South Fork Site
Wetland Restoration Monitoring Report
Project # 93507
Monitoring Year 01
2010

Submitted to:

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

Construction Completed: May 2005
Gauges Installed: April 2010
Submitted: December 2010

Landmark Center II, Suite 220
4601 Six Forks Road
Raleigh, NC 27609
Phone: (919) 783-9214
Fax: (919) 783-9266

Project Manager: Adam Spiller
Email: adam.spiller@kci.com
Project No: 12071067D_SF10

TABLE OF CONTENTS

APPENDIX A – GENERAL FIGURES AND TABLES

APPENDIX B – SITE PHOTOS

APPENDIX C – HYDROLOGIC DATA

1.0 EXECUTIVE SUMMARY / PROJECT ABSTRACT

The South Fork Site is located in southern Catawba County, North Carolina, approximately five miles southwest of Newton, and is in the Northern Inner Piedmont ecoregion of the Piedmont physiographic province. The project is located in USGS Hydrologic Unit 03050102-04-0010 of the Catawba River Basin. The site is made up of two parcels (denoted here as Northern and Southern) that are approximately 1,500 feet apart. Most of the site had been historically cleared of vegetation, but portions of sparse forest were left adjacent to some of the existing streams. The rest of the site was planted with native vegetation as part of the stream restoration.

The South Fork Restoration Site was completed in May 2005 as a stream restoration site. The 68-acre site is a full delivery project provided for the North Carolina Ecosystem Enhancement Program (EEP) by EBX-Neuse-I, LLC (EBX). During the full delivery process, wetland credits were not requested and were not a part of the contract with EBX. KCI conducted a wetland feasibility study of the South Fork Site for the NC EEP in 2009 to determine the extent of the wetlands on the site. This study found that the stream restoration project created, restored, and enhanced some wetlands, while other wetlands unaffected by the stream project were preserved as part of the conservation easement. These wetlands are available as potential mitigation credit for the EEP.

The wetland component of the site does not have a vegetation success criterion, so vegetation monitoring is not a part of this monitoring report. The entire site was planted with native vegetation as a part of the stream restoration project and this site is currently being monitored for vegetative success. The stream monitoring reports have reported that the site has been meeting the project's vegetation success criterion. This report provides photos of the areas where the gauges are installed as a qualitative record of the wetland conditions.

Seven gauges have been established within the created wetlands. Data were collected bi-monthly from the gauges over the monitoring period. The gauges are installed in representative wetlands, which reflect the different hydrology regimes found at the site. The gauges are installed in Wetlands 1, 5, 7, 11, 18, 28, and 33. During the 2010 growing season all of the gauges met the success criteria of having saturated soil conditions occurring within 12 inches of the ground surface for a minimum of 10% (22 days) of the 225 day growing season (March 25 to November 4) 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.

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 mitigation and restoration plan documents available on the EEPs website. All raw data supporting the tables and figures in the appendices are available upon request.

2.0 METHODOLOGY

RDS Ecotone gauges provided by the EEP are downloaded on a bi-monthly basis to monitor the wetland hydrology.

3.0 REFERENCES

KCI. 2009. *South Fork Wetland Feasibility Memo*. Produced for the EEP. Raleigh, NC.

APPENDIX A

General Figures and Tables

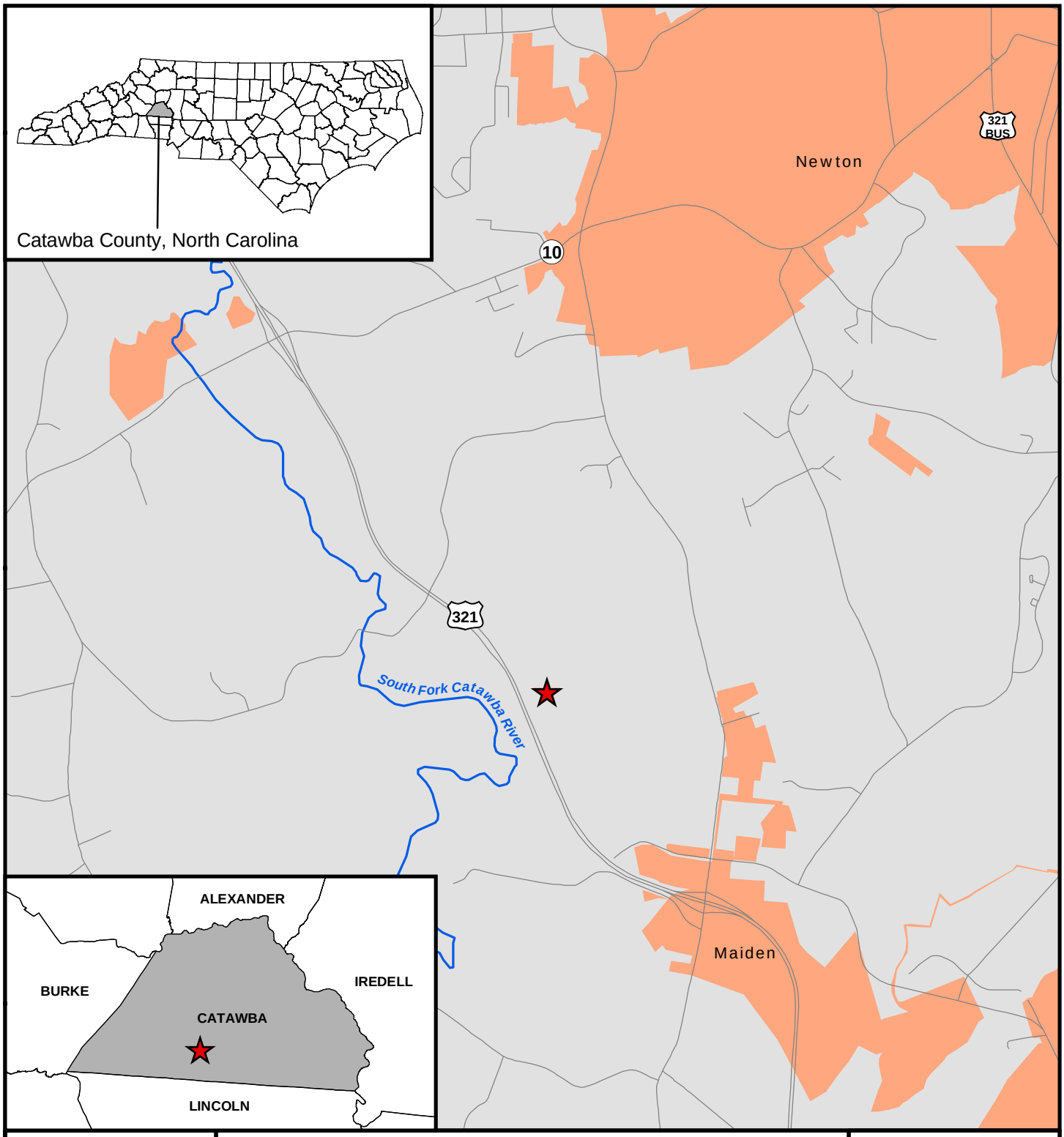


Figure 1. Vicinity Map
South Fork Site / Project No. 93507

- Site Location
- Roads
- Major Streams and Rivers
- Cities and Towns
- County Boundaries

1:48,000

1 inch = 4,000 feet

4,000 2,000 0 4,000 Feet

KCI ASSOCIATES OF NC

Ecosystem Enhancement PROGRAM

Figure 2a. Current Condition Plan View
South Fork Site / Project No. 93507

Figure 2b. Current Condition Plan View
South Fork Site / Project No. 93507

Wetland Monitoring Gauges - Hydrology Met
Wetland Creation
Wetland Enhancement
Wetland Preservation
Conservation Easement

1:2,400
1 inch = 200 feet

N
W E
S

210 105 0 210
Feet

Ecosystem Enhancement Program

KCI Associates of SC

Source: Catawba County GIS, Orthoimagery 2005.
Map created 5/24/10 by KCI.

