Roquist Wetland
Restoration Monitoring Report
EEP Project # 312
EEP Contract # 004476
Monitoring Year – 05

Submitted to:

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

Construction Completed: 2008
Data Collection: August 2012
Submitted: January 2013

Monitoring Firm

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

Project Contact: Adam Spiller
Email: adam.spiller@kci.com
KCI Project No: 16121789_MY05

Design Firm

HSMM of North Carolina, Inc.
3333 Regency Parkway, Suite 120
Cary, NC 27518

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1.0 EXECUTIVE SUMMARY / PROJECT ABSTRACT

The North Carolina Ecosystem Enhancement Program (EEP) restored and preserved wetlands and preserved streams at the Roquist Wetland Site in Bertie County, North Carolina. The 3,920-acre site is located within the USGS 8-digit HUC 03010107 of the Roanoke River Basin. The project restored 36.5 acres of wetland and preserved an additional 3,781 acres of wetland and 4,000 linear feet of stream channel. Project construction was completed in 2008. The project objectives are listed below.

Project Objectives

- Restoration of 36.5 acres of previously ditched and filled non-riparian wetlands.
- Preservation of 3,000 acres of non-riparian wetlands.
- Preservation of 759 acres of high quality non-riparian wetlands.
- Preservation of 22.4 acres of riparian wetlands.
- Preservation of 4,000 linear feet of stream channel.

The restored wetlands were planted with fifteen different species of bare root trees and shrubs. Baseline vegetation monitoring was delayed until the end of the first growing season. Ten vegetation monitoring plots were established during the first monitoring year, following the CVS-EEP protocol. Because of this, the data reported in the *Roquist Wetland Restoration Site Phase I Mitigation Report* is first-year monitoring data and not baseline data as would typically be found in the baseline report. The first year of monitoring also reported that wild hogs significantly damaged the planted vegetation, resulting in increased mortality. The fifth year of monitoring found a site average of 101 planted stems/acre. Eight of the plots had planted stem densities less than the five year success criterion of 260 stems/acre. The site's average stem density including volunteers is 1,016 stems/acre, with four of the ten vegetation plots having total stem densities less than 260 stems/acre. Four plots have no planted stems in them and two of those plots have no volunteer stems either.

To monitor wetland hydrology, 12 gauges were established. Seven of these gauges (2, 3b, 5, 9, 11b, 14, and 15) were installed in restored wetlands. The remaining five gauges (1, 4, 6, 13, and 12) are reference gauges that were installed in existing wetlands, and are paired with a gauge in an adjacent restoration area. Two of the restoration gauges (14 and 15) are not paired with reference gauges. During the fifth growing season, all of the restoration gauges met the success criteria of having saturated soil conditions occurring within 12 inches of the ground surface for a minimum of 12.5% (29 consecutive days) of the 231-day growing season (March 22 to November 8) during average climatic conditions, or having the hydroperiod in the restoration areas be within 20% of the corresponding reference hydroperiod during drought conditions. The daily rainfall data obtained from a local weather station shows that the area had average rainfall during the 2012 growing season. The months of February, March, April, May, July, September, and October experienced average rainfall. Rainfall was less than average in January, June, and November, while August experienced above average rainfall.

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

Level 2 of the CVS-EEP protocol (http://cvs.bio.unc.edu/methods.htm) was used to collect vegetation data from the Roquist Site this year.

