Tarlton Stream and Wetland Restoration Project

Contract #:	D05013-1
County:	Cumberland
Cataloging Unit:	Cape Fear 03030004
Monitoring Firm POC:	Mid-Atlantic Mitigation, LLC Rich Mogensen (704) 782-4133 Kimley-Horn Associates, Inc. Will Wilhelm (704) 333-5131
Prepared For:	EEP Project Manager, Guy Pearce

Year 4 (2009) Monitoring Report

Kimley-Horn
and Associates, Inc.

Mid-Atlantic
Mitigation, LLC
AN EARTHMARK COMPANY

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1.0 EXECUTIVE SUMMARY/PROJECT ABSTRACT

On behalf of the North Carolina Ecosystem Enhancement Program (NCEEP), Mid-Atlantic Mitigation, LLC (MAM) with technical assistance from Kimley-Horn and Associates (KHA) restored, enhanced and preserved 4,402 linear feet of stream, restored 6.6 acres of riverine wetlands and enhanced 2.7 acres of riverine wetlands. Construction of the project began in November 2005 with beaver dam removal and grade-control structure installation, continued into March 2006 with final planting completed in June 2006. The Tarlton Stream and Wetland Restoration Project (Project) will provide NCEEP with 3,930 Stream Mitigation Units (SMUs) and 8.0 Wetland Mitigation Units (WMUs).

The objective of the restoration approach is to plan, design, and construct a dynamically stable stream/riparian floodplain and bottomland hardwood riverine wetland community providing an ecological improvement for the entire site and watershed. This project is designed to provide a stream channel that neither aggrades nor degrades while maintaining its dimension, pattern, and profile with the capacity to transport the surface water and sediment load. Also, the Project aims to reestablish the primary stream and wetland functions associated with nutrient removal and transport, sediment retention, wildlife (both aquatic and terrestrial) habitat, and to provide restoration of riparian zones that historically were an impounded lakebed. The restoration approach, due to the existing condition (fluctuating open water levels caused by beaver activity) and varied historical conditions of the site (lake, dry lake bed, beaver impoundments, etc.), involved an "adaptive" management phased process.

The project was constructed in two phases. The restoration approach established a stable grade control stream section, which maintains the elevation of the entire stream thalweg and the floodplain by controlling the downstream end of the project area. The floodplain elevation below the removed dam was set by installing several rock-cross vanes and a constructed riffle to hold the grade of the existing lake bottom area which is now the floodplain area above the former dam. This design provides both secondary water quality and primary flood storage benefits. The Project (both streams and wetlands) underwent a natural adjustment to a more stable aquatic ecosystem. The streams continued to re-establish natural channel function. This adaptive management approach allowed the streams to naturally seek equilibrium and appropriate dimension, pattern, and profile as the Project stabilizes. The primary restoration approach is to determine whether the stream adjustments trend towards the design criteria and restoration goals based on up-stream reference morphology and vegetation communities.

The riverine wetland and buffer vegetation community will transition as the system seeks hydrologic and biologic equilibrium. After removing the dam, sediments were unconsolidated and mucky with saturation. It was anticipated that settling and subsidence would occur throughout the initial growing season, first through evaporation and then through transpiration as the herbaceous cover (seeded and natural propagation) established. This did occur and continues to progress. Areas that were not

saturated/ponded (i.e. fringe areas and/or headwater wetlands) were initially planted with bare root seedlings and containerized plants to establish a bottomland hardwood riparian wetland community. Later as the site dewatered, thousands of containerized, bottomland hardwood trees & shrubs were planted throughout the stream and wetland areas.

The stream(s) will be monitored for stability of dimension, pattern, and profile using standard practices including permanent cross sections, riffle-run-pool analysis, and pebble counts. Wetland hydrology and vegetation success will be monitored using self-reading ground water monitoring gages and standardized, randomly placed permanent vegetation plots which will be monitored for species diversity and survival. Monitoring data will be analyzed to determine what remedial actions if any are required and any remedial actions proposed will be detailed in the annual monitoring reports.

The fourth year monitoring began with plant counts and photos on September 8th, 2009, and was completed with survey work on October 27th and 28th, 2009. The vegetation in all of the plots currently meets and/or exceeds the requirements while profiles and cross sections continue to indicate increased stability and function. Monitoring success will be discussed in detail in Section 3.

2.0 PROJECT BACKGROUND

2.1 LOCATION AND SETTING

The Project is located in the City of Fayetteville, Cumberland County, North Carolina on the corner of Clearwater Drive and US 401 Bypass (Country Club Drive). A location map is included in Figure 1. The project site is located in the Upper Cape Fear River Watershed (USGS 8-digit Hydrologic Unit 03030004, and NCDWQ River Basin 03-06-15), and is within the NC Ecosystem Enhancement Program (EEP) Cross Creek Targeted Local Watershed (00050). The project site was historically impounded by a dam built in the 1970s, creating Country Club Lake which impounded about 4,500 feet of two perennial prongs of a tributary to Cross Creek. The project drainage area is approximately 2.6 sq. mi. flowing into Cross Creek, a 303(d)-listed stream for impaired biological activity. The eastern prong of the project which is named UT to Cross Creek East has a drainage area of 1.0 square miles. The western prong named UT to Cross Creek West has a drainage area of 1.6 square miles. The project area conservation easement consists of 17.8 acres. The restoration project is being managed and monitored by Mid-Atlantic Mitigation, LLC but the property is owned by Greg and Patricia Tarlton and the conservation easement is held by the State of North Carolina.

2.2 STRUCTURE AND OBJECTIVES

The goals and objectives of the Project are to restore a naturally stable stream and riparian wetland community; to restore a bottomland hardwood wetland community; and to provide stormwater management for downstream development. In addition, water quality will be improved, flood storage will be increased, wildlife and aquatic habitat will be restored and the threat of flooding of downstream areas will be significantly reduced.

Phase I (completed Fall 2005): A beaver management plan was implemented to remove all the beavers from the project site. The removal of the old dam debris and spillway was completed in November and December 2005 making it more difficult for the beavers to re-establish a dam at its existing location. A beaver control program which includes regular site visits to the former dam area has been implemented and will continue throughout the monitoring period. In mid-November 2005, the lake water level was lowered over a 3-5 day period slowly releasing the water downstream to prevent flooding and erosion. In conjunction with removing the beaver dams, the stream section through the area of the historical dam and beaver dams was restored. The channel in this section (approximately 175 feet) was restored using a Priority I (Rosgen) restoration approach. The stream restoration included establishing a bankfull channel and active floodway through the relic spillway/dam and providing a variety of in-stream structures (rock vanes, constructed riffle, and step pool structures) to provide grade control, stability, and improve aquatic habitat diversity. The natural channel design was based on the upstream reference reach. The restoration project was constructed through and under an existing aerial sanitary sewer crossing that is cut out of the easement limits. In addition to the stream restoration, a BMP (level spreader / pre-formed scour hole) was constructed in this area at the outlet of a stormwater drainage pipe. This restoration establishes a stable grade control, which maintains the elevation of the entire stream thalweg and the floodplain by controlling the downstream end of the project area. The floodplain elevation below the dam was set to hold the grade of the existing lake bottom which is now the floodplain area above the former dam area. This also prevented any sediment that was in the old lake from being washed downstream and to provide a natural "pinch-point" corresponding with existing topography. This pinch-point will help re-establish and control natural hydrology in the proposed riparian wetland during events above bankfull and act as a large detention area.

Phase II (completed in July 2006): Once the beavers, beaver dams, and impounded water were removed, and the downstream grade control established, the Project (both streams and wetlands) underwent a natural adjustment to a more stable aquatic ecosystem. The stream segments found their hydrologic equilibrium and re-established bed and bank features. In addition, the site soils gradually dewatered allowing the deposited sediments to consolidate and subside. During the first growing season, the Project soils stabilized through evapotranspiration and subsidence processes. The streams continued to re-establish natural channel function, and were evaluated for necessary adjustments. This adaptive management approach allowed the streams to naturally seek equilibrium and appropriate dimension, pattern, and profile as compared to the upstream reference reach. The primary restoration approach is to determine whether the stream adjustments trend towards the design criteria and restoration goals based on reference morphology and vegetation communities. The eastern and western prongs are designed as Rosgen C5->E5 channels. During each monitoring year, where the channel slope and/or dimension are found to be unstable, structures such as rock cross vanes, log cross vanes, log vanes, log sills, and constructed riffles may be utilized to help maintain the channel compared to the reference morphology.

The riparian wetland and buffer vegetation community will transition and stabilize as the system seeks hydrologic equilibrium. The initial planting/seeding of the site was completed in March-April 2006 to establish herbaceous cover of exposed bare soils with the expectation that the initial growing season would allow for evapotranspiration to dewater lake bottom sediments. These sediments were initially unconsolidated and mucky with saturation. It was anticipated that settling and subsidence would occur throughout the initial growing season, first through evaporation and then through transpiration as the herbaceous cover (seeded and natural propagation) established. This has occurred as proposed. Areas that are not saturated/ponded (i.e. fringe areas and/or floodplain wetlands) were planted with bare root seedlings and containerized plants to establish a bottomland hardwood riparian wetland community. Additional plantings may occur as needed as the site continues to consolidate and settle.

In order to stabilize the newly constructed stream channel and flood plain areas both temporary and permanent grass seed as well as wetland herbaceous seed were applied to all restored areas. The types of seeds used were: *Leersia oryzoides* (Rice Cut grass); *Panicum clandestinum* (Deertongue grass); *Panicum virgatum* (Switchgrass): *Trisacum dactyloides* (Gama grass), and *Secale cereale* (Annual rye). Also, a Southeast Wildflower mix was applied throughout the project. Five hardwood planting zones were established as follows: Zone 1 – Stream Channel, Zone 2- Stream Bank, Zone 3 – Bottomland Hardwood wetland, Zone 4 – Swamp Wetland, and Zone 5- Upland fringe. Livestakes were installed along the newly constructed channel (approx. 175') within Zone 2. They were planted randomly spaced approximately 3 feet apart and differed in sizes ranging from .25" to 2" in diameter and 2' to 3' in length. Further livestaking may be necessary as the new stream channels stabilize. Zone 3 –5 consists of bareroot seedlings and 1 gallon containerized plants, which were planted randomly 3' to 12' apart throughout the project.

Table I. Project Mitigation Structure and Objectives Table

Project Segment	Mitigation Type	Approach	Linear Footage or Acerage	Stationing	Comment
Stream W Prong	P	-	341	10 + 00 - 14 + 00	Western Prong as it enters the site
Stream W Prong	E1		596	14 + 00 - 19 + 00	Western Prong between Preservation Area and Restoration Area
Stream	R	P1	3465		Remainder of Site is Restoration (88%)
Wetland	R	-	6.6		Project is 83% restoration
Wetland	E	-	2.7		Stream Enhancement Area is bordered by Wetland Enhancement, Several other enhancement areas exist

Table II. Project Activity and Reporting History

Activity or Report	Calendar Year of Completion or Planned Completion	Actual Completion Date
Restoration Plan	October 2005	March 2006
Construction	October 2006	March 2006
Temporary /Permanent seeding	October 2006	March 2006
Bareroot Plantings	November 2006	March 2006
Containerized Plantings	November 2006	June 2006
Mitigation Plan	December 2006	August 2006
Year 1 Monitoring	December 2007	October 2006
Year 2 Monitoring	December 2008	December 2007
Year 3 Monitoring	December 2009	November 2008
Year 4 Monitoring	December 2010	November 2009
Year 5 Monitoring	December 2011	

Table III. Project Contacts

Project Manager Mid-Atlantic Mitigation, LLC	1960 Derita Road Concord, NC 28027 Rich Mogensen (704) 782-4133
Designer Kimley-Horn and Associates Inc.	4651 Charlotte Park Dr Suite 300 Charlotte, NC 28217 Will Wilhelm (704) 333-5131
Construction Contractor Earthwork Inc.	343 Chapman Drive Sanford, NC 27330 Dan Wood (919) 718-6812
Planting & Seeding Contractor Carolina Silvics Seed mixes provided by IKEX Nursery Stock provided by Native Roots Nursery (Formerly Southern Shade)	908 Indian Trail Road Edenton, North Carolina 27932 Dwight McKinney (252) 482-8491
Monitoring Performers Mid-Atlantic Mitigation, LLC	1960 Derita Road Concord, North Carolina 28027 Christine Cook (704) 782-4133 x101

Table IV. Project Background

Project Background Table	
Project County	Cumberland
Drainage Area	2.6 square miles
Drainage Cover Estimate (%)	10%
Physiographic Region	Coastal Plain
Ecoregion	45a Southern Inner Piedmont
Wetland Type	Palustrine, Forested, Broad-leaved Deciduous
Cowardin Classification	PFO1Fh
Dominant soil types	Johnston Loam
Reference site ID	UT to Cross Creek
USGS HUC for Project and Reference	03030004
NCDWQ Sub-basin for Project and Reference	03-06-15
% of project easement fenced	0 – Urban site surrounded by private residence

3.0 PROJECT CONDITION AND MONITORING RESULTS

3.1 VEGETATION ASSESSMENT

3.1.1 Soil Data

Table V. Preliminary Soil Data

Series	**Max Depth (in)**	**% Clay on Surface**	**K**	**T**	**OM %**
Johnston Loam	80	25 - 49	.20 - .17	5	3 - 8

3.1.2 Vegetative Problem Areas

At this time, no vegetative problem areas or invasive species problems have been noted. The site has been stabilized and vegetated with native woody and herbaceous species.

3.1.3 Stem Counts

Zones 1 – 3 of the five planting zones were sampled in three 75 ft by 75 ft plots. The prevalent vegetation should consist of macrophytes that typically are adapted for life in saturated soil conditions. These species should have the ability to grow, compete, reproduce, and persist in anaerobic soil conditions. A reduction in the percentage of nuisance vegetation in wetlands areas with existing vegetation to less than 15% will indicate enhancement of wetland vegetation. For the restoration areas, study plots showing that the composition and density of vegetation in the restoration areas that compares closely to the reference areas will indicate restoration success for vegetation.

The initial success of riparian and wetland vegetation planting will be evaluated based on herbaceous cover as the site is stabilized in the initial growing season. After the year-two growing season, success will be gauged by stem counts of planted species and desirable volunteer species. Stem counts of over 320 trees per acre after 3 years, 288 trees per acre after 4 years, and 260 trees per acre after 5 year will be considered successful. Photos taken at established photo points should indicate maturation of riparian vegetation community.

On September 8th, 2009, the fourth year-vegetative monitoring was performed on the established vegetative plots.

Exhibit Table VI: Stem Counts for Each Species Arranged by Plot

Species	Plots 1	2	3	Initial Totals	Year 1 Totals	Year 2 Totals	2008 Initial	Year 3 Totals	Year 4 Totals	Survival %
Betula nigra	3	12		18	18	15	18	16	15	83%
Chamaecyparis thyoides		1		8	2		8		1	13%
Cornus ammomum		2	1	10	9	2	10	3	3	30%
Fraxinus pennsylvanica	20		13	35	35	43	35	34	33	94%
Liriodendron tulipifera				1			1			0%
Magnolia virginiana		2					3	3	2	67%
Nyssa aquatica	4	1	1	6	6	8	6	6	6	100%
Nyssa biflora	1	4		8	8	6	8	5	5	63%
Nyssa slyvantica	6			10	10	10	10	10	6	60%
Quercus bicolor		2					3	3	2	67%
Quercus nigra			1	2			2		1	50%
Quercus phellos				1	1	1	1	1		0%
Quercus shumardii				1	1		1			0%
Taxodium distichium	6	10	7	25	21	24	25	25	23	92%
Totals	**40**	**34**	**23**	**125**	**111**	**109**	**131**	**106**	**97**	74%

Table VII. Stems Per Acre

	Year 1 2006		Year 2 2007		Year 3 2008		Year 4 2009		Year 5 2010	
	SPA	SPA w/ volunteers	SPA	SPA w/ volunteers	SPA	SPA w/ volunteers	SPA	SPA w/ volunteers	SPA	SPA w/ volunteers
Plot 1	410	441	418	425	356	441	310	465		
Plot 2	217	232	232	278	271	332	263	294		
Plot 3	232	279	194	255	194	309	178	294		
Total	**286**	**317**	**281**	**319**	**274**	**361**	**250**	**351**		

3.1.4 Vegetation Assessment Summary

Vegetation success will be defined as tree survival to meet 288 stems per acre after 4 years and 260 stems per acre after 5 years inside the permanent vegetative plots and herbaceous cover evaluated with photos showing 75% coverage, after 5 years.

Survival of several species is above 90% after 4 years with additional volunteers of many desirable species. Volunteer species include *Alnus serrulata, Cephalanthus occidentalis, Platanus occidentalis, and Salix nigra,* none of these species were planted because of the large available seed source and excellent growing conditions of the site. Volunteers of planted species include *Betula nigra* and *Fraxinus pennsylvanica*. A large colony of Alders still exists in Plot 3, this dense community is typical of Alders and will be managed and thinned to a manageable number of individuals, approximately 10 to 15. On March 24th, 2008 a small replant, as requested by EEP after the 2007 monitoring report, was done. 55 *Magnolia virginiana*, 45 *Quercus bicolor*, and 35 *Taxodium distichum*, for a total of 135 plants were installed in the areas around and between Plots 2 and 3.

