

**UT to Pembroke Creek Wetland and Stream
Restoration Monitoring Report
EEP Project # 283
Monitoring Year 03**



Submitted to:



NCDENR-EEP, 1652 Mail Service Center, Raleigh, NC 27699-1652

**Data Collection: 2010
Construction Completed: February 2008
Submitted: December 2010**

Monitoring Firm



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KCI Project No: 12071067C_PM10**

Design Firm



EcoEngineering, A Division of the John R. McAdams Company Inc.
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Durham, NC 27713

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1.0 EXECUTIVE SUMMARY / PROJECT ABSTRACT

The North Carolina Ecosystem Enhancement Program (EEP) restored, enhanced, and preserved wetlands and restored a headwater wetland valley, which is analogous to a stream in this setting, at the UT Pembroke Site in Chowan County, North Carolina. The 59-acre site is located within the USGS 8-digit HUC 03010205 of the Pasquotank River Basin. These assets and their acreage totals were revised by the EEP during the summer of 2009, with the revised totals reflected in Table 1 of this report. The project goals and objectives are listed below.

Goal: Modify the channelized water features, based on reference conditions, with the intent to restore the site's primary wetland functions such as nutrient cycling, flood storage, and wildlife habitat.

Objectives:

- Improve water quality in the basin by filtering nutrients through on-site wetlands.
- Buffer flood flows downstream by increasing infiltration and storage areas.
- Design a waterway through the wetland complex with appropriate cross-section, slope, and pattern as to provide nutrient filtering, flood storage, and wildlife habitat while meeting the appropriate success criteria for the wetland.
- Improve terrestrial and aquatic habitat diversity.
- Establish a contiguous buffer along the project that can serve as a migration corridor for local fauna.

The restored wetlands and headwater wetland valley were planted with one of three different planting zones, each with various species of bare root trees and shrubs. Following the CVS-EEP protocol, sixteen vegetation monitoring plots were established during the baseline data collection immediately after the site was planted. Plot number 14 was damaged during road maintenance and was reset in the same location during the second year of monitoring. The third year of monitoring found a site average of 212 planted stems/acre, with nine of the sixteen vegetation monitoring plots having planted stem densities less than the three and five-year success criteria of 320 and 260 stems/acre, respectively. The site's average total stem density including volunteers is 1,002 stems/acre, with five of the sixteen vegetation plots having densities less than the three and five-year success criteria. The only exotic species identified at the site are parrotfeather (*Myriophyllum aquaticum*), which is present in areas of open standing water, honeysuckle (*Lonicera japonica*), which is scattered throughout the site, and privet (*Ligustrum sinense*), which is predominantly found in the enhancement wetland. Some parts of the site have large cattail (*Typha latifolia*) populations, which may outcompete desirable vegetation and become problematic. There are also areas where the *Juncus effusus* is growing so vigorously that there are no planted stems in the surrounding area. Future supplemental planting is planned for the UT Pembroke site.

The restored headwater wetland valley is stable. In the parts of the site where there are large areas of standing water, the feature becomes less visually defined, but there is still active flow of water across the site. A maintenance plan to increase the rate of draw down through the site has been planned and will be initiated in 2011.

Fifteen groundwater monitoring wells have been established to monitor wetland hydrology. Of these wells, five (4, 5, 6, 9, and 13) were installed in restored wetlands, two (2 and 3) were installed in enhanced wetlands, five (7, 8, 10, 11, and 15) were installed in the headwater wetland valley, and two (12 and 16) were installed in the preserved wetlands as reference wells. A new monitoring well, Monitoring Well 17, was installed in the restored wetland in April 2009. In June 2010, four additional monitoring wells, Monitoring Wells 18, 19, 20, and 21, were installed. These four wells were installed to sample the hydrologic differences between hummocks and depressions in the restored wetland. Wells 18 and 20 are

in depressions and Wells 19 and 21 are on hummocks. During the site's third growing season, 14 of the 17 wells in the restoration and enhancement areas met the success criterion of having saturated soil conditions occurring within 12 inches of the ground surface for a minimum continuous period of 5% (13 days) of the 263 day growing season (March 10 to November 28) during average climatic conditions. The daily rainfall data obtained from a local weather station shows that the area had average rainfall during the 2010 growing season. The wells that did not meet the success criteria - Wells 2, 3, and 4 - each had water above the jurisdictional depth for a maximum of four, five, and six days, respectively. Monitoring Wells 2 and 3 are in the enhanced wetland and Well 4 is in the restored non-riparian wetland.

Summary information/data related to the occurrence 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 Baseline Monitoring Report (formerly Mitigation Plan) and in the Mitigation Plan (formerly the Restoration Plan) documents available on the EEP's website. All raw data supporting the tables and figures in the appendices are available from EEP upon request.

2.0 METHODOLOGY

The cross-sections are surveyed with a total station instrument and stationed according to the distance between survey shots. The stationing is then adjusted to match significant topography changes from the previous year's cross-sections.

The Level 2 of the CVS-EEP protocol (<http://cvs.bio.unc.edu/methods.htm>) was used to collect vegetation data from the UT Pembroke site.

3.0 REFERENCES

Lee, M. T., R. K. Peet, S. D. Roberts, and T. R. Wentworth. 2006. CVS-EEP Protocol for Recording Vegetation, Version 4.0 (<http://cvs.bio.unc.edu/methods.htm>)

Weakley, A. S. 2006. Flora of the Carolinas, Virginia, Georgia, and Surrounding Areas. (http://www.herbarium.unc.edu/FloraArchives/WeakleyFlora_2006-Jan.pdf)

Appendix A

Project Vicinity Map and Background Tables

Directions to the Project Site:
From Raleigh, travel on US-64 E.
Stay straight on US-17 N. Take
exit 224 and take a left at the top of
the ramp. Then take a left onto
Emperor's Landing Rd. Then take a
right onto Tip Toe Rd. Then take a
right onto Macedonia Rd. The site
will be on your right.

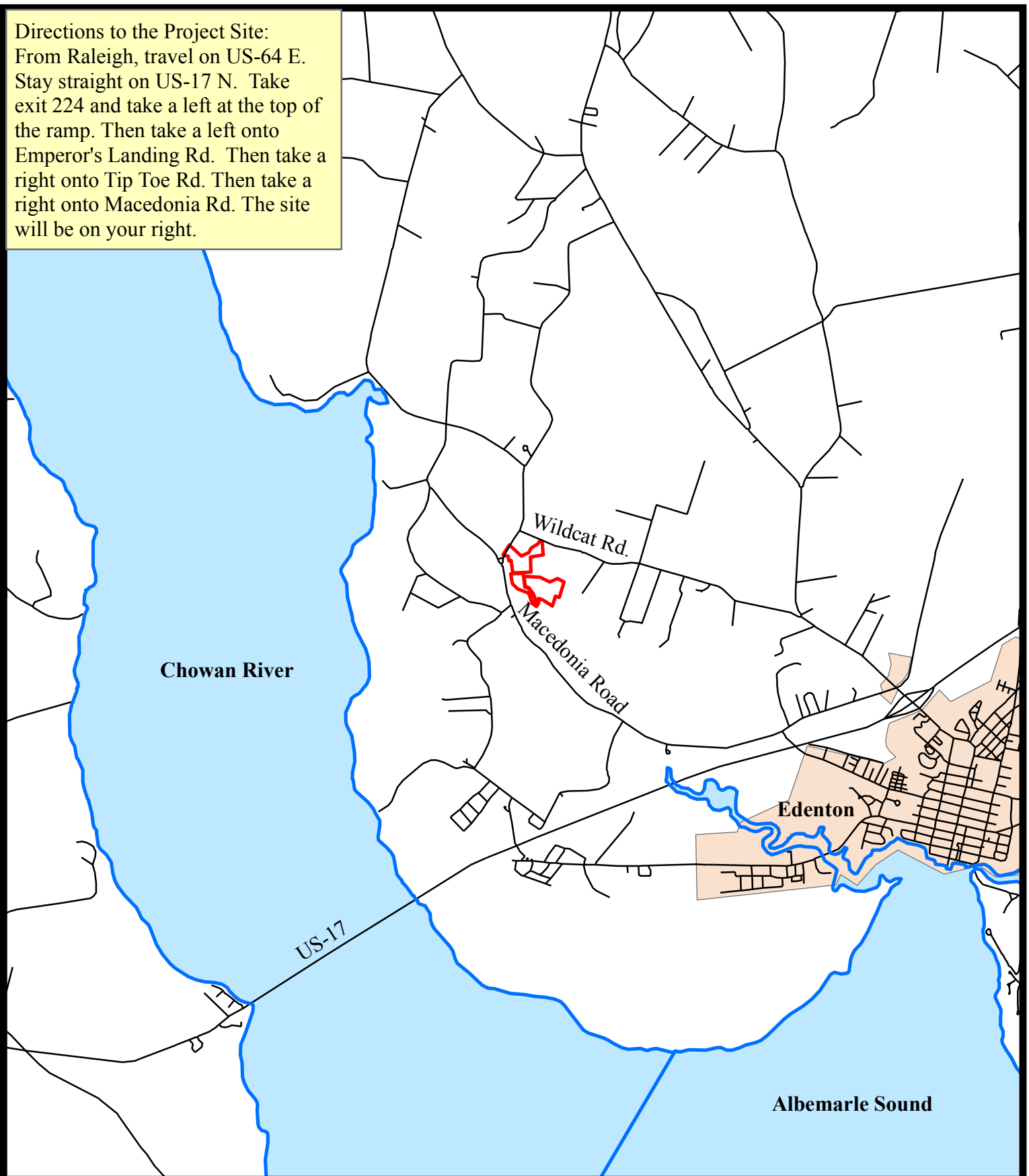


Figure 1. Site Vicinity Map
UT Pembroke Creek, Chowan County, EEP Project # 283



— Project Easement Boundary

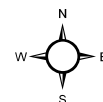


Table 1a. Project Restoration Components									
Project Number and Name: 283 - UT to Pembroke Creek									
Segment/ Reach ID	Existing Linear Feet	Restoration Level	Approach	Linear Feet / Acreage	Stationing	Mitigation Ratio	Mitigation Units	BMP Elements	Comment
Headwater Wetland Valley	-	R	-	4,488 lf	00+00 to 34+73 and 40+00 to 58+72	1:1	4,488	-	This feature is 100 fet wide for its entire length, encompassing 9.96 acres.
Riparian Wetlands	-	R	-	13.81 ac	-	1:1	13.81	-	
Non-Riparian Wetlands	-	R	-	4.46 ac	-	1:1	4.46	-	
Non-Riparian Wetlands	-	E	-	5.26 ac	-	2:1	2.63	-	
Riparian Wooded Wetlands	-	P	-	8.95 ac	-	5:1	1.79	-	
Non-Riparian Wooded Wetlands		P		25.92 ac	-	5:1	5.18	-	

R = Restoration E = Enhancement P = Preservation

Table 1b. Project Component Summations							
Project Number and Name: 283 - UT to Pembroke Creek							
Restoration Level	Stream (lf)	Riparian Wetland (Ac)		Non-Ripar (Ac)	Upland (Ac)	Buffer (Ac)	BMP
		Riverine	Non-Riverine				
Restoration	4,488		13.81	4.46			
Enhancement				5.26			
Enhancement I							
Enhancement II							
Creation							
Preservation			8.95	25.92			
HQ Preservation							
		0	22.76				
Totals (Feet/Acres)	4,488		22.76	35.64	0		
MU Totals	4,488		15.60	12.27	0		

Non-Applicable

Table 2. Project Activity and Reporting History		
Project Number and Name: 283 - UT to Pembroke Creek		
Elapsed Time Since Grading Complete: 2 yr 10 months		
Elapsed Time Since Planting Complete: 3 yr 0 months		
Number of Reporting Years: 3		
Activity or Report	Data Collection Complete	Actual Completion or Delivery
Restoration Plan	2006	Sep 06
Final Design - 90%		Mar 07
Construction		Feb 08
As-Built Survey		Nov 07
Bare-Root Planting		Dec 07
Baseline Monitoring (Mitigation Plan)		Oct 08
Year 1 Monitoring	Nov 08	Mar 09
Year 2 Monitoring	Nov 09	Dec 09
Year 3 Monitoring	Nov 10	Dec 10



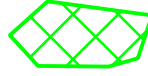


Table 3. Project Contacts Table	
Project Number and Name: 283 - UT Pembroke	
Design Firm	EcoEngineering, A Division of the John R. McAdams Company Inc. 2905 Meridian Parkway Durham, North Carolina 27713 Contact: Mr. James M. Halley, P.E. Phone: (919) 287-4262 Fax: (919) 361-2269
Construction Contractor	Backwater Environmental PO Box 1654 119 Ilex Court Pittsboro, North Carolina 27312 Contact: Mr. Adam McIntyre Phone: (919) 482-8491
Planting Contractor	Carolina Silvics, Inc. 908 Indian Trail Road Edenton, North Carolina 27932 Phone: (252) 482-8491
Monitoring Performers	
Mitigation Plan and MY-01	EcoEngineering, A Division of the John R. McAdams Company Inc. 2905 Meridian Parkway Durham, North Carolina 27713 Contact: Mr. James M. Halley, P.E. Phone: (919) 287-4262 Fax: (919) 361-2269
MY-02, 03	KCI Associates of NC Landmark Center II, Suite 220 4601 Six Forks Rd. Raleigh, NC 27609 Contact: Mr. Adam Spiller Phone: (919) 278-2514 Fax: (919) 783-9266

Table 4. Project Attribute Table	
Project Number and Name: 283 - UT Pembroke	
Project County	Chowan County
Drainage Area	0.4 mi ²
Drainage Impervious Cover Estimate (%)	<5%
Physiographic Region	Outer Coastal Plain
Easement Acreage	59.4 ac
Planted Acreage	32.6 ac
Total Vegetated Acreage	59.4 ac
Ecoregion	Chesapeake-Pamlico Lowlands and Tidal Marshes
Plant Communities	Coastal Plain Small Stream Swamp, Nonriverine Wet Hardwood Forest, and Mesic Mixed Hardwood Forest
Dominant Soil Types	Cape Fear, Conetoe, Dragston, Portsmouth, Roanoke, and Tomotley
Reference Site ID	Reference Sites 1, 2, 3, and 4
USGS HUC for Project and References	03010205
Any portion of the project segment 303d listed?	No
Any portion of the project segment upstream of a 303d listed segment?	No
Reasons for 303d Listing or Stressor	N/A
% of Project Fenced	0%