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 Maps and Background Tables

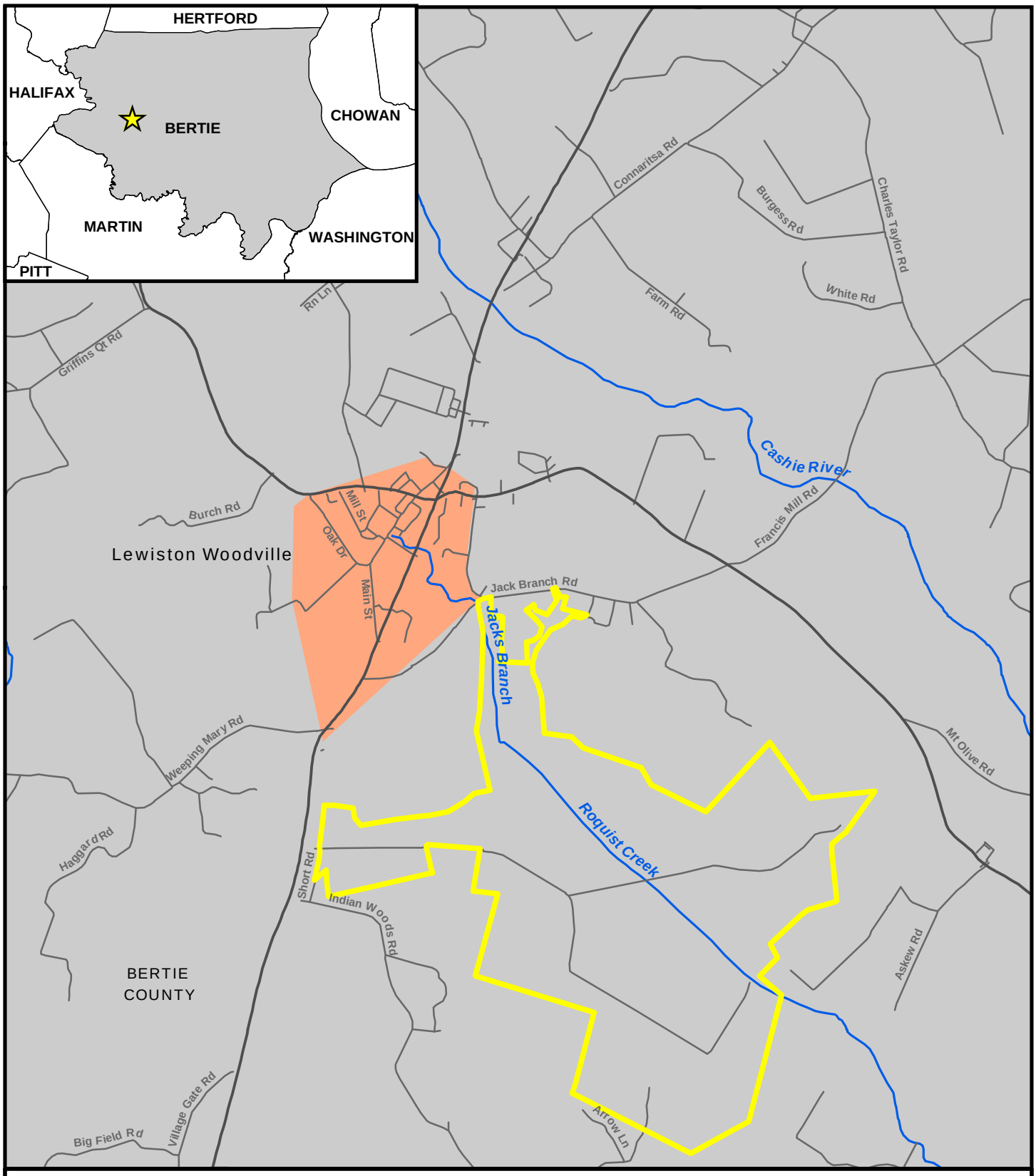


Figure 1. Vicinity Map

Project Property Boundary
Major Roads
Other Roads
Major Rivers
Cities and Towns

N
W
E
S

1 0.5 0 1 Miles

Ecosystem Enhancement Program

KCI

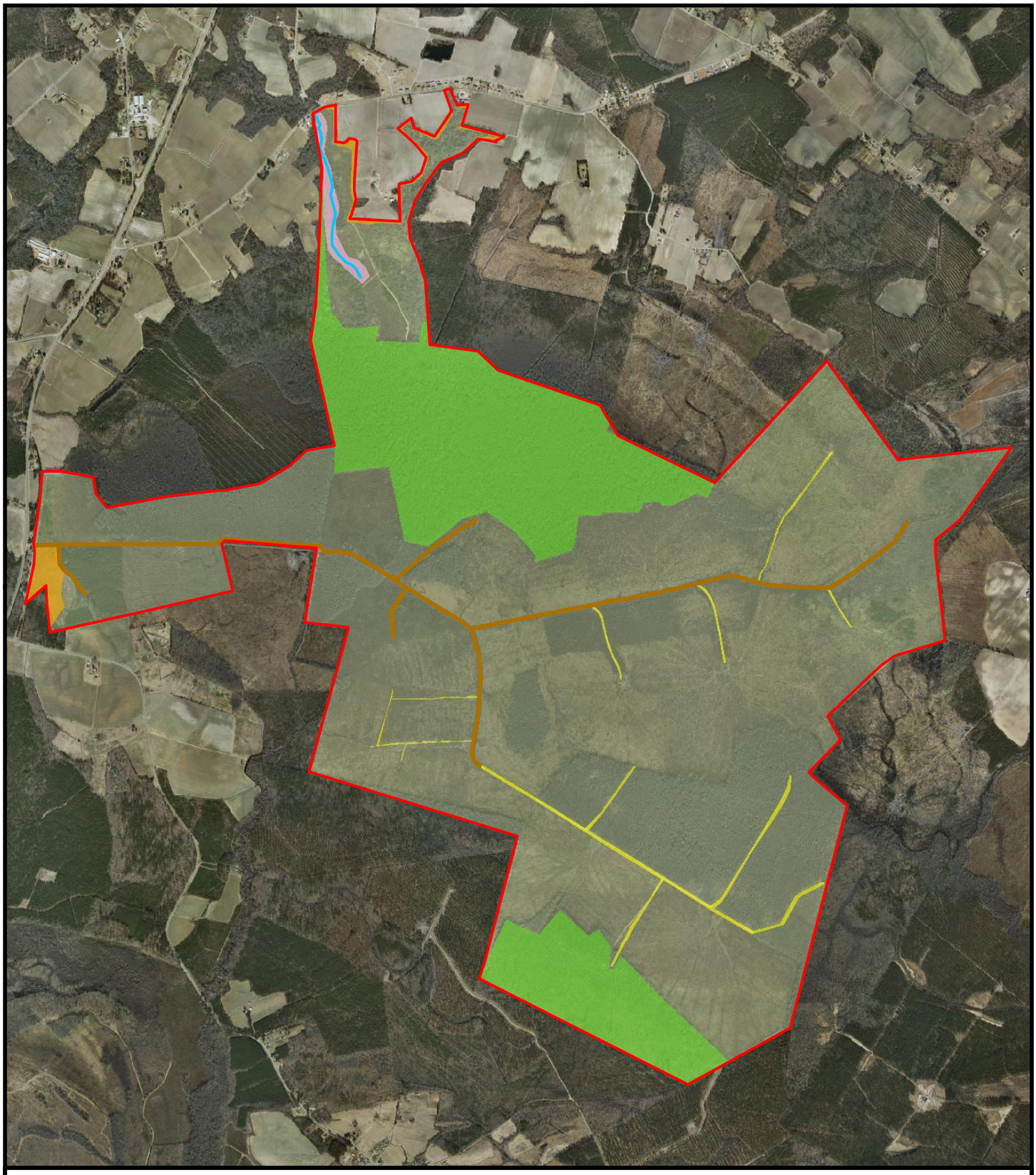


Figure 2. Site Asset Map

Ecosystem Enhancement Program

- Non-Riparian Restoration
- Riparian Preservation
- Non-Riparian Preservation
- High Quality Non-Riparian Preservation
- Upland Preservation
- Existing Roads
- Jack's Branch Stream Preservation
- Site Boundary

N W E S

1:36,000

1 inch = 3,000 feet

3,000 1,500 0 3,000 Feet

KCI

Table 1a. Project Restoration Components
Project Number and Name: 312 - Roquist Wetland

Project Component	Existing Linear Feet / Acreage	Restoration Level	Linear Feet / Acreage	Mitigation Ratio	Mitigation Units	Comment
Non-Riparian Restored Wetlands	0.0	R	36.5	1:1	36.5	Restored wetland hydrology and planted native trees and shrubs.
Riparian Preserved Wetlands	22.4	P	22.4	5:1	4.5	In conservation easement
Non-Riparian Preserved Wetlands	3,000.0	P	3,000.0	5:1	600	In conservation easement
Non-Riparian Preserved High Quality Wetlands	759.0	P	759.0	5:1	151.8	In conservation easement
Jack's Branch Stream	4,000	P	4,000	5:1	800	In conservation easement

