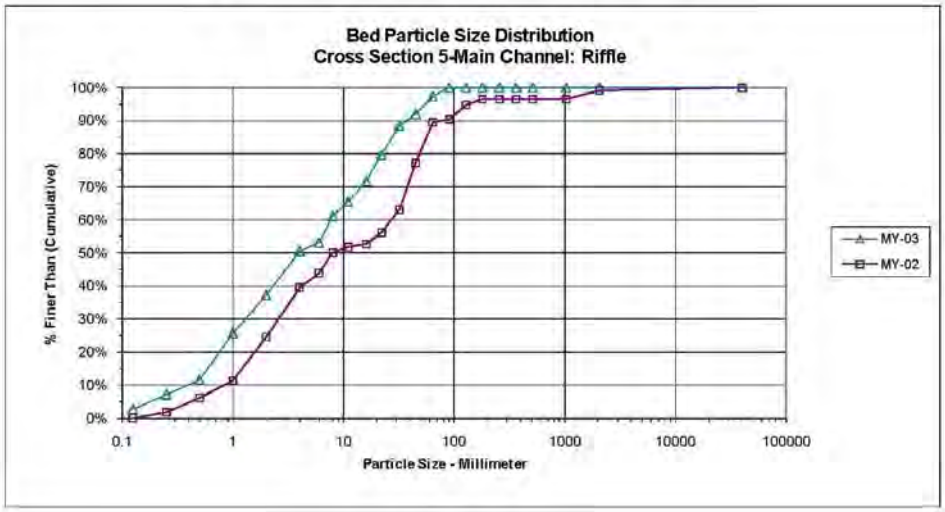
PEBBLE COUNT								
Project:	Little Beaver Creek Monitoring MY-03					**Date:**	4/8/2010	
Location:	Cross Section #3							
				Particle Counts				
Inches	Particle	Millimeter		Riffles	Pools	Total No.	Item %	% Cumulative
	Silt/Clay	< 0.062	S/C	25	0	25	25%	25%
	Very Fine	.062 - .125	S	25	0	25	25%	50%
	Fine	.125 - .25	A	15	0	15	15%	65%
	Medium	.25 - .50	N	5	0	5	5%	70%
	Coarse	.50 - 1.0	D	15	0	15	15%	85%
.04 - .08	Very Coarse	1.0 - 2.0	S	8	0	8	8%	93%
.08 - .16	Very Fine	2.0 - 4.0		0	0	0	0%	93%
.16 - .22	Fine	4.0 - 5.7	G	0	0	0	0%	93%
.22 - .31	Fine	5.7 - 8.0	R	2	0	2	2%	95%
.31 - .44	Medium	8.0 - 11.3	A	1	0	1	1%	96%
.44 - .63	Medium	11.3 - 16.0	V	3	0	3	3%	99%
.63 - .89	Coarse	16.0 - 22.6	E	1	0	1	1%	100%
.89 - 1.26	Coarse	22.6 - 32.0	L	0	0	0	0%	100%
1.26 - 1.77	Very Coarse	32.0 - 45.0	S	0	0	0	0%	100%
1.77 - 2.5	Very Coarse	45.0 - 64.0		0	0	0	0%	100%
2.5 - 3.5	Small	64 - 90	C	0	0	0	0%	100%
3.5 - 5.0	Small	90 - 128	O	0	0	0	0%	100%
5.0 - 7.1	Large	128 - 180	B	0	0	0	0%	100%
7.1 - 10.1	Large	180 - 256	L	0	0	0	0%	100%
10.1 - 14.3	Small	256 - 362	B	0	0	0	0%	100%
14.3 - 20	Small	362 - 512	L	0	0	0	0%	100%
20 - 40	Medium	512 - 1024	D	0	0	0	0%	100%
40 - 80	Lrg- Very Lrg	1024 - 2048	R	0	0	0	0%	100%
	Bedrock		BDRK		0	0	0%	100%
			Totals	**100**	**0**	**100**	**100%**	**100%**

d16	d35	d50	d84	d95
silt/clay	0.05	0.13	1.0	8.0



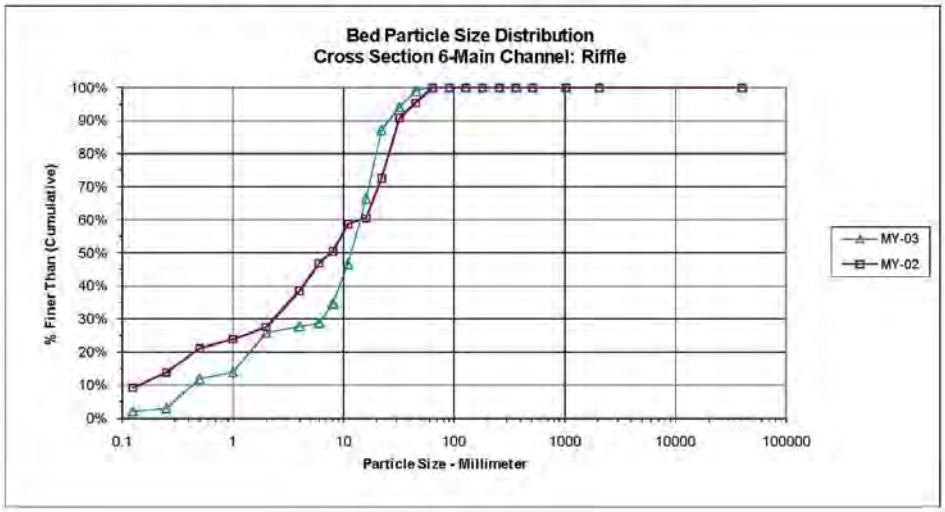
PEBBLE COUNT								
Project:	Little Beaver Creek Monitoring MY-03					**Date:**	4/8/2010	
Location:	Cross Section #5							
				Particle Counts				
Inches	Particle	Millimeter		Riffles	Pools	Total No.	Item %	% Cumulative
	Silt/Clay	< 0.062	S/C	3	0	3	3%	3%
	Very Fine	.062 - .125	S	0	0	0	0%	3%
	Fine	.125 - .25	A	5	0	5	4%	7%
	Medium	.25 - .50	N	5	0	5	4%	12%
	Coarse	.50 - 1.0	D	16	0	16	14%	26%
.04 - .08	Very Coarse	1.0 - 2.0	S	13	0	13	12%	37%
.08 - .16	Very Fine	2.0 - 4.0		15	0	15	13%	50%
.16 - .22	Fine	4.0 - 5.7	G	3	0	3	3%	53%
.22 - .31	Fine	5.7 - 8.0	R	9	0	9	8%	61%
.31 - .44	Medium	8.0 - 11.3	A	5	0	5	4%	65%
.44 - .63	Medium	11.3 - 16.0	V	7	0	7	6%	72%
.63 - .89	Coarse	16.0 - 22.6	E	9	0	9	8%	80%
.89 - 1.26	Coarse	22.6 - 32.0	L	10	0	10	9%	88%
1.26 - 1.77	Very Coarse	32.0 - 45.0	S	4	0	4	4%	92%
1.77 - 2.5	Very Coarse	45.0 - 64.0		6	0	6	5%	97%
2.5 - 3.5	Small	64 - 90	C	3	0	3	3%	100%
3.5 - 5.0	Small	90 - 128	O	0	0	0	0%	100%
5.0 - 7.1	Large	128 - 180	B	0	0	0	0%	100%
7.1 - 10.1	Large	180 - 256	L	0	0	0	0%	100%
10.1 - 14.3	Small	256 - 362	B	0	0	0	0%	100%
14.3 - 20	Small	362 - 512	L	0	0	0	0%	100%
20 - 40	Medium	512 - 1024	D	0	0	0	0%	100%
40 - 80	Lrg- Very Lrg	1024 - 2048	R	0	0	0	0%	100%
	Bedrock		BDRK		0	0	0%	100%
			Totals	**113**	**0**	**113**	**100%**	**100%**