Appendix B

Visual Assessment Data


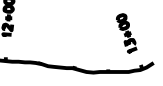


PROJECT CONDITION

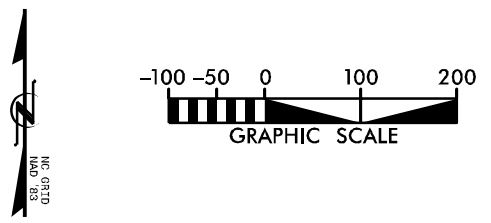
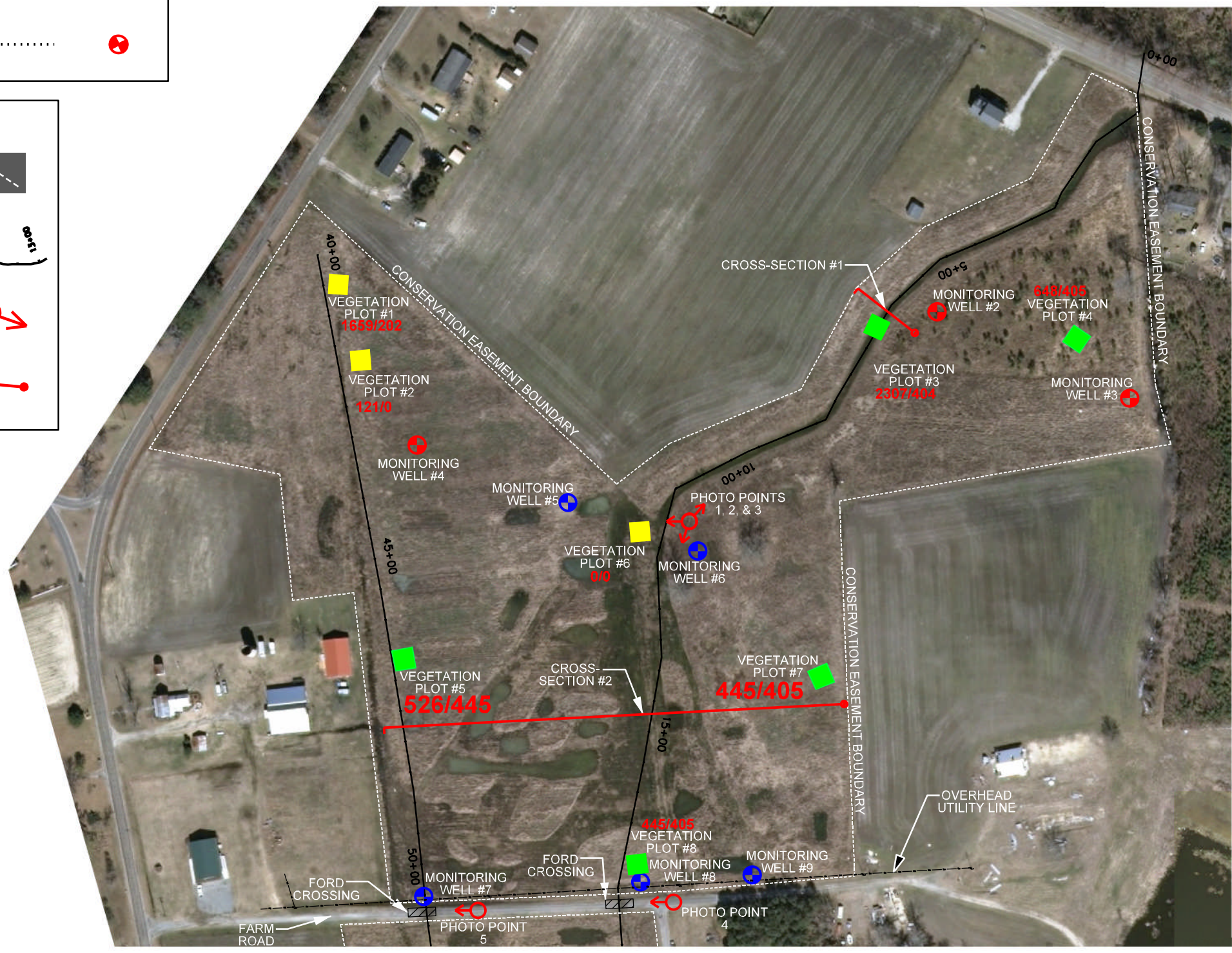
- VEG PLOT ACHIEVING DENSITY CRITERION 
- VEG PLOT BELOW DENSITY CRITERION 
- INVASIVE SPECIES 
- WETLAND GAUGE ACHIEVING HYDROLOGIC CRITERION 
- WETLAND GAUGE BELOW HYDROLOGIC CRITERION 

PROJECT CONDITION DETAILS

VEG PLOT TOTAL / PLANTED STEM DENSITY..... 890/423

LEGEND

- EASEMENT BOUNDARY 
- AS-BUILT STATIONED CENTERLINE 
- PHOTO POINT 
- CROSS-SECTION 



MATCHLINE - SEE SHEET 2

MATCHLINE - SEE SHEET 2

NO.	REVISIONS	DATE	APPROVED







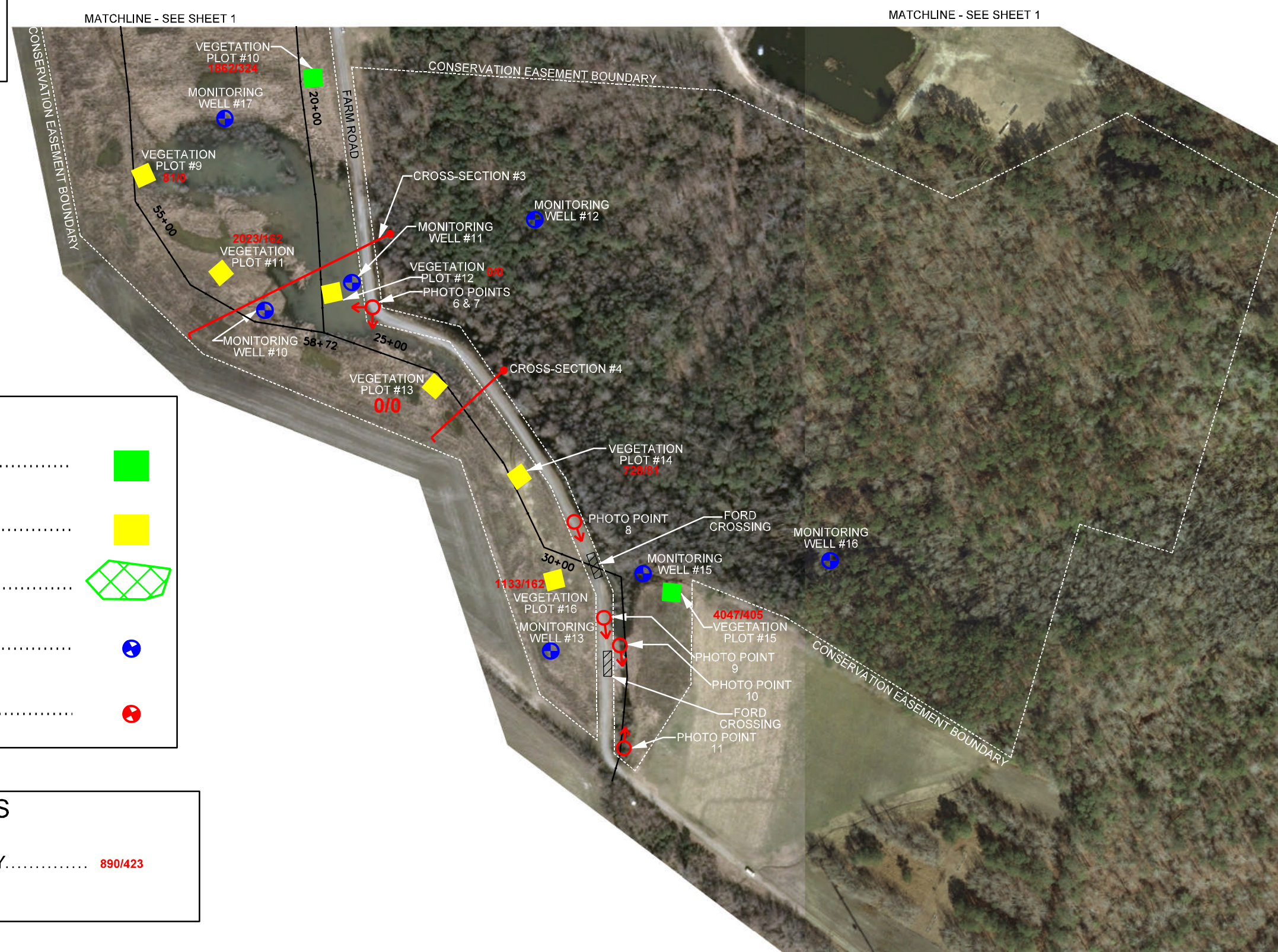
KCI ASSOCIATES OF NC
 ENGINEERS • PLANNERS • SCIENTISTS
 4601 SIX FORKS ROAD
 RALEIGH, NORTH CAROLINA 27609

UT PEMBROKE CREEK
 WETLAND AND STREAM RESTORATION
 EEP PROJECT #283
 CHOWAN COUNTY, NORTH CAROLINA
 UT PEMBROKE, MONITORING YEAR 03



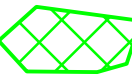


DATE: DEC 2010
 SCALE: 1" = 200'
 CURRENT CONDITION PLAN VIEW
 SHEET 1 OF 2

LEGEND

- EASEMENT BOUNDARY 
- AS-BUILT STATIONED CENTERLINE 
- PHOTO POINT 
- CROSS-SECTION 



PROJECT CONDITION

- VEG PLOT ACHIEVING DENSITY CRITERION 
- VEG PLOT BELOW DENSITY CRITERION 
- INVASIVE SPECIES 
- WETLAND GAUGE ACHIEVING HYDROLOGIC CRITERION 
- WETLAND GAUGE BELOW HYDROLOGIC CRITERION 

PROJECT CONDITION DETAILS

VEG PLOT TOTAL / PLANTED STEM DENSITY..... 890/423

NO.	SYMBOL	DESCRIPTION	DATE	APPROVED



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RALEIGH, NORTH CAROLINA 27609

UT PEMBROKE CREEK
WETLAND AND STREAM RESTORATION
EEP PROJECT #283
CHOWAN COUNTY, NORTH CAROLINA
UT PEMBROKE, MONITORING YEAR 03

DATE: DEC 2010
SCALE: 1" = 200'
CURRENT CONDITION
PLAN VIEW
SHEET 2 OF 2

Table 5. Vegetation Condition Assessment						
Project Number and Name: 283 - UT to Pembroke Creek Wetland and Stream						
Planted Acreage 32.6			Easement Acreage 59.4			
Vegetation Category	Definitions	Mapping Threshold	CCPV Depiction	Number of Polygons	Combined Acreage	% of Planted Acreage
1. Bare Areas	Very limited cover of both woody and herbaceous material.	0.1 acres	Pattern and Color	0	0.00	0.0%
2. Low Stem Density Areas	Woody stem densities clearly below target levels based on MY3, 4, or 5 stem count criteria.	0.1 acres	Not Depicted, Covers Most of Restoration Area	2	27.36	83.9%
Total				2	27.36	83.9%
3. Areas of Poor Growth Rates or Vigor	Areas with woody stems of a size class that are obviously small given the monitoring year.	0.25 acres	Pattern and Color	0	0.00	0.0%
Cumulative Total				2	27.36	83.9%
4. Invasive Areas of Concern	Areas or points (if too small to render as polygons at map scale).	1000 SF	Pattern and Color	0	0.00	0.0%
5. Easement Encroachment Areas	Areas or points (if too small to render as polygons at map scale).	none	Pattern and Color	0	0.00	0.0%

Photo Point Photos



Photo Point 1 – 12/2/09 - MY 02 – Facing northwest toward Wildcat Road.



Photo Point 1 – 12/8/10 - MY 03 – Facing northwest toward Wildcat Road.



Photo Point 2 – 12/2/09 - MY 02 – Facing west toward Macedonia Road.



Photo Point 2 – 12/8/10 - MY 03 – Facing west toward Macedonia Road.



Photo Point 3 – 12/2/09 - MY 02 – Facing south toward the downstream end of the project.



Photo Point 3 – 12/8/10 - MY 03 – Facing south toward the downstream end of the project.



Photo Point 4 – 12/2/09 - MY 02 – Road Crossing Type A – Station 17+75 – Facing west toward Macedonia Road.



Photo Point 4 – 12/8/10 - MY 03 – Road Crossing Type A – Station 17+75 – Facing west toward Macedonia Road.



Photo Point 5 – 12/2/09 - MY 02 – Road Crossing Type A – Station 50+75 – Facing west toward Macedonia Road.



Photo Point 5 – 12/8/10 - MY 03 – Road Crossing Type A – Station 50+75 – Facing west toward Macedonia Road.



Photo Point 6 – 12/2/09 - MY 02 – Facing northwest toward Macedonia Road.



Photo Point 6 – 12/8/10 - MY 03 – Facing northwest toward Macedonia Road.



Photo Point 7 – 12/2/09 - MY 02 – Facing south.



Photo Point 7 – 12/8/10 - MY 03 – Facing south.



Photo Point 8 – 12/2/09 - MY 02 – Road Crossing Type B – Station 30+50



Photo Point 8 – 12/8/10 - MY 03 – Road Crossing Type B – Station 30+50



Photo Point 9 – 12/2/09 - MY 02 – Road Crossing Type C – Station 32+50



Photo Point 9 – 12/8/10 - MY 03 – Road Crossing Type C – Station 32+50



Photo Point 10 – 12/2/09 - MY 02 – Grade transition, facing downstream.



Photo Point 10 – 12/8/10 - MY 03 – Grade transition, facing downstream.



Photo Point 11 – 12/2/09 - MY 02 – Grade transition, facing upstream



Photo Point 11 – 12/8/10 - MY 03 – Grade transition, facing upstream.

Vegetation Monitoring Plot Photos



Plot 1 – 10/26/10 - MY 03 - Facing Macedonia Road on the northwestern portion of the site



Plot 2 – 10/26/10 - MY 03 - Facing Macedonia Road on the northwestern portion of the site



Plot 3 – 10/27/10 - MY 03 - Facing intersection of Macedonia Road and Wildcat Road



Plot 4 – 10/27/10 - MY 03 - Facing Macedonia Road and Wildcat Road on the northeastern portion of the site



Plot 5 – 10/27/10 - MY 03 - Facing Macedonia Road on western portion of the site



Plot 6 – 10/27/10 - MY 03 - Facing Macedonia Road on the central portion of the site



Plot 7 – 10/26/10 - MY 03 - Facing intersection of Macedonia Road on the western portion of the site



Plot 8 – 10/26/10 - MY 03 - Facing Macedonia Road on central portion of the site just north of the main road



Plot 9 – 10/27/10 - MY 03 - Facing Macedonia Road on western portion of the site near the pond



Plot 10 – 10/27/10 - MY 03 - Facing Macedonia Road just southwest of the intersection of the main road and the dirt access road



Plot 11 – 10/26/10 - MY 03 - Facing Macedonia Road just south of Plot 9 near the pond



Plot 12 – 10/26/10 - MY 03 - Facing Macedonia Road just south of the pond



Plot 13 – 10/26/10 - MY 03 - Facing Macedonia Road on southwestern portion of the site



Plot 14 – 10/26/10 - MY 03 - Facing Macedonia Road on southwestern portion of the site



Plot 15 – 10/26/10 - MY 03 - Facing east on the southeastern portion of the site



Plot 16 – 10/26/10 - MY 03 - Facing Macedonia Road on the southwestern portion of the site

Appendix C

Vegetation Plot Data

Table 6. Vegetation Plot Mitigation Success Summary Table		
Project Number and Name: 283 - UT Pembroke		
Vegetation Plot ID	Monitoring Year 03 Planted Stem Density (stems/acre)	Vegetation Survival Threshold Met?
1	202	No
2	0	No
3	405	Yes
4	405	Yes
5	445	Yes
6	0	No
7	405	Yes
8	405	Yes
9	0	No
10	324	Yes
11	162	No
12	0	No
13	0	No
14	81	No
15	405	Yes
16	162	No

Table 7. CVS Vegetation Plot Metadata	
Project Number and Name: 283 - UT Pembroke	
Report Prepared By	Laura Lord
Date Prepared	12/22/2010 14:55
database name	KCI-2010-A.mdb
database location	M:\2007\12071067_2007 EEP OPEN END\Veg_database
computer name	12-216A-CF18
file size	50597888
DESCRIPTION OF WORKSHEETS IN THIS DOCUMENT-----	
Metadata	Description of database file, the report worksheets, and a summary of project(s) and project data.
Proj, planted	Each project is listed with its PLANTED stems per acre, for each year. This excludes live stakes.
Proj, total stems	Each project is listed with its TOTAL stems per acre, for each year. This includes live stakes, all planted stems, and all natural/volunteer stems.
Plots	List of plots surveyed with location and summary data (live stems, dead stems, missing, etc.).
Vigor	Frequency distribution of vigor classes for stems for all plots.
Vigor by Spp	Frequency distribution of vigor classes listed by species.
Damage	List of most frequent damage classes with number of occurrences and percent of total stems impacted by each.
Damage by Spp	Damage values tallied by type for each species.
Damage by Plot	Damage values tallied by type for each plot.
Planted Stems by Plot and Spp	A matrix of the count of PLANTED living stems of each species for each plot; dead and missing stems are excluded.
ALL Stems by Plot and spp	A matrix of the count of total living stems of each species (planted and natural volunteers combined) for each plot; dead and missing stems are excluded.
PROJECT SUMMARY-----	
Project Code	283
project Name	UT Pembroke
Description	Stream and wetland restoration site in Chowan County, NC
River Basin	Roanoke
length(ft)	4,488
stream-to-edge width (ft)	50
area (sq m)	41,691
Required Plots (calculated)	11
Sampled Plots	16