R - Restoration P - Preservation

Table 1b. Component Summations
Project Number and Name: 312 - Roquist Wetland

Restoration Level	Stream (lf)	Riparian Wetland (Ac)		Non-Ripar (Ac)	Upland (Ac)	Buffer (Ac)	BMP
		Riverine	Non-Riverine				
Restoration				36.5			
Enhancement							
Enhancement I							
Enhancement II							
Creation							
Preservation	4,000	22.4		3,000			
HQ Preservation				759			
		22.4					
Totals (Feet/Acres)	**4,000**	**22.4**		**3,796**	**0**	**0**	
MU Totals	**800**	**4.5**		**788.3**	**0**	**0**	

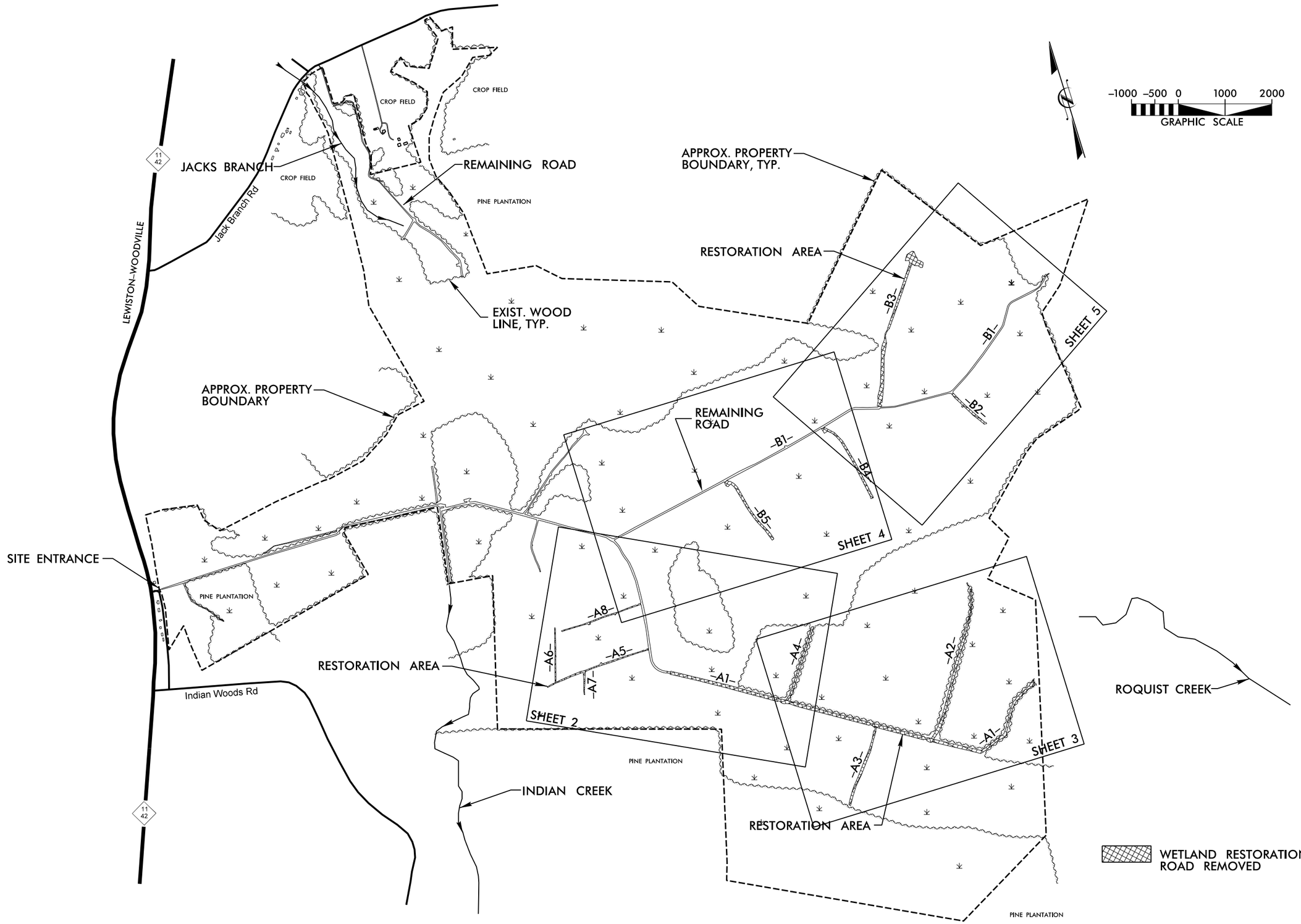
Table 2. Project Activity and Reporting History Project Number and Name: 312 - Roquist Wetland		
Elapsed Time Since Grading Complete: 4 yr 11 months **Elapsed Time Since Planting Complete: 4yr 11 months** **Number of Reporting Years: 5**		
Activity or Report	**Data Collection Complete**	**Actual Completion or Delivery**
Restoration Plan	N/A	Aug 05
Final Design - 90%	N/A	Jul 06
Construction	N/A	Jan 08
Permanent Seeding	N/A	Jun 08
Bare Root Planting	N/A	Jan 08
Mitigation Plan / Record Drawings (Year 1 Veg Monitoring Data)	Oct 08	Nov 08
Year 2 Monitoring	Oct 09	Dec 09
Year 3 Monitoring	Oct 10	Dec 10
Year 4 Monitoring	Oct 11	Dec 11
Year 5 Monitoring	Aug 12	Dec 12