d16	d35	d50	d84	d95
silt/clay	1.81	3.93	26.9	55.6



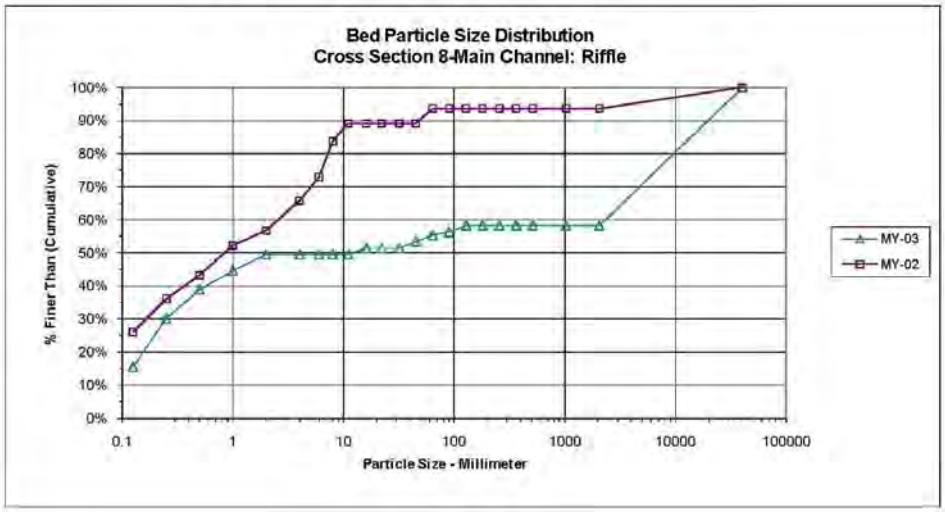
PEBBLE COUNT								
Project:	Little Beaver Creek Monitoring MY-03					**Date:**	4/8/2010	
Location:	Cross Section #6							
				Particle Counts				
Inches	Particle	Millimeter		Riffles	Pools	Total No.	Item %	% Cumulative
	Silt/Clay	< 0.062	S/C	1	0	1	1%	1%
	Very Fine	.062 - .125	S	1	0	1	1%	2%
	Fine	.125 - .25	A	1	0	1	1%	3%
	Medium	.25 - .50	N	9	0	9	9%	12%
	Coarse	.50 - 1.0	D	2	0	2	2%	14%
.04 - .08	Very Coarse	1.0 - 2.0	S	12	0	12	12%	26%
.08 - .16	Very Fine	2.0 - 4.0		2	0	2	2%	28%
.16 - .22	Fine	4.0 - 5.7	G	1	0	1	1%	29%
.22 - .31	Fine	5.7 - 8.0	R	6	0	6	6%	35%
.31 - .44	Medium	8.0 - 11.3	A	12	0	12	12%	47%
.44 - .63	Medium	11.3 - 16.0	V	20	0	20	20%	66%
.63 - .89	Coarse	16.0 - 22.6	E	21	0	21	21%	87%
.89 - 1.26	Coarse	22.6 - 32.0	L	7	0	7	7%	94%
1.26 - 1.77	Very Coarse	32.0 - 45.0	S	5	0	5	5%	99%
1.77 - 2.5	Very Coarse	45.0 - 64.0		1	0	1	1%	100%
2.5 - 3.5	Small	64 - 90	C	0	0	0	0%	100%
3.5 - 5.0	Small	90 - 128	O	0	0	0	0%	100%
5.0 - 7.1	Large	128 - 180	B	0	0	0	0%	100%
7.1 - 10.1	Large	180 - 256	L	0	0	0	0%	100%
10.1 - 14.3	Small	256 - 362	B	0	0	0	0%	100%
14.3 - 20	Small	362 - 512	L	0	0	0	0%	100%
20 - 40	Medium	512 - 1024	D	0	0	0	0%	100%
40 - 80	Lrg- Very Lrg	1024 - 2048	R	0	0	0	0%	100%
	Bedrock		BDRK	0	0	0	0%	100%
			Totals	**101**	**0**	**101**	**100%**	**100%**