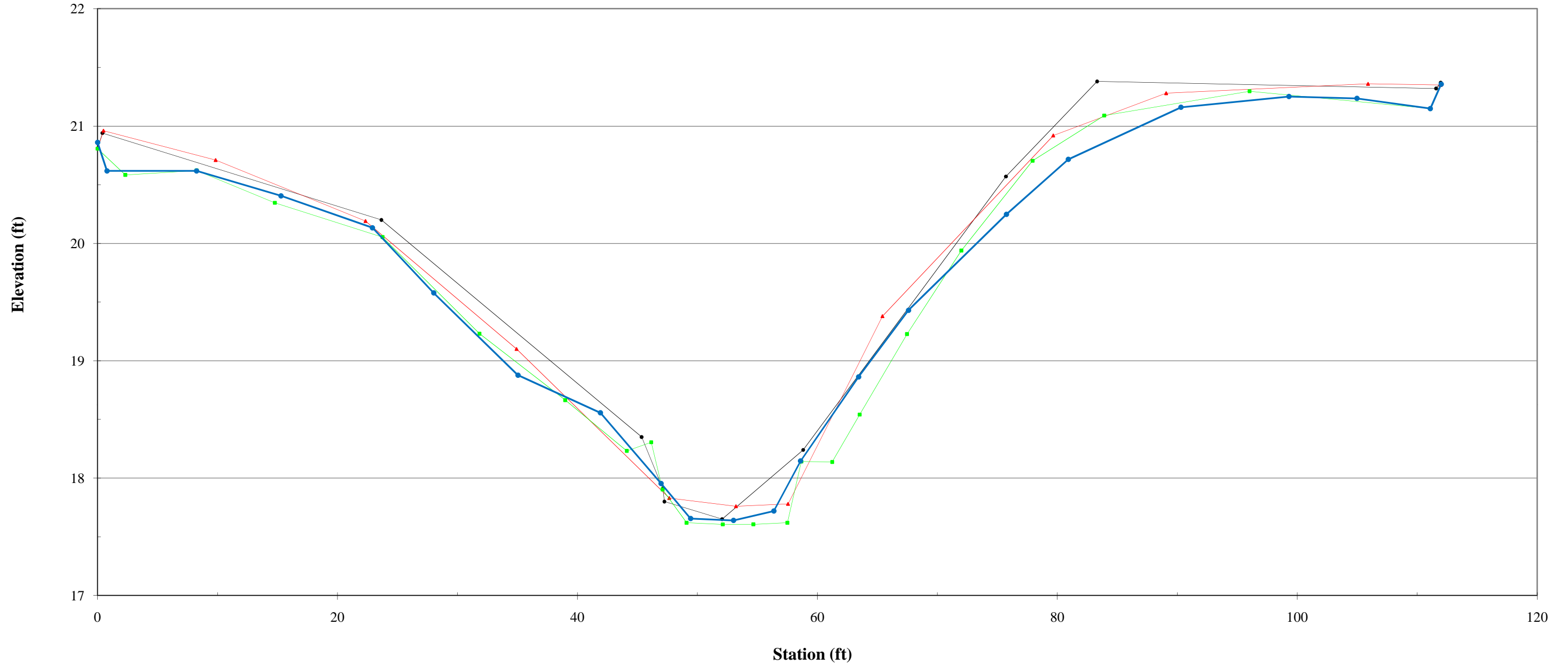
Table 8. Stem Count Total and Planted by Plot and Species
Project Number and Name: 283 - UT Pembroke

			Current Plot Data (MY3 2010)																																					
Scientific Name	Common Name	Species Type	E283-01-0001			E283-01-0002			E283-01-0003			E283-01-0004			E283-01-0005			E283-01-0006			E283-01-0007			E283-01-0008			E283-01-0009			E283-01-0010										
			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								
<i>Acer rubrum</i>	red maple	Tree																																						
<i>Baccharis</i>	baccharis	Shrub Tree																																						
<i>Carya</i>	hickory	Tree																																						
<i>Diospyros virginiana</i>	common persimmon	Tree																																						
<i>Fraxinus pennsylvanica</i>	green ash	Tree																																						
<i>Itea virginica</i>	Virginia sweetspire	Shrub																																						
<i>Juglans nigra</i>	black walnut	Tree																																						
<i>Ligustrum sinense</i>	Chinese privet	Shrub Tree																																						
<i>Liquidambar styraciflua</i>	sweetgum	Tree			36							18																												
<i>Liriodendron tulipifera</i>	tuliptree	Tree		1	1							3	3		7	7								4	4									2						
<i>Morella cerifera</i>	wax myrtle	Shrub Tree										4	8																					3	3					
<i>Nyssa biflora</i>	swamp tupelo	Tree										1	1																						3	3				
<i>Persea palustris</i>	swamp bay	Tree																																						
<i>Pinus taeda</i>	loblolly pine	Tree																																						
<i>Platanus occidentalis</i>	American sycamore	Tree			1							3																												
<i>Populus deltoides</i>	eastern cottonwood	Tree																																						
<i>Prunus serotina</i>	black cherry	Shrub Tree																																						
<i>Pyrus calleryana</i>	Callery pear	Tree																																						
<i>Quercus</i>	oak	Shrub Tree																																		1				
<i>Quercus alba</i>	white oak	Tree		1	1																																			
<i>Quercus falcata</i>	southern red oak	Tree																																						
<i>Quercus laurifolia</i>	laurel oak	Tree																																						
<i>Quercus lyrata</i>	overcup oak	Tree																																						
<i>Quercus michauxii</i>	swamp chestnut oak	Tree		1	1							1	1																											
<i>Quercus nigra</i>	water oak	Tree		1	1							1	1																											
<i>Quercus phellos</i>	willow oak	Tree																																		2	35			
<i>Rhus</i>	sumac																																							
<i>Rhus copallinum</i>	flameleaf sumac	Shrub Tree																																						
<i>Salix nigra</i>	black willow	Tree																																						
<i>Salix sericea</i>	silky willow	Shrub Tree																																						
<i>Sambucus canadensis</i>	Common Elderberry	Shrub Tree																																						
<i>Sambucus nigra</i>	European black elderberry	Shrub Tree																																						
<i>Taxodium distichum</i>	bald cypress	Tree																																						
<i>Ulmus americana</i>	American elm	Tree																																			2	2		
Stem count			0	4	41	0	0	3	0	10	57	0	10	16	0	11	13	0	0	0	0	10	11	0	10	11	0	0	2	0	8	46								
size (ares)			1			1			1			1			1			1			1			1			1			1			1			1				
size (ACRES)			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02				
Species count			0	4	6	0	0	1	0	5	9	0	3	5	0	5	6	0	0	0	0	4	5	0	4	5	0	0	1	0	3	6								
Stems per ACRE			0	161.9	1659	0	0	121.4	0	404.7	2307	0	404.7	647.5	0	445.2	526.1	0	0	0	0	404.7	445.2	0	404.7	445.2	0	0	80.94	0	323.7	1862								

Appendix D

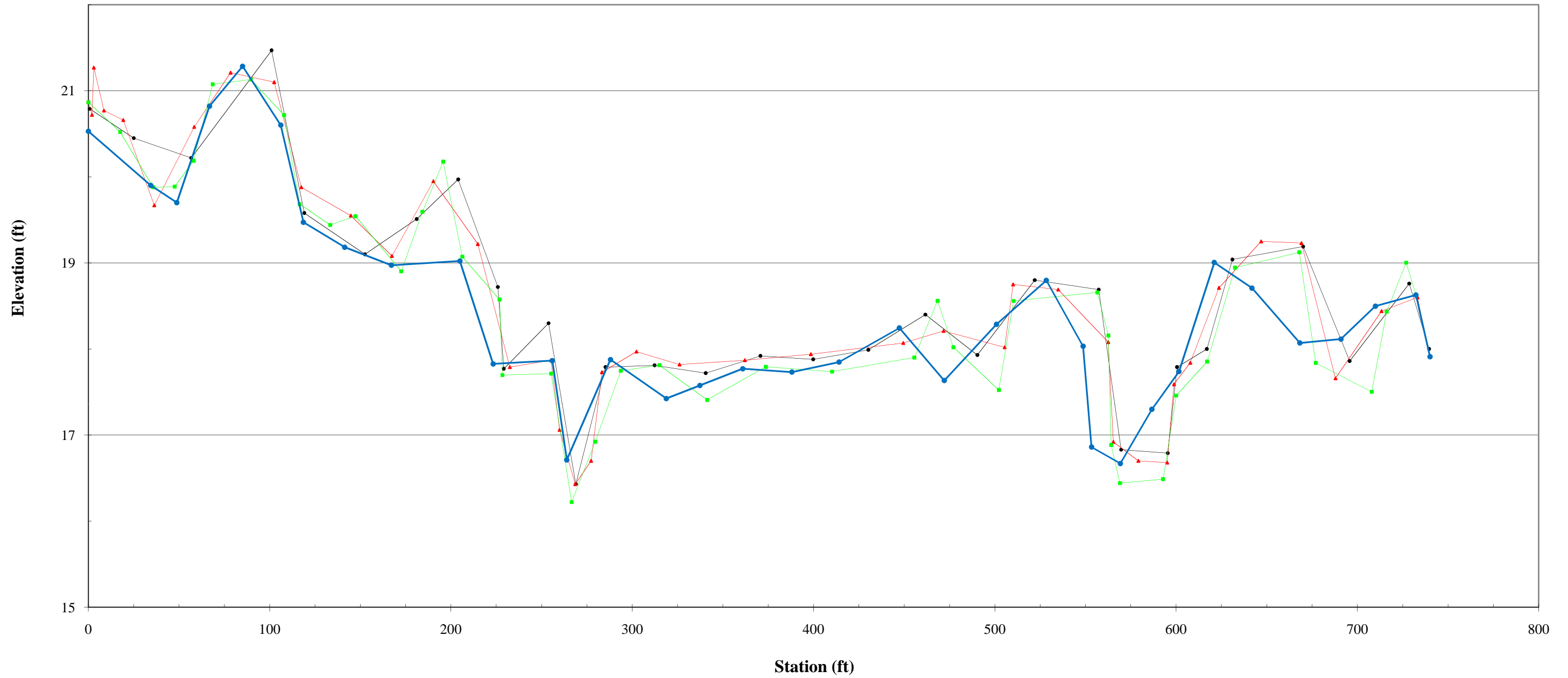
Wetland Survey Data

**Cross-Section 1
UT Pembroke
EEP Project Number 283- MY03**



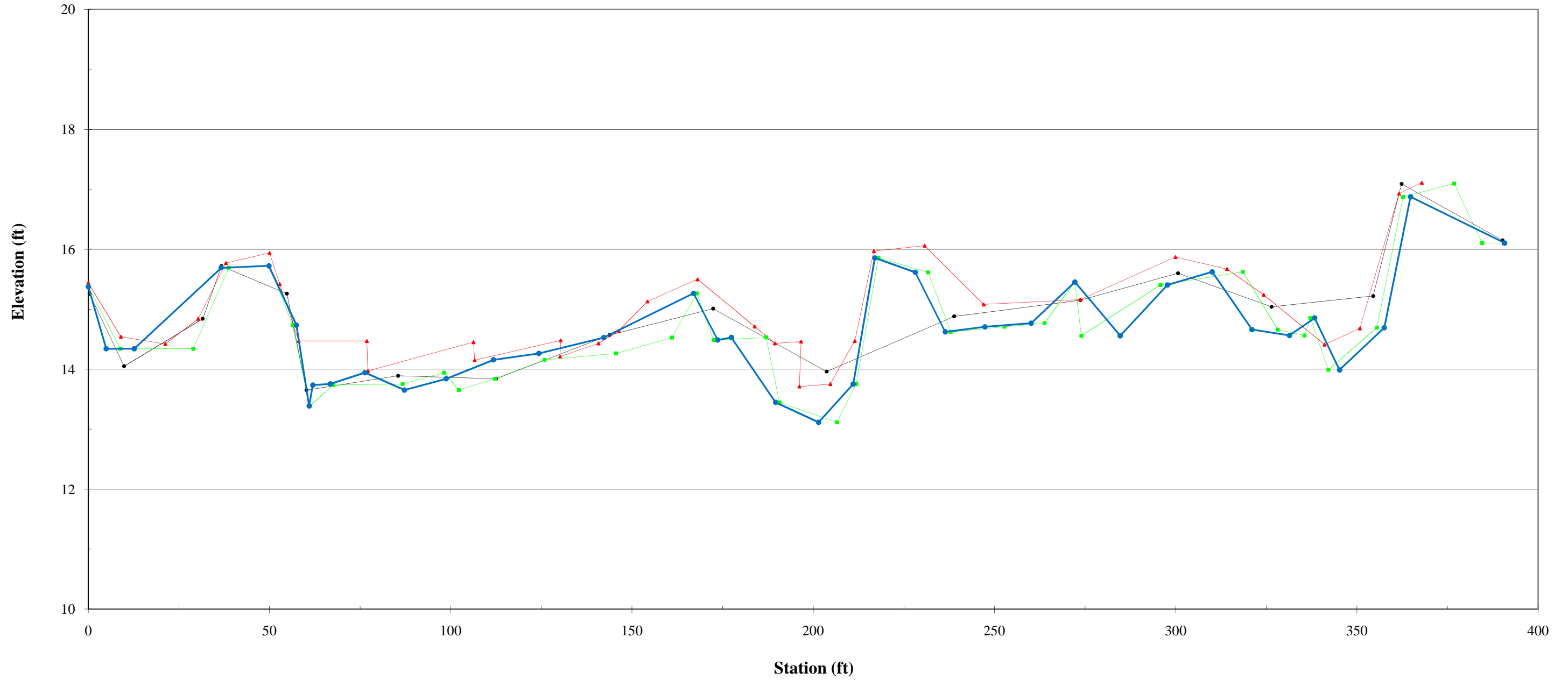
—•— MY-00 —▲— MY-01, 10/11/08 —■— MY-02, 10/21/09 —●— MY-03, 10/27/10

**Cross-Section 2
UT Pembroke
EEP Project Number 283- MY03**



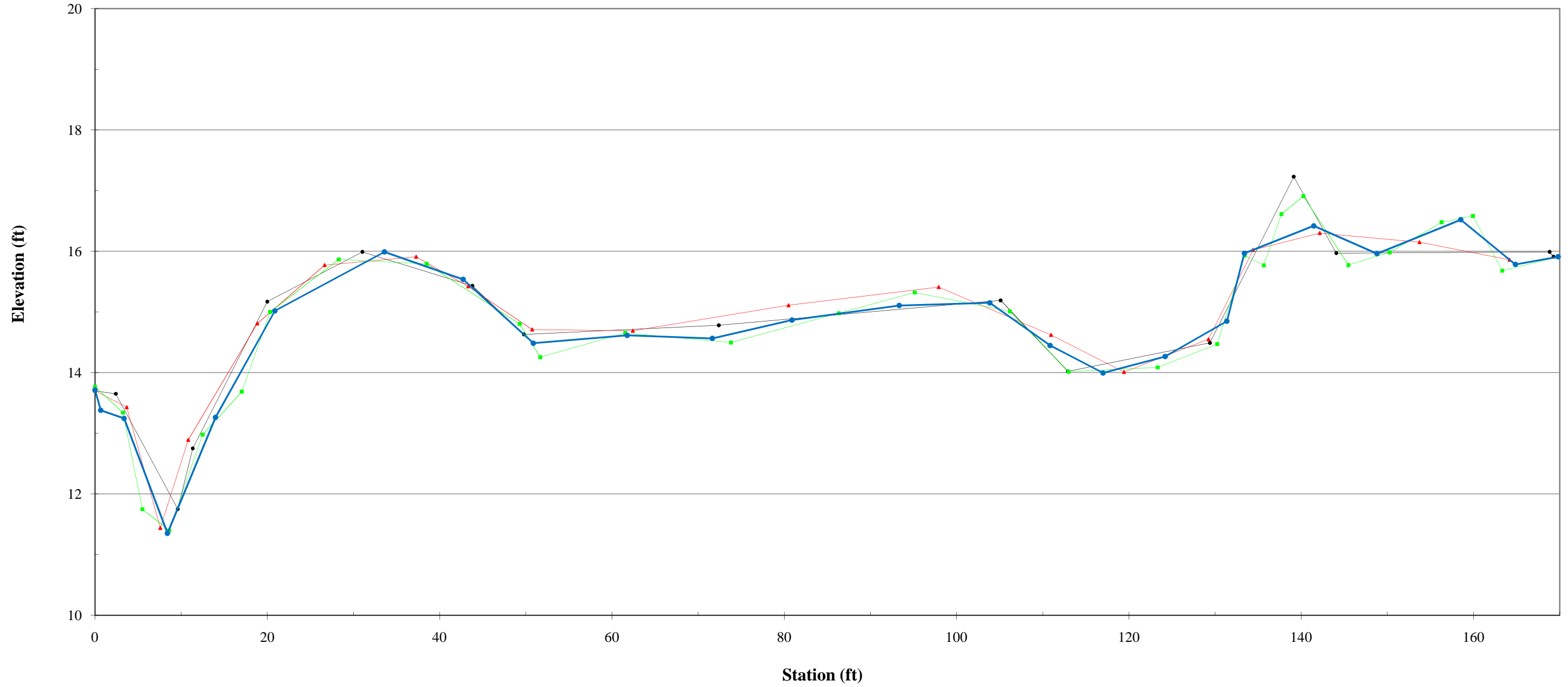
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**Cross-Section 3
UT Pembroke
EEP Project Number 283- MY03**