Based on sampling, the site as a whole shows an average of 250 stems per acre of planted stems and 350 stems per acre when healthy, desirable volunteers are included, only 10 Alder individuals in Plot 3 were used in this calculation. The site demonstrates 74 percent survival of planted stems. The community is diverse and rich with healthy volunteers. Using the adaptive management approach for this site; the contribution of healthy, desirable volunteers will be considered before any decisions are made on additional plantings. This site was not over planted during initial planting as would typically be done due to a predicted high rate of colonization of desirable volunteer species. While the planted stem count is below the 4 year goal in plots 2 and 3 of 288 stems the contribution of desirable volunteers is significant and places the stems per acre calculation well above this goal. The high survival of volunteers species and individuals indicates that the adaptive management approach is working.

In Appendix A, the vegetative survey data tables show the actual counts of each species found per plot. The herbaceous cover plant community was monitored in a 1 m by 1 m square at one corner of each plot. Herbaceous cover for the site is at or close to 100%.

3.2 CHANNEL STABILITY ASSESSMENT

3.2.1 Cross Sections

The site as a whole has shown no significant change since as-built documents were submitted. The Cross Section plots are located in Appendix B. Cross Sections 1 and 2 are the only constructed riffle and pool. The stream bank sub-surfaces and stream bed were formed with some stone debris. The banks were graded to the typical designed cross sections. The stream bed is made of stone to stabilize the riffle and to increase bed form diversity/ habitat of the riffle for this section as well as acting as grade control. The

stream channels at Cross Sections 3 through 10 are less defined than Cross Sections 1 and 2. MAM and KHA tried to select deep still areas for pools and chose shallower areas of swift running water for the riffle cross sections. Observations for each Cross Section follow.

Cross Section 1 Pool – No significant changes, Thalweg right of center.
Cross Section 2 Riffle– Sand deposits from 2008 have washed out returning to the 2006, 2007 trend, thalweg close to centered.
Cross Section 3 Pool – Channel appears to be shifting to the right, thalweg right of center.
Cross Section 4 Riffle – Channel continues to deepen slightly, thalweg close to center.
Cross Section 5 Riffle – Channel has narrowed and deepened since 2006 and 2007, but has stabilized to match the 2008 trend, thalweg close to center.
Cross Section 6 Pool - Channel depth continues to fluctuate slightly, thalweg right of center.
Cross Section 7 Riffle - Channel has deepened slightly, thalweg left of center.
Cross Section 8 Pool – Deposition appears to have occurred in this pool along left bank in 2008, but has stabilized to match the 2008 trend, thalweg right of center.
Cross Section 9 Riffle – Channel has deepened since 2006, but appears stable as of 2008, scouring or settling of unconsolidated materials may have occurred along right bank in 2008, but has also stabilized, thalweg left of center
Cross Section 10 Pool – Channel indicates a steep slope on the left bank, but appears stable, depth and sand formations continue to fluctuate, thalweg left of center.

3.2.2 Bank Full Events

The Crest Stage Gage (CSG) located at the southern end of the site below the confluence of the East and West Prongs was reset and indicated bankfull conditions on March 5th and September 8th, 2009.

In order for the CSG to indicate bankfull conditions the stream gage north of the site in the reference area must register a peak of approximately 24 inches or higher and rainfall onsite as recorded by the raingage near the CSG must be significant (generally, exceeding one inch combined for two consecutive days).Therefore, the most likely event preceding the March reading was February 28th and March 1st, 2009. As for the September reading, the first half of the month of August 2009 was overcast and rainy with trace rainfall amounts or higher recorded consecutively from July 27th through August 7th and August 11th through 15th. The site was observed to be "water logged" during an August site inspection by the beaver control contractor (no dams were observed on that site inspection). During the September 8th inspection the CSG itself appeared to be "water logged" due to rain, not necessarily from a true bankfull event. Several events between the March 5th and September 8th site inspections could have triggered a bankfull event, but none were observed. While no significant rainfall was recorded onsite, the upstream stream gage registered peaks on August 22nd and 23rd, and on August 31st and the quality check gage upstream of the site recorded significant rainfall on those dates. Comparison data between the onsite gage and the Fayetteville PWC gage is located in Appendix E.

Rainfall amounts and stream gage peaks are shown in the table below.

Table VIII. Potential Bankfull Events

Date	Stream Gage	Onsite Rainfall	Comments
12/11/2008	28.27	1.67	
2/28/2009	23.27	1.59	
3/1/2009	23.29	1.12	CSG Inspected & reset 3/5/2009
3/28/2009	23.05	1.50 (2 days)	rainfall 27th & 28th combined
4/16/2009	25.05	0.56	
5/5/2009	24.62	1.10 (2 days)	rainfall 4th & 5th combined
7/28/2009	25.11	0.65	
8/2/2009	29.13	0.03	
8/14/2009	29.54	.62 (3 days)	rainfall 12th, 13th, & 14th combined
8/22/2009	33.99	0	
8/23/2009	26.23	0.01	
8/31/2009	26.94	0	CSG inspected and reset on 9/8/2009

3.2.3 Pebble Counts and Longitudinal Profiles

There is currently only one constructed riffle on the project, which is located at the site of the original dam and corresponds with Cross Section 2. This riffle was constructed with large cobbles and small boulders found on site. A pebble count was done in 2006 which demonstrated the substantial size of the bed material. In 2009, pebble counts were done on two sections of the same riffle, 2009 and 2009a. Sample 2009a was taken in the same area as the 2006 sample. Only a small representative sample was taken in 2006. Samples for 2009 were slightly larger, but low amounts of smaller bed material make a larger count difficult. The site has shown no significant change since as-built documents were submitted. Pebble count graphs are located in Appendix B with Cross Section 2.

Profiles of the Eastern and Western Prongs show similar trends. While the profiles still appear somewhat inconsistent, several stable pool and riffle features have begun to emerge and an overall trend towards stability from 2006 is developing. Several obvious pools (profile graphs in Appendix C) have formed and appear stable on the upper portion of the Eastern and Western Prongs. Riffle areas appear to be becoming more defined with longer stretches of similar elevation followed by pools or series of pools. The UT appears to have developed a stable pattern as of 2008, but its profile continues to be inconsistent, a stable pool appears to have formed at approximately the 70 foot mark followed by a stable riffle-like stretch for approximately 80 feet. The inconsistent nature of the profile in this reach can be attributed to the presence of large amounts of course woody debris and organic material. The current stream morphology is common and typically stable in low-gradient coastal plain systems.

3.2.4 Wetland Assessment

Seven ground water gages are distributed around the project along with one reference gage off site, but not far upstream on the Western Prong. Graphs showing the 2009 data have been prepared and are included in Appendix E. The average growing season for Cumberland County and the Fayetteville area is 213 days between March and October. Therefore, ten percent of the growing season is approximately 21 days. All gages indicated successful jurisdictional hydrology in 2009. Gages CE2 and CE5 both malfunctioned within 24 hours of each other in mid-January. These gages had to be returned to the manufacturer for new sensors and were replaced in mid-April.

Table IX. Success Criteria Attainment

Well ID	Well Hydrology Threshold Met?	Mean	Vegetation Plot ID	Vegetation Survival Threshold Met?	Mean
CC2	Y	100%	Plot 1	Y	33% 100% w/ vols
CC3	Y		Plot 2	N (Y w/ vols)	
CEC6	Y		Plot 3	N (Y w/ vols)	
CE2	Y				
CE5	Y				
CEC10	Y				
Tarlton 4	Y				
CC6	Y				

Table Xa. Wetland Criteria Attainment

Well ID	Well Hydrology Threshold Met?	Total days w/ Jurisdictional Hydrology	Percent of Growing Season w/ Jurisdictional Hydrology
CC2	Y	62	29%
CC3	Y	90	42%
CEC6	Y	51	24%
CE2	Y	77	36%
CE5	Y	162	76%
CEC10	Y	27	13%
Tarlton 4	Y	42	20%
CC6	Y	64	30%

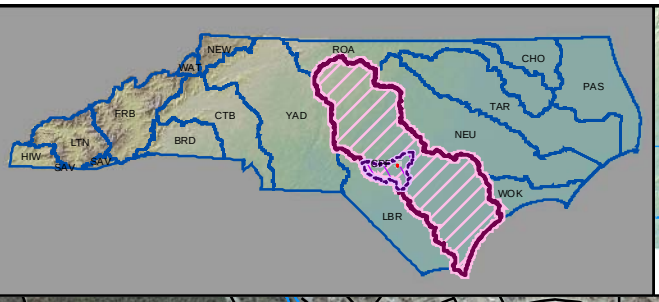
Table Xb.:
Percent of Growing Season Meeting Jurisdictional Requirements by Year

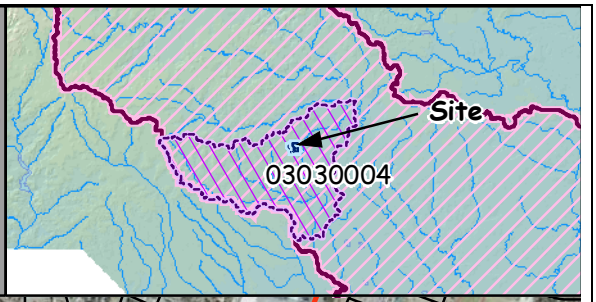
Well ID	2006	2007	2008	2009
CC2	43%	4%	14%	29%
CC3	27%	32%	32%	42%
CEC6	40%	22%	18%	24%
CE2	39%	37%	32%	36%
CE5	100%	71%	100%	76%
CEC10	41%	8%	5%	13%
Tarlton 4	22%	21%	24%	20%
CC6	32%	170%	100%	30%

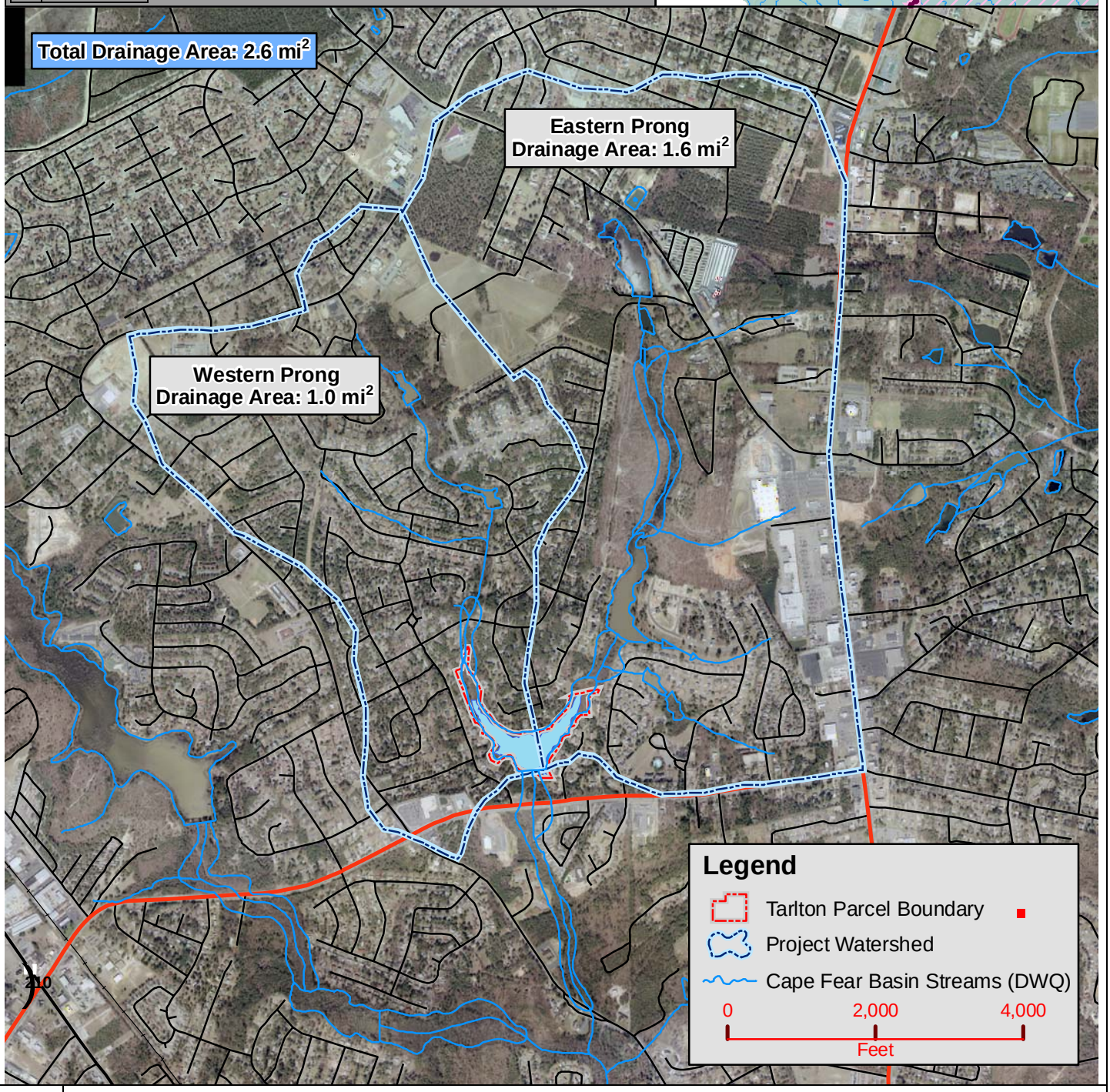
3.2.5 Site Stability Assessment Summary

Overall, the stream channel continues to develop and stabilize as planned. The herbaceous vegetative cover has also developed a healthy and diverse community. The planted trees and shrubs have also done well and are supplemented by a robust existing buffer community which provides a seed source for volunteers well suited to the current site conditions. Many of the volunteer species are the same as the planted individuals from the approved planting list. Ground water wells demonstrate favorable trends and jurisdictional wetland hydrology. No beaver activity was noted on the site this year. A beaver contractor is actively monitoring the site on a quarterly basis.

NEW	NEW
PAS	PASQUOTANK
YAD	YADKIN
CHO	CHOWAN
ROA	ROANOKE
TAR	TAR-PAMLICO
NEU	NEUSE
WAT	WATAUGA
CPF	CAPE FEAR
FRB	FRENCH BROAD
CTB	CATAWBA
LTN	LITTLE TENNESSEE
BRD	BROAD
HIW	HIWASSEE
LBR	LUMBER
SAV	SAVANNAH
WOK	WHITE OAK

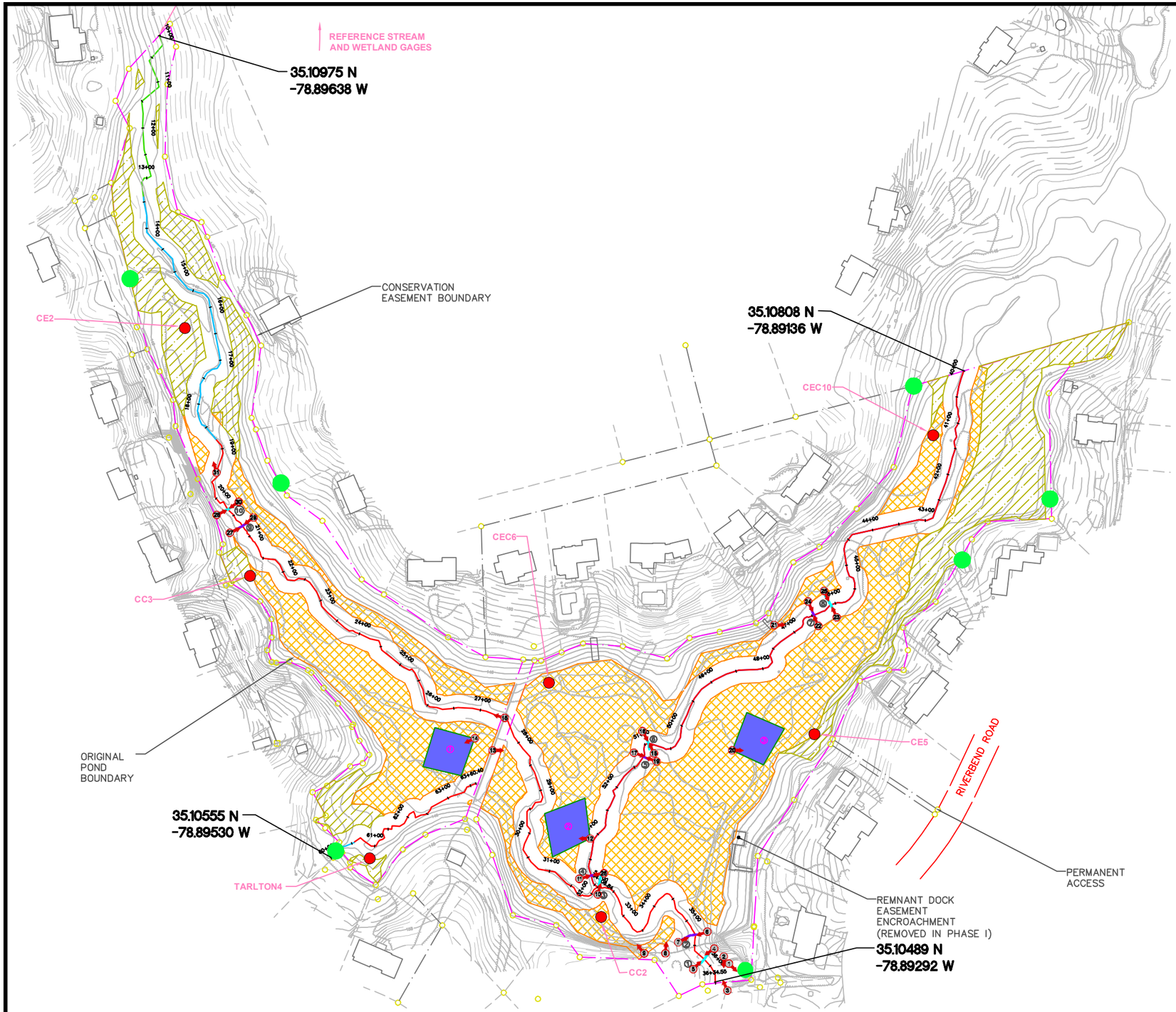


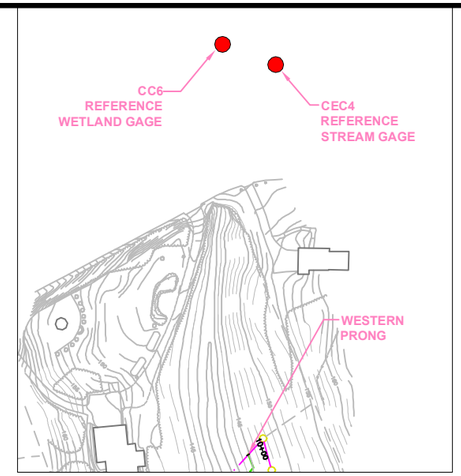




Title	Project Site Watershed Map (Cumberland County 2001 Aerial)