Table 3. Project Contacts Table Project Number and Name: 312 - Roquist Wetland	
Design Firm	HSMM of North Carolina, Inc. 3333 Regency Parkway, Suite 120 Cary, North Carolina 27518 Contact: Mr. Rick Prosser Phone: (919) 460-6895
Construction Contractor	Sawyer's Land Developing, Inc. 275 Higginsport Road Belhaven, North Carolina 27810 Contact: Mr. Len Hunt Phone: (252) 943-2154
Aggregate Supplier	Hanson Rocky Mount Quarry #017 10471 NC-97 West Rocky Mount, North Carolina 27801 Phone: (252) 977-1611
Seeding Contractor	Holland Landscaping, Inc. 953 Blackrock Road Merry Hill, North Carolina 27957 Contact: Mr. Randy Holland Phone: (252) 856-4163
Planting Contractor / Bare-Root Plant Supplier	Emerald Forest, Inc. 4651 Black Woods Road Chesapeake, Virginia 23322 Contact: Mr. Peter McClintock Phone: (757) 421-0929
Bare-Root Plant Supplier	Int'l Paper SC Super Tree Nursery 5594 Highway 38 S Blenheim, South Carolina 29516 Phone: (843) 528-3203
Survey Contractor	H.C.Harris, Jr., Engineering & Surveying, P.A. 216 Main Street Winterville, North Carolina 28590 Contact: Mr. Cliff Harris, Jr. Phone: (252) 321-5607
Monitoring Performers	
MY-01	HSMM of North Carolina, Inc. 3333 Regency Parkway, Suite 120 Cary, North Carolina 27518 Contact: Mr. Rick Prosser Phone: (919) 460-6895
MY-02 - MY-04	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: 312 – Roquist Wetland**	
Project County	Bertie County
Drainage Area	21.4 mi^2
Drainage Impervious Cover Estimate (%)	<5%
Physiographic Region	Inner Coastal Plain
Ecoregion	Mid-Atlantic Floodplains and Low Terraces
Plant Communities	Nonriverine Swamp Forest and Nonriverine Wet Hardwood Forest
Dominant Soil Types	Leaf Sandy Loam
Reference Site ID	On Site
USGS HUC for Project and Reference	03010107
Any portion of the project segment 303d listed?	No - not rated
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



REVISIONS

NO.	DESCRIPTION	DATE	APPROVED

Ecosystem Enhancement Program

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

ROQUIST WETLAND SITE

BERTIE COUNTY, NORTH CAROLINA
EEP PROJECT NUMBER 312 - MY05

DATE: NOV 2012
SCALE: 1" = 2000'

CURRENT CONDITION PLAN VIEW

SHEET 1 OF 5

PROJECT CONDITION DETAILS

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

PROJECT CONDITION

VEG PLOT ACHIEVING DENSITY CRITERION .....

VEG PLOT BELOW DENSITY CRITERION .....

WETLAND GAUGE ACHIEVING HYDROLOGIC CRITERION .....

WETLAND GAUGE BELOW HYDROLOGIC CRITERION .....

IMAGE SOURCE: NC 2010 STATEWIDE ORTHOIMAGERY

MATCHLINE - SEE SHEET 4

GAUGE 6

0 / 0

GAUGE 5
VEGETATION PLOT 5

GAUGE 4

0 / 0

GAUGE 3B
VEGETATION PLOT 6

GAUGE 1

4349 / 283

GAUGE 2
VEGETATION PLOT 7

REMAINING ROAD

WETLAND RESTORATION, ROAD REMOVED

1214 / 162

VEGETATION PLOT 10

2711 / 121

VEGETATION PLOT 9

EXISTING WETLAND

EXISTING WETLAND

PROPERTY / CONSERVATION EASEMENT BOUNDARY

-A1-

-A4-

-A5-

-A6-

-A7-

-A8-

MATCHLINE - SEE SHEET 3

–200 –100 0 200 400

GRAPHIC SCALE

REVISIONS

STAL	DESCRIPTION	DATE	APPROVED

Ecosystem Enhancement Program

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

ROQUIST WETLAND SITE

BERTIE COUNTY, NORTH CAROLINA
EEP PROJECT NUMBER 312 - MY05

A1, A4, A5, A6, A7, A8

DATE: NOV 2012
SCALE: 1"= 400'

CURRENT CONDITION PLAN VIEW

SHEET 2 OF 5

PROJECT CONDITION

VEG PLOT ACHIEVING DENSITY CRITERION

VEG PLOT BELOW DENSITY CRITERION

WETLAND GAUGE ACHIEVING HYDROLOGIC CRITERION

WETLAND GAUGE BELOW HYDROLOGIC CRITERION

PROJECT CONDITION DETAILS

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

IMAGE SOURCE: NC 2010 STATEWIDE ORTHOIMAGERY

–200 –100 0 200 400

GRAPHIC SCALE

MATCHLINE - SEE SHEET 2

EXISTING WETLAND

WETLAND RESTORATION, ROAD REMOVED

-A1-

65+00

60+00

55+00

VEGETATION PLOT 8

728 / 40

50+00

45+00

40+00

35+00

30+00

25+00

20+00

15+00

-A2-

EXISTING WETLAND

WETLAND RESTORATION, ROAD REMOVED

PROPERTY / CONSERVATION EASEMENT BOUNDARY

-A3-

EXISTING WETLAND

SYM.	DESCRIPTION	DATE	APPROVED
	REVISIONS		

Ecosystem Enhancement Program

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RALEIGH, NORTH CAROLINA 27609

ROQUIST WETLAND SITE

BERTIE COUNTY, NORTH CAROLINA
EEP PROJECT NUMBER 312 - MY05

A1, A2, A3

DATE: NOV 2012
SCALE: 1"= 400'

CURRENT CONDITION PLAN VIEW

SHEET 3 OF 5

PROJECT CONDITION

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

IMAGE SOURCE: NC 2010 STATEWIDE ORTHOIMAGERY

PROJECT CONDITION DETAILS

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

REVISIONS			
DESCRIPTION	DATE	APPROVED	

Ecosystem Enhancement Program

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

ROQUIST WETLAND SITE
BERTIE COUNTY, NORTH CAROLINA
EEP PROJECT NUMBER 312 - MY05

B1, A4, A5

DATE: NOV 2012
SCALE: 1"= 400'