—●— MY-00 —▲— MY-01, 10/11/08 —■— MY-02, 10/21/09 —●— MY-03, 10/27/10

**Cross-Section 4
UT Pembroke
EEP Project Number 283- MY03**

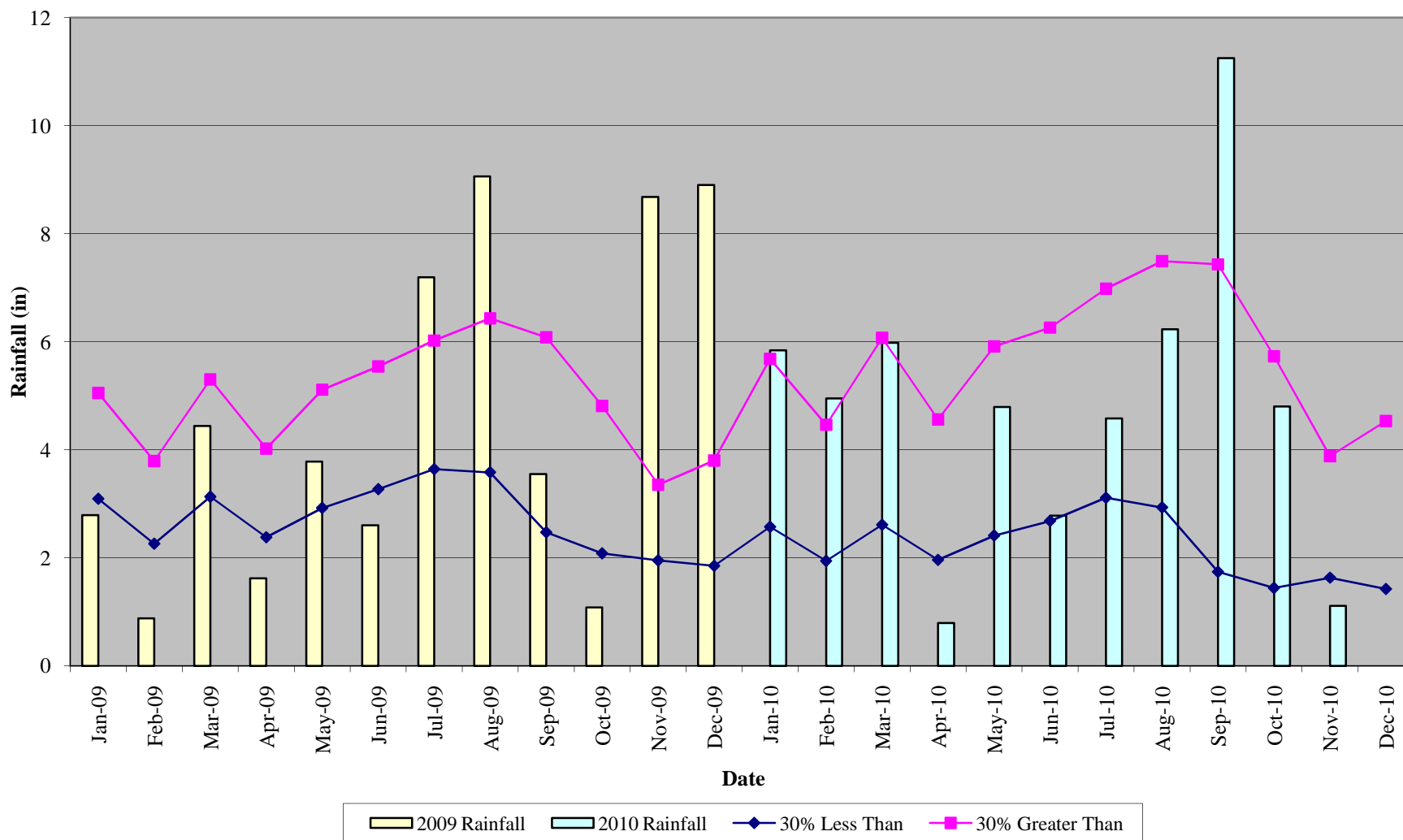


—●— MY-00 —▲— MY-01, 10/11/08 —■— MY-02, 10/21/09 —●— MY-03, 10/27/10

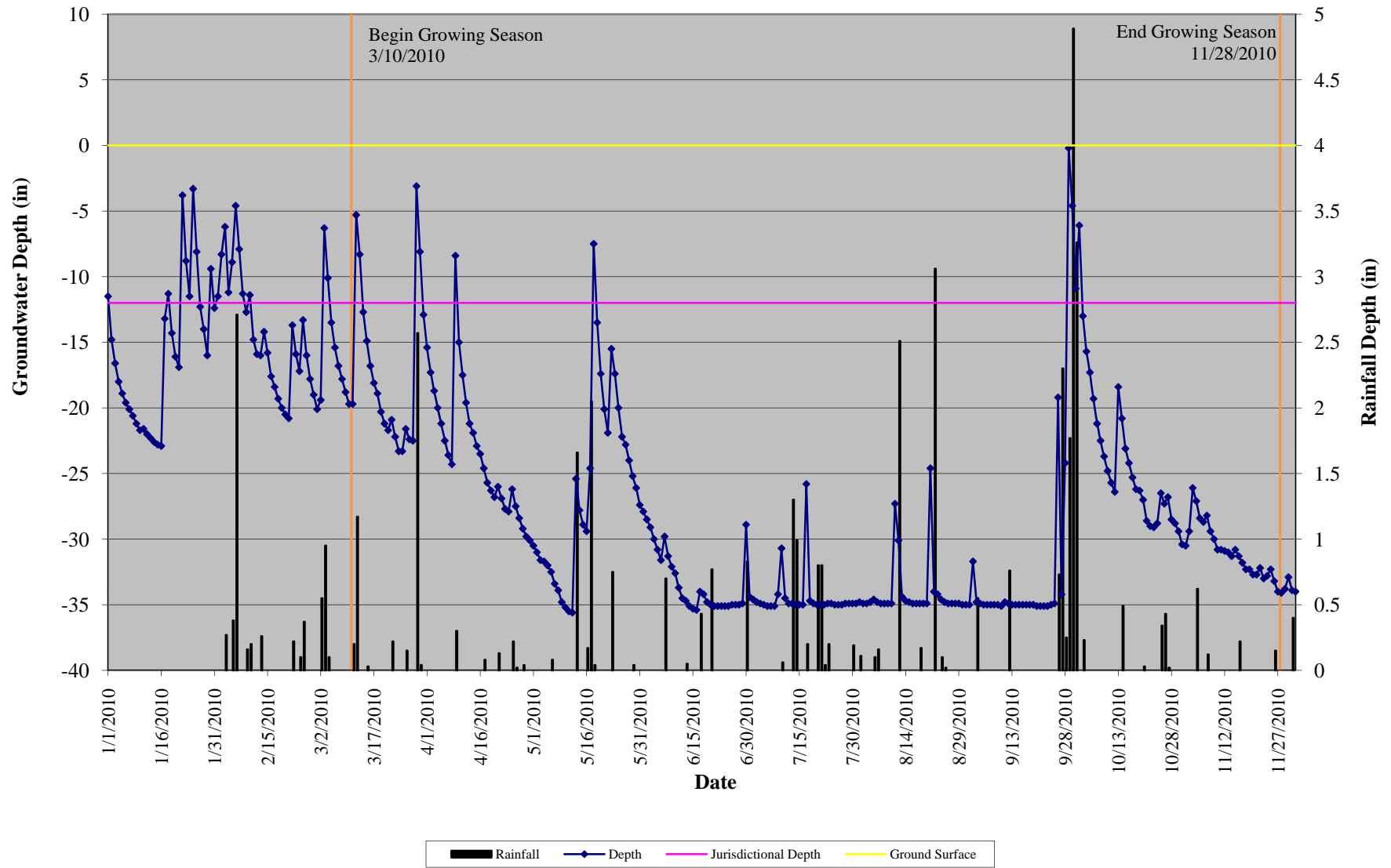
Appendix E

Hydrologic Data

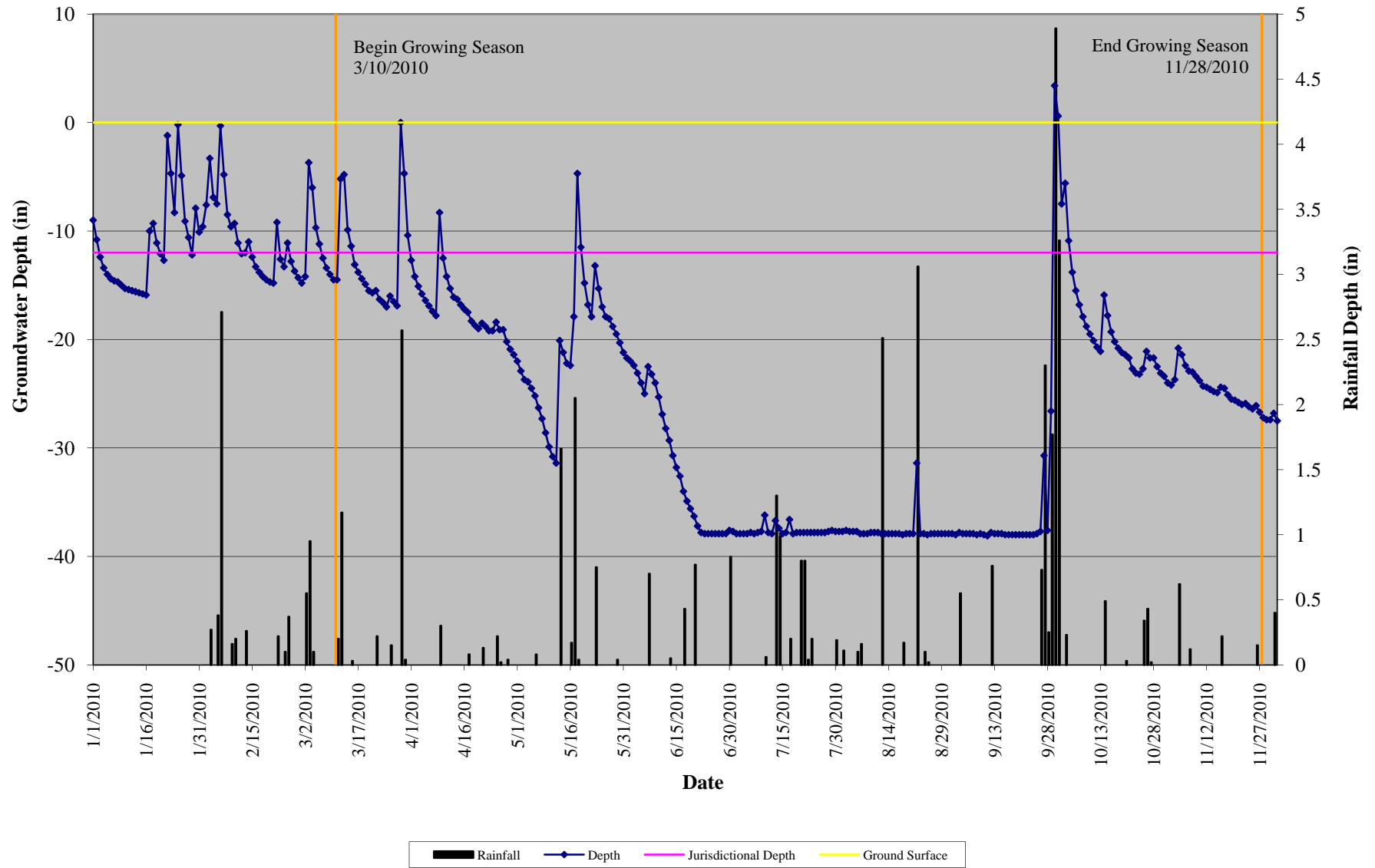
UT Pembroke 30-70 Percentile Graph 2009-2010
Edenton, NC Monthly Rainfall



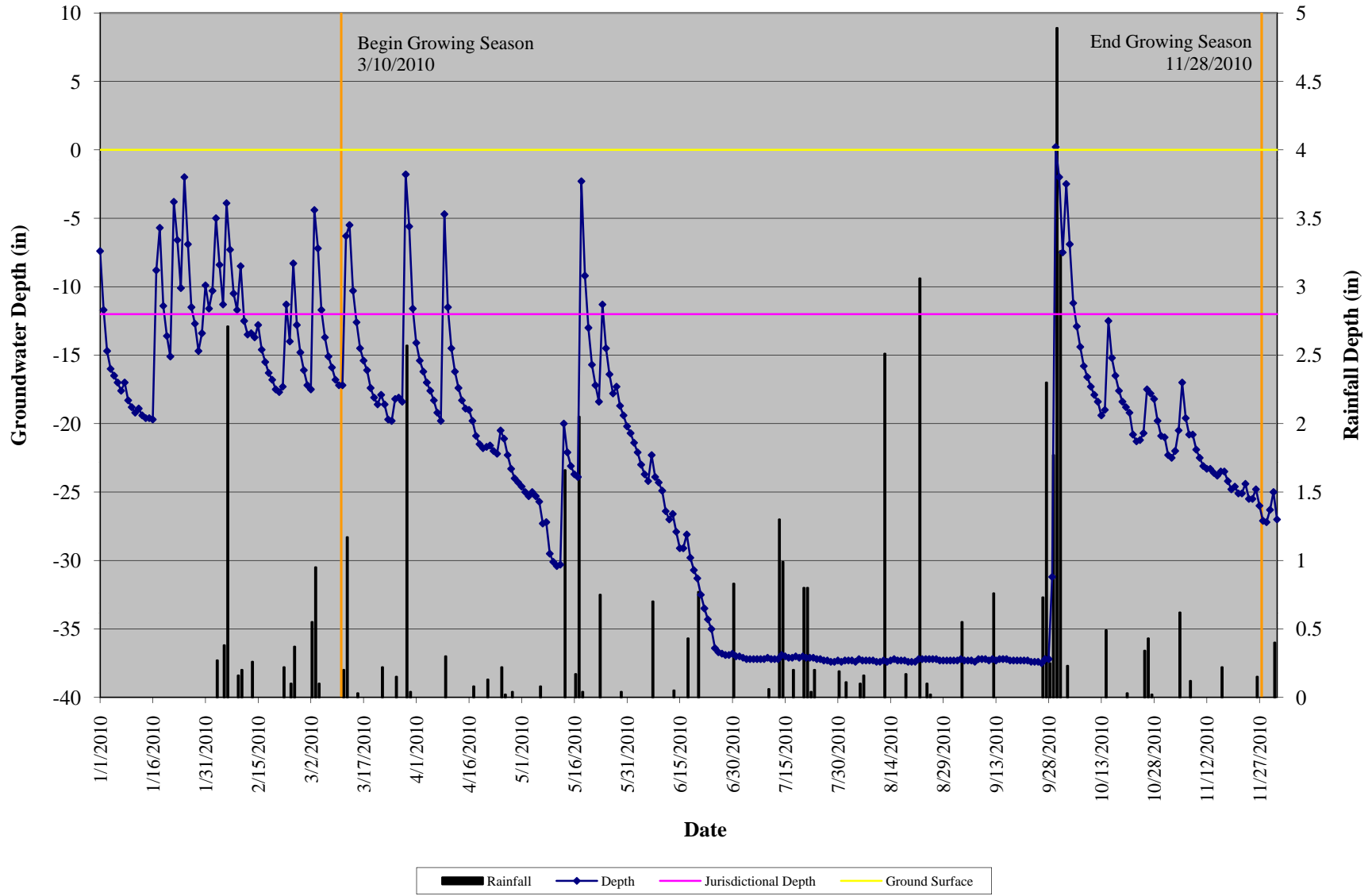
UT Pembroke MY03 Ground Water Monitoring Well #2