W20
0.02 ac
W21
0.2 ac
W19
0.06 ac
W22
0.02 ac
W35
0.004 ac
W18
0.19 ac
WG6
W23
0.12 ac
W24
0.06 ac
W29
0.18 ac
W17
0.08 ac
W15
0.01 ac
W16
0.03 ac
W34
0.02 ac
W32
0.02 ac
W31
0.17 ac
W30
0.04 ac
W26
0.44 ac
WG7
W28
0.34 ac
WG5
W33
0.32 ac
W27
0.04 ac

Table 1a. Project Components
South Fork Site / Project No. 93507

Wetland Unit	Riparian or Non-Riparian	Wetland Creation (ac)	Wetland Enhancement (ac)	Wetland Restoration (ac)	Wetland Preservation (ac)	Notes
W1	Riparian			2.73		Wetland restored by raising stream bed elevation thus blocking outflow of ditches. Wetland has been planted with trees, but many areas remain open and covered by herbaceous vegetation.
W2	Riparian	1.82				Wetland created by raising stream bed elevation thus blocking outflow from ditches. Wetland has been planted with trees, but many areas remain open and covered by herbaceous vegetation.
W3A	Riparian	0.22				Wetland created by digging ditch along toe of slope for spoil to construct utility and owner access road. Wetland dominated by herbaceous/shrub vegetation.
W3B	Riparian	0.48				Wetland created by raising stream bed elevation thus blocking outflow from ditches. Wetland has been planted with trees, but many areas remain open and covered by herbaceous vegetation.
W4	Riparian	0.65				Wetland created by installing ditch plugs and raising stream bed elevation thus blocking outflow from ditches. Wetland is forested.
W5	Riparian	0.81				Wetland created by raising stream bed elevation thus blocking outflow from ditches. Wetland has been planted with trees, but many areas remain open and covered by herbaceous vegetation.
W6	Riparian	0.001				Wetland created by raising stream bed elevation and grading floodplain at confluence of ditch. Wetland dominated by herbaceous/shrub vegetation.
W7	Riparian	0.82				Depressional wetland created by grading new channel at higher elevation and only partially filling old channel. Wetland has been planted with trees, but many areas remain open and covered by herbaceous vegetation.
W8	Non-Riparian		0.15			Originally a natural wetland that was excavated then blocked during stream construction, which enhanced the wetland's hydrology. Wetland is
W9	Non-Riparian	0.01				Depressional wetland created for stormwater runoff. Has significant aquatic function. Wetland is predominantly covered by forest.
W10	Riparian	0.05				Depressional stormwater wetland created by blocking the outlet with fill while grading new channel at higher elevation. Wetland is predominantly covered by forest.
W11	Riparian	0.36				Depressional wetland created by grading new channel at higher elevation during stream construction and only partially filling old channel. Wetland has been planted with trees, but many areas remain open and covered by herbaceous vegetation.
W13	Riparian				0.02	Natural wetland formed from hillside seepage coming onto floodplain bench. Wetland is forested.
W14	Riparian	0.12				Depressional wetland created by grading floodplain and constructing new channel at a higher elevation. Stream overflow and seepage through left bank is retained in graded depressional floodplain. Wetland has been planted with trees.
W15	Riparian	0.01				Wetland created by floodplain grading and vernal pool construction in floodplain. Wetland has been planted with trees and is partially forested.
W16	Riparian	0.03				Wetland created by floodplain grading, vernal pool construction in floodplain and in-stream structures. Wetland has been planted with trees and is partially forested.
W17	Riparian	0.08				Wetland created by floodplain grading, vernal pool construction in floodplain and in-stream structures. Wetland has been planted with trees and is partially forested.
W18	Riparian	0.19				Wetland created by floodplain grading, vernal pool construction in floodplain and in-stream structures. Wetland has been planted with trees and is partially forested.
W19	Riparian	0.06				Wetland created by floodplain grading, vernal pool construction in floodplain and in-stream structures. Wetland has been planted with trees and is partially forested.
W20	Riparian				0.02	Natural wetland along floodplain of stream.Wetland is forested.
W21	Riparian		0.20			Natural wetland along stream fed from hillside seeps and enhanced by construction of in-stream structures. Wetland is partially forested.
W22	Riparian		0.02			Natural wetland along stream enhanced by the construction of in-stream structures. Wetland has been planted with trees and is partially forested.
W23	Riparian	0.12				Wetland created by raising stream bed elevation onto abandoned floodplain with in-stream structures. Wetland has been planted with trees and is covered by herbaceous/shrub vegetation.
W24	Riparian	0.06				Wetland created by raising stream bed elevation, floodplain grading and vernal pool construction. Also receives hydrology from hillside seepage along toeslope. Wetland has been planted with trees and is covered by herbaceous/shrub vegetation.
W26	Riparian	0.44				Wetland created by connecting floodplain elevation and bankfull elevation. Wetland has been planted with trees and is covered by herbaceous/shrub vegetation.
W27	Riparian				0.04	Natural headwater wetland fed by hillside seepage that is adjacent to stream. Wetland is forested.
W28	Riparian	0.34				Wetland created by excavating new floodplain at the existing bankfull elevation. Hillside and groundwater seepage supports wetland. Wetland has been planted with trees and is covered by herbaceous/shrub vegetation.
W29	Riparian		0.18			Natural wetland along new channel fed from hillside seeps and hydrologically enhanced by construction of in-stream structures, which raised the local water table. Wetland has been planted with trees and is partially forested.
W30	Riparian				0.04	Natural wetland fed by hillside seepage. Wetland has been planted with trees and is partially forested.
W31	Riparian	0.17				Wetland created by floodplain grading, floodplain pool construction and the construction of in-stream structures. Wetland has been planted with trees and is covered with herbaceous/shrub vegetation.
W32	Riparian	0.02				Wetland created by grading and vernal pool construction in floodplain. Wetland has been planted with trees and is covered with herbaceous/shrub vegetation.
W33	Non-Riparian	0.32				Wetland created by excavating uplands, floodplain grading and enhanced by construction of in-stream structures to raise stream bed elevations. Wetland has been planted with trees and is partially forested and partially covered with cattails.
W34	Riparian	0.02				Wetland created by grading, vernal pool construction and enhanced by construction of in-stream structures to raise stream bed elevations. Wetland has been planted with trees and is covered with herbaceous/shrub vegetation.
W35	Riparian	0.004				Wetland created by grading, vernal pool construction in floodplain and enhanced by construction of in-stream structures. Wetland has been planted with trees and is covered with herbaceous/shrub vegetation.
Total		**7.21**	**0.55**	**2.73**	**0.12**	