CURRENT CONDITION PLAN VIEW

SHEET 4 OF 5

0 200 400

GRAPHIC SCALE

MATCHLINE - SEE SHEET 4

EXISTING WETLAND

CONSERVATION EASEMENT BOUNDARY

15+00

20+00

25+00

30+00

-B3-

35+00

65+00

40+00

WETLAND RESTORATION,
ROAD REMOVED

GAUGE 11b
VEGETATION PLOT 2

607 / 364

GAUGE 12

EXISTING WETLAND

60+00

55+00

-B1-

50+00

45+00

REMAINING ROAD

20+00

40+00

35+00

30+00

25+00

15+00

-B1-

40+00

GAUGE 15
VEGETATION PLOT 1

202 / 40

EXISTING WETLAND

-B2-

15+00

CONSERVATION EASEMENT BOUNDARY

PROJECT CONDITION

VEG PLOT ACHIEVING DENSITY CRITERION	
VEG PLOT BELOW DENSITY CRITERION	
WETLAND GAUGE ACHIEVING HYDROLOGIC CRITERION	
WETLAND GAUGE BELOW HYDROLOGIC CRITERION	

PROJECT CONDITION DETAILS

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

IMAGE SOURCE:
NC 2010 STATEWIDE ORTHOIMAGERY

SYM.	DESCRIPTION	DATE	APPROVED
	REVISIONS		

Ecosystem Enhancement Program

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

ROQUIST WETLAND SITE

BERTIE COUNTY, NORTH CAROLINA
EEP PROJECT NUMBER 312 - MY05

B1, B2, B3

DATE: NOV 2012
SCALE: 1"= 400'

CURRENT CONDITION PLAN VIEW

SHEET 5 OF 5

Table 5. Vegetation Condition Assessment

Project Number and Name: 312 - Roquist Wetland

Planted Acreage 36.5 **Easement Acreage 3,920**

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 a Large Part of Restoration Area	0	25.40	69.6%
			Total	0	25.40	69.6%
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	0	25.40	69.6%
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%

Vegetation Monitoring Plot Photos

Plot 1 Photo – 8/14/12 - MY 05

Plot 2 Photo – 8/14/12 - MY 05

Plot 3 Photo – 8/14/12 - MY 05

Plot 4 Photo – 8/14/12 - MY 05

Plot 5 Photo – 8/14/12 - MY 05

Plot 6 Photo – 8/14/12 - MY 05

Plot 7 Photo – 8/14/12 - MY 05

Plot 8 Photo – 8/14/12 - MY 05

Plot 9 Photo – 8/14/12 - MY 05

Plot 10 Photo – 8/14/12 - MY 05

Appendix C

Vegetation Assessment Data

Table 6. Vegetation Plot Mitigation Success Summary Table Project Number and Name: 312 - Roquist Wetland			
Vegetation Plot ID	**Monitoring Year 05 Planted Stem Density (stems/acre)**	**Vegetation Survival Threshold Met? (260 planted stems/acre after MY05)**	**Monitoring Year 05 Total Stem Density (stems/acre)**
1	40	No	202
2	364	Yes	607
3	0	No	121
4	0	No	324
5	0	No	0
6	0	No	0
7	283	Yes	4,249
8	40	No	728
9	121	No	2,711
10	162	No	1,214

Table 7. CVS Vegetation Plot Metadata Project Number and Name: 312 - Roquist Wetland	
Report Prepared By	april helms
Date Prepared	10/30/2012 9:11
database name	KCI-2012-A.mdb
database location	M:\2007\12071067_2007 EEP OPEN END\Veg_database
computer name	12-CV76KF1
file size	59768832
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	312
project Name	Roquist
Description	
area (sq m)	35000
Required Plots (calculated)	10
Sampled Plots	10

Table 8. CVS Planted Stem Count by Plot and Species
Project Number and Name: 312 – Roquist Wetland

			Current Plot Data (MY5 2012)																												
			E312-A-0001			E312-A-0002			E312-A-0003			E312-A-0004			E312-A-0005			E312-A-0006			E312-A-0007			E312-A-0008			E312-A-0009			E312-A-0010		
Scientific Name	**Common Name**	**Species Type**	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T
Acer rubrum	red maple	Tree			4			6						6									70			3			2			25
Baccharis	baccharis	Shrub																													
Clethra alnifolia	coastal sweetpepperbush	Shrub																													
Diospyros virginiana	common persimmon	Tree																													
Fraxinus pennsylvanica	green ash	Tree	1	1	1	1	1	1																		1					
Itea virginica	Virginia sweetspire	Shrub																													
Leucothoe axillaris	coastal doghobble	Shrub																													
Liquidambar styraciflua	sweetgum	Tree									2			2												13			7		
Nyssa biflora	swamp tupelo	Tree																			1	1	1								
Nyssa sylvatica	blackgum	Tree				5	5	5													1	1	29						4	1	1	2
Quercus	oak	Tree																											51			
Quercus laurifolia	laurel oak	Tree																									1	1	1			
Quercus michauxii	swamp chestnut oak	Tree				1	1	1													1	1	1	1	1	1				1	1	1
Quercus pagoda	cherrybark oak	Tree																												1	1	1
Quercus phellos	willow oak	Tree				1	1	1																			1	1	1			
Quercus rubra	northern red oak	Tree																													
Quercus shumardii	Shumard's oak	Tree																												1	1	1
Rhus copallinum	flameleaf sumac	shrub																														
Salix nigra	black willow	Tree									1																					
Taxodium distichum	bald cypress	Tree																									1	1	1			
Ulmus americana	American elm	Tree																			4	4	4									
Vaccinium corymbosum	highbush blueberry	Shrub				1	1	1																								
	Stem count		1	1	5	9	9	15	0	0	3	0	0	8	0	0	0	0	0	0	7	7	105	1	1	18	3	3	67	4	4	30
	size (ares)		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		
	Species count		1	1	2	5	5	6	0	0	2	0	0	2	0	0	0	0	0	0	4	4	5	1	1	4	3	3	7	4	4	5
	Stems per ACRE		40	40	202	364	364	607	0	0	121	0	0	324	0	0	0	0	0	0	283	283	4249	40	40	728	121	121	2711	162	162	1214

P-LS – Planted Live Stake Stems P-all – Planted Stems Total (with Live Stakes) T – Total (Planted Including Live Stakes and Volunteers)