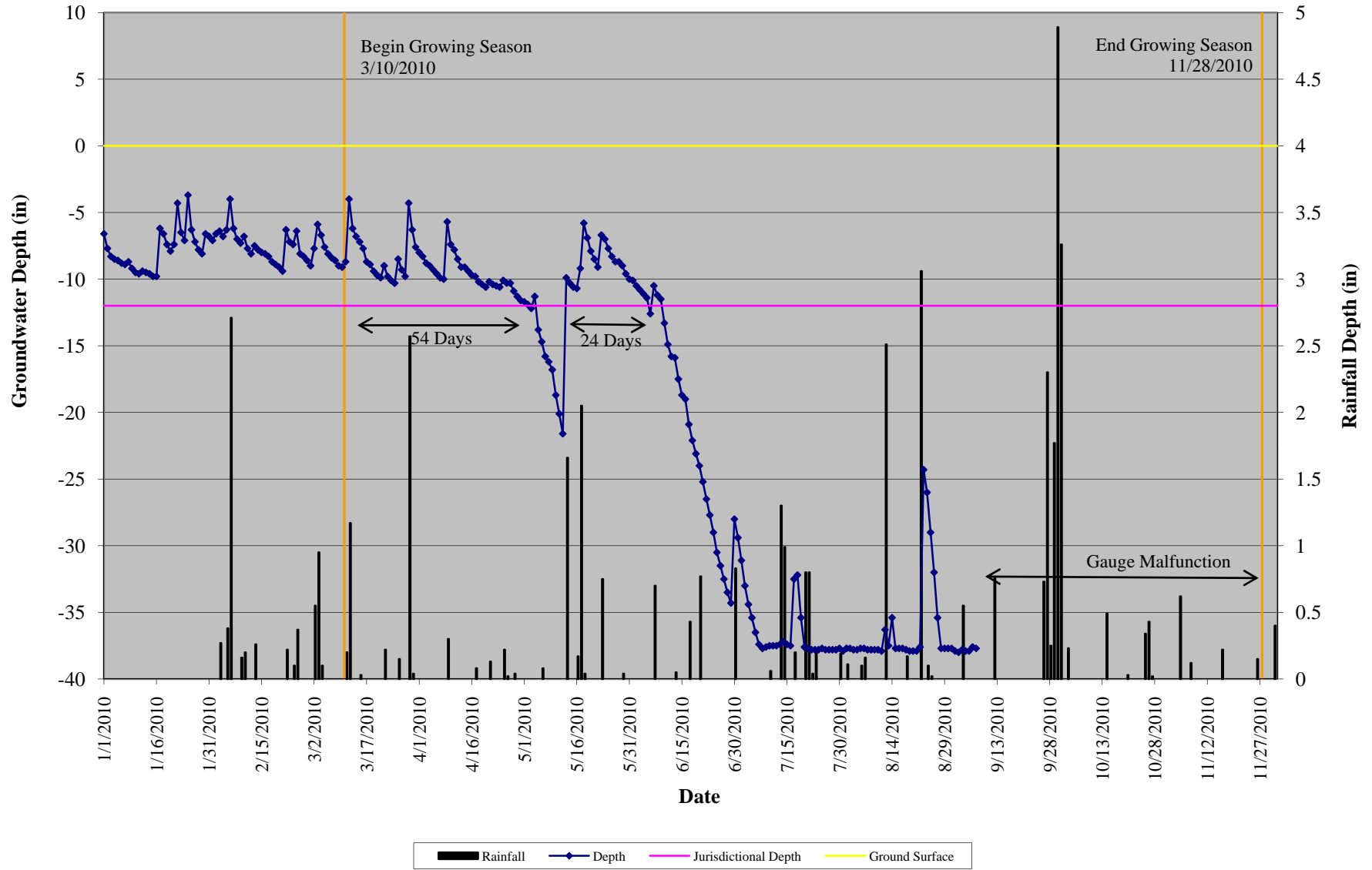
UT Pembroke MY03 Ground Water Monitoring Well #3