Table 1b. Component Summations South Fork Site / Project No. 93507							
Restoration Level	**Stream (lf)**	**Riparian Wetland (Ac)**		**Non-Ripar (Ac)**	**Upland (Ac)**	**Buffer (Ac)**	**BMP**
		Riverine	**Non-Riverine**				
Restoration		2.73	0	0			
Enhancement		0.40	0	0.15			
Creation		6.88	0	0.33			
Preservation		0.12	0	0			
Totals		**10.13**	**0**				
		10.13		**0.48**			

Table 2. Project Activity & Reporting History South Fork Site / Project No. 93507		
Activity or Report	**Data Collection Complete**	**Actual Completion or Delivery**
Stream Restoration Plan		July 2004
Planting		April 2005
Site Construction		May 2005
Stream As-built Report		July 2005
Year 1 Stream Monitoring		Nov 2005
Year 2 Stream Monitoring		Nov 2006
Year 3 Stream Monitoring	Sep 2007	Nov 2007
Year 4 Stream Monitoring		Nov 2008
Year 5 Stream Monitoring		Nov 2009
Wetland Feasibility Study	March - Nov 2009	Dec 2009
Wetland Monitoring Gauges Installed		Apr 2010
Baseline Wetland Monitoring Report		Jun 2010
Year 1 Wetland Monitoring	Nov 2010	Dec 2010

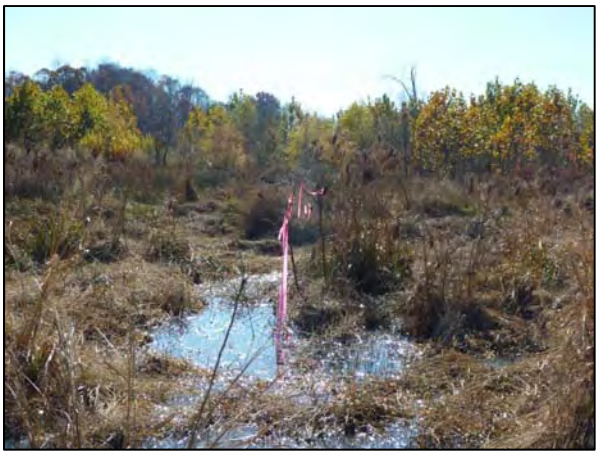
Table 3. Project Contacts South Fork Site / Project No. 93507	
Full Delivery Provider	EBX-Neuse 1, LLC 909 Capability Drive, Suite 3100 Raleigh, NC 27606
Primary Project Design POC	Norton Webster (919) 829-9909
Designer	Buck Engineering
Primary Project Design POC	Kevin Tweedy (919) 463-5488
Stream Monitoring Performers	WK Dickson and Co., Inc
Monitoring POC	Daniel Ingram (919) 782-0495
Wetland Feasibility and Monitoring Performers	KCI Associates of NC, PA 4601 Six Forks Road, Suite 220 Raleigh, NC 27609
Monitoring POC	Adam Spiller (919) 783-9214

Table 4. Project Attributes South Fork Site / Project No. 93507		
Project County	Catawba County	
Physiographic Region	Piedmont	
Ecoregion	Northern Inner Piedmont	
River Basin	Catawba	
USGS HUC	03050102040010	
NCDWQ Sub-Basin	03-08-35	
Within Extent of EEP Watershed Plan	No	
WRC Class	Warm	
% of Project Easement Demarcated	100%	
Beaver Activity Observed During Design Phase	No	
Restoration Component Attributes		
	Northern Parcel	**Southern Parcel**
Drainage Area (sq.mi.)	1.8	0.4
Stream Order	N/A	N/A
Restored Length (feet)	N/A	N/A
Perennial or Intermittent	N/A	N/A
Watershed Type	Rural	Rural
Watershed LULC Distribution		
Forest/Wetland	-	
Pasture/Managed Herbaceous	-	
Developed	-	
Watershed Impervious Cover	<5%	
NCDWQ AU/Index Number	11-129-(0.5)	
NCDWQ Classification	WS-V	
303d Listed	No	
Upstream of 303d Listed Segment	No	
Reasons for 303d Listing or Stressor	N/A	
Total Acreage of Easement	68.0	
Total Vegetated Acreage within Easement	68.0	
Total Planted Acreage as Part of Restoration	-	
Rosgen Classification of Pre-Existing	N/A	N/A
Rosgen Classification of As-Built	N/A	N/A
Valley Type	II / VIII / X	II / VII
Valley Slope	0.002	0.021
Valley Side Slope Range	-	-
Valley Toe Slope Range	-	-
Cowardin Classification	-	-
Trout Waters Designation	No	
Species of Concern, Endangered, Etc.	None	
Dominant Soil Series and Characteristics		
Series	Chewacla	
Depth	-	
Clay%	-	-
K	-	-
T	-	-