d16	d35	d50	d84	d95
1.2	8.1	11.9	21.1	34.5

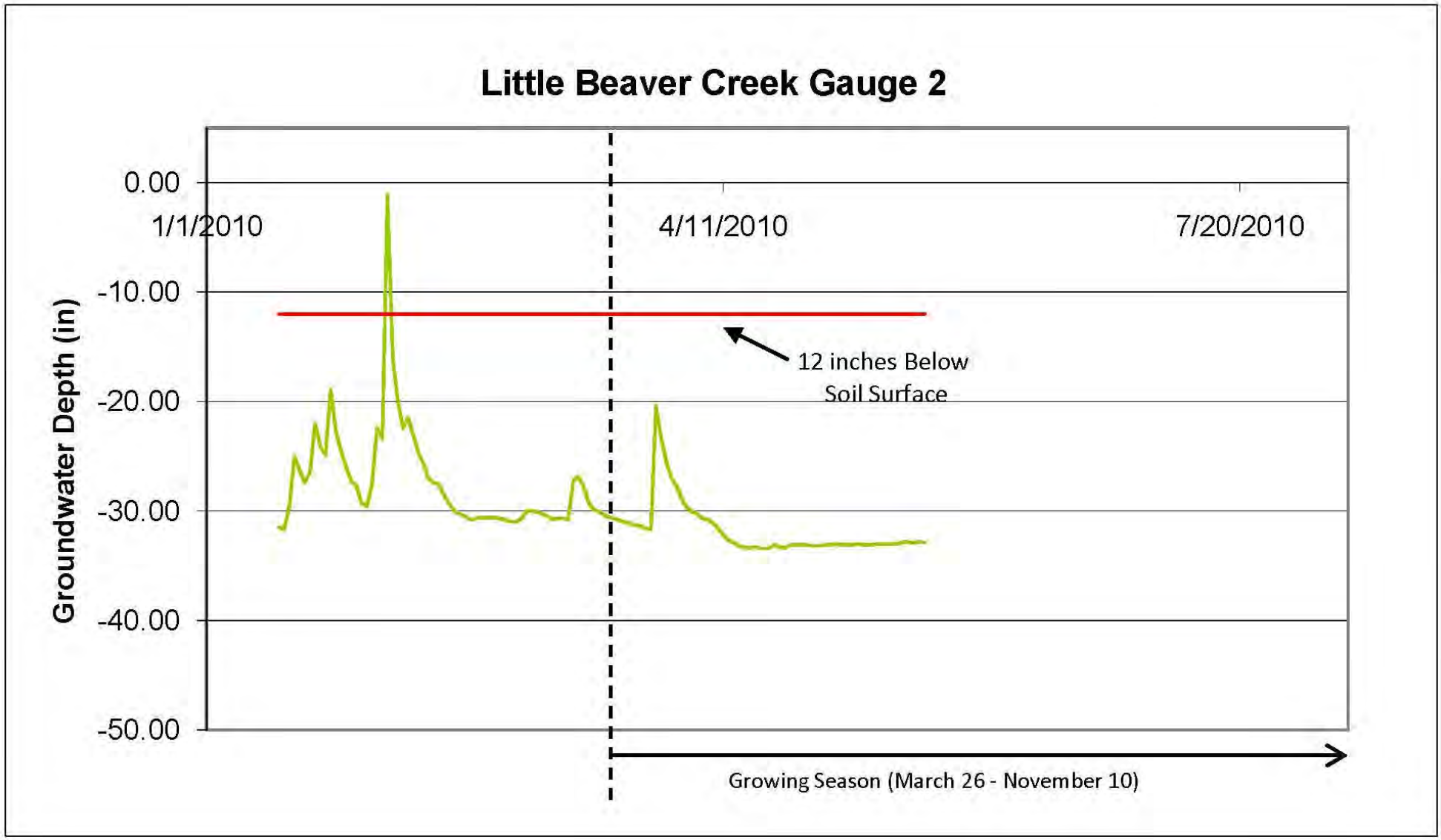


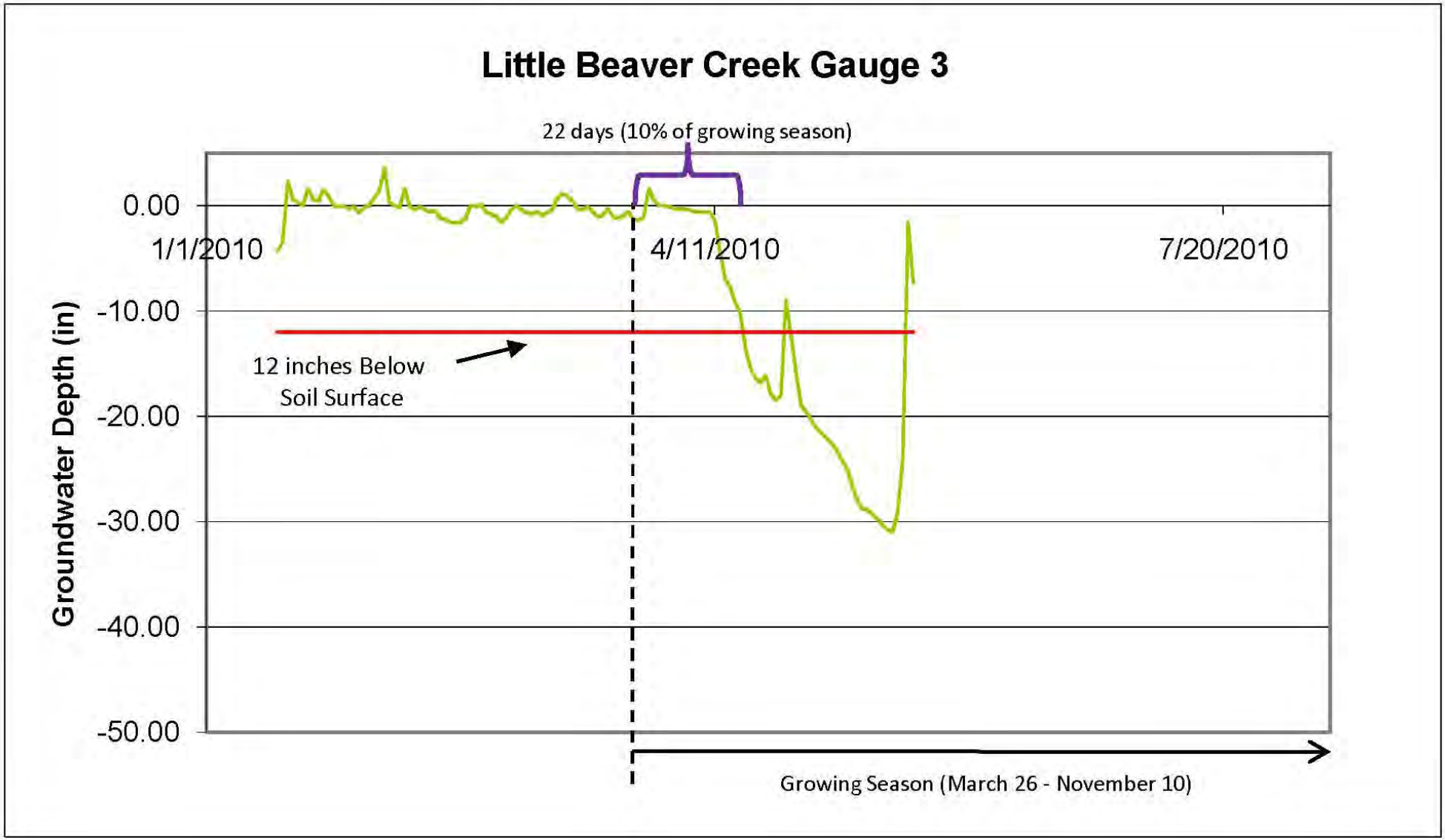
PEBBLE COUNT								
Project:	Little Beaver Creek Monitoring MY-03					**Date:**	4/8/2010	
Location:	Cross Section #8							
				Particle Counts				
Inches	Particle	Millimeter		Riffles	Pools	Total No.	Item %	% Cumulative
	Silt/Clay	< 0.062	S/C	8	0	8	8%	8%
	Very Fine	.062 - .125	S	8	0	8	8%	16%
	Fine	.125 - .25	A	15	0	15	15%	30%
	Medium	.25 - .50	N	9	0	9	9%	39%
	Coarse	.50 - 1.0	D	6	0	6	6%	45%
.04 - .08	Very Coarse	1.0 - 2.0	S	5	0	5	5%	50%
.08 - .16	Very Fine	2.0 - 4.0		0	0	0	0%	50%
.16 - .22	Fine	4.0 - 5.7	G	0	0	0	0%	50%
.22 - .31	Fine	5.7 - 8.0	R	0	0	0	0%	50%
.31 - .44	Medium	8.0 - 11.3	A	0	0	0	0%	50%