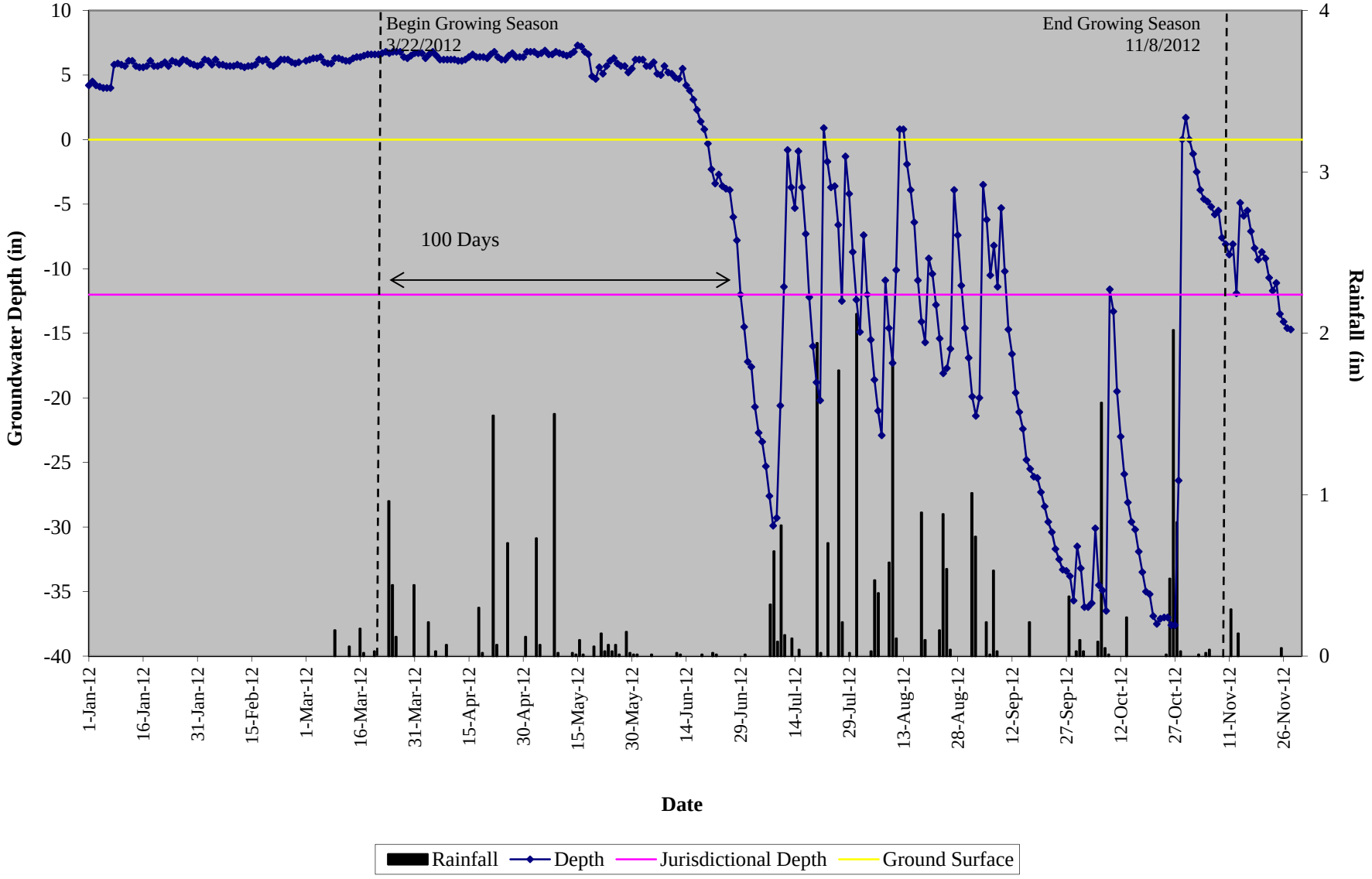
Table 8. CVS Planted Stem Count by Plot and Species

			Annual Means														
			MY5 (2012)			MY4 (2011)			MY3 (2010)			MY2 (2009)			MY1 (2008)		
Scientific Name	**Common Name**	**Species Type**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**
Acer rubrum	red maple	Tree			116			46			17			54			19
Baccharis	baccharis	Shrub												4			
Clethra alnifolia	coastal sweetpepperbush	Shrub										1	1	1		1	1
Diospyros virginiana	common persimmon	Tree												36			43
Fraxinus pennsylvanica	green ash	Tree	2	2	3	3	3	10	3	3	12	3	3	15		3	3
Itea virginica	Virginia sweetspire	Shrub														1	1
Leucothoe axillaris	coastal doghobble	Shrub														1	1
Liquidambar styraciflua	sweetgum	Tree			24			12			2			11			12
Nyssa biflora	swamp tupelo	Tree	1	1	1	1	1	1	1	1	1	1	1	1			
Nyssa sylvatica	blackgum	Tree	7	7	40	7	7	12	7	7	7	9	9	9		12	12
Quercus	oak	Tree			51			76			76						
Quercus laurifolia	laurel oak	Tree	1	1	1	2	2	2	3	3	3	3	3	3		3	3
Quercus michauxii	swamp chestnut oak	Tree	4	4	4	4	4	4	4	4	4	4	4	4		4	4
Quercus pagoda	cherrybark oak	Tree	1	1	1	1	1	1				1	1	1			
Quercus phellos	willow oak	Tree	2	2	2	2	2	4	2	2	6	2	2	2		3	3
Quercus rubra	northern red oak	Tree															115
Quercus shumardii	Shumard's oak	Tree	1	1	1	1	1	1	2	2	2	2	2	59		3	3
Rhus copallinum	flameleaf sumac	shrub												13			5
Salix nigra	black willow	Tree			1									1			1
Taxodium distichum	bald cypress	Tree	1	1	1	1	1	1	1	1	1	1	1	1		1	1
Ulmus americana	American elm	Tree	4	4	4	4	4	5	4	4	4	5	5	5		4	4
Vaccinium corymbosum	highbush blueberry	Shrub	1	1	1	1	1	1	1	1	1	1	1	5		3	3
		Stem count	25	25	251	27	27	176	28	28	136	33	33	225	0	39	234
		size (ares)	10			10			10			10			10		
		size (ACRES)	0.25			0.25			0.25			0.25			0.25		
		Species count	11	11	15	11	11	14	10	10	13	12	12	18	0	12	18
		Stems per ACRE	101	101	1016	109	109	712	113	113	550	134	134	911	0	158	947