Prepared For: Mid-Atlantic Mitigation, LLC	**Project**	Tarlton Stream and Wetland Restoration Cumberland County, North Carolina	
	Date	**Project Number**	**Figure**
	11/28/07	012857003	1





CU: 03030004

SITE LEGEND

- MAJOR CONTOUR
- MINOR CONTOUR
- PROPERTY BOUNDARY
- WETLAND ENHANCEMENT
- WETLAND RESTORATION
- STREAM RESTORATION
- STREAM ENHANCEMENT
- STREAM PRESERVATION
- PERMANENT RIFFLE CROSS SECTION
- PERMANENT POOL CROSS SECTION
- VEGETATION MONITORING QUAD
- MONITORING GAGE
- STORM WATER OUTFALL
- 20 PHOTOGRAPH LOCATIONS

GRID

GRAPHIC SCALE

200 0 100 200 400 800

(IN FEET)
1 inch = 200 ft.

REV. No.:	REVISION:	DATE:	DRAWN BY:	CHECKED BY:

PREPARED IN THE OFFICE OF:
Kimley-Horn and Associates, Inc.
P.O. BOX 33068 – RALEIGH, NORTH CAROLINA 27636-3068
PHONE: (919) 677-2000 FAX: (919) 677-2050

CLIENT: MID-ATLANTIC MITIGATION

TITLE: MONITORING PLAN MAP

SEAL:

DATE: 11/30/07
HORIZONTAL SCALE: 1": 200'
VERTICAL SCALE: 1": 200'
DRAWN BY: JLD
DESIGNED BY: JLD
CHECKED BY: WRW

PROJECT: TARLTON STREAM AND WETLAND RESTORATION
CUMBERLAND COUNTY

ATTACHED REFERENCE FILES:
S.C.O. NUMBER: D05013-1
FIGURE NUMBER: 2

APPENDIX A. Vegetation Raw Data

Exhibit Table VI: Stem Counts for Each Species Arranged by Plot										
Species	Plots 1	2	3	Initial Totals	Year 1 Totals	Year 2 Totals	2008 Initial	Year 3 Totals	Year 4 Totals	Survival %
Betula nigra	3	12		18	18	15	18	16	15	83%
Chamaecyparis thyoides		1		8	2		8		1	13%
Cornus ammomum		2	1	10	9	2	10	3	3	30%
Fraxinus pennsylvanica	20		13	35	35	43	35	34	33	94%
Liriodendron tulipifera				1			1			0%
Magnolia virginiana		2					3	3	2	67%
Nyssa aquatica	4	1	1	6	6	8	6	6	6	100%
Nyssa biflora	1	4		8	8	6	8	5	5	63%
Nyssa slyvantica	6			10	10	10	10	10	6	60%
Quercus bicolor		2					3	3	2	67%
Quercus nigra			1	2			2		1	50%
Quercus phellos				1	1	1	1	1		0%
Quercus shumardii				1	1		1			0%
Taxodium distichium	6	10	7	25	21	24	25	25	23	92%
Totals	**40**	**34**	**23**	**125**	**111**	**109**	**131**	**106**	**97**	74%

Stems per Acre

97	=				250
16875					43560

Plot 1	40	310		spa
Plot 2	34	263		spa
Plot 3	23	178		spa
	97	751		
		3	=	250

Stems per Acre w/ Voluteers

Plot 1	60	465		spa
Plot 2	38	294		spa
Plot 3	38	294		spa
	136	1053		
		3	=	351

Table VII. Stems Per Acre

	Year 1 2006		Year 2 2007		Year 3 2008		Year 4 2009		Year 5 2010	
	SPA	SPA w/ volunteers	SPA	SPA w/ volunteers	SPA	SPA w/ volunteers	SPA	SPA w/ volunteers	SPA	SPA w/ volunteers
Plot 1	410	441	418	425	356	441	310	465		
Plot 2	217	232	232	278	271	332	263	294		
Plot 3	232	279	194	255	194	309	178	294		
Total	**286**	**317**	**281**	**319**	**274**	**361**	**250**	**351**		

Tarlton- Vegetation plot #1						
	Number of Planted Species/Number of Volunteers					
Trees/ Shrubs	**2006**	**2007**	**2008**	**2009**	**2010**	
Acer rubrum				/2		100 % Volunteers
Alnus serrulata	/3	/1	/2	/12		100 % Volunteers
Betula nigra	5	3	4	3		
Cephalanthus occidentalis	/1					
Chamaecyparis thyoides	1					
Cornus amomum	4					
Fraxinus pennsylvanica	20	20/7	20/9	20/6		
Liriodendron tulipifera						
Nyssa aquatica	5	5	5	4		
Nyssa biflora	6	6	5	1		
Nyssa slyvantica	5	5	5	6		
Quercus falcata var. pagodafolia						
Quercus michauxii						
Quercus nigra						
Quercus phellos						
Quercus shumardii						
Taxodium distichium	7	8	7	6		
Total Planted	**53**	**47**	**46**	**40**		
Voluteers	**4**	**1**	**11**	**20**		

Plot Size: 5625 ft²

Herbacous Vegetation	**2006**	**2007**	**2008**	**2009**	**2010**
Juncus spp.	Dominant	Dominant	Dominant	Common	
Polygonum* spp. *(tearthumb)	Sub dominant			Dominant	
Eupatorium capillifolium	Common				

Stems/plot	=	Stems/ac
Sq ft/plot		Sq ft/acre
40		232
5625		43560
60		465
5625		43560

Tarlton- Vegetation plot # 2					
Trees/ Shrubs	**Number of Species planted/Number of Volunteers**				
	2006	**2007**	**2008**	**2009**	**2010**
Alnus serrulata					
Betula nigra	12	12/4	12/6	12	
Cephalanthus occidentalis	/2				
Chamaecyparis thyoides	1			1	
Cornus amomum	1	1/2	2	2/2	
Fraxinus pennsylvanica	1				
Liriodendron tulipifera					
Magnolia virginiana			3	2	
Nyssa aquatica	1	1/2	1/1	1/1	
Nyssa biflora	4	4	4/1	4/1	
Nyssa slyvantica					
Platanus occidentalis					
Quercus bicolor			3	2	
Quercus falcata var. pagodafolia					
Quercus michauxii					
Quercus nigra					
Quercus phellos					
Quercus shumardii					
Salix nigra					
Taxodium distichium	8	10	10	10	
Total Planted	**28**	**29**	**35**	**34**	
Volunteers	**2**	**7**	**8**	**4**	

100 % Volunteers

Plot Size: 5625 ft²

Herbacous Vegetation	**2006**	**2007**	**2008**	**2009**	**2010**
Eupatorium capillifolium	Sparse				
***Juncus* spp.**	Dominant		Dominant	Dominant	
panicum clandestinum	Common				
polygonum pensylvanicum	Dominant				
polygonum spp. (smartweed)	Common	Common	Common		
Polygonum* spp. *(tearthumb)	Common	Common	Common	Dominant	
sedge sp.	Sparse			Common	

Stems/plot	=	Stems/ac
Sq ft/plot		Sq ft/acre
34		263
5625		43560
38		294
5625		43560

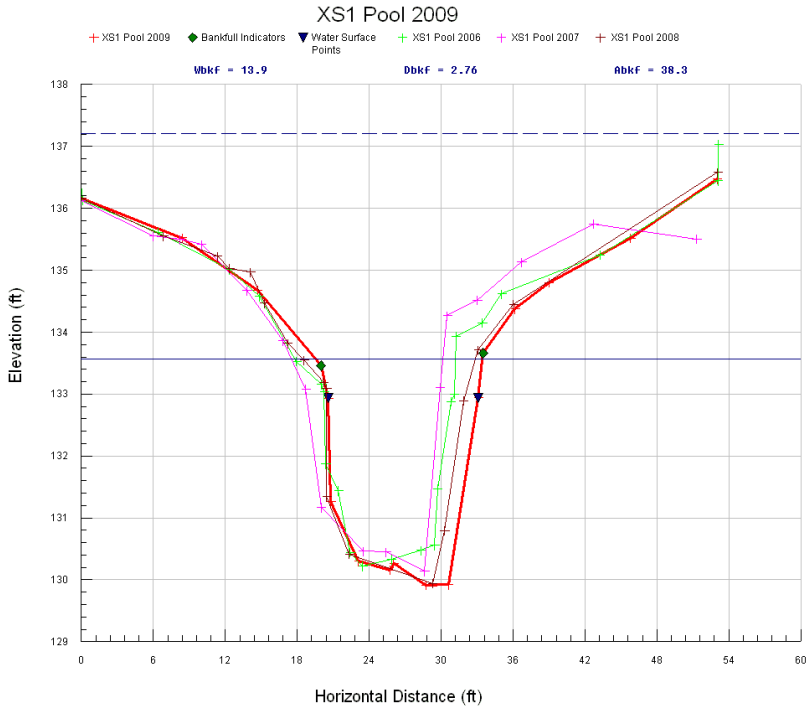
Tarlton- Vegetation plot # 3						
Trees/ Shrubs	**Number of Species planted/Number of Volunteers**					
	2006	**2007**	**2008**	**2009**	**2010**	
Acer rubrum				/1		100 % Volunteers
Alnus serrulata	/5+	/5+	/10+	/10+		100 % Volunteers
Betula nigra	1					
Cephalanthus occidentalis		/1	/1			100 % Volunteers
Chamaecyparis thyoides						
Cornus amomum	4	1	1	1		
Fraxinus pennsylvanica	14- (2 Stressed)	16	14	13		
Liriodendron tulipifera						
Nyssa aquatica	1	1	1	1		
Nyssa biflora	2					
Nyssa slyvantica						
Platanus occidentalis		/1	/1	/1		100 % Volunteers
Quercus falcata var. pagodafolia						
Quercus michauxii						
Quercus nigra	1	1	1	1		
Quercus phellos						
Quercus shumardii	1					
Salix nigra	/1	/1	/3	/3		100 % Volunteers
Taxodium distichium	6	6	8	7		
Total Planted	**30**	**25**	**25**	**23**		
Volunteers	**6**	**8**	**15**	**15**		

Plot Size: 5625 ft²

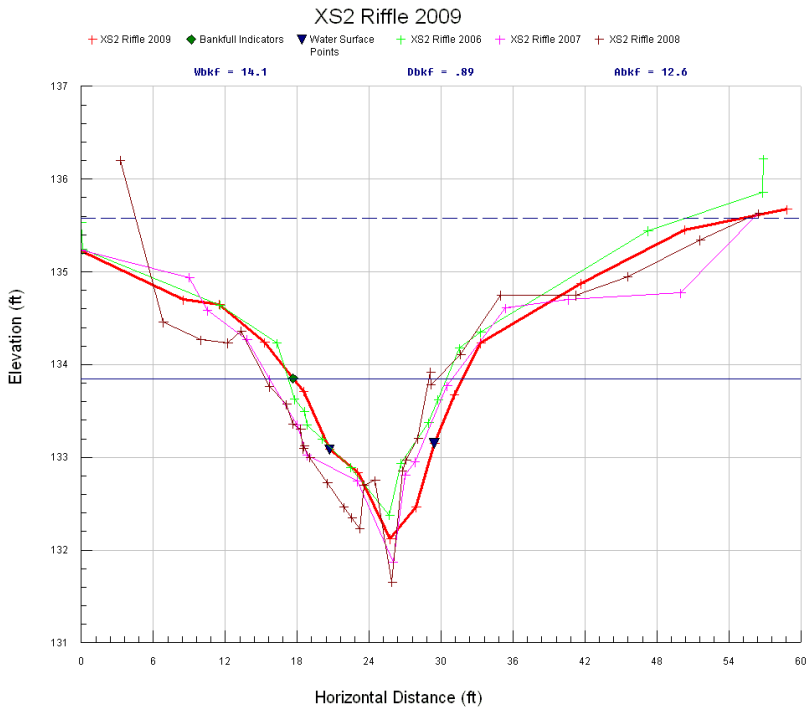
Herbacous Vegetation	**2006**	**2007**	**2008**	**2009**	**2010**
Eupatorium capillifolium	Dominant				
Juncus spp.	Dominant	Dominant	Dominant	Dominant	
Lycopus virginicus	Sparse				
Mikania scandens	Sparse				
Polygonum spp. (tearthumb)	Dominant	Dominant	Dominant	Dominant	
unidentified	Sparse				

Stems/plot	=	Stems/ac
Sq ft/plot		Sq ft/acre
23		178
5625		43560
38		294
5625		43560