.44 - .63	Medium	11.3 - 16.0	V	2	0	2	2%	51%
.63 - .89	Coarse	16.0 - 22.6	E	0	0	0	0%	51%
.89 - 1.26	Coarse	22.6 - 32.0	L	0	0	0	0%	51%
1.26 - 1.77	Very Coarse	32.0 - 45.0	S	2	0	2	2%	53%
1.77 - 2.5	Very Coarse	45.0 - 64.0		2	0	2	2%	55%
2.5 - 3.5	Small	64 - 90	C	1	0	1	1%	56%
3.5 - 5.0	Small	90 - 128	O	2	0	2	2%	58%
5.0 - 7.1	Large	128 - 180	B	0	0	0	0%	58%
7.1 - 10.1	Large	180 - 256	L	0	0	0	0%	58%
10.1 - 14.3	Small	256 - 362	B	0	0	0	0%	58%
14.3 - 20	Small	362 - 512	L	0	0	0	0%	58%
20 - 40	Medium	512 - 1024	D	0	0	0	0%	58%
40 - 80	Lrg- Very Lrg	1024 - 2048	R	0	0	0	0%	58%
	Bedrock		BDRK	43	0	43	42%	100%
			Totals	**103**	**0**	**103**	**100%**	**100%**

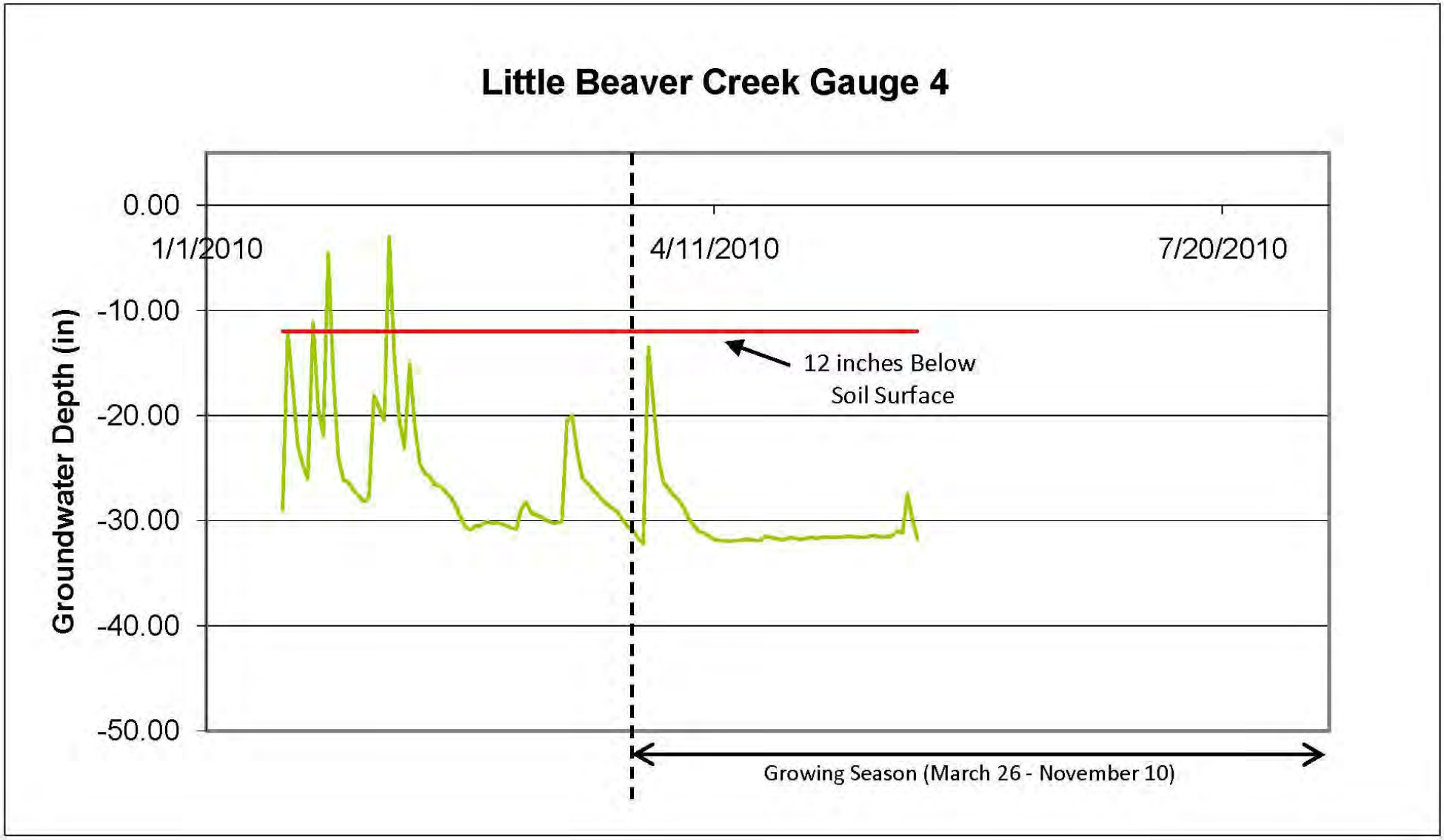
d16	d35	d50	d84	d95
0.1	0.4	12.3	Bedrock	Bedrock