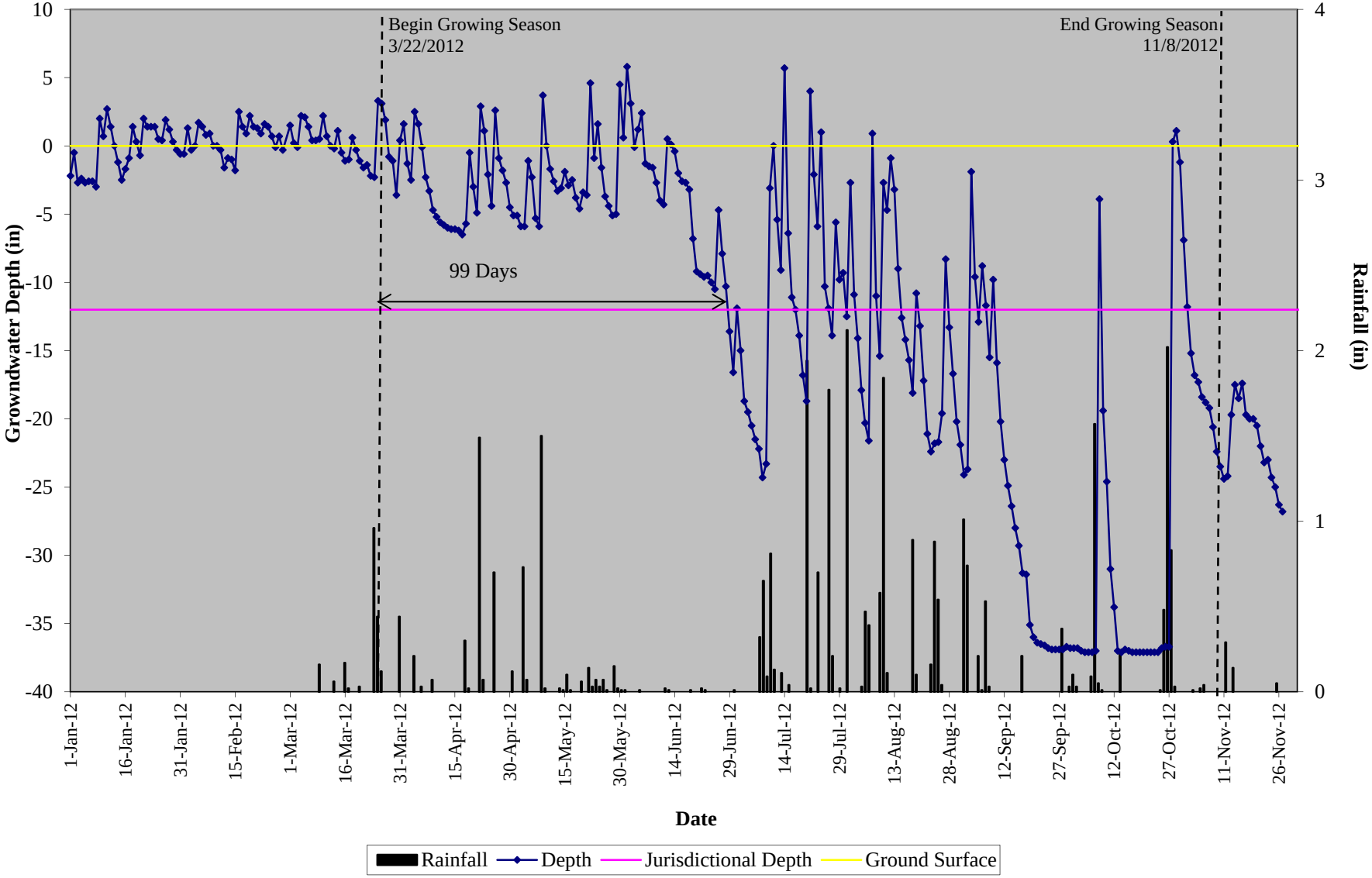
Appendix D

Hydrologic Data

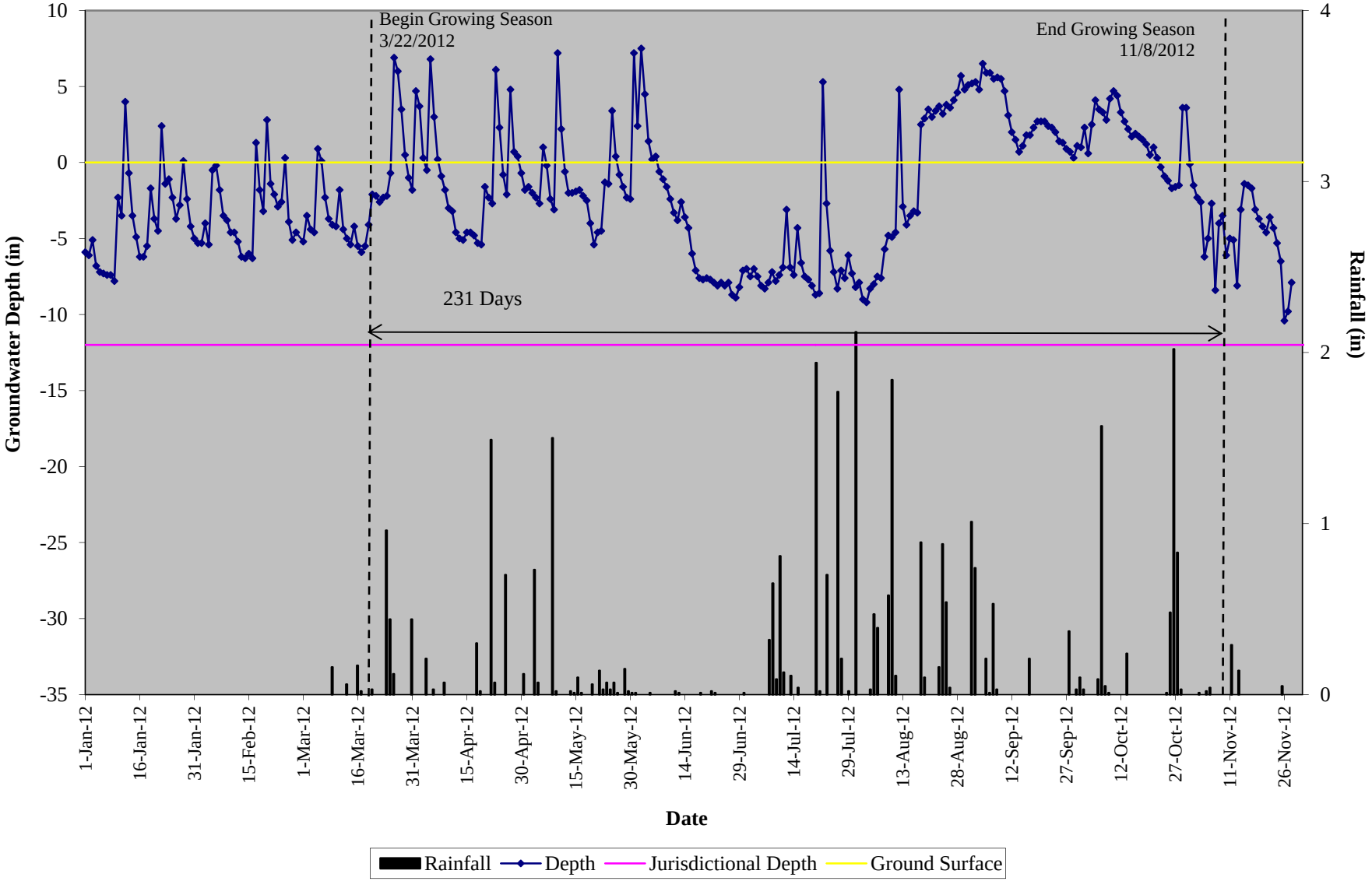
Roquist MY05