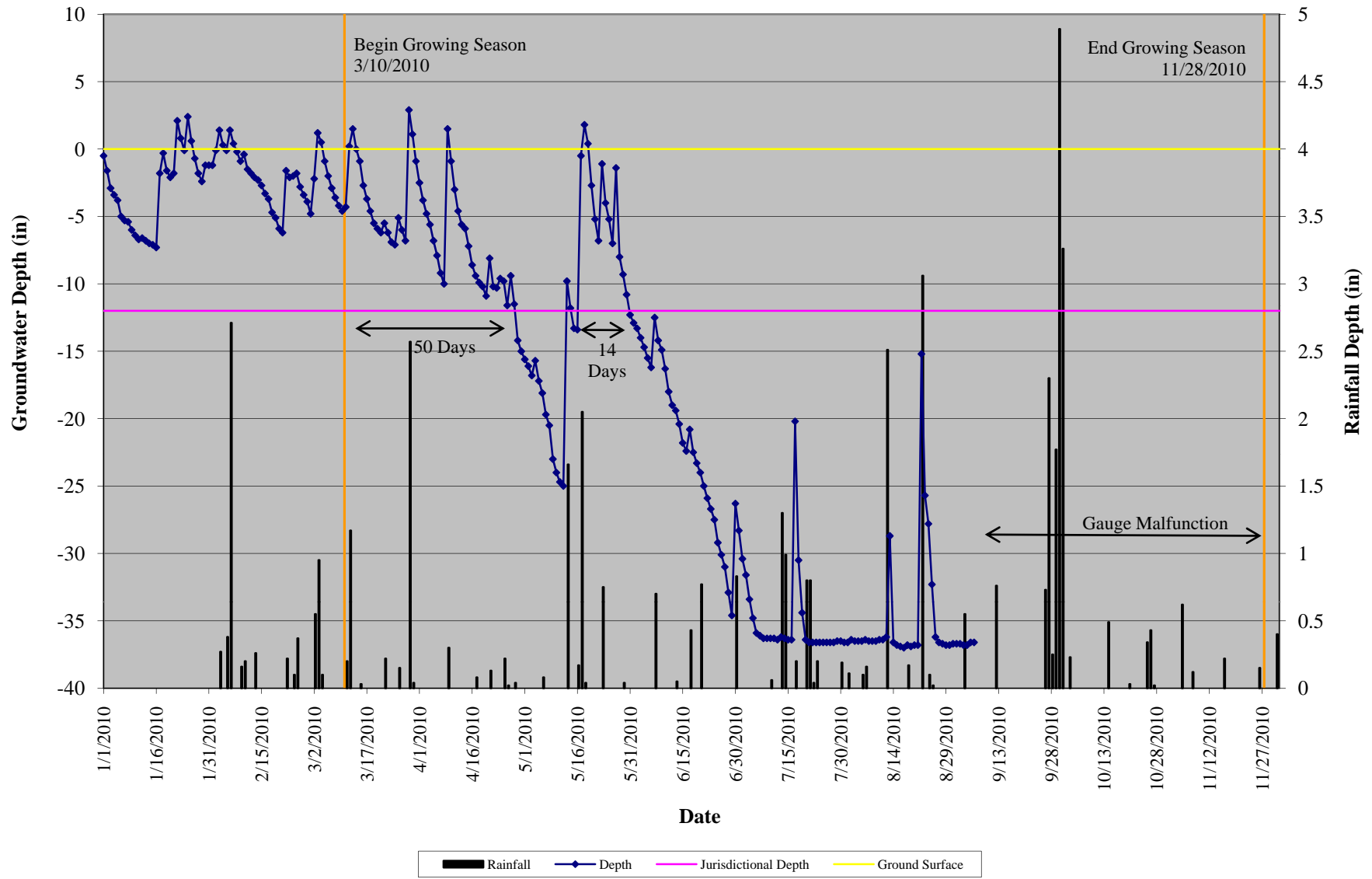
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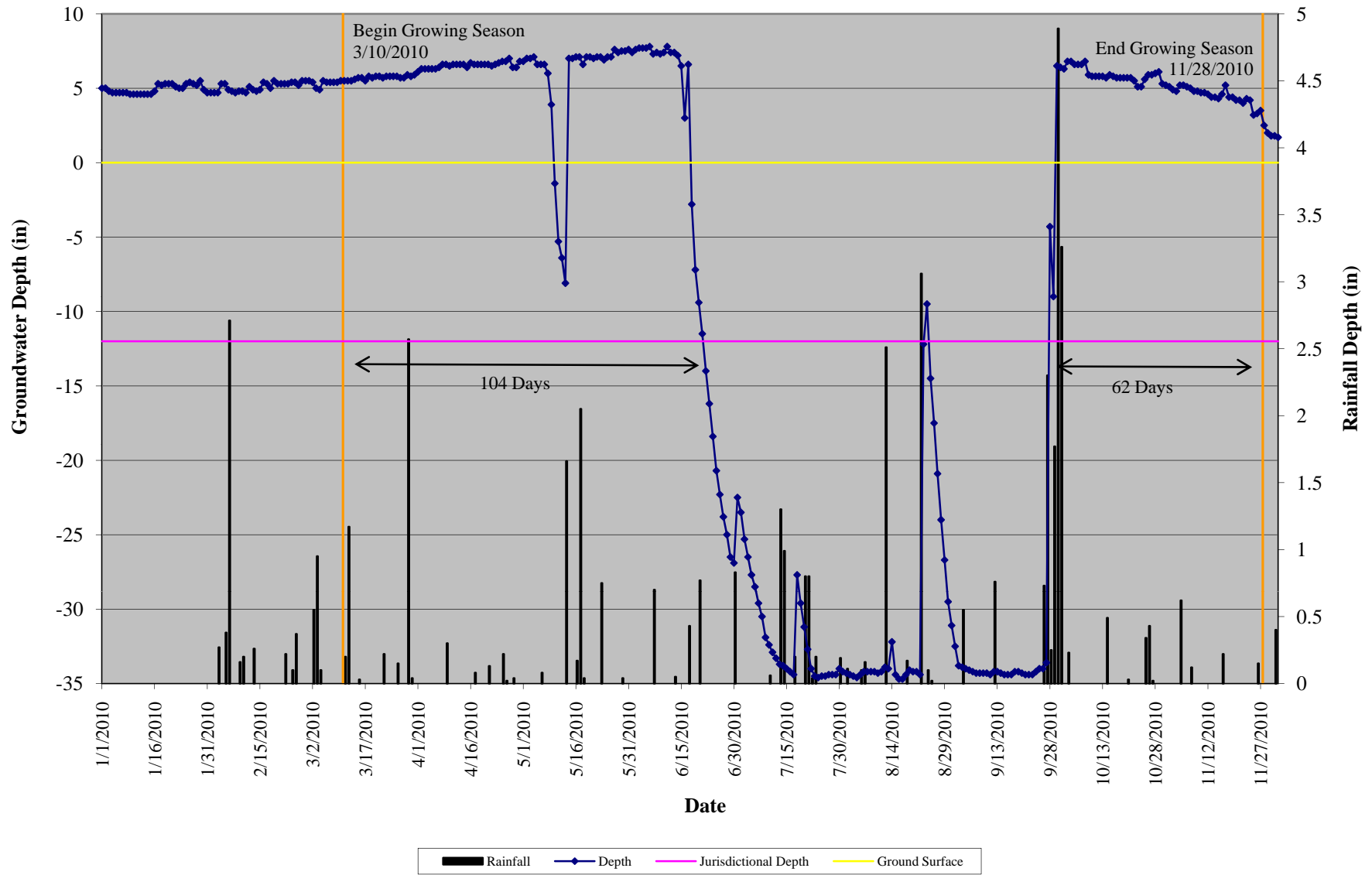
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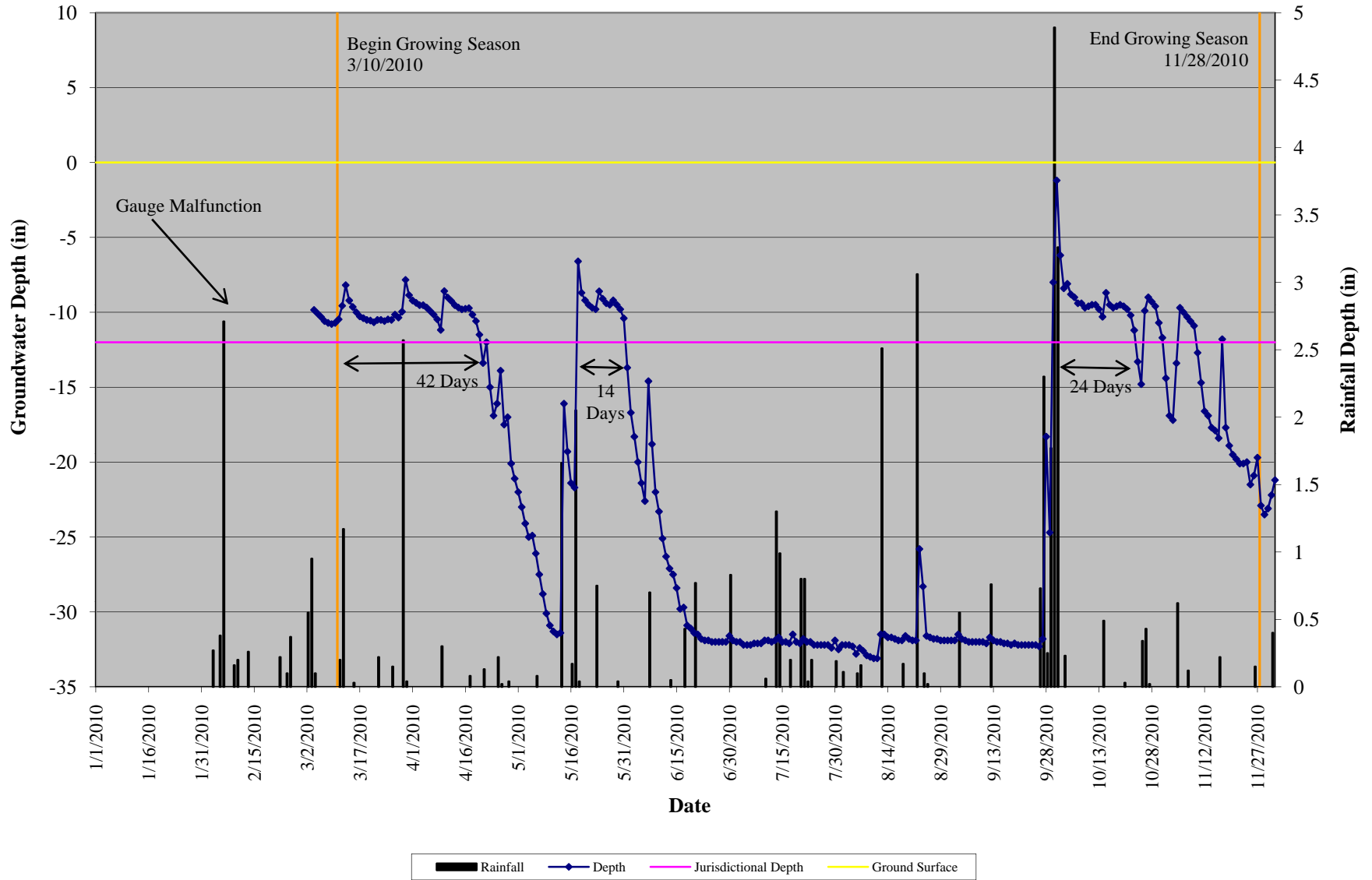
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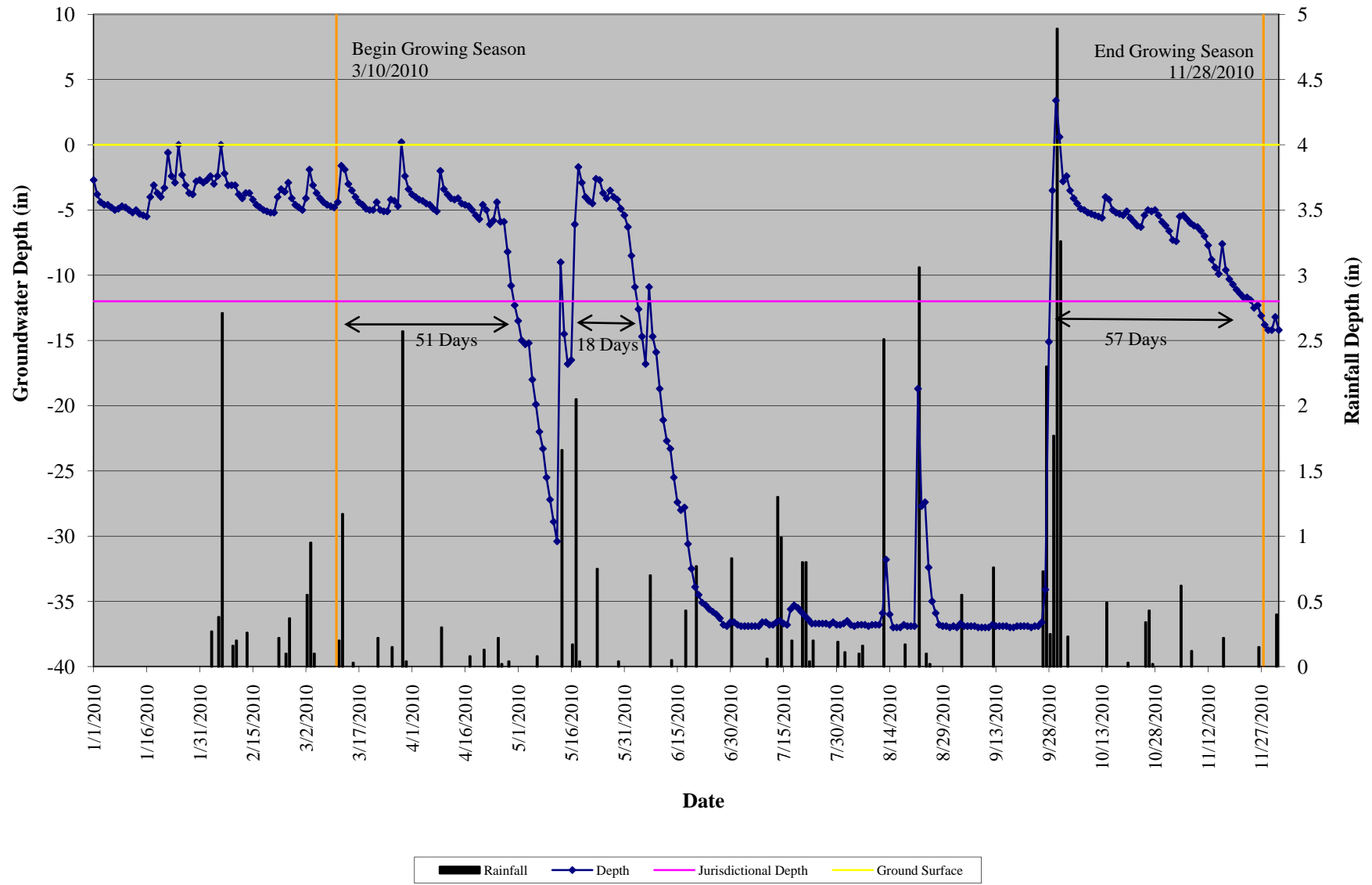
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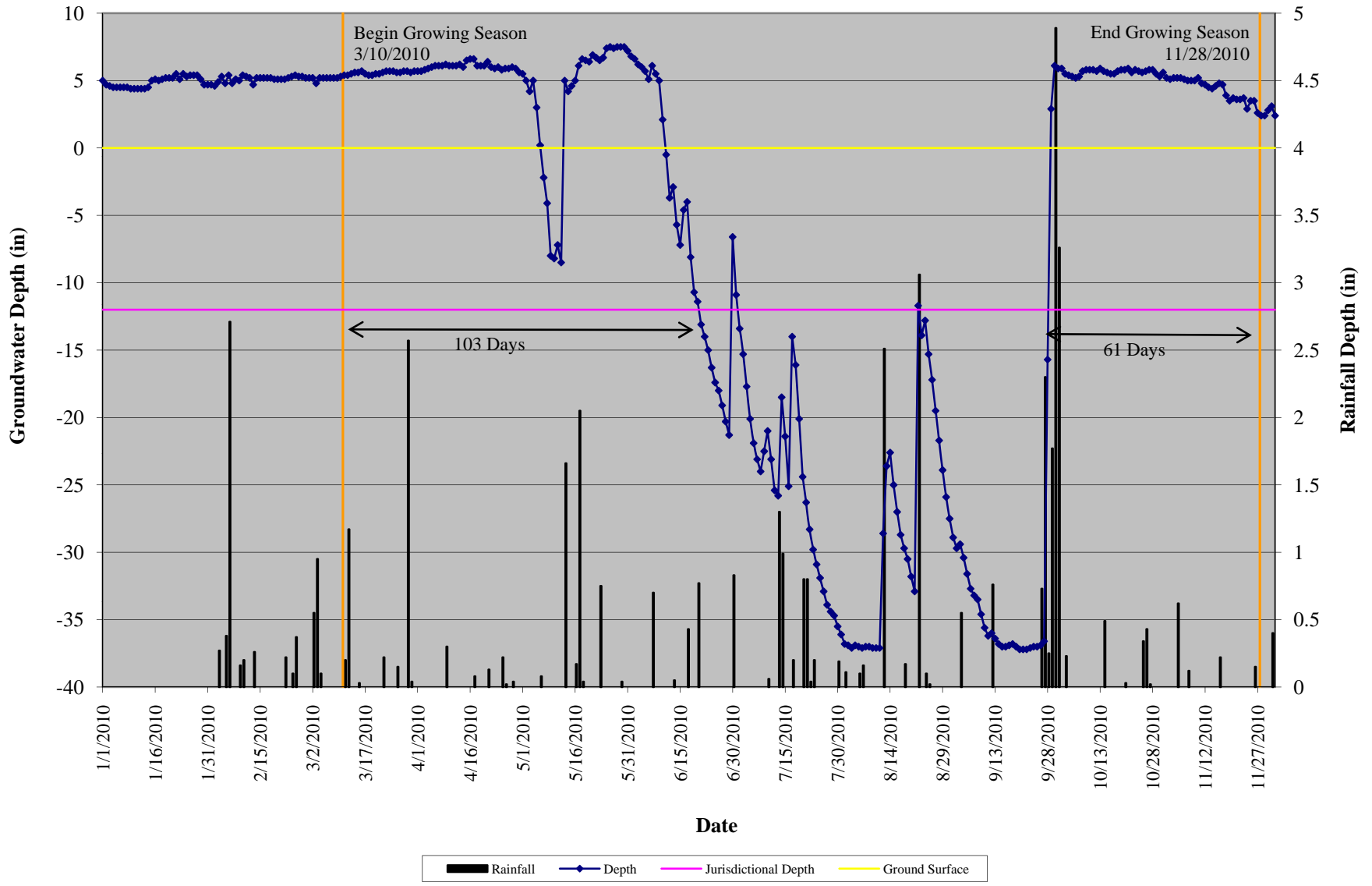
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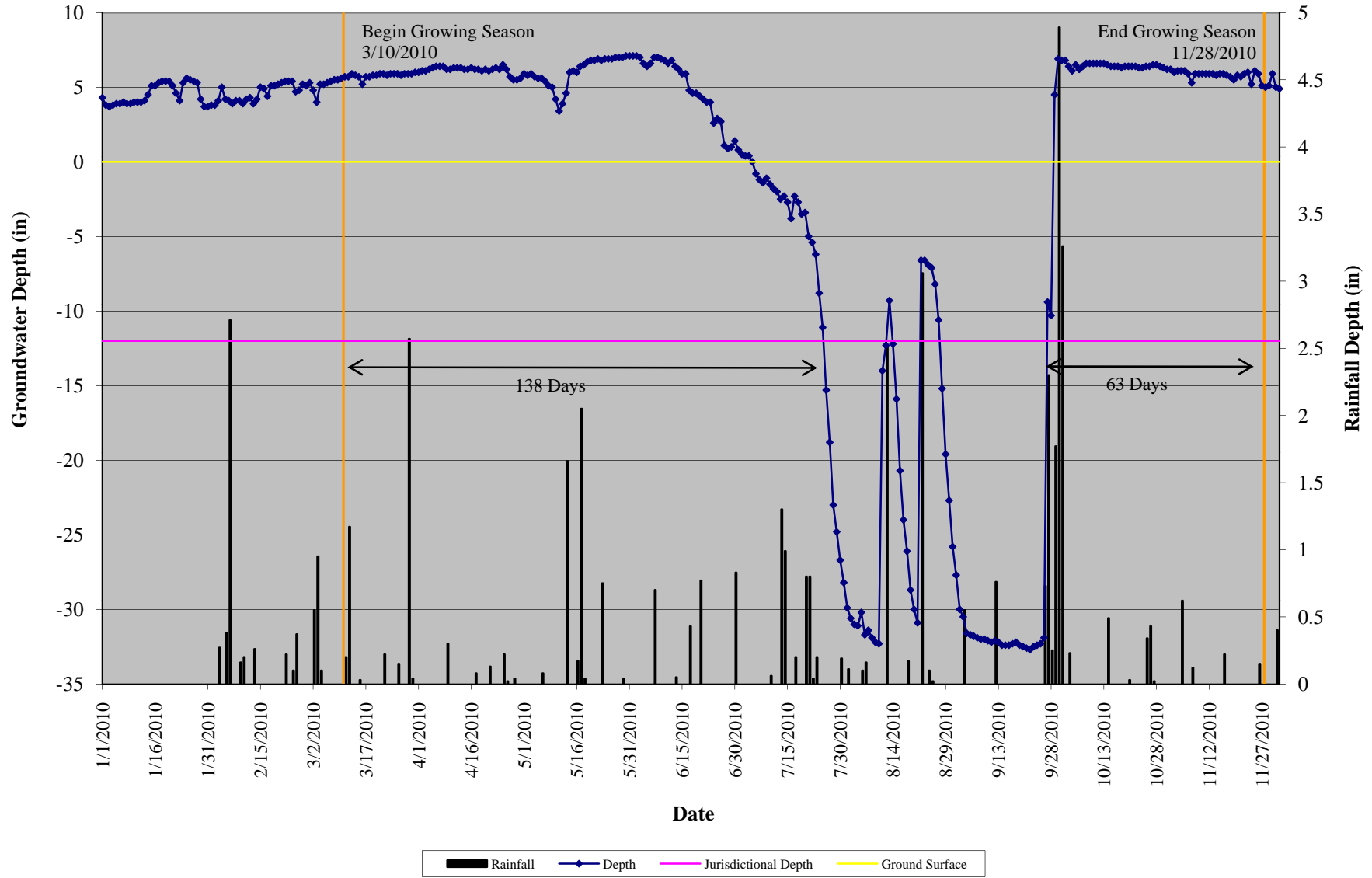
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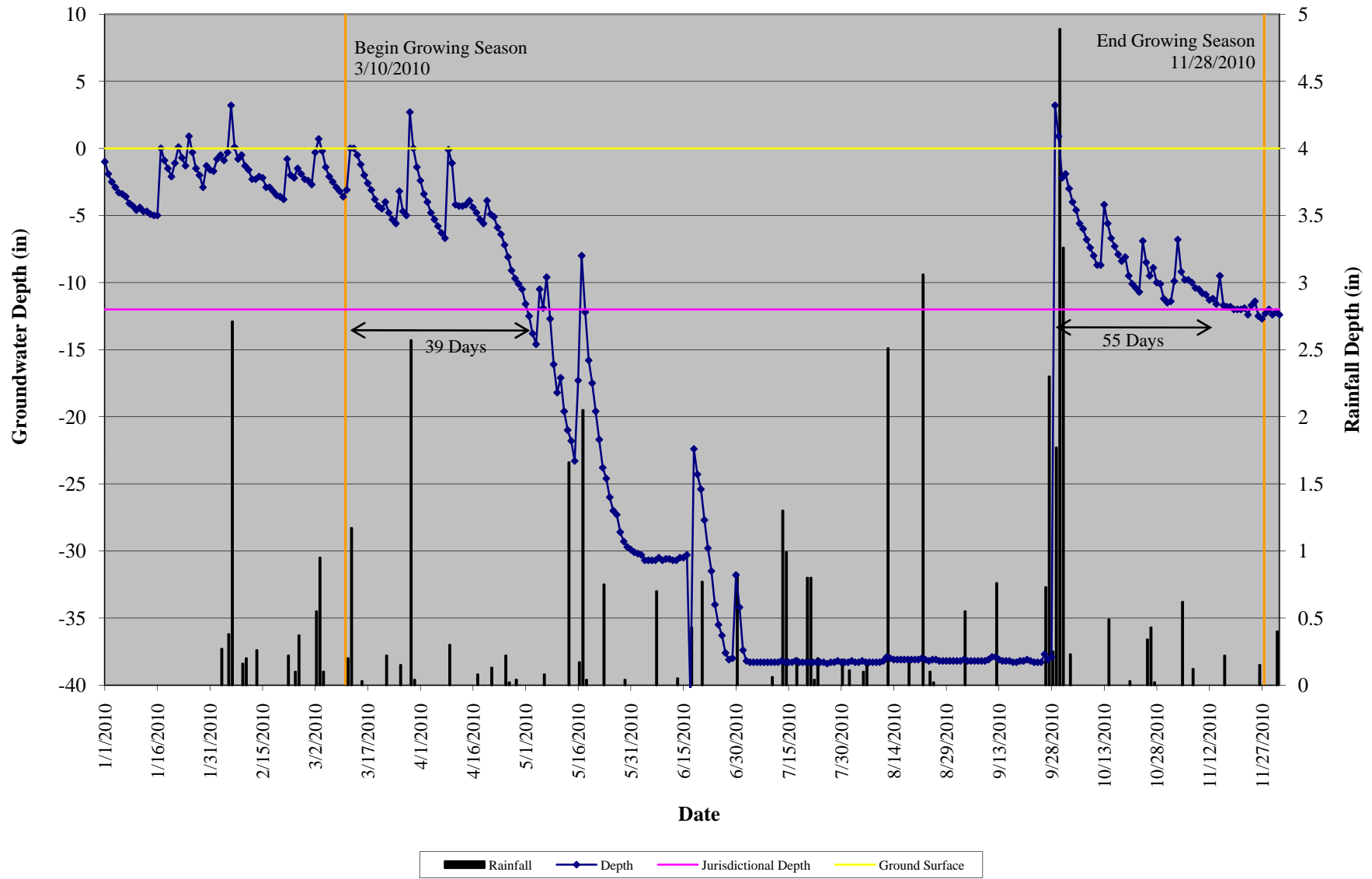
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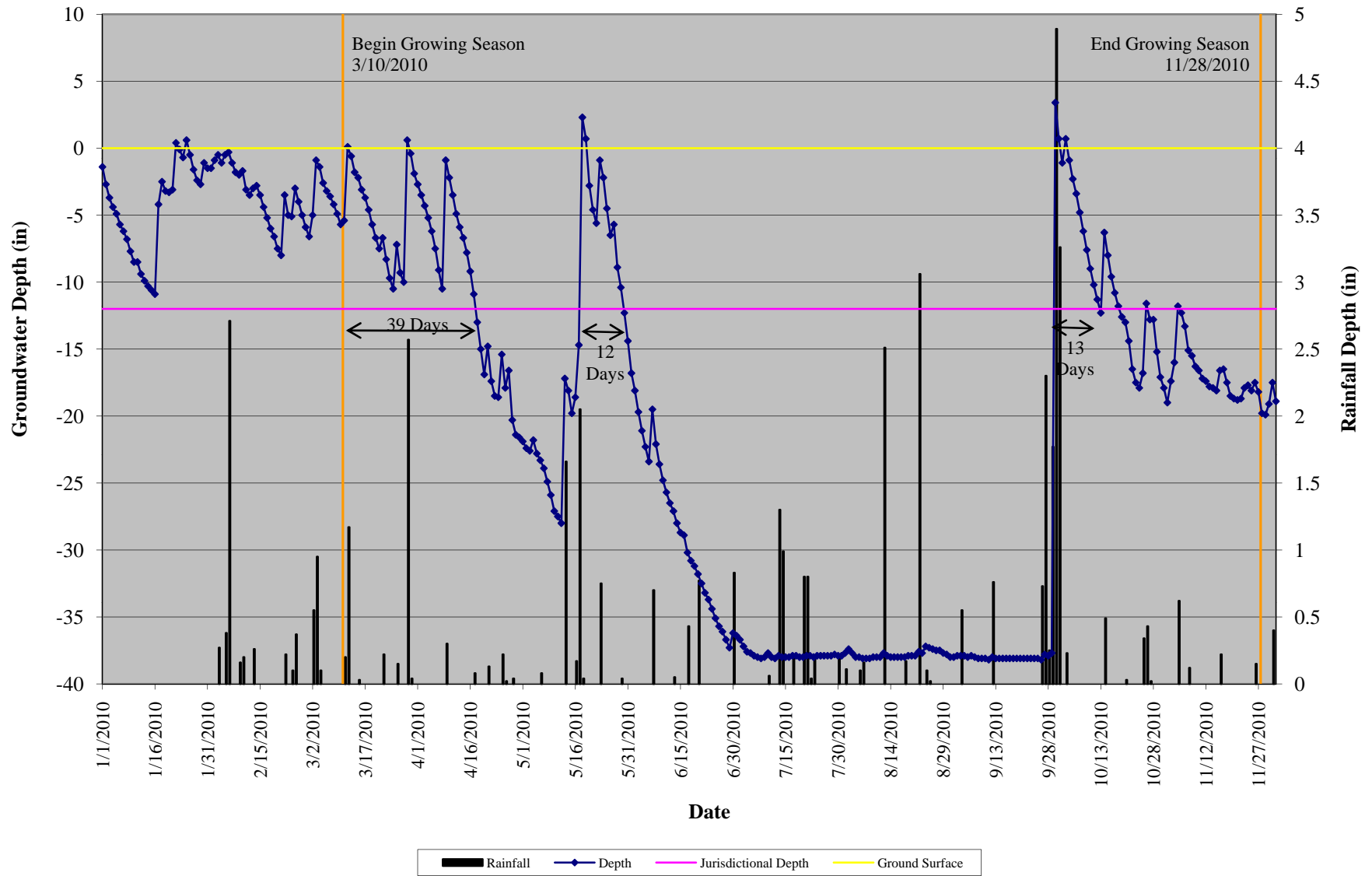
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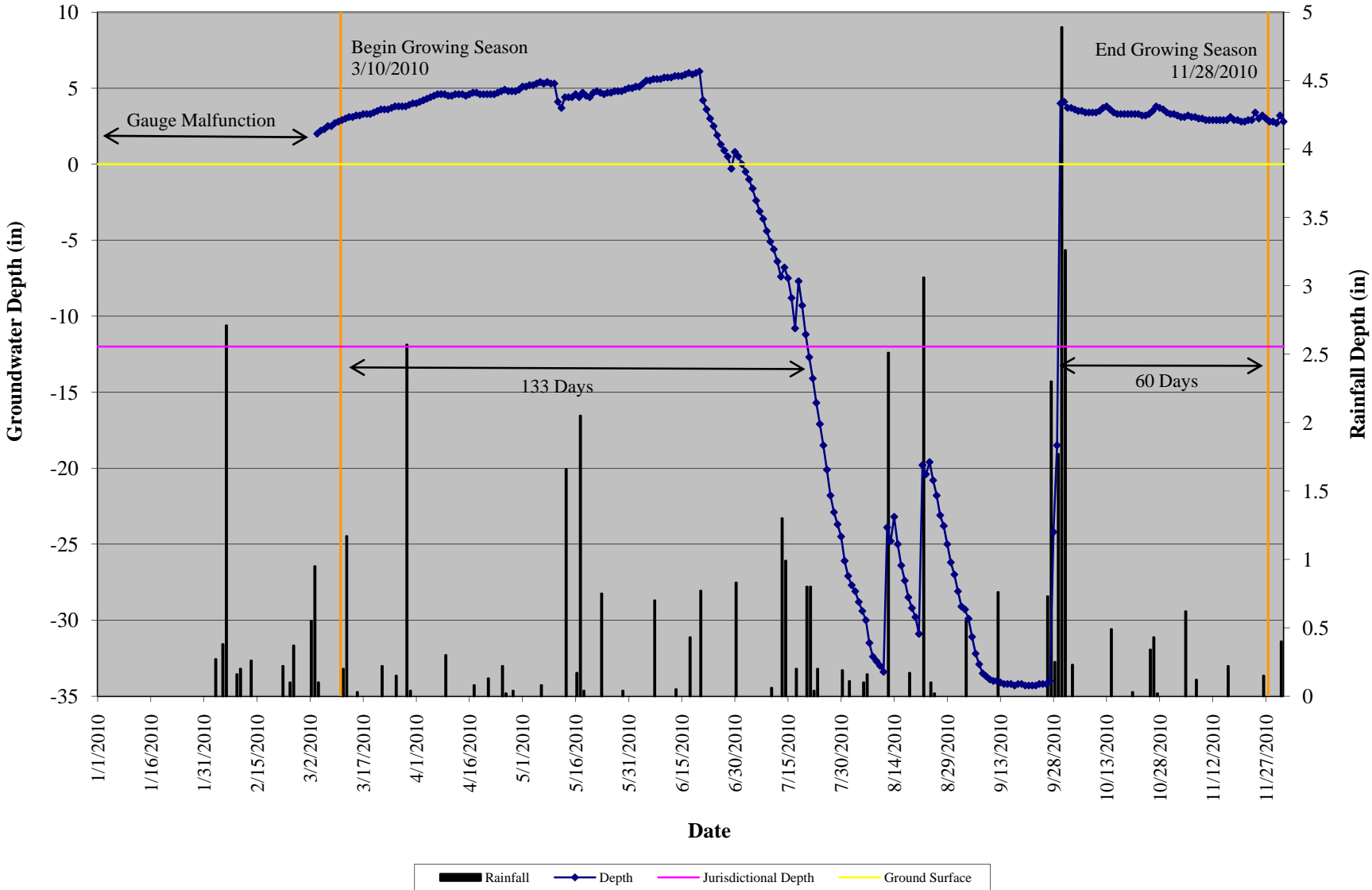
UT Pembroke MY03 Ground Water Monitoring Reference Well #12