APPENDIX B. Cross Sections & Pebble Counts



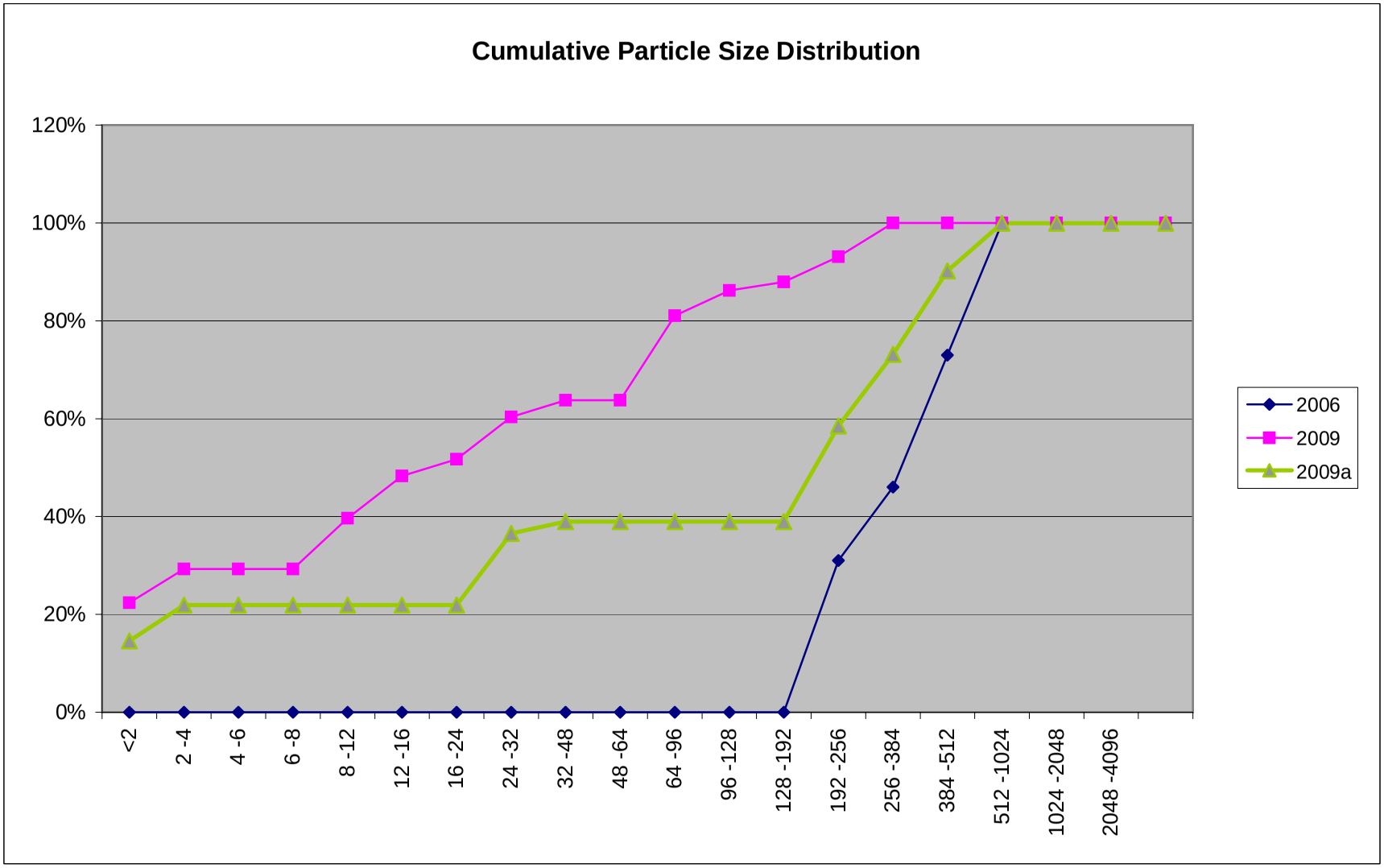
Graph 1: Cross Section 1 Pool

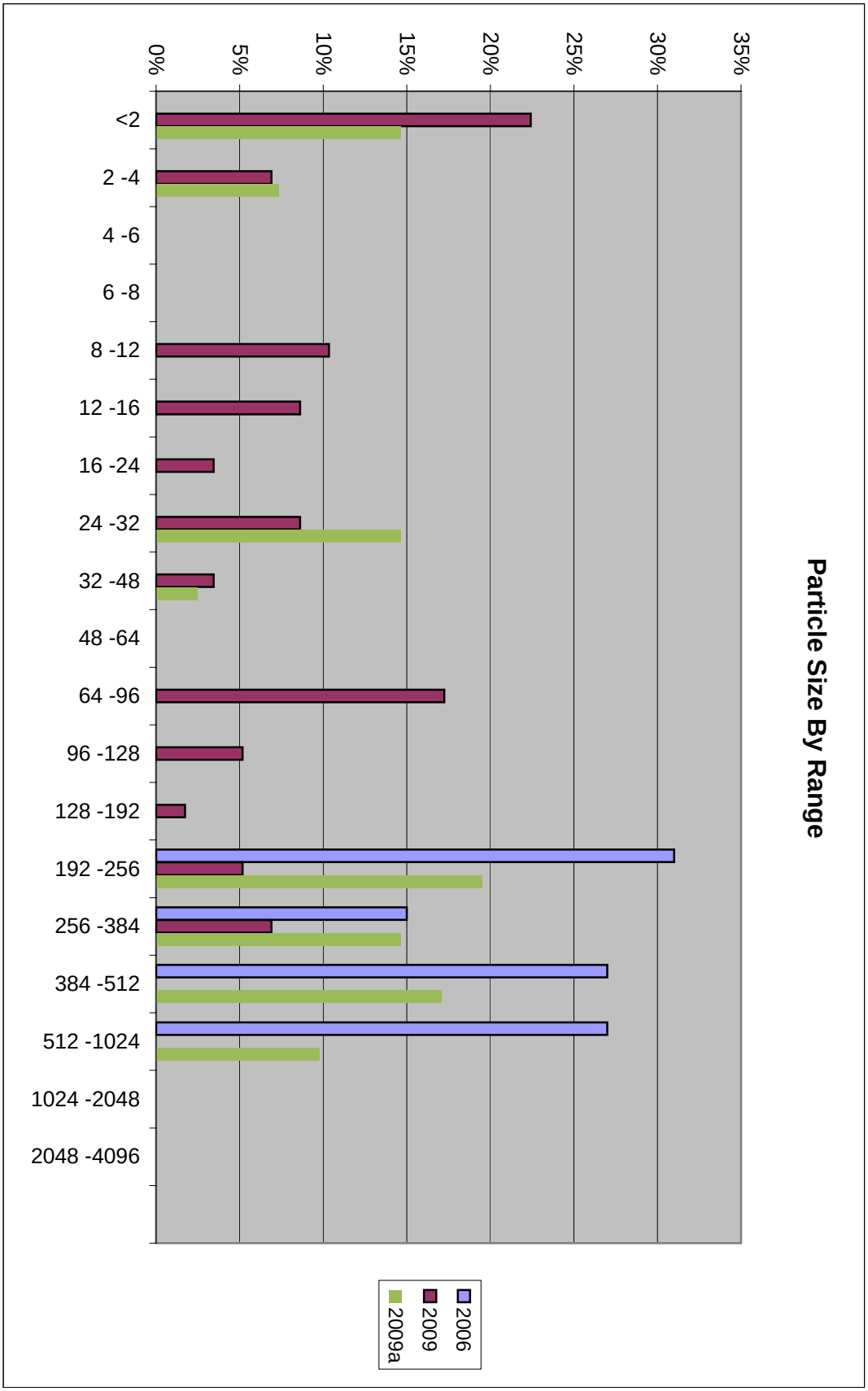


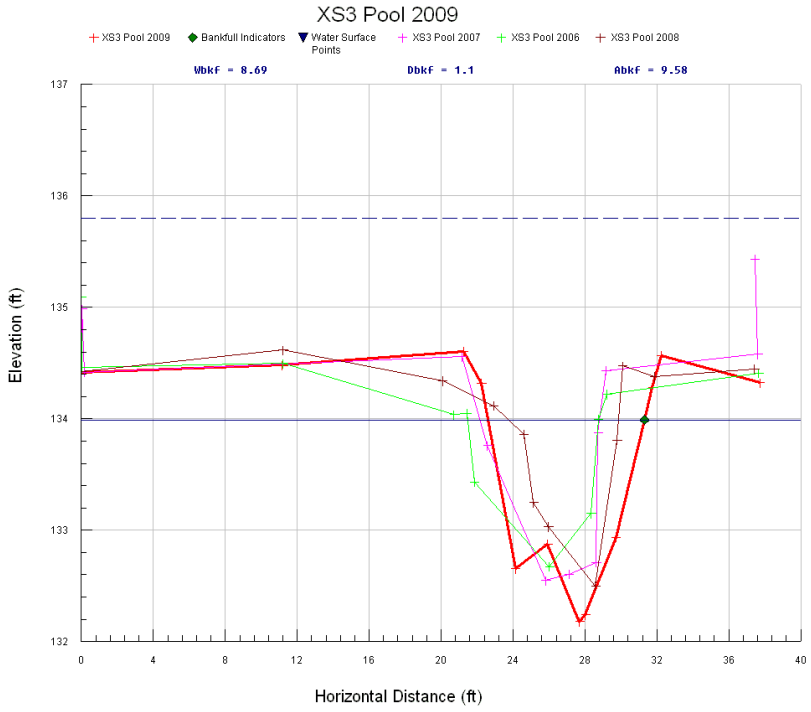
Graph 2: Cross Section 2 Riffle

Title	Cross Section Survey Graphs
Prepared For: EarthMark MITIGATION SERVICES	**Project**: Tarlton Stream and Wetland Restoration Project Cumberland County, North Carolina

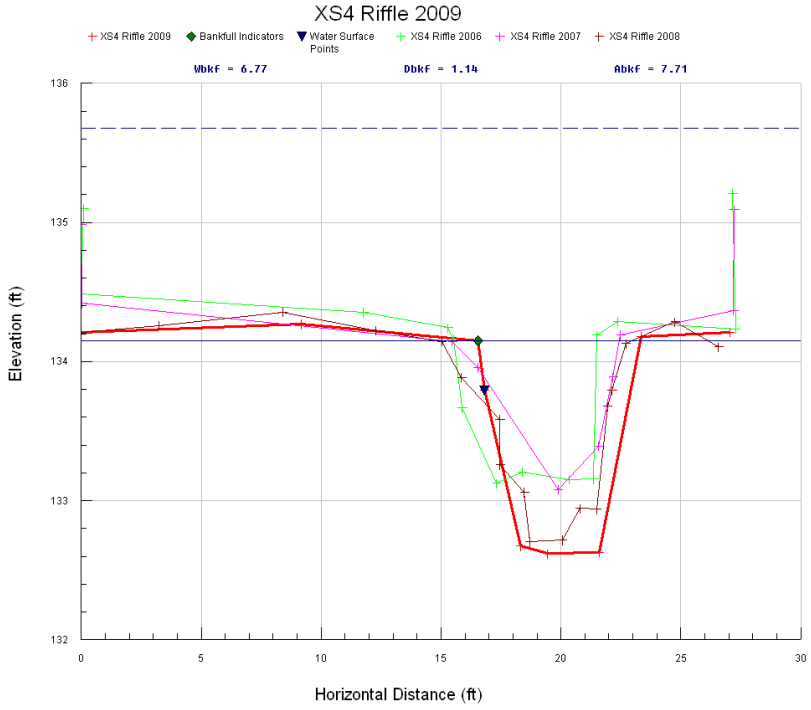
Date	**KHA Project Number**	**Figure**
11/5/09	018285010	4


Cumulative Particle Size Distribution
120%
100%
80%
60%
40%
20%
0%
<2
2 -4
4 -6
6 -8
8 -12
12 -16
16 -24
24 -32
32 -48
48 -64
64 -96
96 -128
128 -192
192 -256
256 -384
384 -512
512 -1024
1024 -2048
2048 -4096
2006
2009
2009a


Particle Size By Range
0%
5%
10%
15%
20%
25%
30%
35%
<2
2 -4
4 -6
6 -8
8 -12
12 -16
16 -24
24 -32
32 -48
48 -64
64 -96
96 -128
128 -192
192 -256
256 -384
384 -512
512 -1024
1024 -2048
2048 -4096
2006
2009
2009a



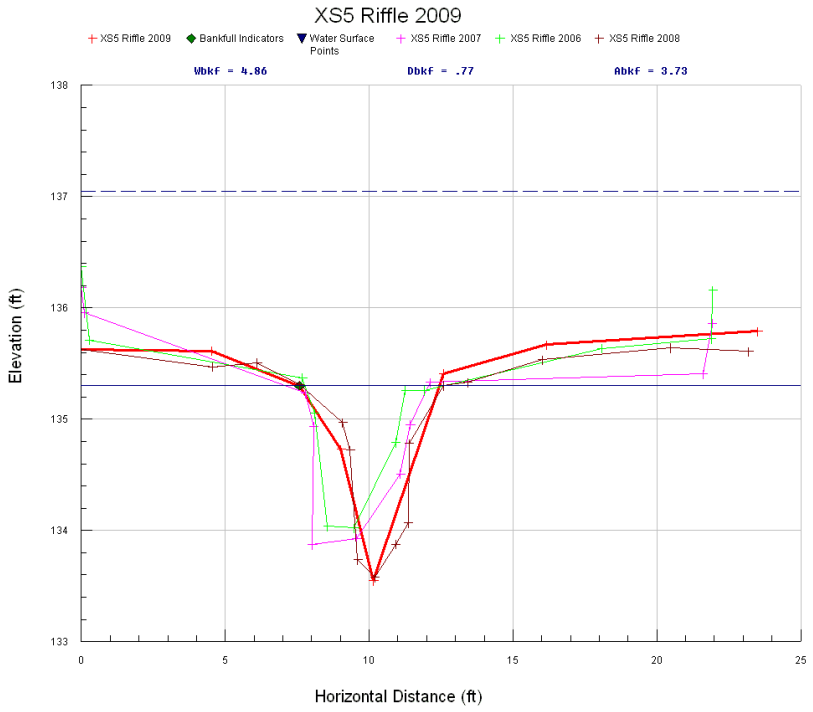
Graph 3: Cross Section 3 Pool



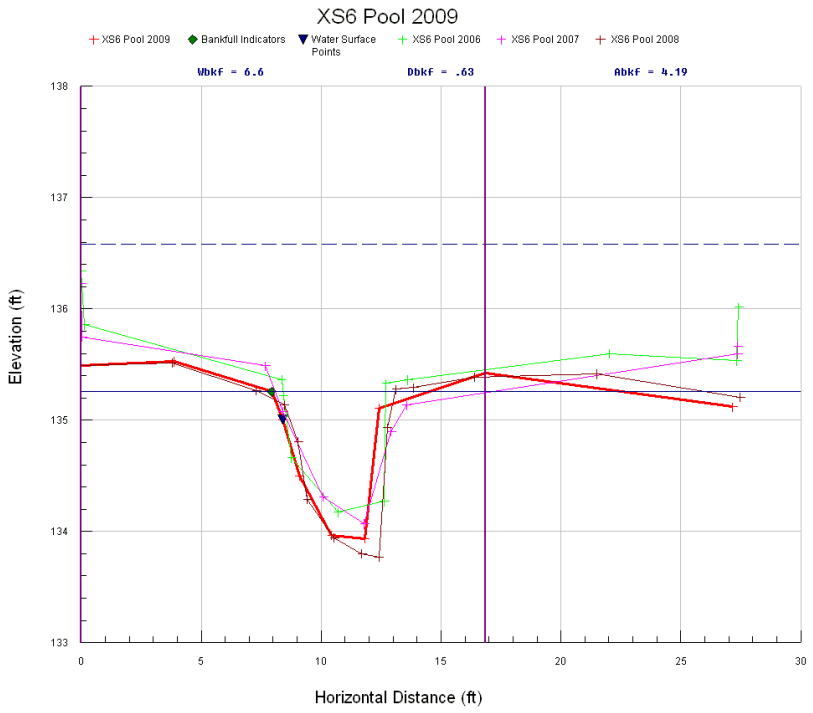
Graph 4: Cross Section 4 Riffle

Title	Cross Section Survey Graphs
Prepared For: EarthMark MITIGATION SERVICES	**Project**: Tarlton Stream and Wetland Restoration Project Cumberland County, North Carolina

Date	**KHA Project Number**	**Figure**
11/5/09	018285010	4a



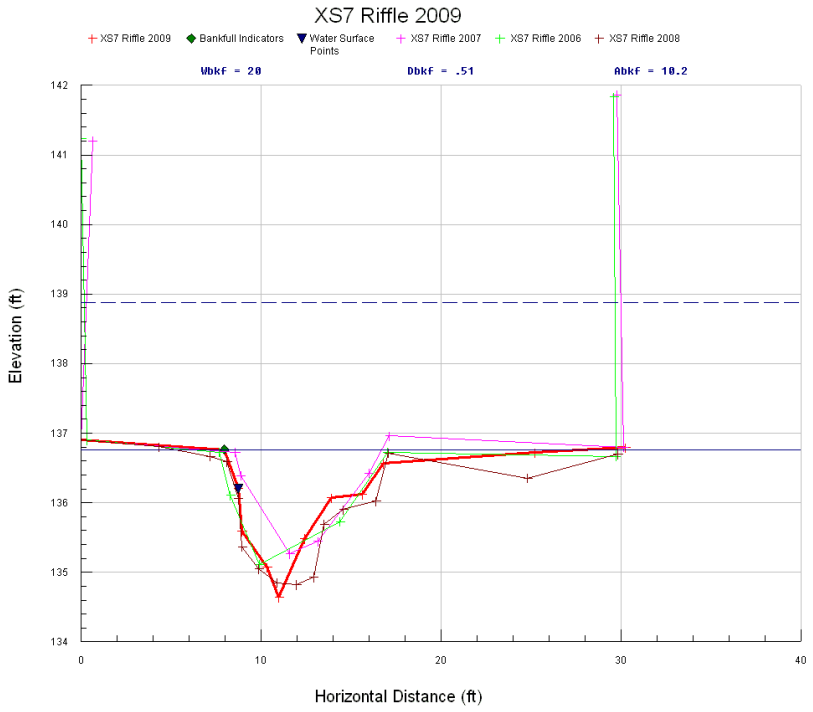
Graph 5: Cross Section 5 Riffle



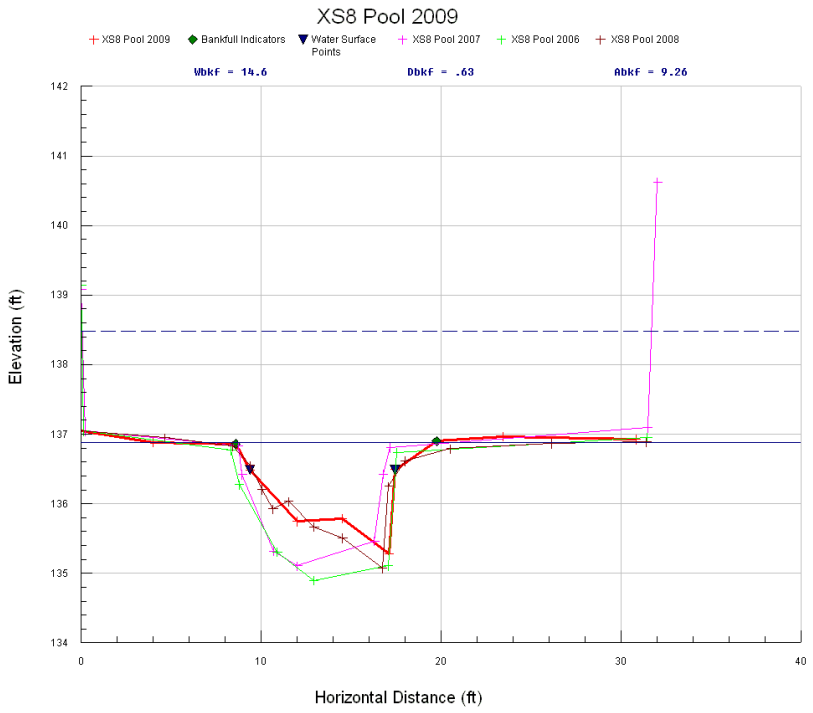
Graph 6: Cross Section 6 Pool

Title	Cross Section Survey Graphs
Prepared For: EarthMark MITIGATION SERVICES	**Project**: Tarlton Stream and Wetland Restoration Project, Cumberland County, North Carolina