APPENDIX B

Site Photos

Gauge 1 – Wetland #2, 4/8/2010



Gauge 1 – Wetland #2, 11/16/2010

Gauge 2 – Wetland #1, 4/8/2010

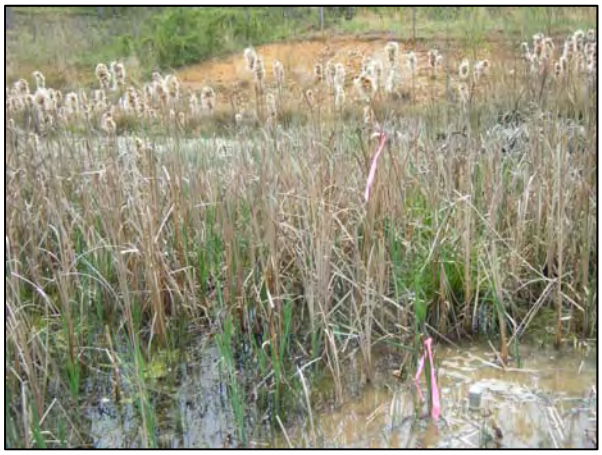
Gauge 2 – Wetland #1, 11/16/2010

Gauge 3 – Wetland #7, 4/8/2010

Gauge 3 – Wetland #7, 11/16/2010

Gauge 4 – Wetland #19, 4/8/2010

Gauge 4 – Wetland #19, 11/16/2010



Gauge 5 – Wetland #12, 4/8/2010

Gauge 5 – Wetland #12, 11/16/2010