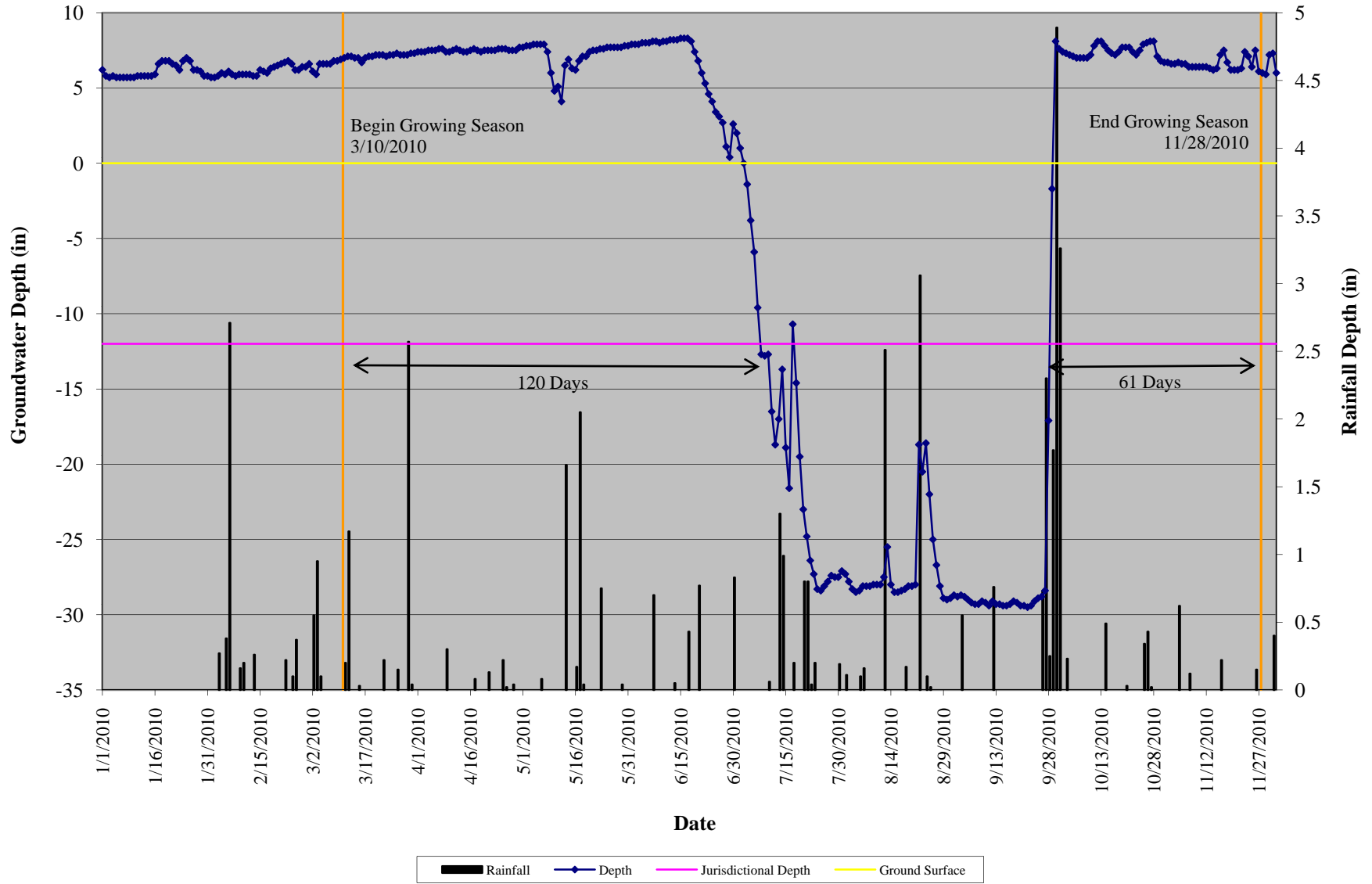
UT Pembroke MY03 Ground Water Monitoring Well #13



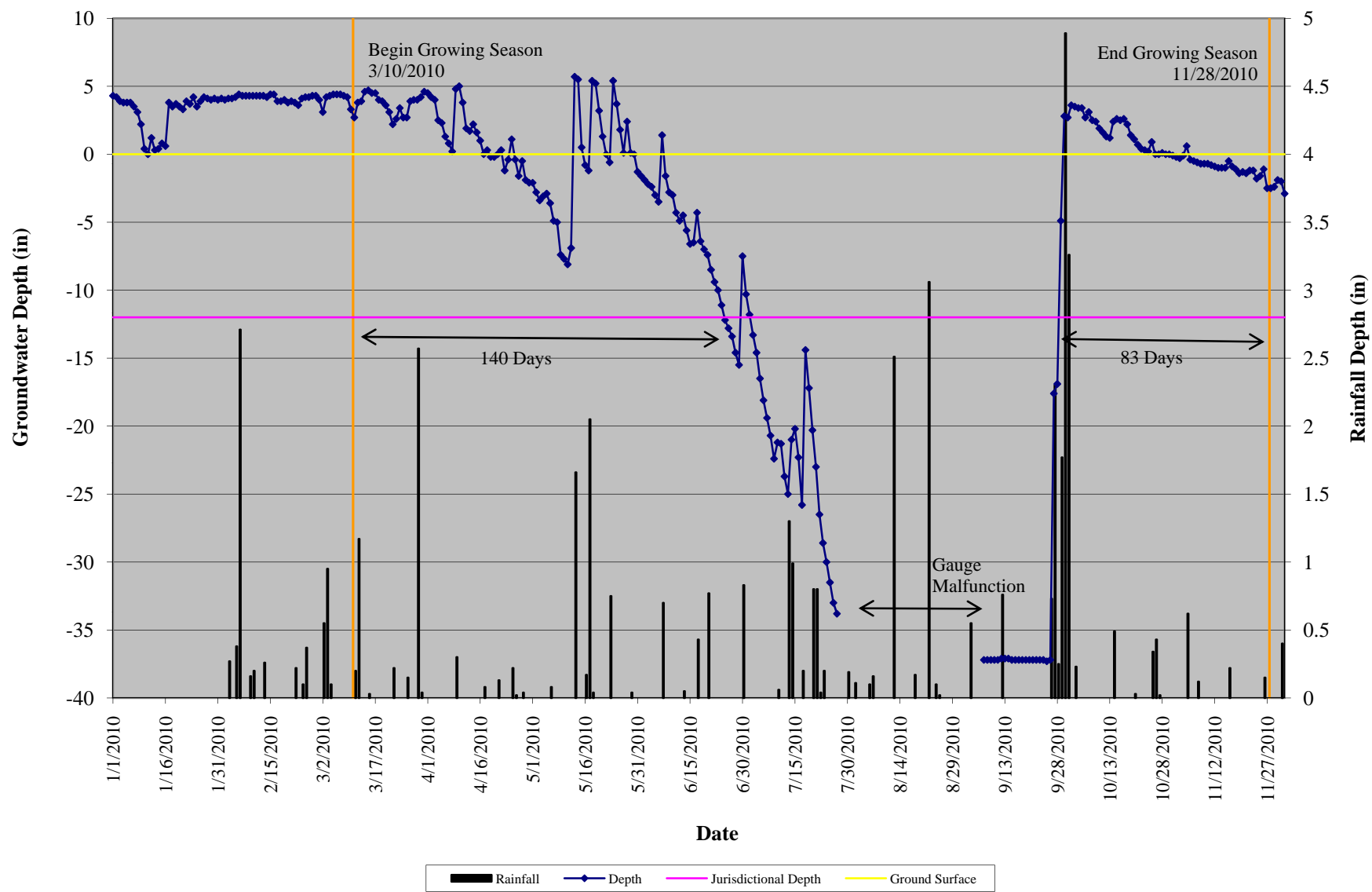
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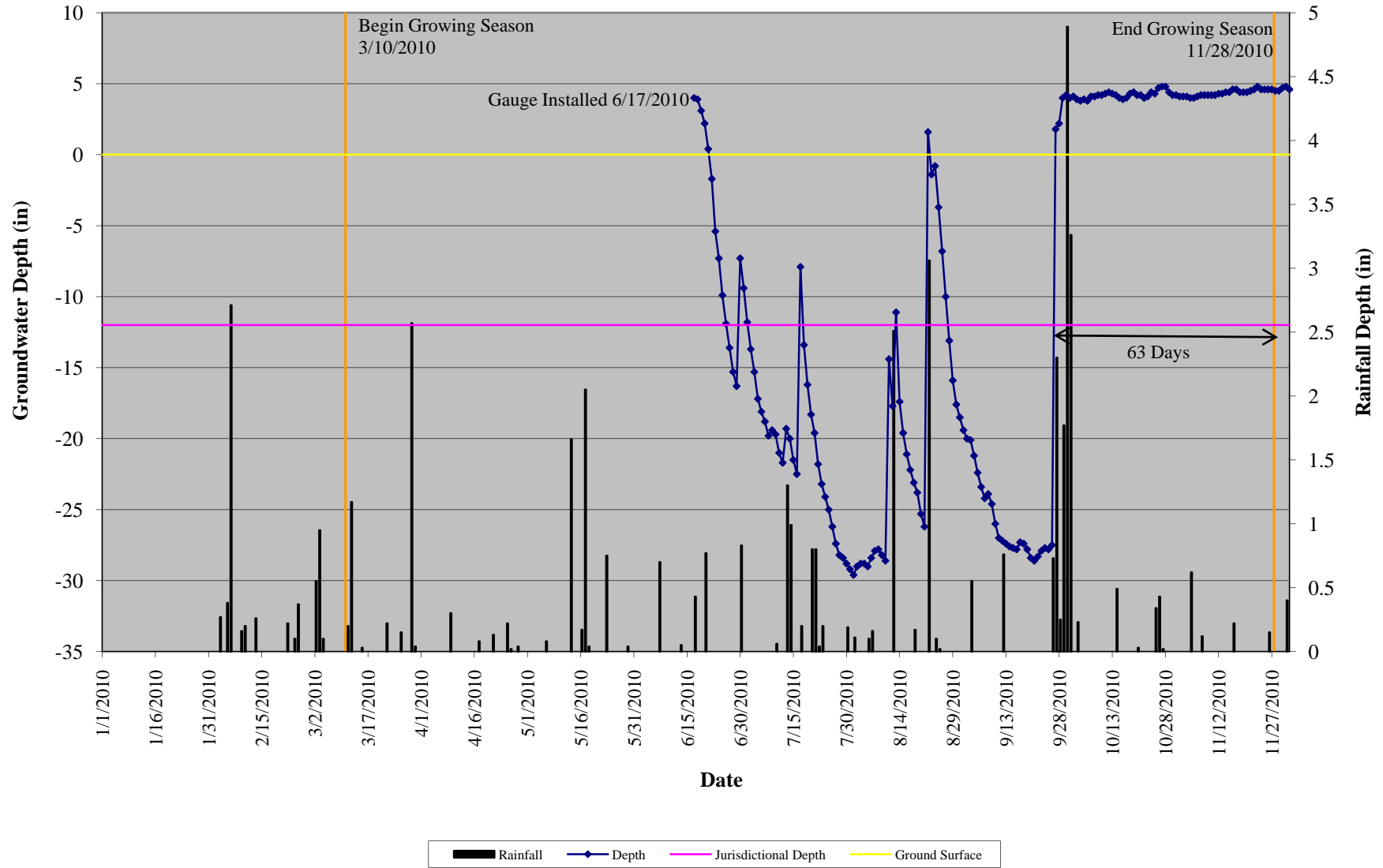
UT Pembroke MY03 Ground Water Monitoring Reference Well #16