Date	**KHA Project Number**	**Figure**
11/5/09	018285010	4b



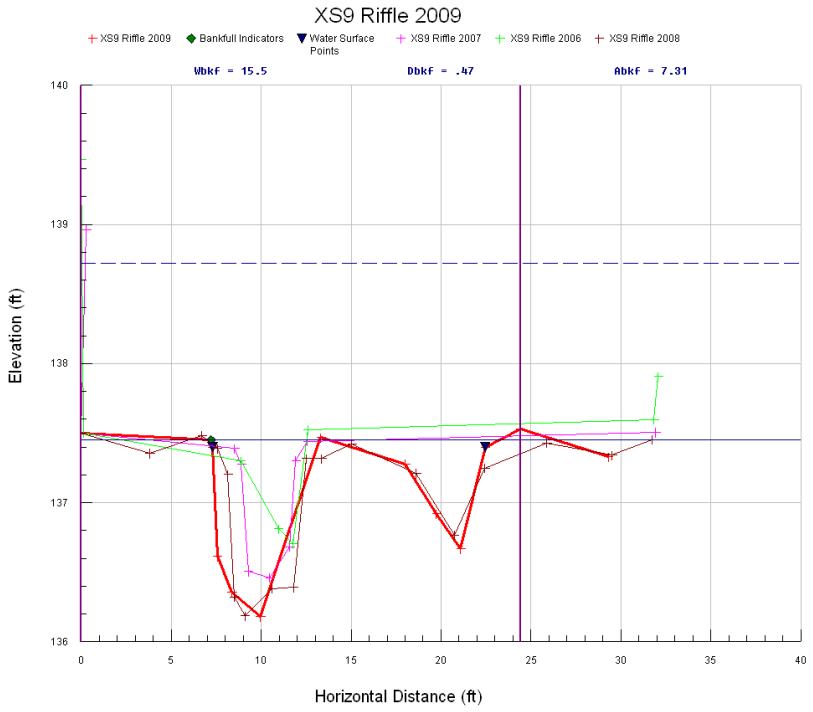
Graph 7: Cross Section 7 Riffle



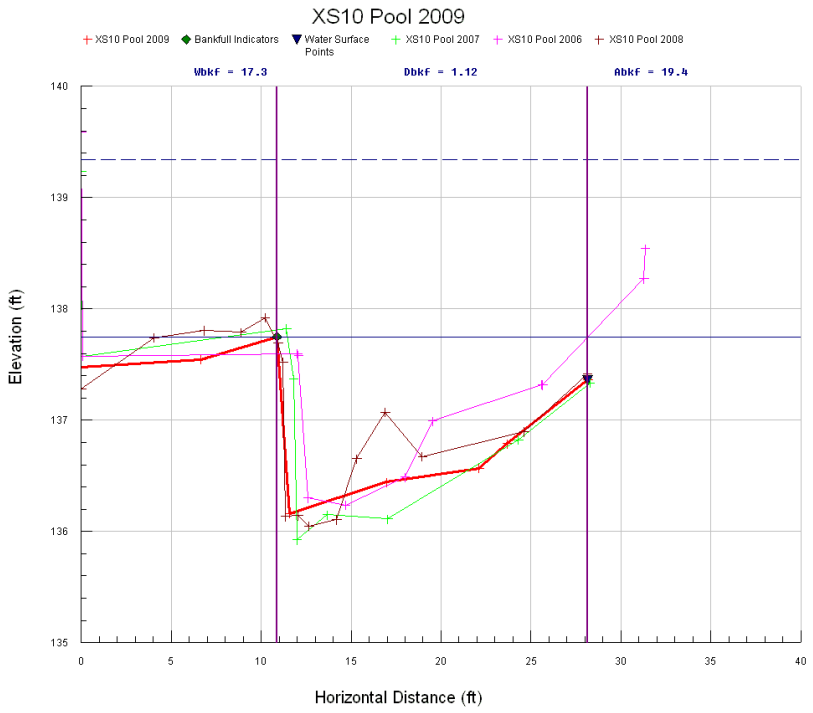
Graph 8: Cross Section 8 Pool

Title	Cross Section Survey Graphs
Prepared For: EarthMark MITIGATION SERVICES	**Project**: Tarlton Stream and Wetland Restoration Project, Cumberland County, North Carolina

Date	**KHA Project Number**	**Figure**
11/5/09	018285010	4c



Graph 9: Cross Section 9 Riffle

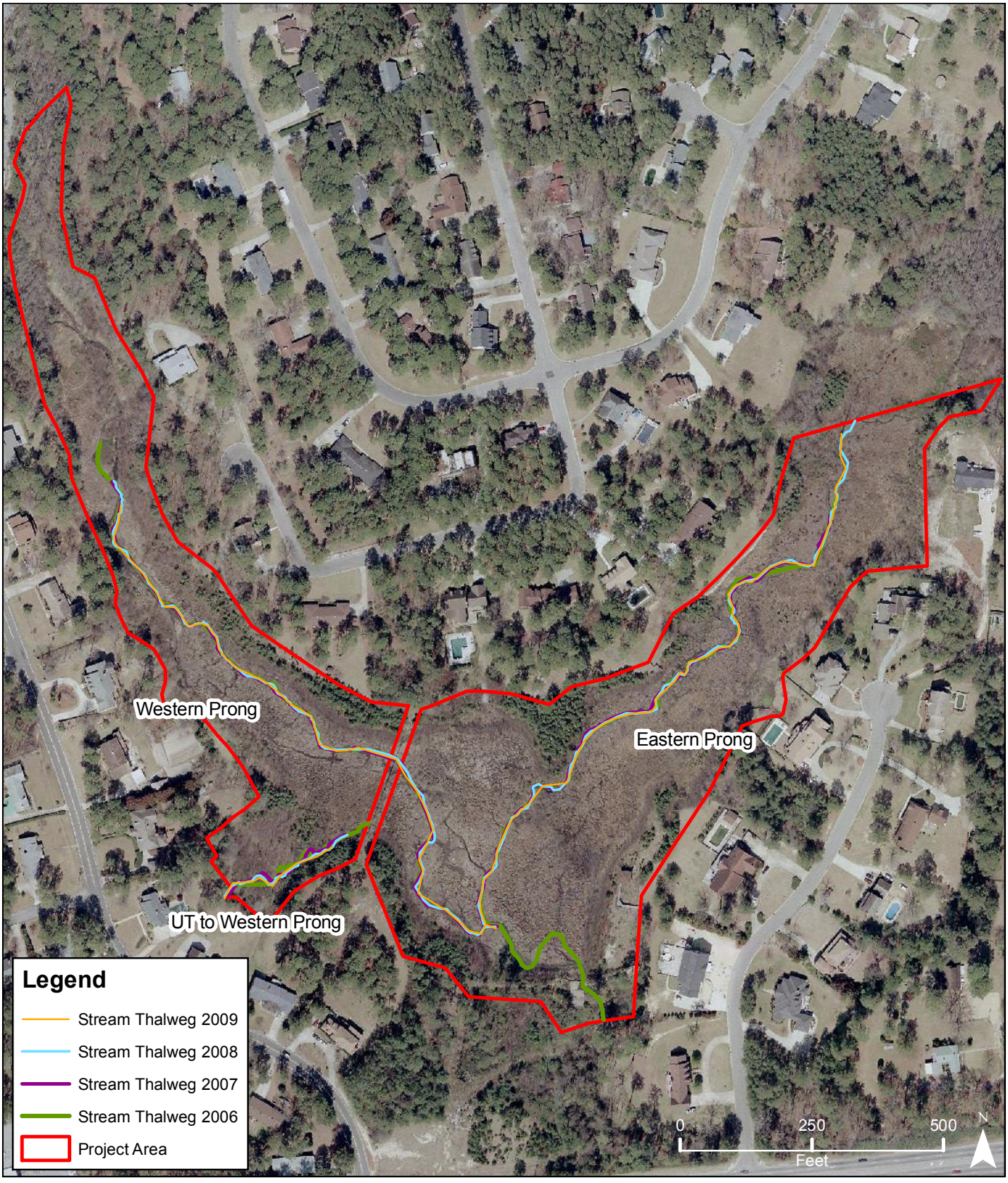


Graph 10: Cross Section 10 Pool

Title	Cross Section Survey Graphs
Prepared For: EarthMark MITIGATION SERVICES	**Project**: Tarlton Stream and Wetland Restoration Project, Cumberland County, North Carolina

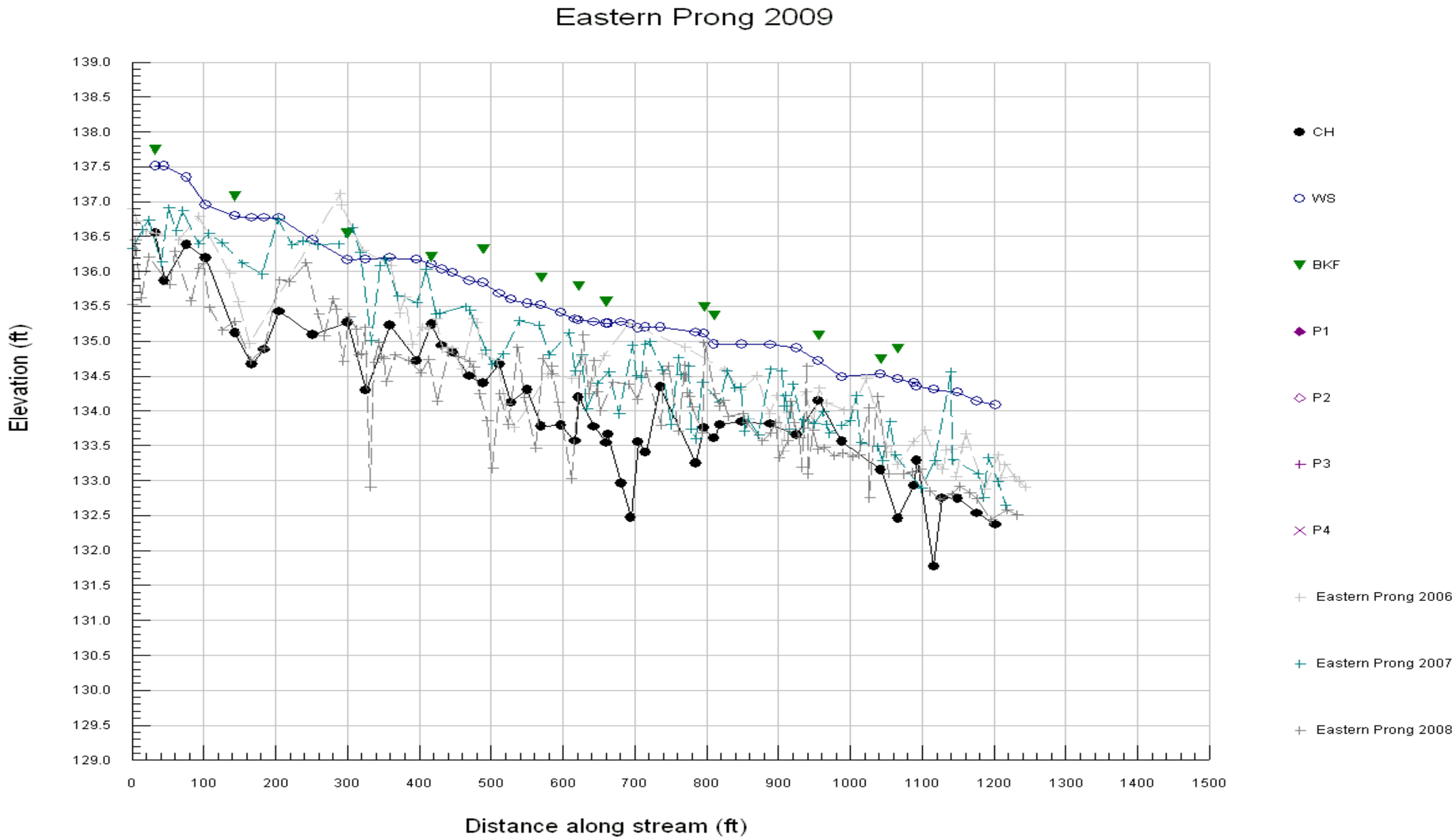
Date	**KHA Project Number**	**Figure**
11/5/09	018285010	4d

APPENDIX C. Pattern & Profile Survey



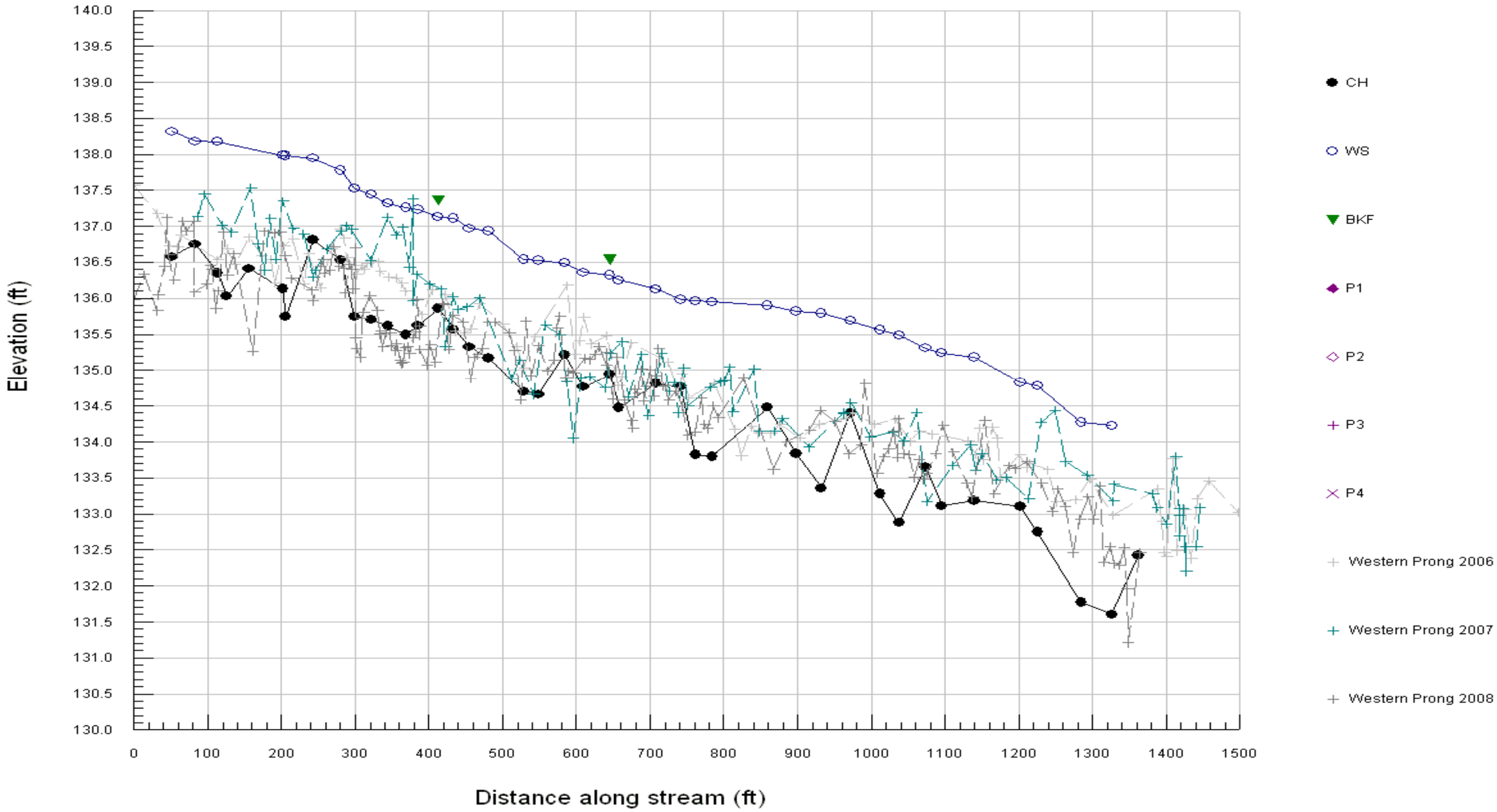
Title	Survey Site Thalweg Map
Prepared For: EarthMark MITIGATION SERVICES	**Project**: Tarlton Stream and Wetland Restoration Project Cumberland County, North Carolina