Gauge 6 – Wetland #13, 4/8/2010

Gauge 6 – Wetland #13, 11/16/2010

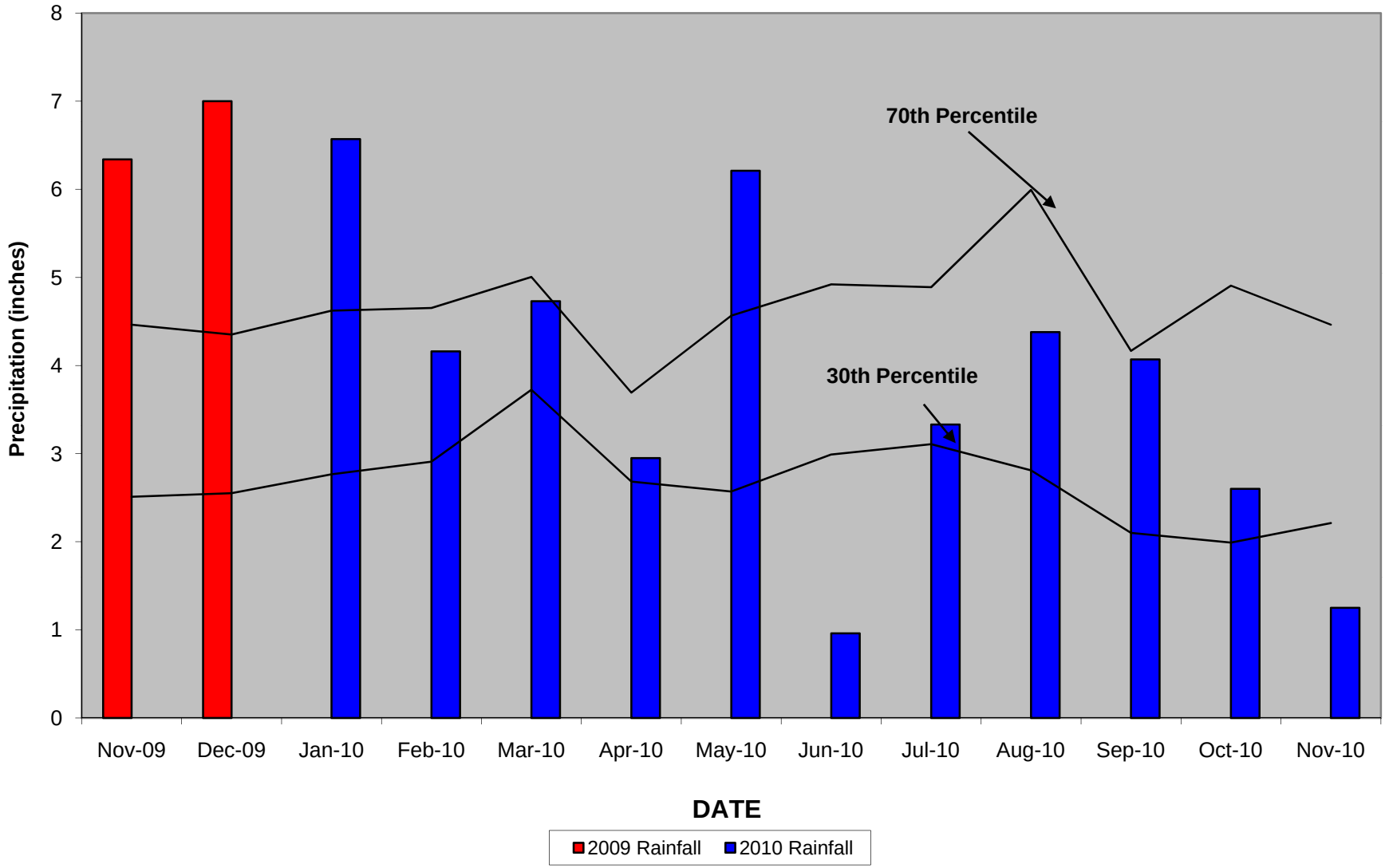
Gauge 7 – Wetland #13, 4/8/2010

Gauge 7 – Wetland #13, 11/16/2010

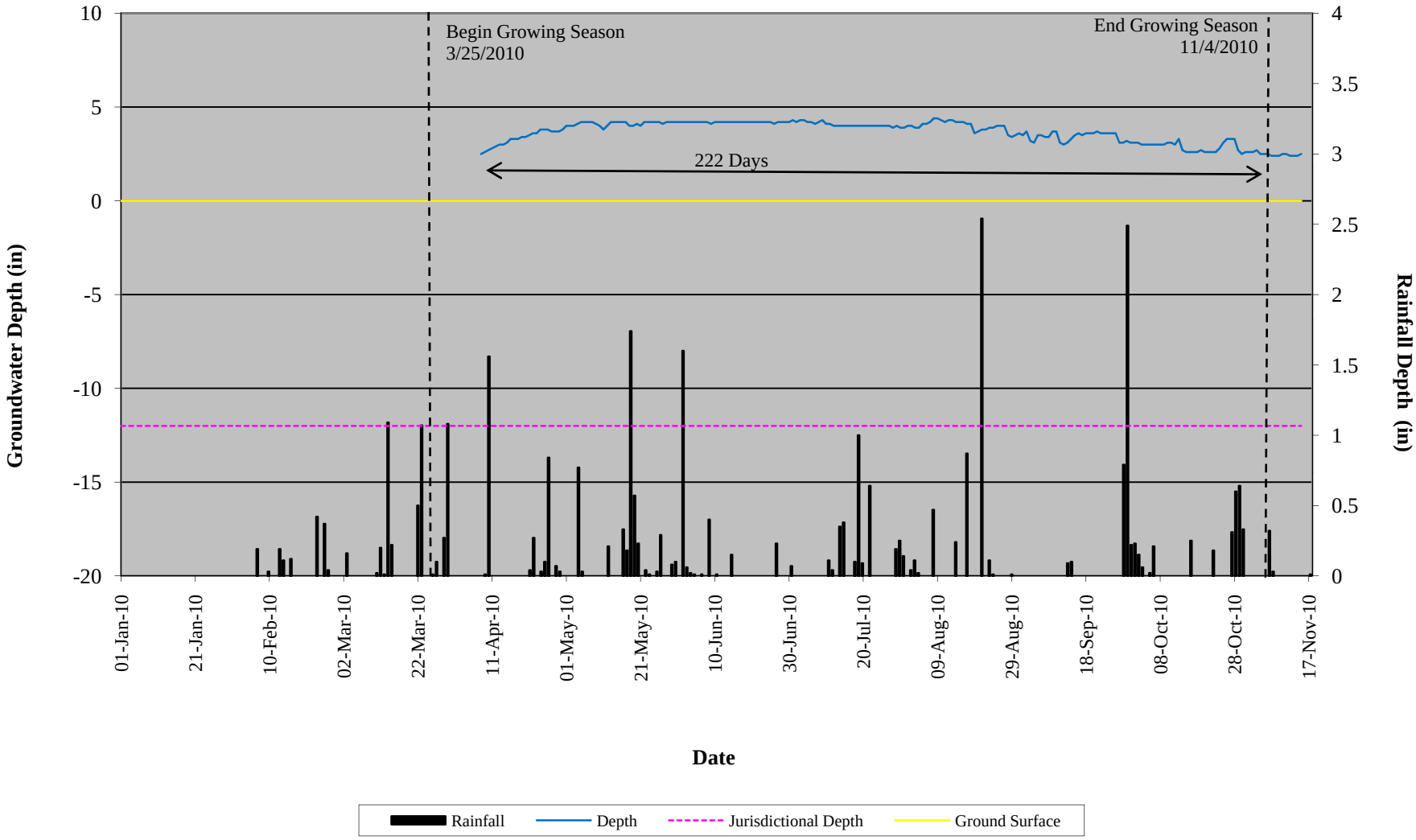
APPENDIX C

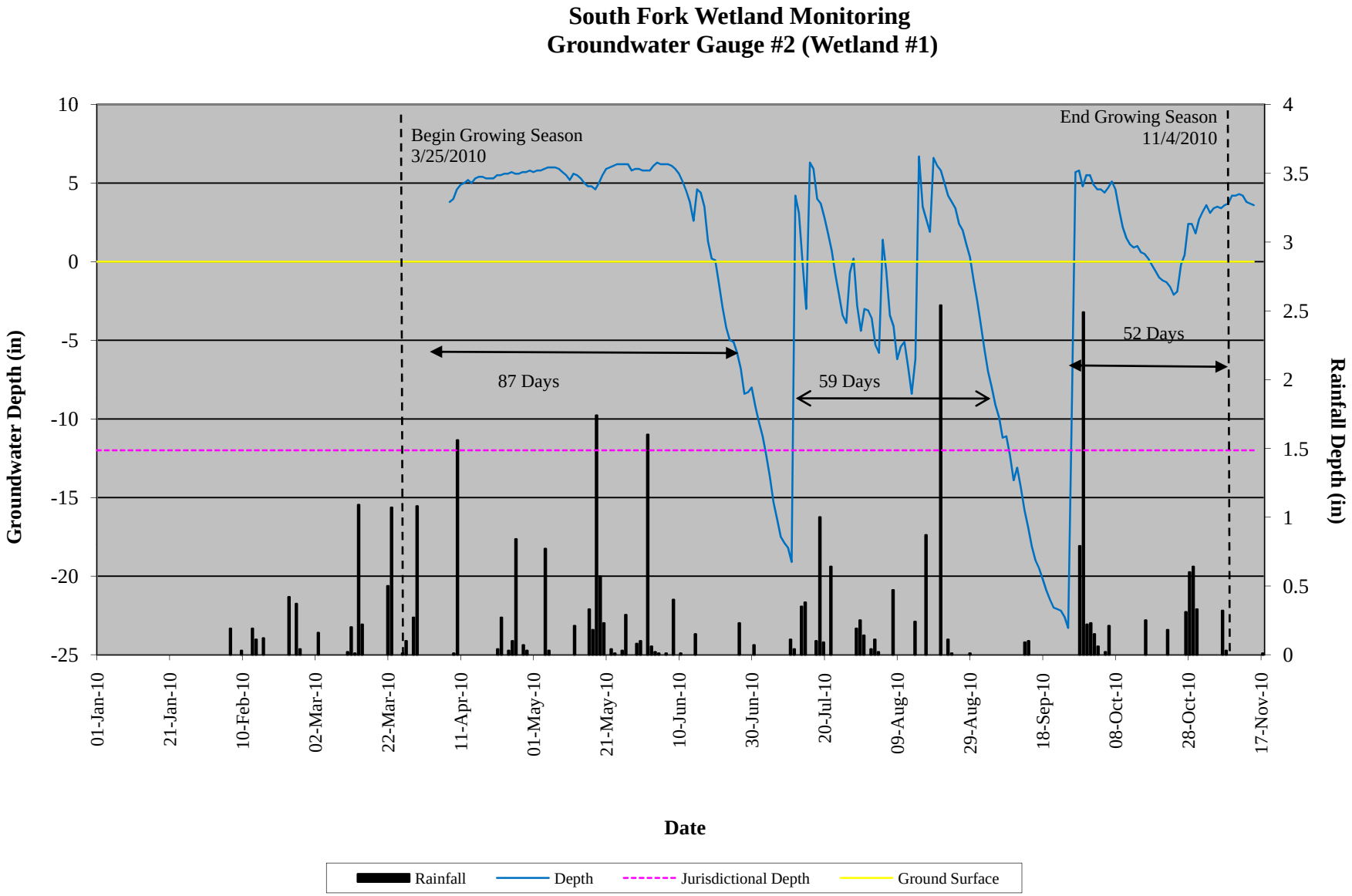
Hydrologic Data

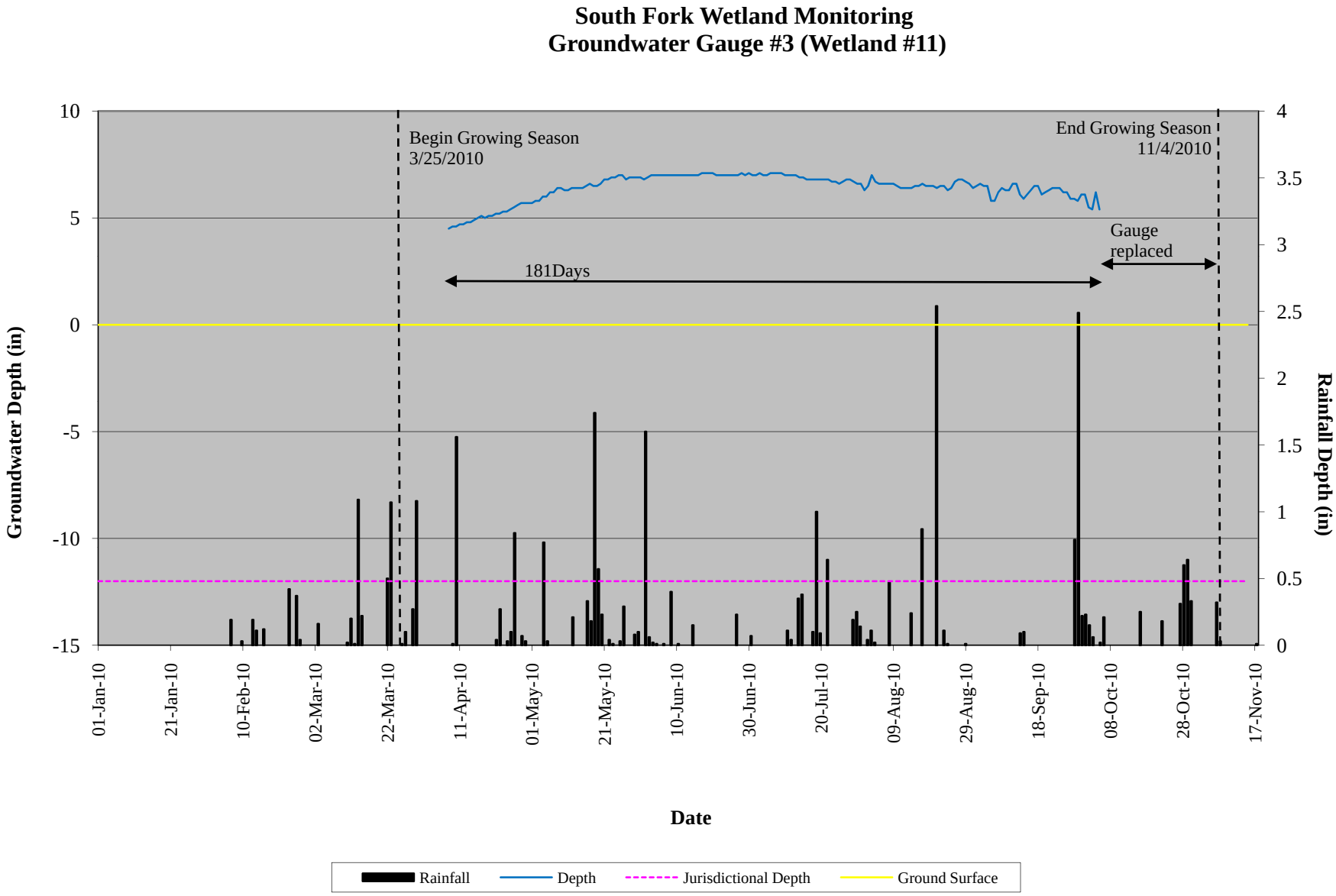
South Fork
30-70 Percentile Graph
Lincolnton, NC