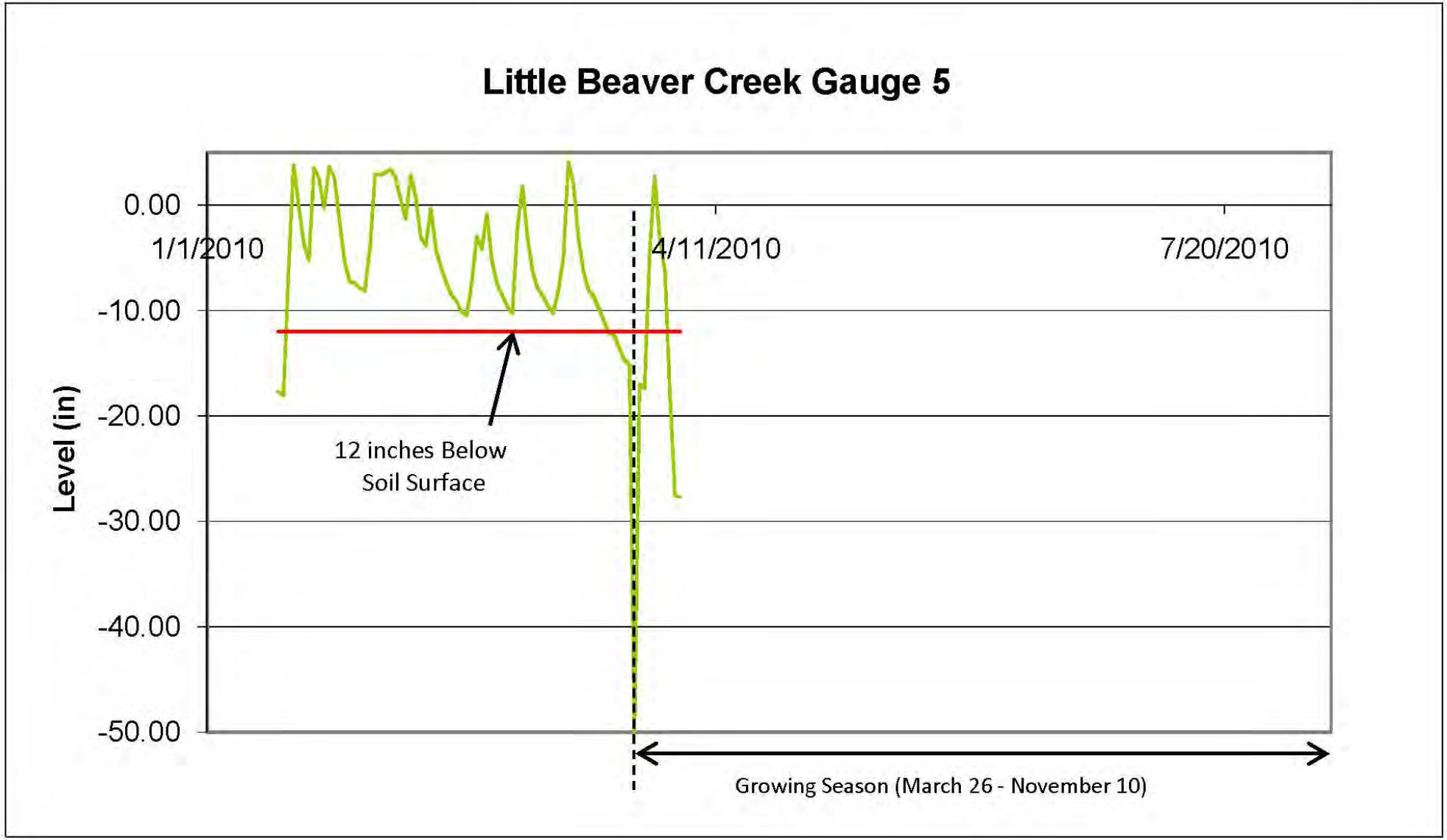


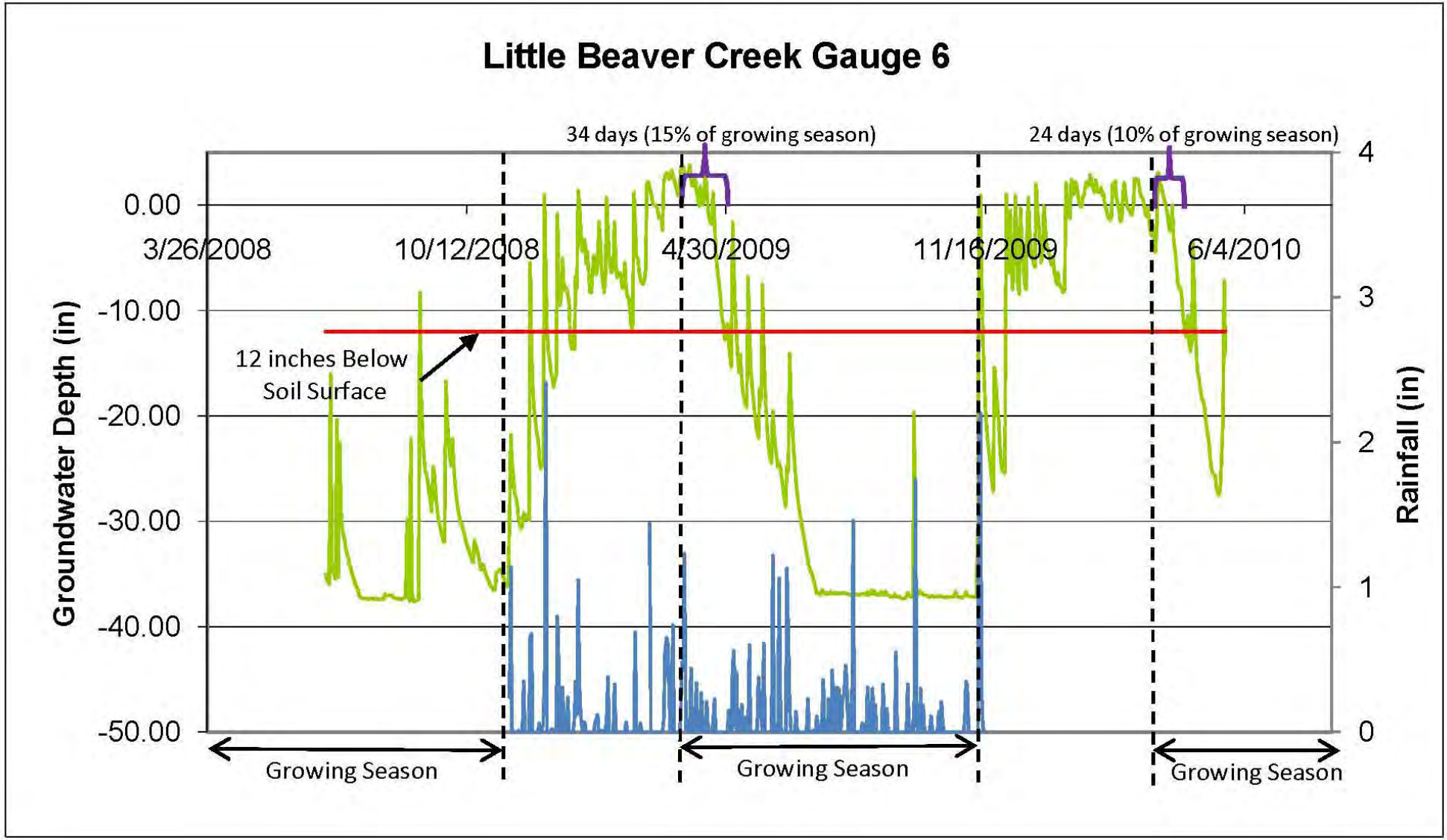
Appendix E. Wetland Assessment

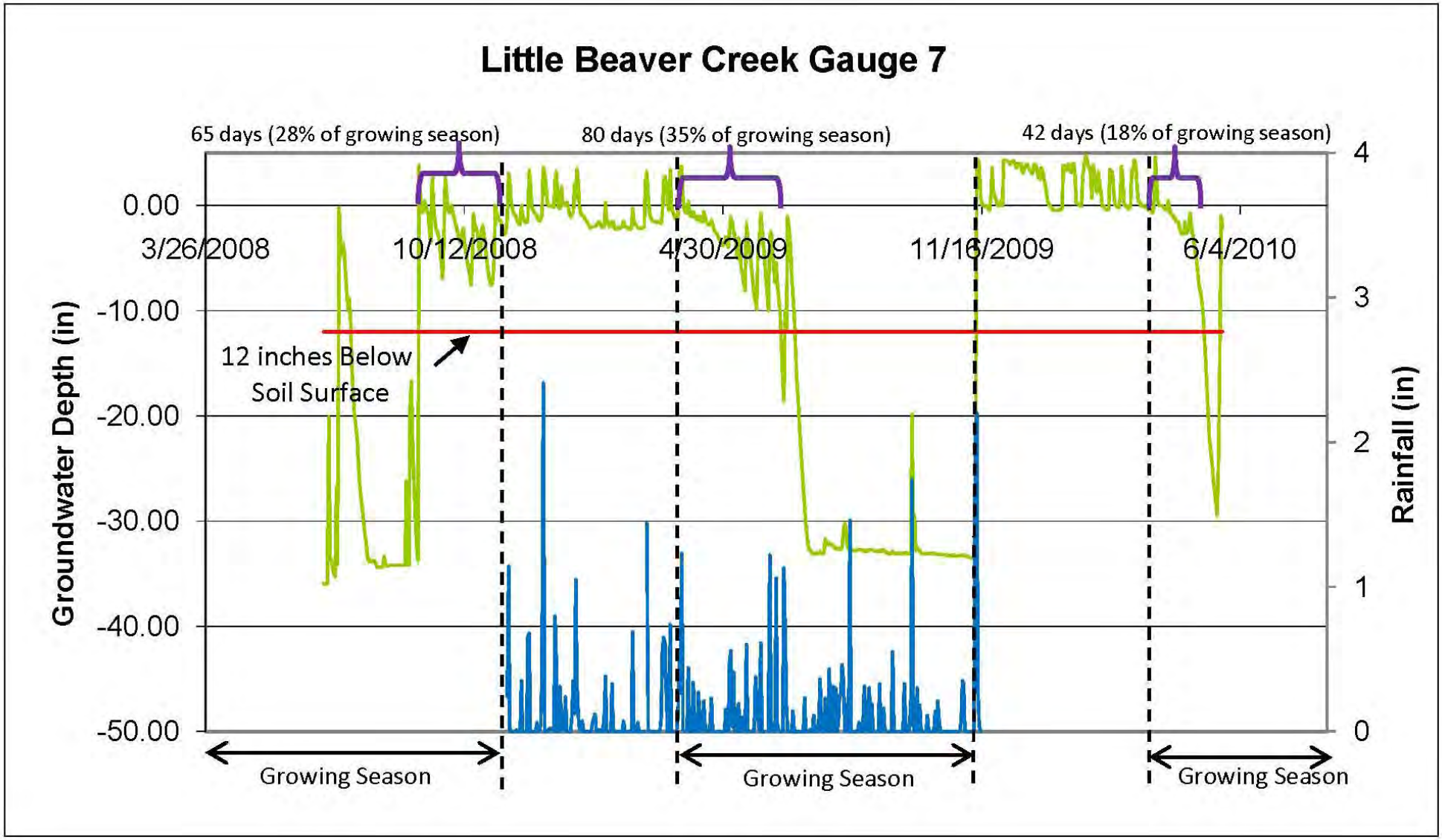

Little Beaver Creek Gauge 2
Groundwater Depth (in)