Date	**KHA Project Number**	**Figure**
11/5/09	018285010	3



Title	Survey Profile Graphs
Prepared For: EarthMark MITIGATION SERVICES	**Project** Tarlton Stream and Wetland Restoration Project Cumberland County, North Carolina

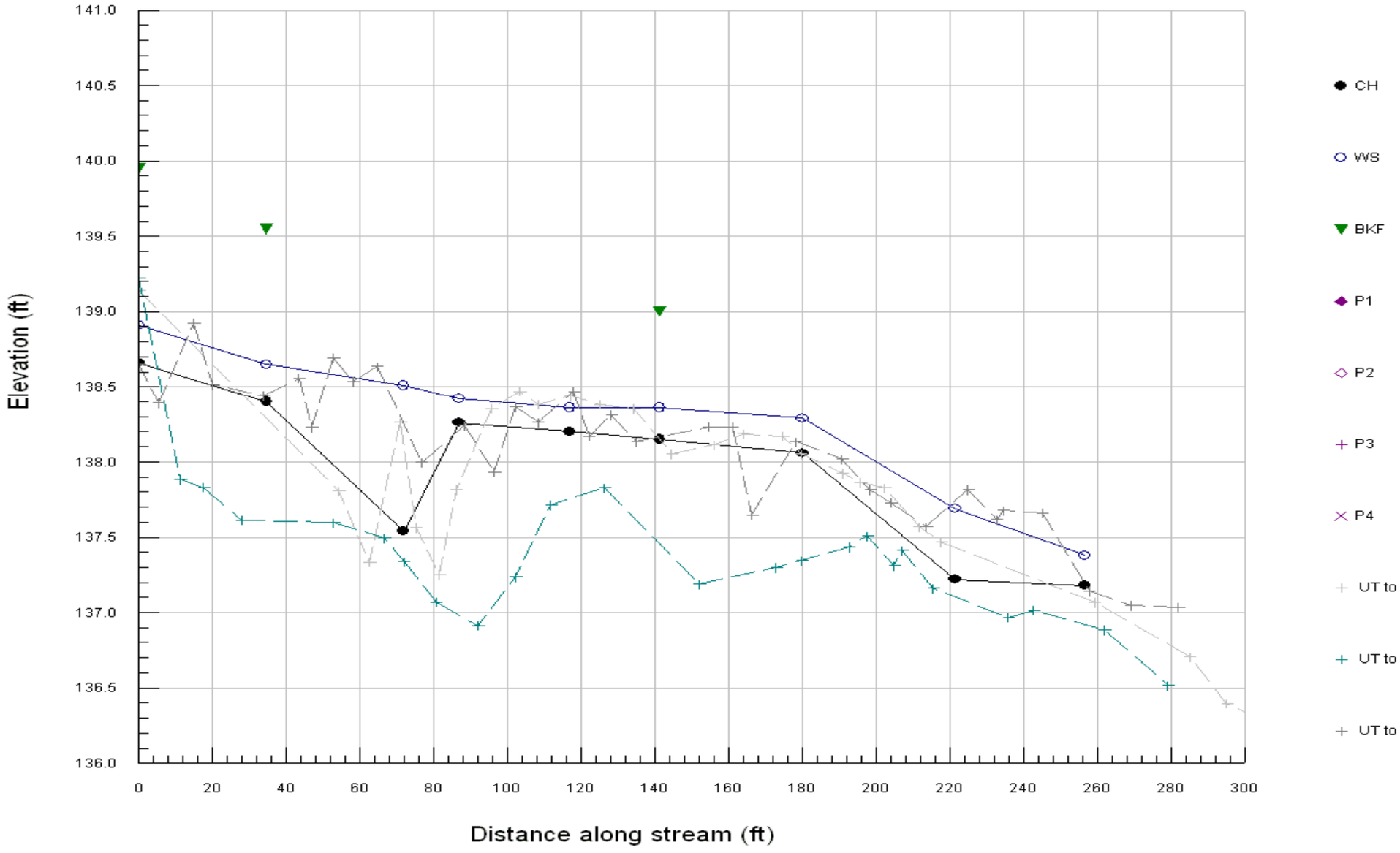
Date	**KHA Project Number**	**Figure**
11/5/09	018285010	5



Title	Survey Profile Graphs
Prepared For: EarthMark MITIGATION SERVICES	**Project**: Tarlton Stream and Wetland Restoration Project Cumberland County, North Carolina

Date	**KHA Project Number**	**Figure**
11/5/09	018285010	5a

UT to Western Prong 2009



Title	Survey Profile Graphs
Prepared For: EarthMark MITIGATION SERVICES	**Project** Tarlton Stream and Wetland Restoration Project Cumberland County, North Carolina

Date	**KHA Project Number**	**Figure**
11/5/09	018285010	5b

APPENDIX D. Photo Log

Photo Point Log

Photo Point 1

Photo Point 2

Photo Point 3

Photo Point 4

Photo Point 5

Photo Point 6

Photo Point 7

Photo Point 8

Photo Point 9

Photo Point 10

Photo Point 11

Photo Point 12 – Veg Plot 2

Photo Point 13

Photo Point 14 – Veg Plot 1

Photo Point 15

Photo Point 16

Photo Point 17

Photo Point 18

Photo Point 19

Photo Point 20 – Veg Plot 3

Photo Point 21

Photo Point 22

Photo Point 23

Photo Point 24

Photo Point 25

Photo Point 26

Photo Point 27

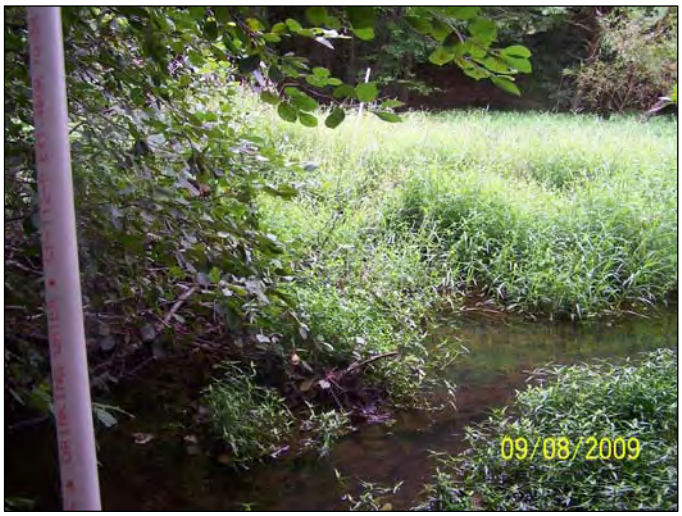


Photo Point 28

Photo Point 29

Photo Point 30

Photo Point 31

Storm Water Outfall Photo Log

Outfall NE of Well CC3

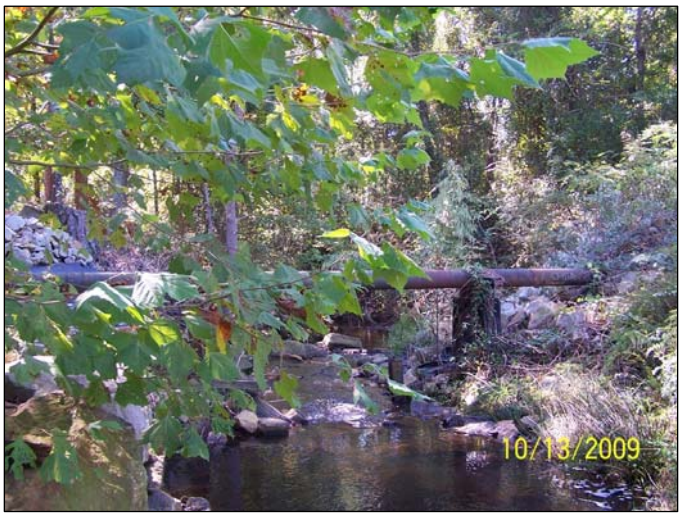
Outfall NW of Well CE2

Outfall N of Well CEC10

Outfall W of Well TARLTON4

Outfall S of Well CEC10

Outfall SE of Well CEC10



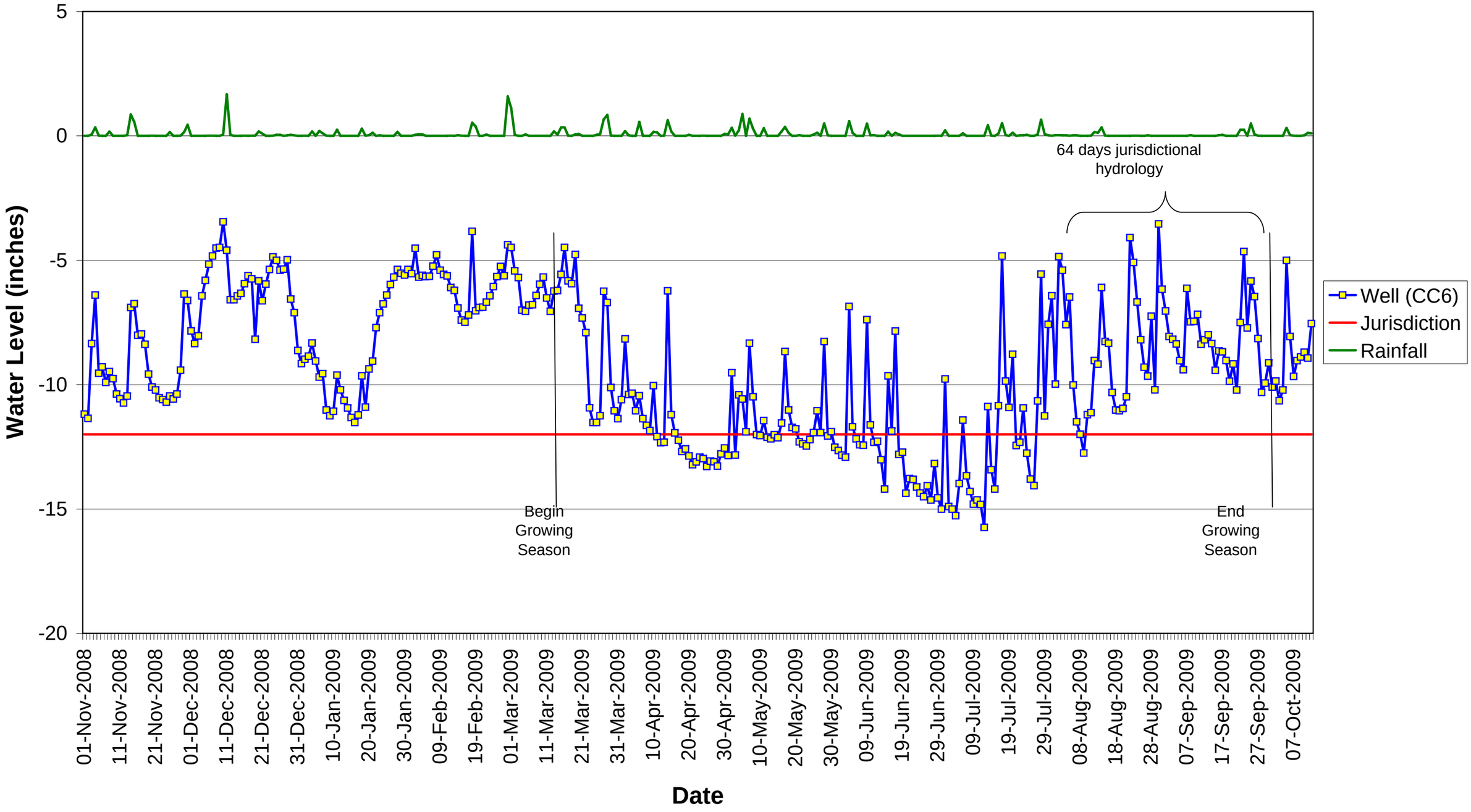
Outfall W of Well CC2

APPENDIX E. Ground and Surface Water Data

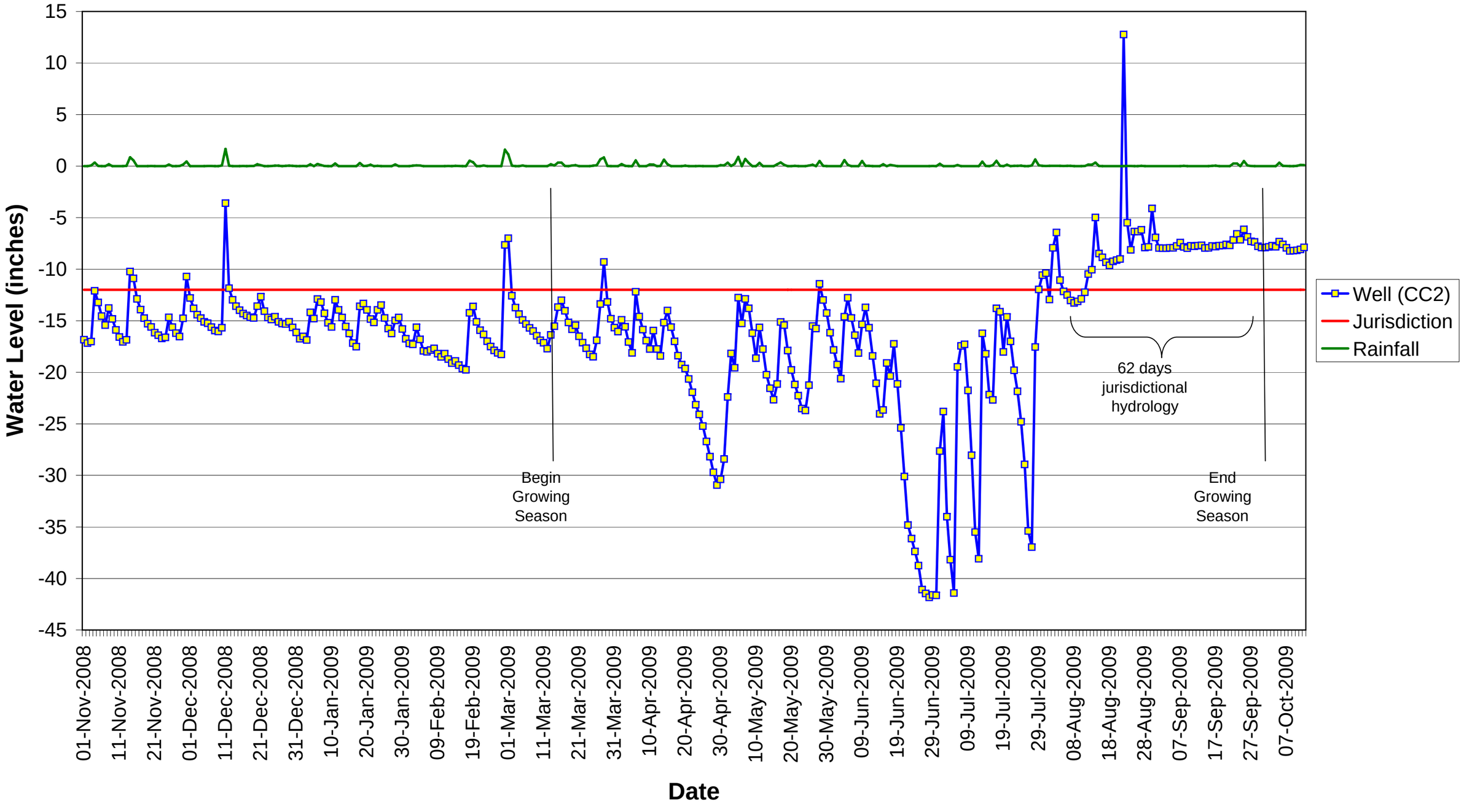
Bank Full Event Log

Rainfall and Stream Gage Graphs

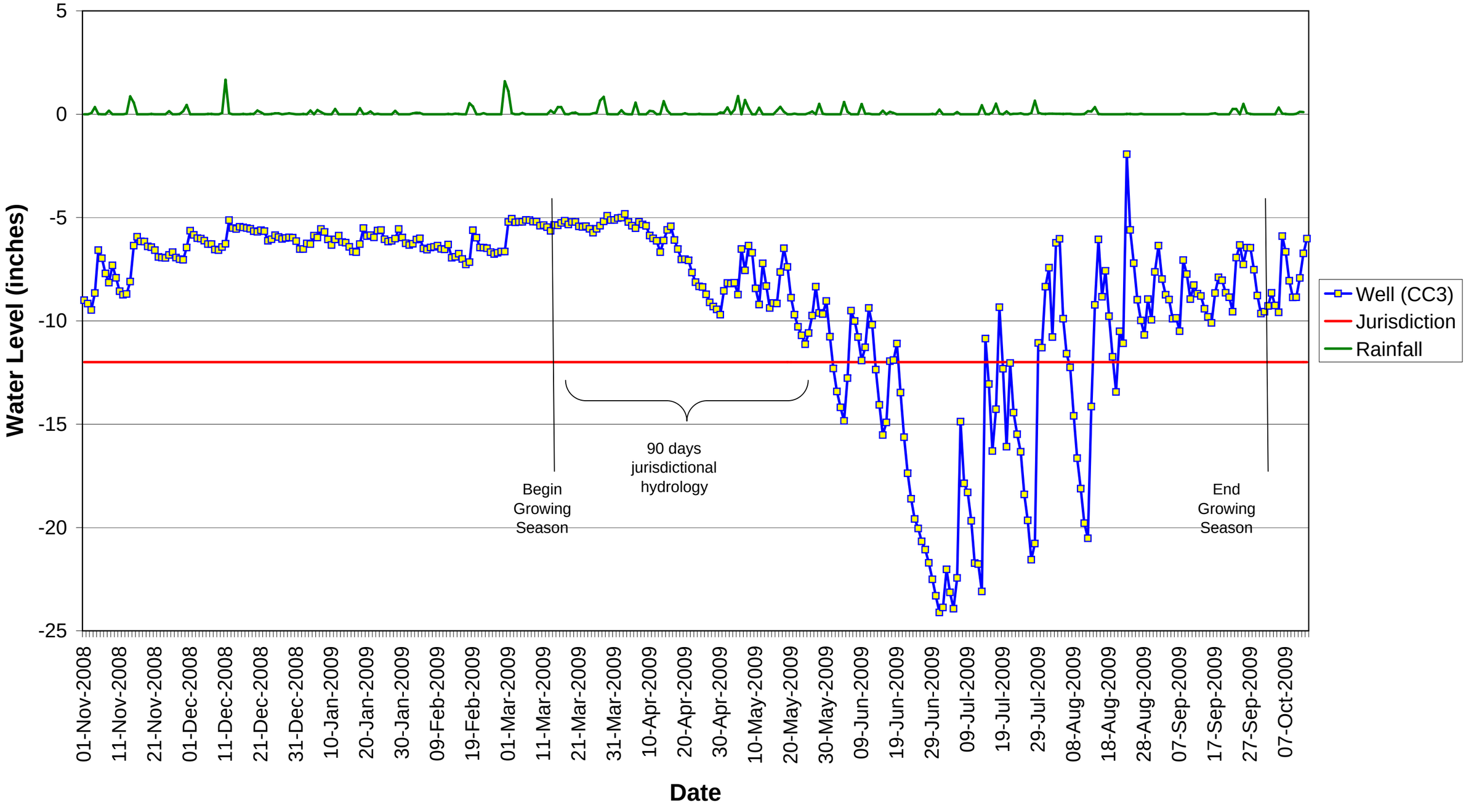
Water Level for Tarlton Well CC6 (Wetland Reference) with Rainfall Data