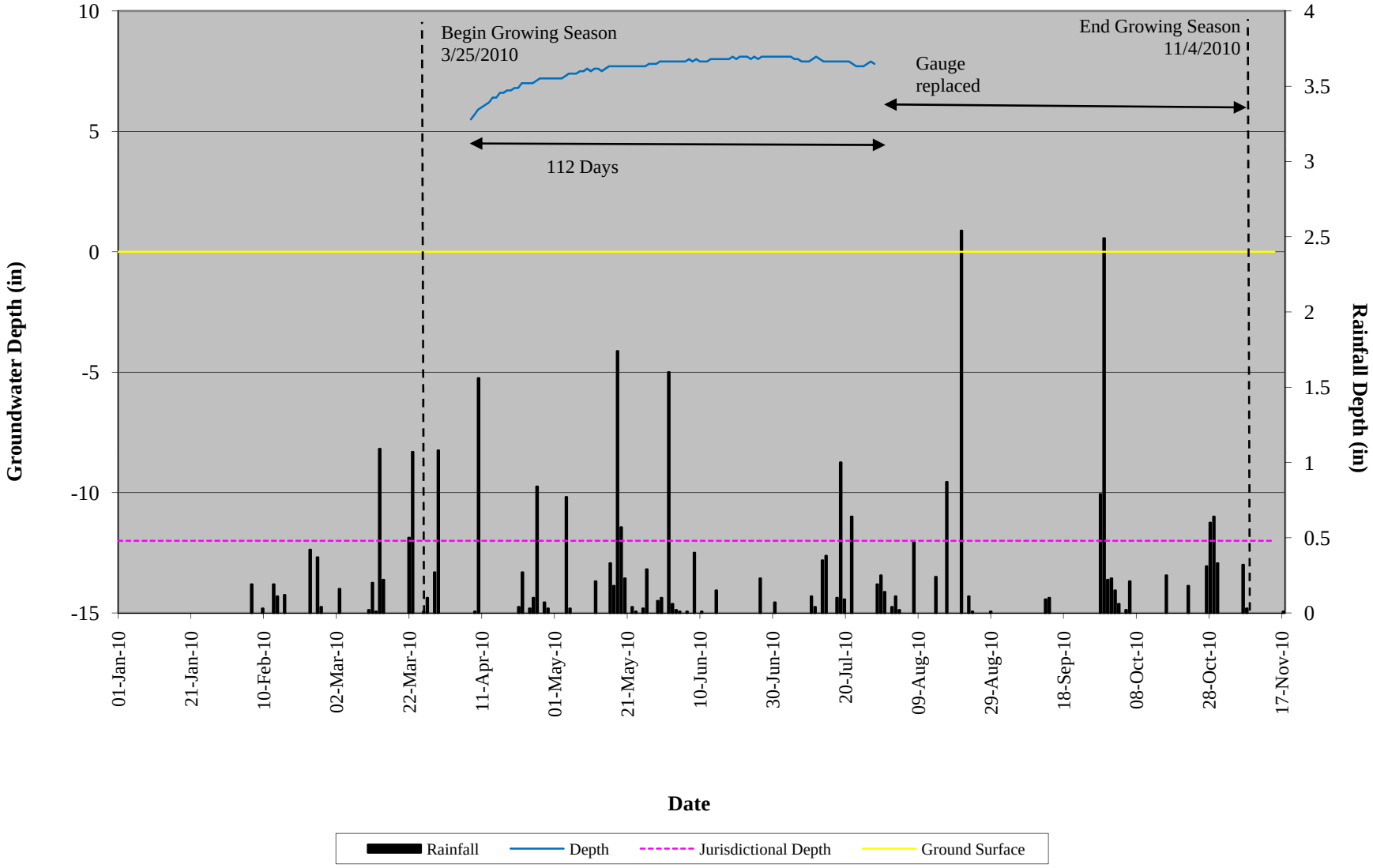
South Fork Wetland Monitoring
Groundwater Gauge #1 (Wetland #14)