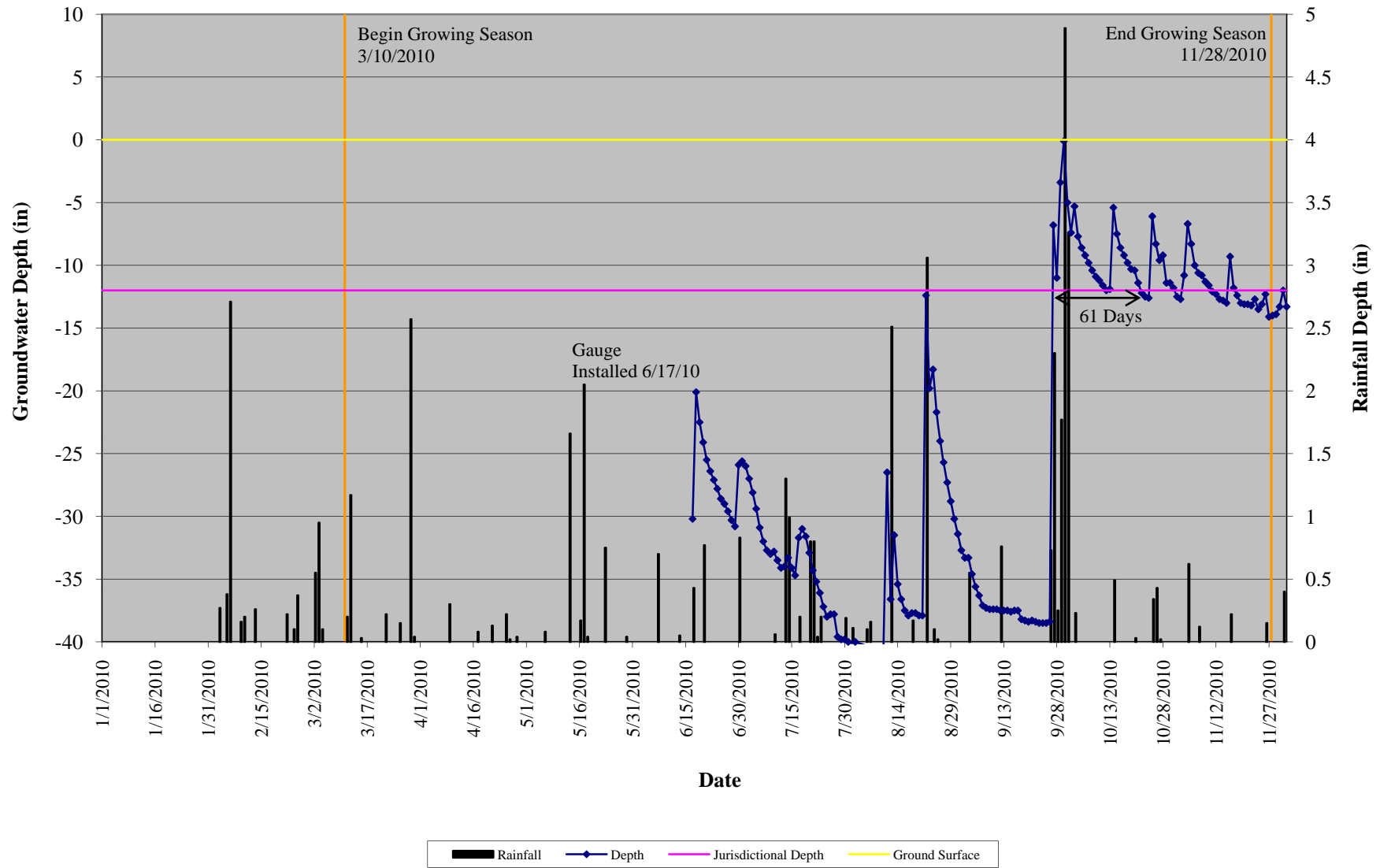
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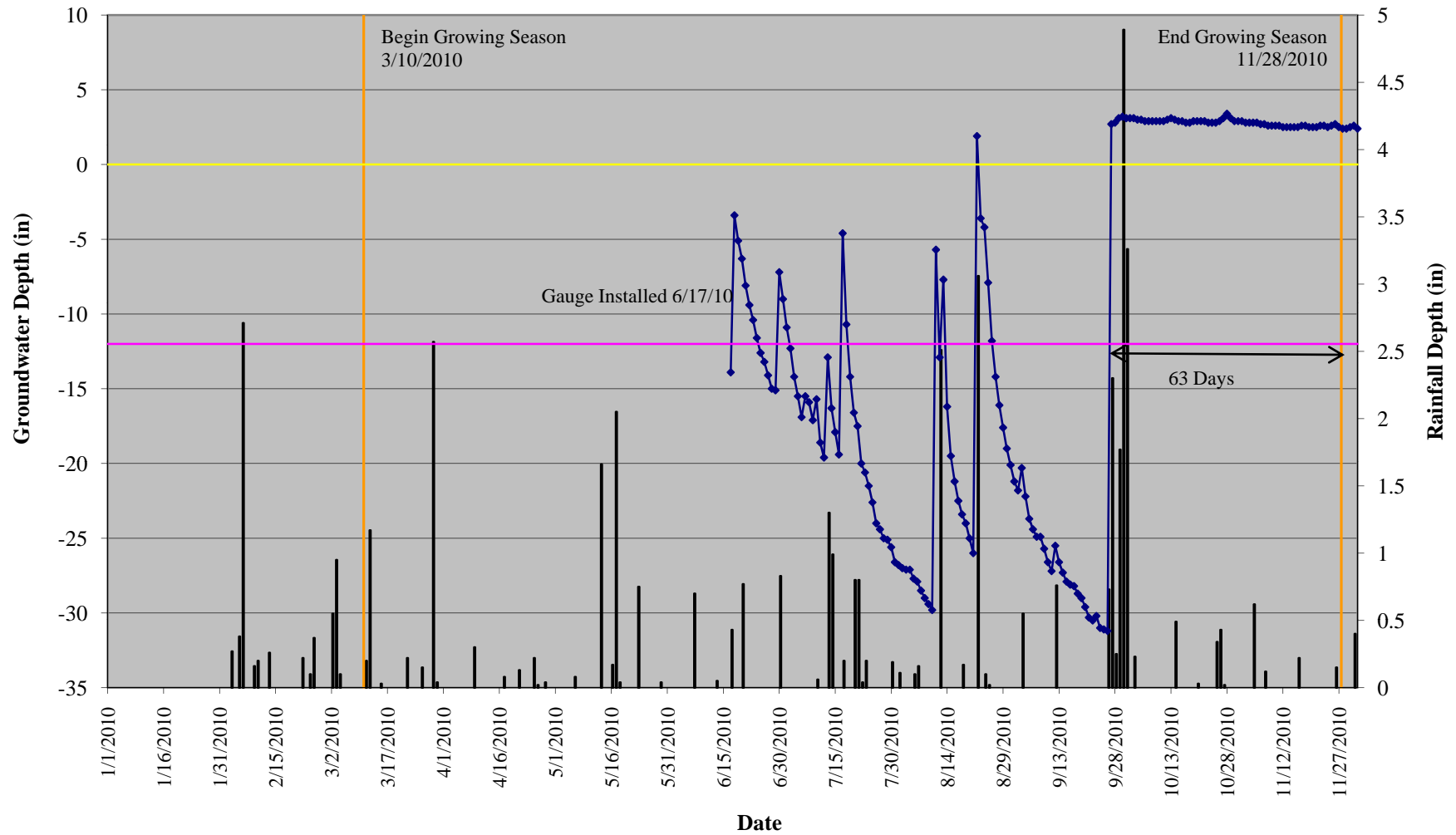
UT Pembroke MY03 Ground Water Monitoring Well #18



UT Pembroke MY03 Ground Water Monitoring Well #19



UT Pembroke MY03 Ground Water Monitoring Well #20



■ Rainfall ◆ Depth — Jurisdictional Depth — Ground Surface

UT Pembroke MY03 Ground Water Monitoring Well #21

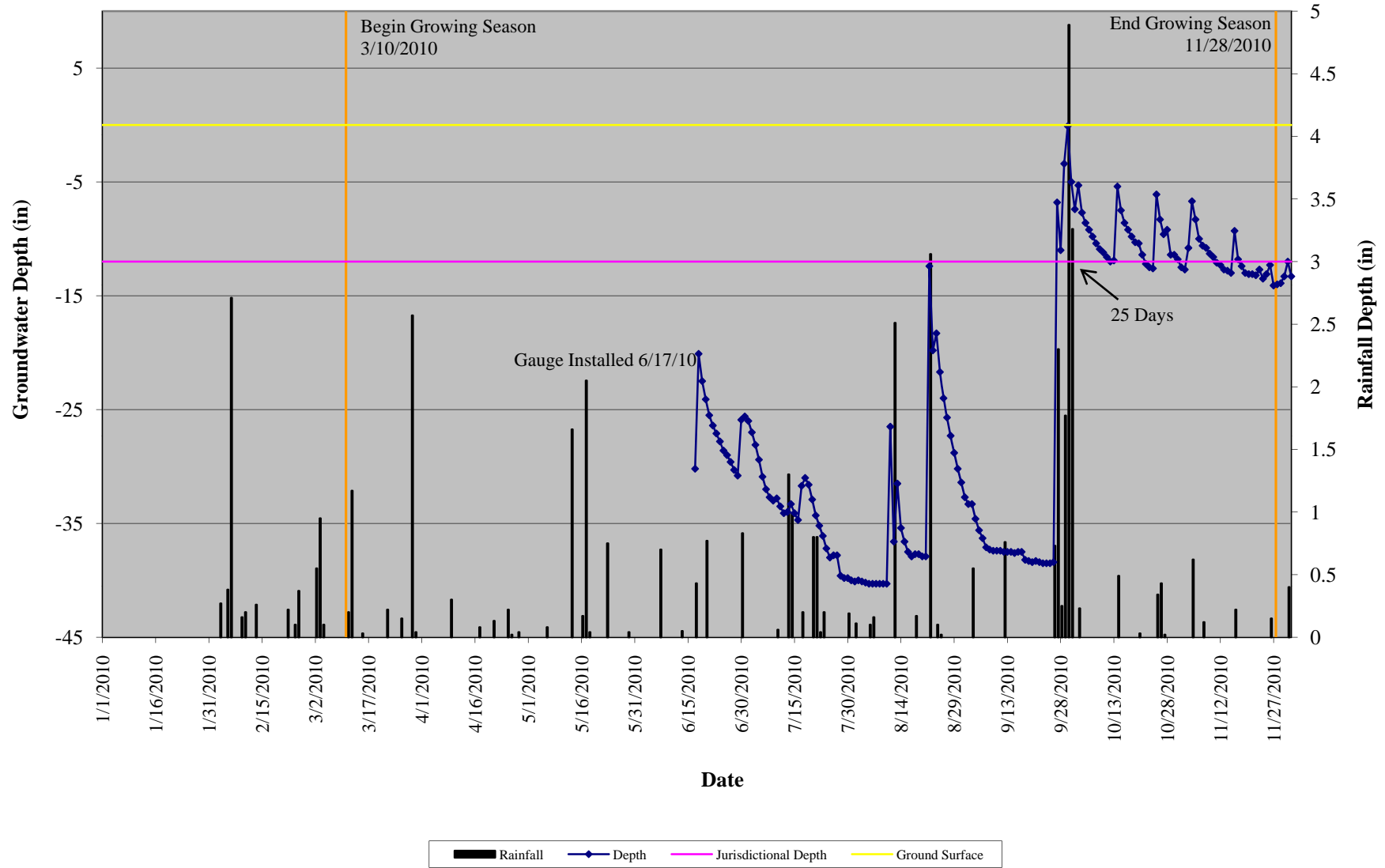


Table 9. Wetland Hydrology Criteria Attainment Table			
Project Number and Name: 283 - UT Pembroke			
Gauge	Success Criteria Achieved / Max Consecutive Days During Growing Season (Percentage)		
	Year 1 (2008)	Year 2 (2009)	Year 3 (2010)
Well 2	No/0 (0%)	No/4 (1.5%)	No/4 (1.5%)
Well 3	No/0 (0%)	No/4 (1.5%)	No/5 (1.9%)
Well 4	No/0 (0%)	No/4 (1.5%)	No/6 (2.3%)
Well 5	No/11 (4.2%)	Yes/49 (18.6%)	Yes/54 (20.5%)
Well 6	No/12 (4.6%)	Yes/46 (17.5%)	Yes/50 (19.0%)
Well 7	Yes/87 (33.1%)	Yes/108 (41.1%)	Yes/104 (39.5%)
Well 8	No/11 (4.8%)	Yes/45 (17.1%)	Yes/42 (16.0%)
Well 9	Yes/51 (19.4%)	Yes/49 (18.6%)	Yes/57 (21.7%)
Well 10	Yes/207 (78.7%)	Yes/110 (41.8%)	Yes/103 (39.2%)
Well 11	Yes/107 (40.7%)	Yes/263 (100%)	Yes/138 (52.5%)
Well 12 <i>Reference</i>	Yes/77 (29.3%)	Yes/53 (20.2%)	Yes/55 (20.9%)
Well 13	No/10 (3.8%)	Yes/31 (11.8%)	Yes/39 (14.8%)
Well 15	Yes/174 (66.2%)	Yes/107 (40.7%)	Yes/133 (50.6%)
Well 16 <i>Reference</i>	Yes/112 (43%)	Yes/87 (33.1%)	Yes/120 (45.6%)
Well 17	N/A	N/A	Yes/140 (53.2%)
Well 18	N/A	N/A	Yes/63 (24.0%)
Well 19	N/A	N/A	Yes/61 (23.2%)
Well 20	N/A	N/A	Yes/63 (24.0%)
Well 21	N/A	N/A	Yes/25 (9.5%)