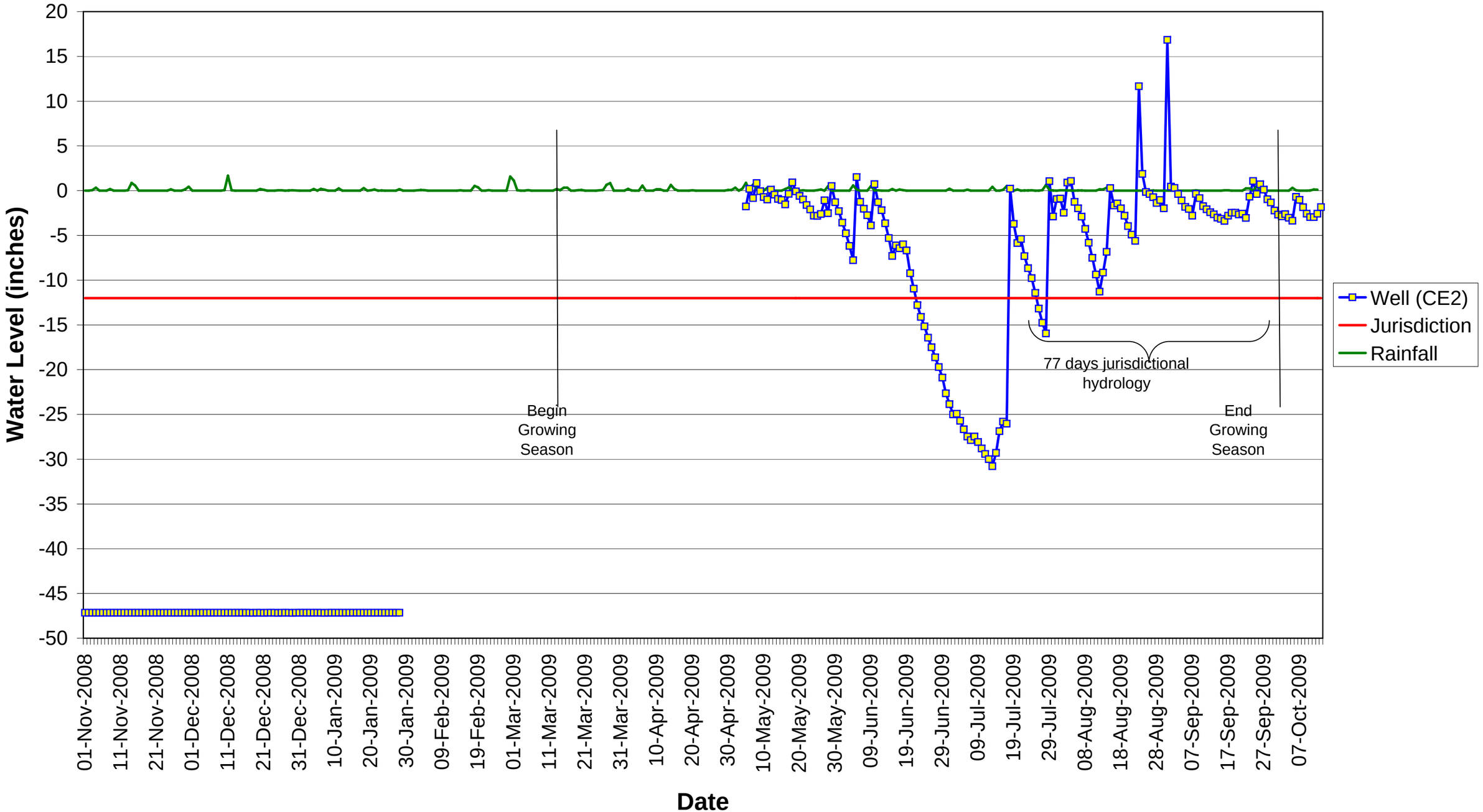
Water Level for Tarlton Well CC2 with Rainfall Data



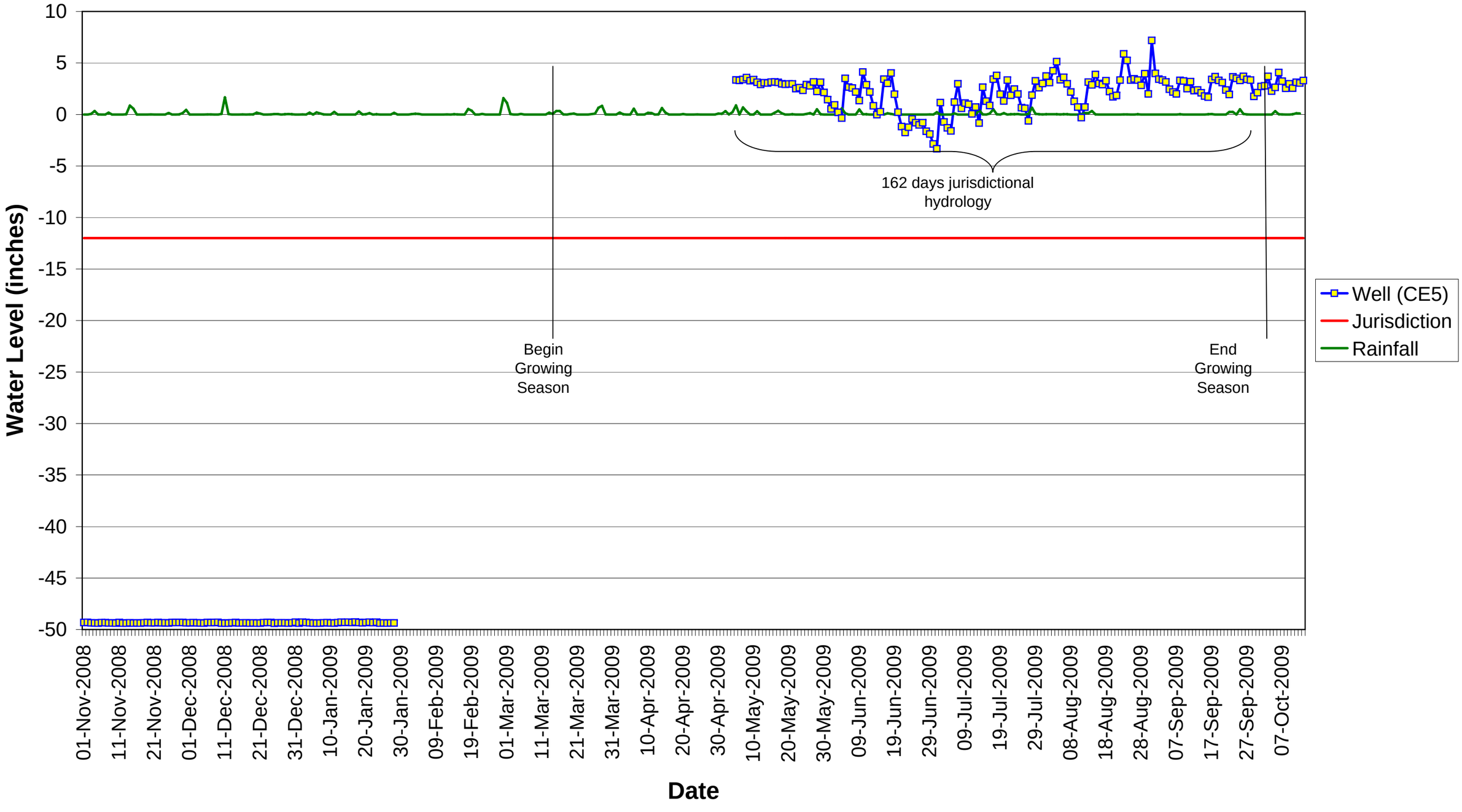
Water Level for Tarlton Well CC3 with Rainfall Data



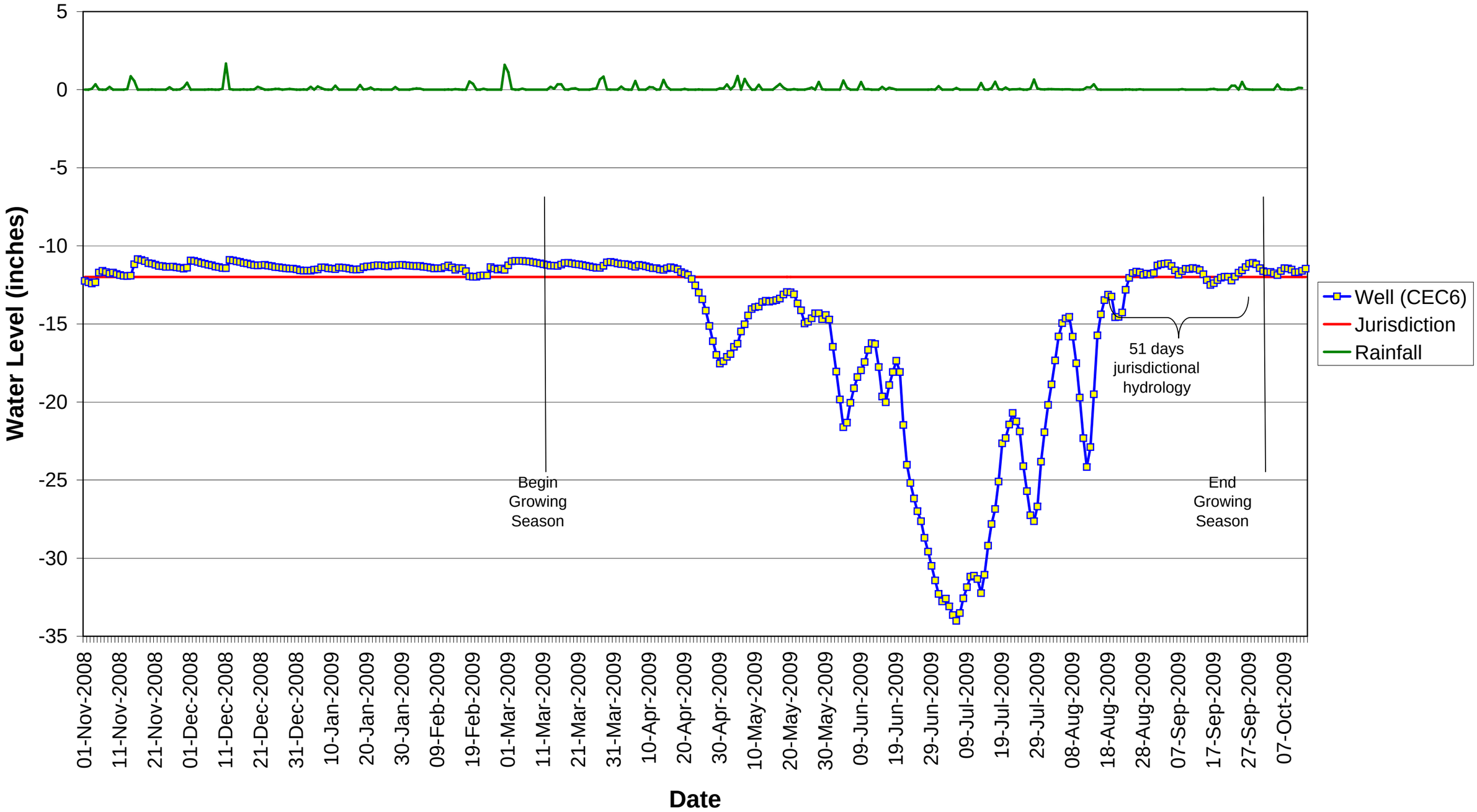
Water Level for Tarlton Well CE2 with Rainfall Data



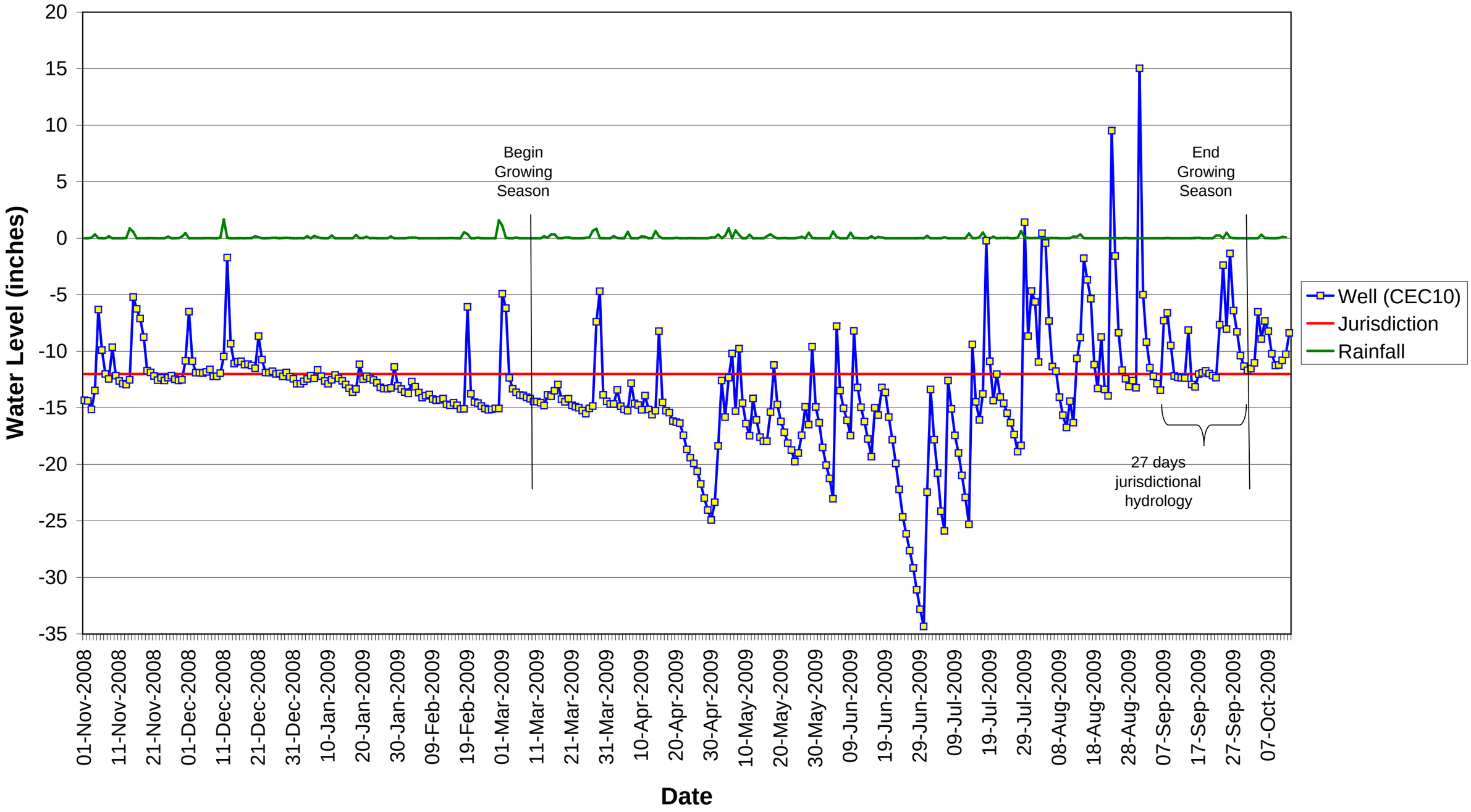
Water Level for Tarlton Well CE5 with Rainfall Data