0.00
-10.00
-20.00
-30.00
-40.00
-50.00
1/1/2010
4/11/2010
7/20/2010
12 inches Below Soil Surface
Growing Season (March 26 - November 10)

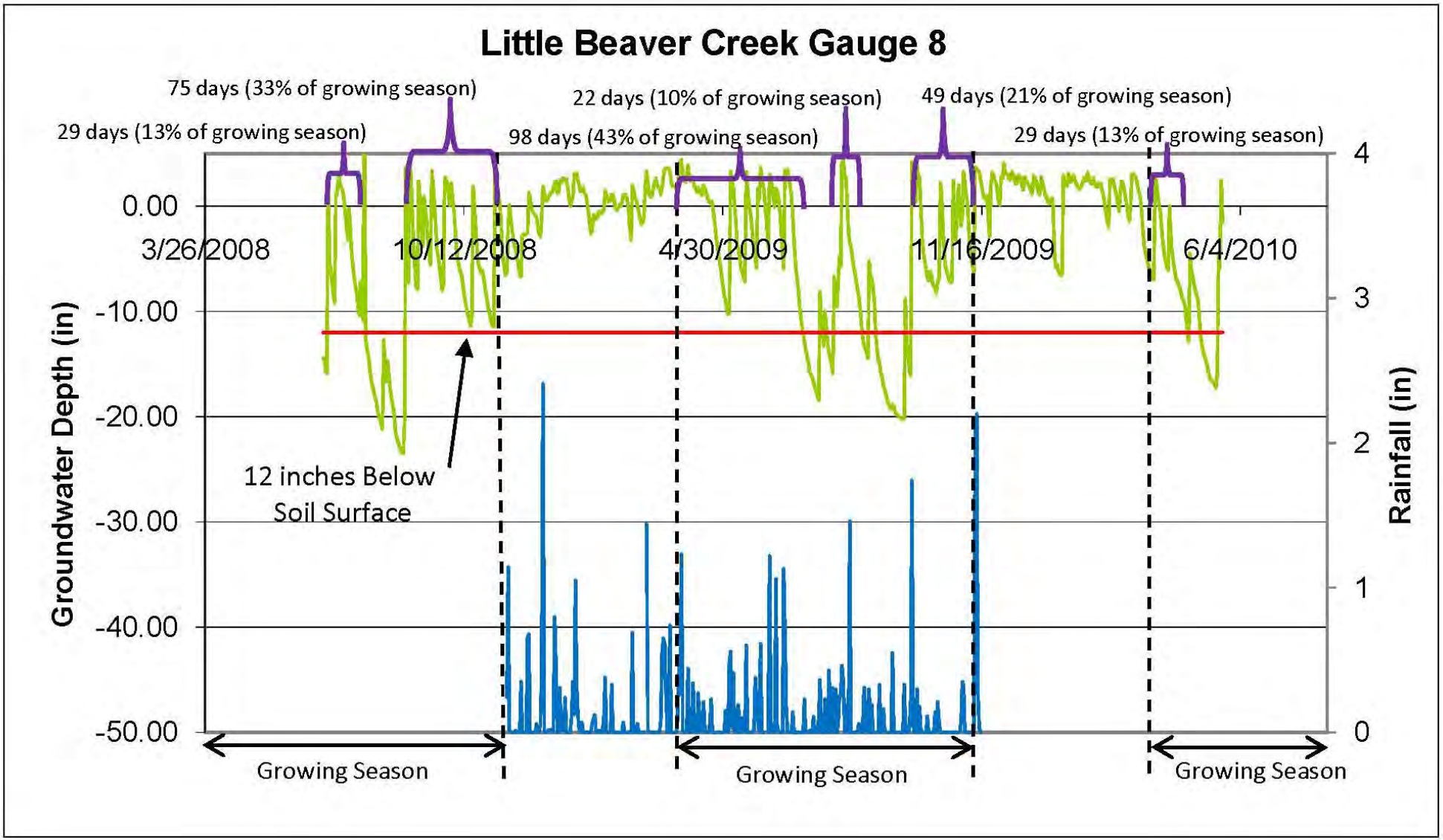

Little Beaver Creek Gauge 3
22 days (10% of growing season)
0.00
-10.00
-20.00
-30.00
-40.00
-50.00
1/1/2010
4/11/2010
7/20/2010
Groundwater Depth (in)
12 inches Below
Soil Surface
Growing Season (March 26 - November 10)