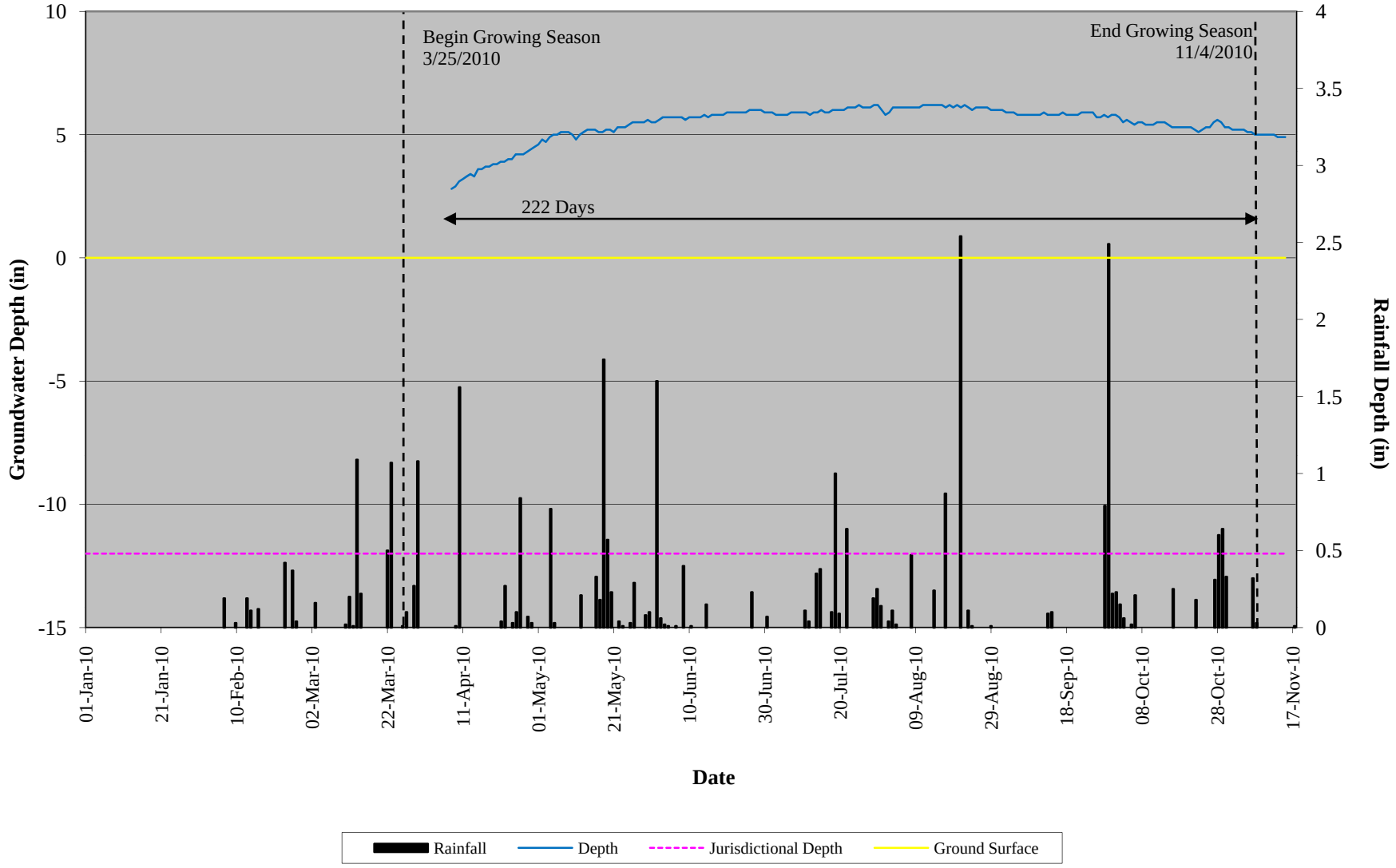

South Fork Wetland Monitoring
Groundwater Gauge #2 (Wetland #1)
Begin Growing Season
3/25/2010
End Growing Season
11/4/2010
87 Days
59 Days
52 Days
Groundwater Depth (in)
Rainfall Depth (in)
Date
10
5
0
-5
-10
-15
-20
-25
4
3.5
3
2.5
2
1.5
1
0.5
0
01-Jan-10
21-Jan-10
10-Feb-10
02-Mar-10
22-Mar-10
11-Apr-10
01-May-10
21-May-10
10-Jun-10
30-Jun-10
20-Jul-10
09-Aug-10
29-Aug-10
18-Sep-10
08-Oct-10
28-Oct-10
17-Nov-10
Rainfall
Depth
Jurisdictional Depth
Ground Surface

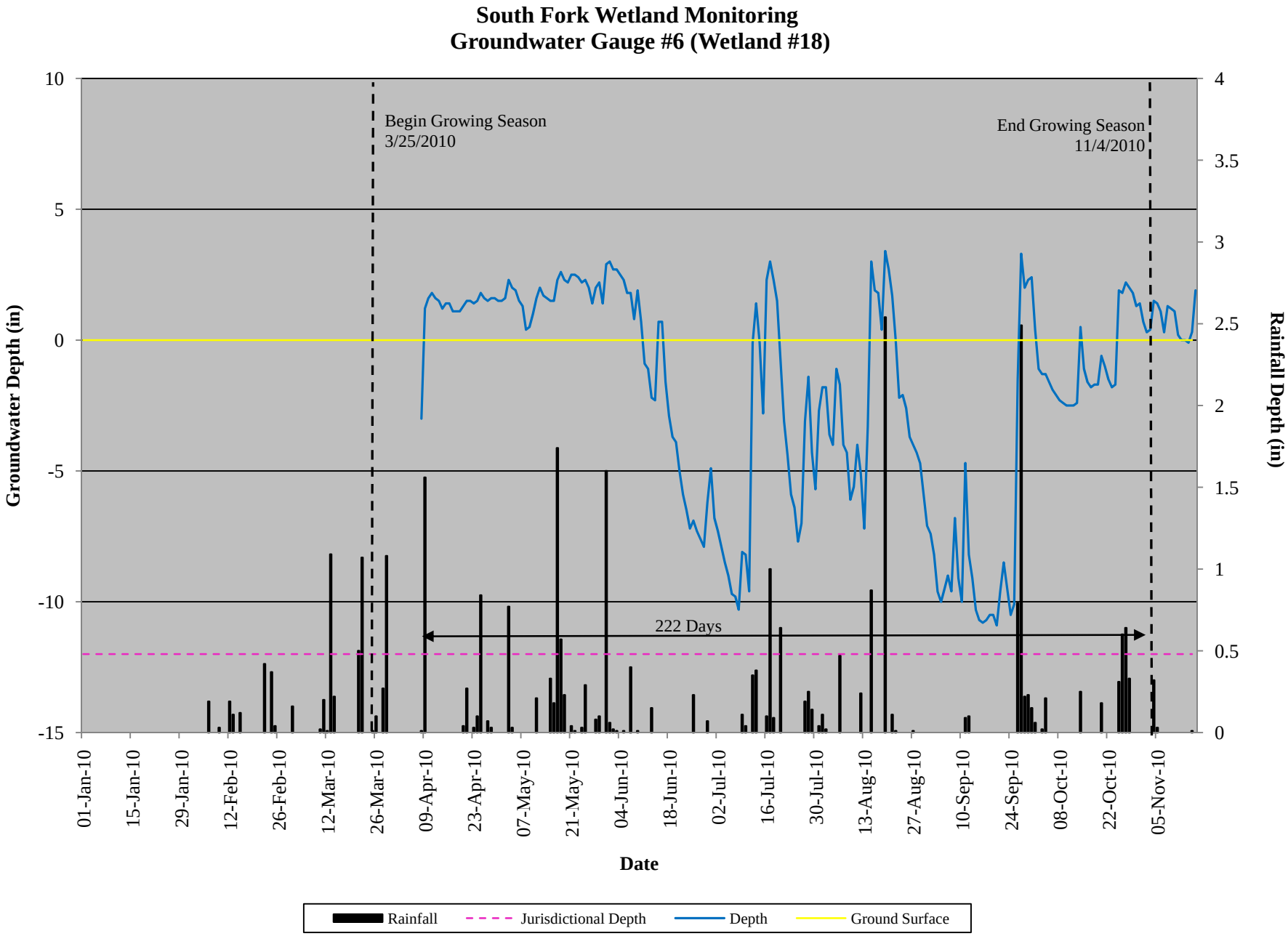

South Fork Wetland Monitoring
Groundwater Gauge #3 (Wetland #11)
Begin Growing Season
3/25/2010
End Growing Season
11/4/2010
Gauge
replaced
181Days
Groundwater Depth (in)
Rainfall Depth (in)
10
5
0
-5
-10
-15
4
3.5
3
2.5
2
1.5
1
0.5
0
01-Jan-10
21-Jan-10
10-Feb-10
02-Mar-10
22-Mar-10
11-Apr-10
01-May-10
21-May-10
10-Jun-10
30-Jun-10
20-Jul-10
09-Aug-10
29-Aug-10
18-Sep-10
08-Oct-10
28-Oct-10
17-Nov-10
Date
Rainfall
Depth
Jurisdictional Depth
Ground Surface