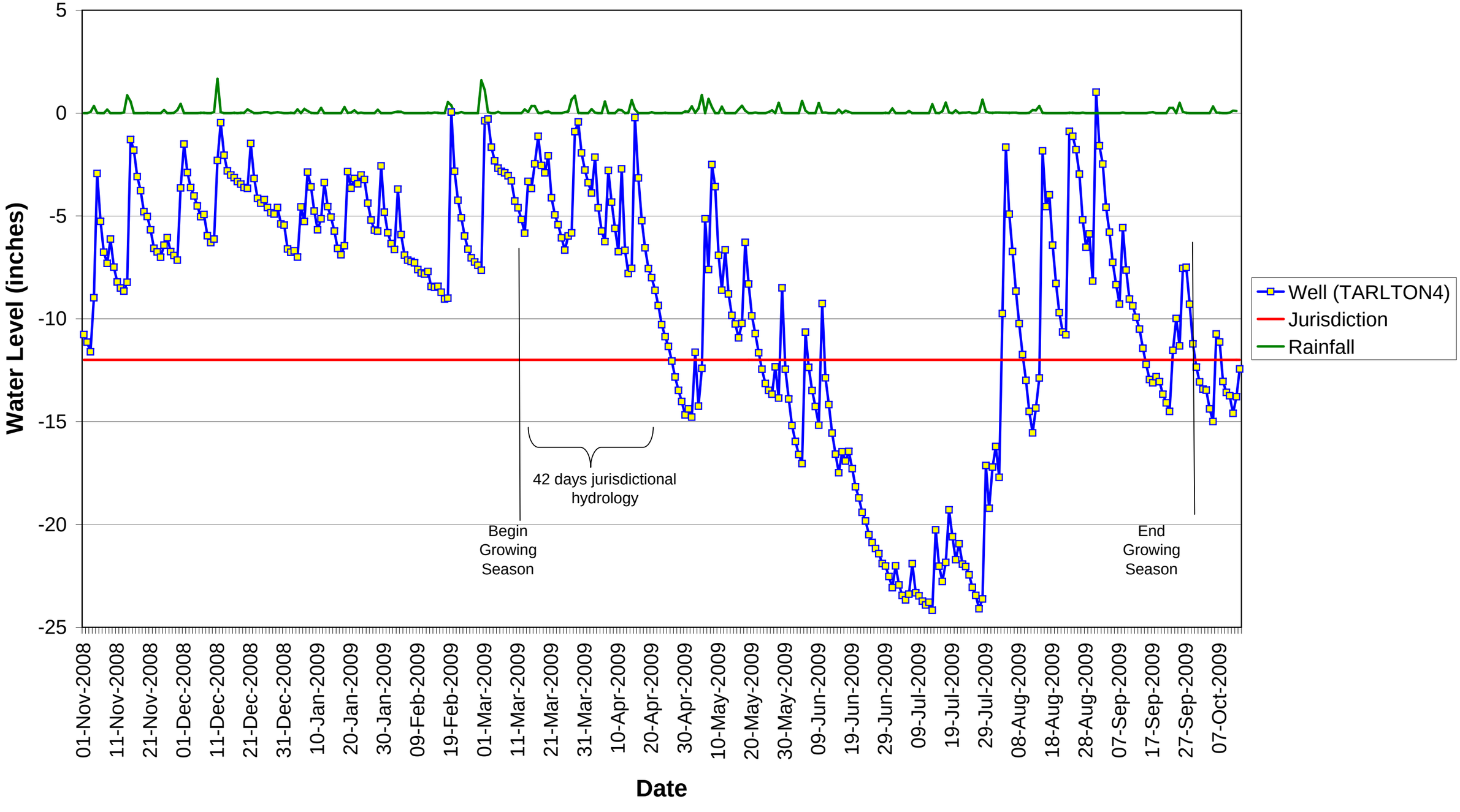
Water Level for Tarlton Well CEC6 with Rainfall Data



Water Level for Tarlton Well CEC10 with Rainfall Data



Water Level for Tarlton Well TARLTON4 with Rainfall Data



Bankfull Events Photo Log

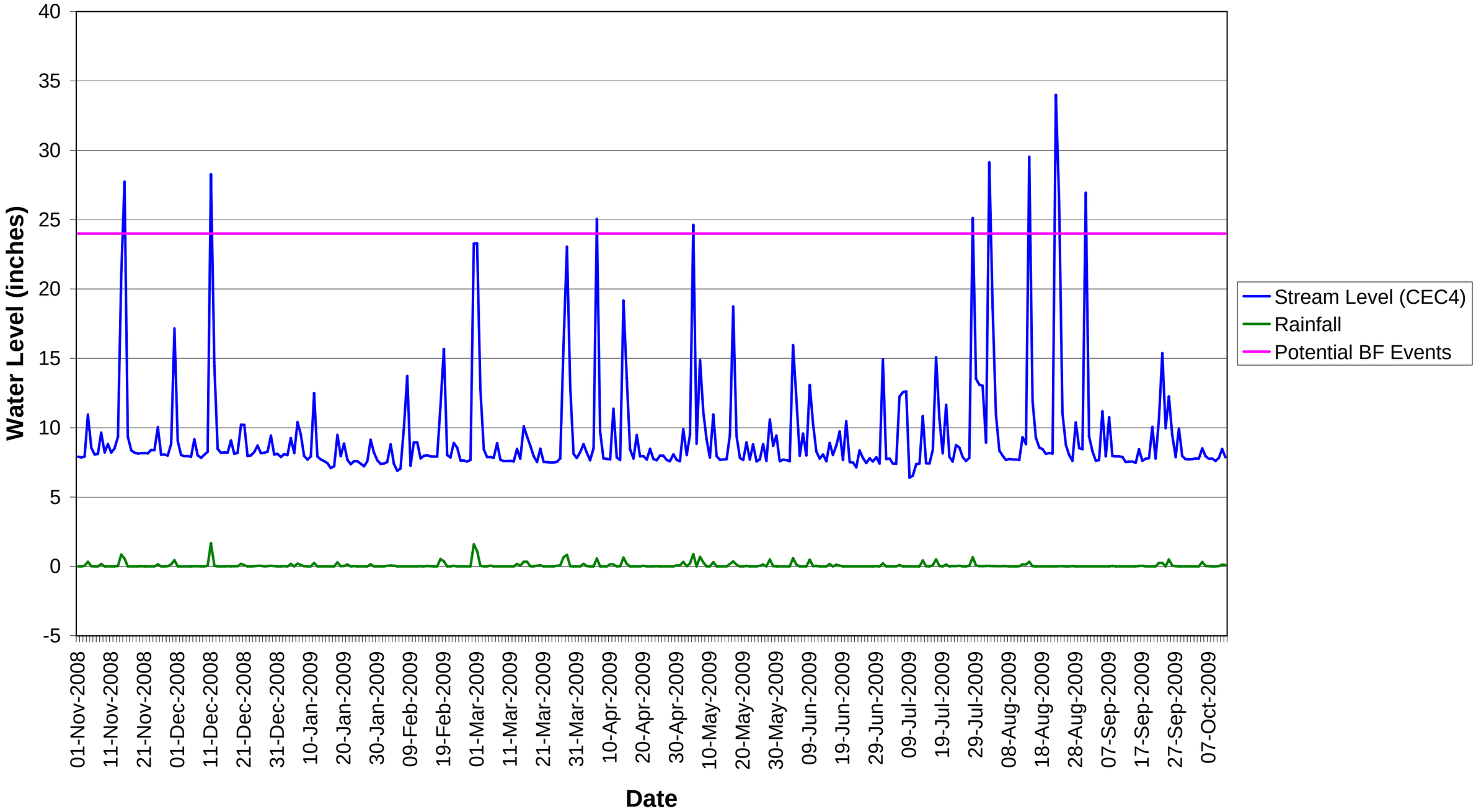
Most likely triggered on February 28th and March 1st, 2009.

Most likely triggered on August 28nd and 23rd or 31st 2009.

Date	Stream Gage	Onsite Rainfall	Comments
12/11/2008	28.27	1.67	
2/28/2009	23.27	1.59	
3/1/2009	23.29	1.12	CSG inspected and reset 3/5/2009
3/28/2009	23.05	1.50 (2 days)	rainfall 27th & 28th combined
4/16/2009	25.05	0.56	
5/5/2009	24.62	1.10 (2 days)	rainfall 4th & 5th combined
7/28/2009	25.11	0.65	
8/2/2009	29.13	0.03	
8/14/2009	29.54	.62 (3 days)	rainfall 12th, 13th, & 14th combined
8/22/2009	33.99*	0	
8/23/2009	26.23*	0.01	
8/31/2009	26.94*	0	CSG inspected and reset 9/8/2009

* Significant rainfall upstream

Stream Water Level vs. Rainfall



STATE CLIMATE OFFICE OF NORTH CAROLINA
NC CRONOS Database
Data retrieval from 313017 - Fayetteville Pwc for past 181 day(s)
175 records for this period of record (97.2% data available; 5 missing records)

2009	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Fayetteville	1.97	1.18	6.48	2.23	3.97	1.85	3.86	4.90	1.31
Onsite	1.39	2.76	3.91	2.02	4.19	1.61	2.48	0.83	1.17

Date/Time (	Fayette 2m Daily Precipitation (in)	Onsite
1/1/2009		
1/2/2009		0.01
1/3/2009	0.02	
1/4/2009		0.18
1/5/2009	0.14	
1/6/2009	0.47	0.2
1/7/2009	0.09	0.1
1/8/2009	0.10	0.01
1/9/2009		
1/10/2009		
1/11/2009	0.26	0.25
1/12/2009		
1/13/2009		
1/14/2009		
1/15/2009		
1/16/2009		
1/17/2009		
1/18/2009		0.29
1/19/2009	0.38	0.01
1/20/2009	0.19	0.03
1/21/2009	0.12	0.13
1/22/2009		
1/23/2009		0.02
1/24/2009		
1/25/2009		
1/26/2009		
1/27/2009		
1/28/2009		0.16
1/29/2009	0.20	
1/30/2009		
1/31/2009		
2/1/2009		
2/2/2009		0.04
2/3/2009	0.13	0.07
2/4/2009	0.03	0.06
2/5/2009		
2/6/2009		
2/7/2009		
2/8/2009		
2/9/2009		

2/10/2009		
2/11/2009		
2/12/2009		0.01
2/13/2009		
2/14/2009		0.03
2/15/2009	0.03	0.01
2/16/2009		
2/17/2009		
2/18/2009	0.02	0.53
2/19/2009	0.84	0.37
2/20/2009		
2/21/2009		
2/22/2009		0.05
2/23/2009		
2/24/2009		
2/25/2009		
2/26/2009		
2/27/2009		
2/28/2009	0.13	1.59
3/1/2009	1.87	1.12
3/2/2009	1.28	0.04
3/3/2009		
3/4/2009		
3/5/2009		0.06
3/6/2009		
3/7/2009		
3/8/2009		
3/9/2009		
3/10/2009		
3/11/2009		
3/12/2009		
3/13/2009		0.18
3/14/2009	0.17	0.05
3/15/2009	0.09	0.34
3/16/2009	0.33	0.34
3/17/2009	0.30	0.01
3/18/2009	0.02	
3/19/2009		0.06
3/20/2009	0.14	0.08
3/21/2009		
3/22/2009		
3/23/2009		
3/24/2009		
3/25/2009		0.04
3/26/2009	0.12	0.08
3/27/2009		0.66
3/28/2009	1.06	0.84
3/29/2009	1.08	0.01
3/30/2009	0.02	
3/31/2009		

4/1/2009		
4/2/2009		0.19
4/3/2009	0.21	0.02
4/4/2009		
4/5/2009		
4/6/2009	-	0.56
4/7/2009	0.06	
4/8/2009		
4/9/2009		
4/10/2009		0.16
4/11/2009	0.28	0.14
4/12/2009		
4/13/2009		0.01
4/14/2009		0.63
4/15/2009	1.59	0.18
4/16/2009		
4/17/2009		
4/18/2009		
4/19/2009		
4/20/2009		0.04
4/21/2009		
4/22/2009	0.09	
4/23/2009		
4/24/2009		0.01
4/25/2009		
4/26/2009		
4/27/2009		
4/28/2009		
4/29/2009		
4/30/2009		0.08
5/1/2009		0.07
5/2/2009	0.02	0.33
5/3/2009	0.25	0.01
5/4/2009		0.22
5/5/2009	0.33	0.88
5/6/2009	0.82	
5/7/2009	0.67	0.69
5/8/2009	0.42	0.29
5/9/2009	0.01	
5/10/2009		
5/11/2009	0.03	0.31
5/12/2009	0.13	
5/13/2009		
5/14/2009		
5/15/2009		
5/16/2009		0.18
5/17/2009		0.36
5/18/2009	0.44	0.12
5/19/2009		
5/20/2009		

5/21/2009	0.03	0.03
5/22/2009		
5/23/2009		
5/24/2009		
5/25/2009		0.05
5/26/2009	0.04	0.13
5/27/2009	0.10	
5/28/2009		0.5
5/29/2009	0.63	0.02
5/30/2009	0.05	
5/31/2009		
6/1/2009		
6/2/2009		
6/3/2009		
6/4/2009		0.59
6/5/2009	0.88	0.12
6/6/2009	0.01	
6/7/2009		
6/8/2009		
6/9/2009		0.49
6/10/2009	0.25	0.02
6/11/2009	0.02	0.03
6/12/2009		
6/13/2009		
6/14/2009		
6/15/2009		0.17
6/16/2009	0.28	0
6/17/2009	0.02	0.12
6/18/2009	0.15	0.06
6/19/2009		
6/20/2009		
6/21/2009		
6/22/2009		
6/23/2009		
6/24/2009		
6/25/2009		
6/26/2009		
6/27/2009	0.24	
6/28/2009		
6/29/2009		0.01
6/30/2009		
7/1/2009		0.22
7/2/2009	0.20	
7/3/2009		
7/4/2009		
7/5/2009		
7/6/2009		0.1
7/7/2009		
7/8/2009		
7/9/2009		
7/10/2009		

7/11/2009		
7/12/2009		
7/13/2009		0.43
7/14/2009	0.81	0.01
7/15/2009		
7/16/2009		0.09
7/17/2009	0.11	0.51
7/18/2009		0.03
7/19/2009		
7/20/2009		0.13
7/21/2009	0.83	
7/22/2009		0.02
7/23/2009		0.02
7/24/2009	0.53	0.04
7/25/2009		
7/26/2009		
7/27/2009		0.05
7/28/2009	0.09	0.65
7/29/2009	0.17	0.07
7/30/2009		0.02
7/31/2009	0.49	0.01
8/1/2009	0.59	0.03
8/2/2009		0.03
8/3/2009	0.04	0.02
8/4/2009	0.14	0.02
8/5/2009		0.01
8/6/2009		0.02
8/7/2009		0.02
8/8/2009		
8/9/2009		
8/10/2009		
8/11/2009		0.01
8/12/2009	0.15	0.15
8/13/2009	0.26	0.13
8/14/2009	0.27	0.34
8/15/2009	1.30	0.01
8/16/2009		0
8/17/2009		0
8/18/2009	0.03	0
8/19/2009		0
8/20/2009		0
8/21/2009		0
8/22/2009		0
8/23/2009	1.20	0.01
8/24/2009	0.50	0.01
8/25/2009		0
8/26/2009		0
8/27/2009		0.02
8/28/2009		0
8/29/2009	0.18	0
8/30/2009		0

8/31/2009	0.87	0
9/1/2009	0.06	0
9/2/2009		0
9/3/2009		0
9/4/2009		0
9/5/2009		0
9/6/2009		0
9/7/2009		0
9/8/2009	0.16	0.03
9/9/2009		0
9/10/2009		0
9/11/2009		0
9/12/2009		0
9/13/2009		0
9/14/2009		0
9/15/2009		0
9/16/2009	0.22	0.03
9/17/2009		0.04
9/18/2009	0.02	0
9/19/2009		0
9/20/2009		0
9/21/2009		0
9/22/2009	0.32	0.25
9/23/2009		0.25
9/24/2009		0
9/25/2009	0.44	0.5
9/26/2009	0.09	0.06
9/27/2009		0.01
9/28/2009		0
9/29/2009		0
9/30/2009		0
10/1/2009		0
10/2/2009		0
10/3/2009		0
10/4/2009	0.09	0
10/5/2009	0.37	0.32
10/6/2009		0.03
10/7/2009		0.01
10/8/2009	0.11	0
10/9/2009	0.22	0
10/10/2009		0.02
10/11/2009	0.52	0.12
10/12/2009	0.05	0.1
10/13/2009		
10/14/2009		
10/15/2009		
10/16/2009		
10/17/2009		
10/18/2009		
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10/31/2009	