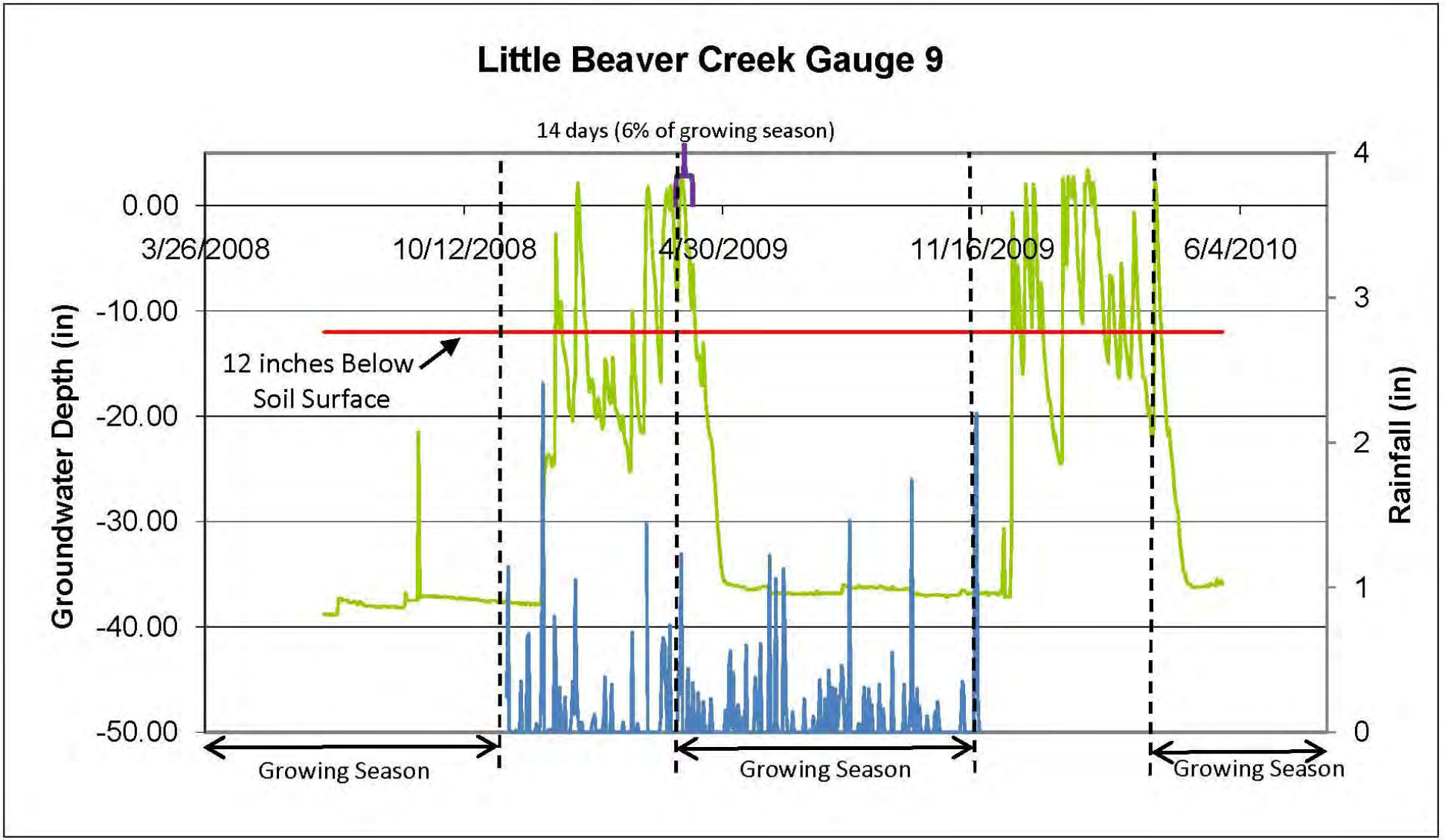

Little Beaver Creek Gauge 4
Groundwater Depth (in)
0.00
-10.00
-20.00
-30.00
-40.00
-50.00
1/1/2010
4/11/2010
7/20/2010
12 inches Below
Soil Surface
Growing Season (March 26 - November 10)


Little Beaver Creek Gauge 5
0.00
-10.00
-20.00
-30.00
-40.00
-50.00
Level (in)
1/1/2010
4/11/2010
7/20/2010
12 inches Below
Soil Surface
Growing Season (March 26 - November 10)


Little Beaver Creek Gauge 6
34 days (15% of growing season)
24 days (10% of growing season)
0.00
-10.00
-20.00
-30.00
-40.00
-50.00
3/26/2008
10/12/2008
4/30/2009
11/16/2009
6/4/2010
12 inches Below Soil Surface
Groundwater Depth (in)
Rainfall (in)
4
3
2
1
0
Growing Season
Growing Season
Growing Season


Little Beaver Creek Gauge 7
65 days (28% of growing season)
80 days (35% of growing season)
42 days (18% of growing season)
0.00
-10.00
-20.00
-30.00
-40.00
-50.00
3/26/2008
10/12/2008
4/30/2009
11/16/2009
6/4/2010
12 inches Below Soil Surface
Groundwater Depth (in)
Rainfall (in)
4
3
2
1
0
Growing Season
Growing Season
Growing Season


Little Beaver Creek Gauge 8
75 days (33% of growing season)
29 days (13% of growing season)
22 days (10% of growing season)
98 days (43% of growing season)
49 days (21% of growing season)
29 days (13% of growing season)
0.00
-10.00
-20.00
-30.00
-40.00
-50.00
3/26/2008
10/12/2008
4/30/2009
11/16/2009
6/4/2010
12 inches Below Soil Surface
Groundwater Depth (in)
Rainfall (in)
4
3
2
1
0
Growing Season
Growing Season
Growing Season


Little Beaver Creek Gauge 9
14 days (6% of growing season)
0.00
-10.00
-20.00
-30.00
-40.00
-50.00
3/26/2008
10/12/2008
4/30/2009
11/16/2009
6/4/2010
12 inches Below Soil Surface
Groundwater Depth (in)
Rainfall (in)
4
3
2
1
0
Growing Season
Growing Season
Growing Season

Wetland Gauge Attainment Data Table

Summary of Groundwater Gauge Results for Years 1 through 5					
Gauge	**Success Criteria Achieved/Max Consecutive Days During Growing Season (Percentage)**				
	Year 1 (2007)	Year 2 (2008)	Year 3 (2009)	Year 4	Year 5
2*	N/A	N/A	No-IP		
3*	N/A	N/A	Yes/22 days (10%)-IP		
4*	N/A	N/A	No-IP		
5*	N/A	N/A	No-IP		
6	Yes/28 days (12%)	N/A	Yes/ 34 days (15%)		
7	Yes/ >29 days (>12.5%)	Yes/28 days (65%)	Yes/80 days (35%)		
8	Yes/ >29 days (>12.5%)	Yes/75 days (33%)	Yes/98 days (43%)		
9	No	N/A	Yes/14 days (6%)		

N/A-Insufficient data or not available

*-Gauges installed 1/15/10, incomplete growing season data set

IP-Growing Season Data collection in progress