South Fork Wetland Monitoring
Groundwater Gauge #4 (Wetland #7)



South Fork Wetland Monitoring
Groundwater Gauge #5 (Wetland #33)




South Fork Wetland Monitoring
Groundwater Gauge #6 (Wetland #18)
Groundwater Depth (in)
Rainfall Depth (in)
Begin Growing Season
3/25/2010
End Growing Season
11/4/2010
222 Days
10
5
0
-5
-10
-15
4
3.5
3
2.5
2
1.5
1
0.5
0
01-Jan-10
15-Jan-10
29-Jan-10
12-Feb-10
26-Feb-10
12-Mar-10
26-Mar-10
09-Apr-10
23-Apr-10
07-May-10
21-May-10
04-Jun-10
18-Jun-10
02-Jul-10
16-Jul-10
30-Jul-10
13-Aug-10
27-Aug-10
10-Sep-10
24-Sep-10
08-Oct-10
22-Oct-10
05-Nov-10
Date
Rainfall
Jurisdictional Depth
Depth
Ground Surface

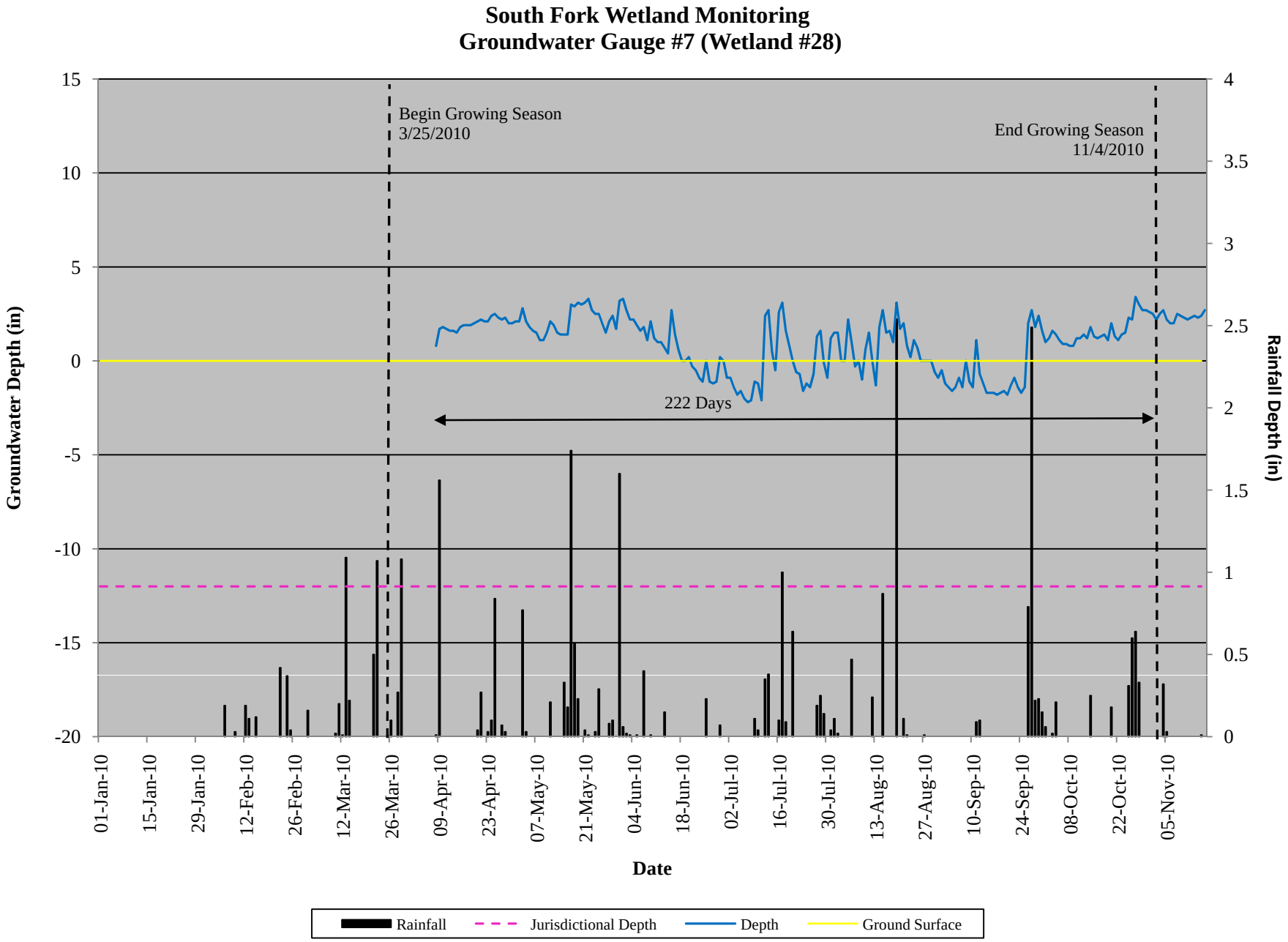

South Fork Wetland Monitoring
Groundwater Gauge #7 (Wetland #28)
Begin Growing Season
3/25/2010
End Growing Season
11/4/2010
222 Days
Groundwater Depth (in)
Rainfall Depth (in)
Date
15
10
5
0
-5
-10
-15
-20
4
3.5
3
2.5
2
1.5
1
0.5
0
01-Jan-10
15-Jan-10
29-Jan-10
12-Feb-10
26-Feb-10
12-Mar-10
26-Mar-10
09-Apr-10
23-Apr-10
07-May-10
21-May-10
04-Jun-10
18-Jun-10
02-Jul-10
16-Jul-10
30-Jul-10
13-Aug-10
27-Aug-10
10-Sep-10
24-Sep-10
08-Oct-10
22-Oct-10
05-Nov-10
Rainfall
Jurisdictional Depth
Depth
Ground Surface

Table 5. Wetland Gauge Attainment Data South Fork Site / Project No. 93507	
Gauge	**Success Criteria Achieved / Max Consecutive Days During Growing Season (Percentage)**
	Year 1 (2010)
Gauge 1	Yes/222 (99%)
Gauge 2	Yes/87 (39%)
Gauge 3	Yes/181 (80%)
Gauge 4	Yes/112 (50%)
Gauge 5	Yes/222 (99%)
Gauge 6	Yes/222 (99%)
Gauge 7	Yes/222 (99%)