Groundwater Monitoring Gauge #1 (Reference for Gauge #2)



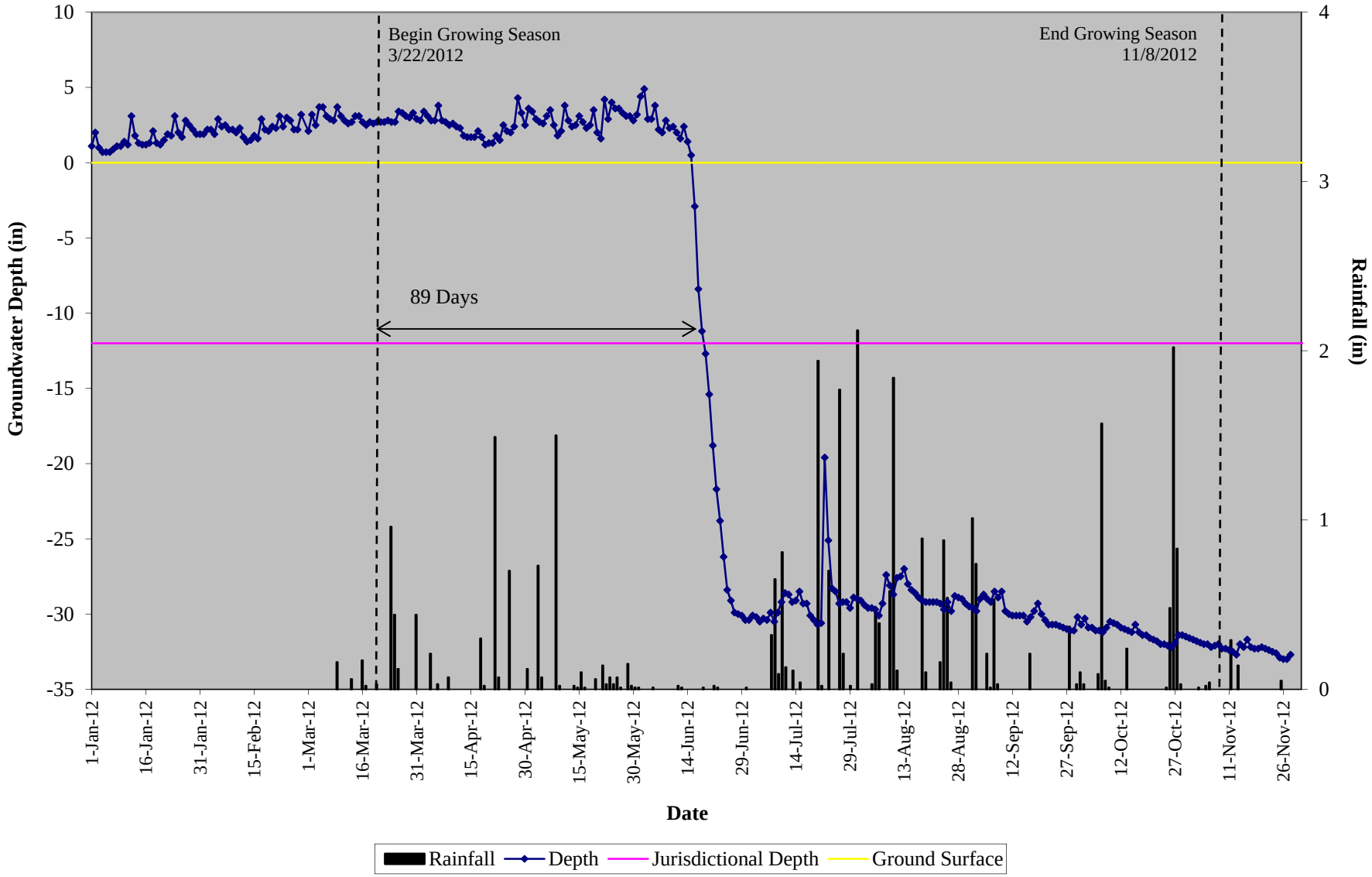
Roquist MY05
Groundwater Monitoring Gauge #2



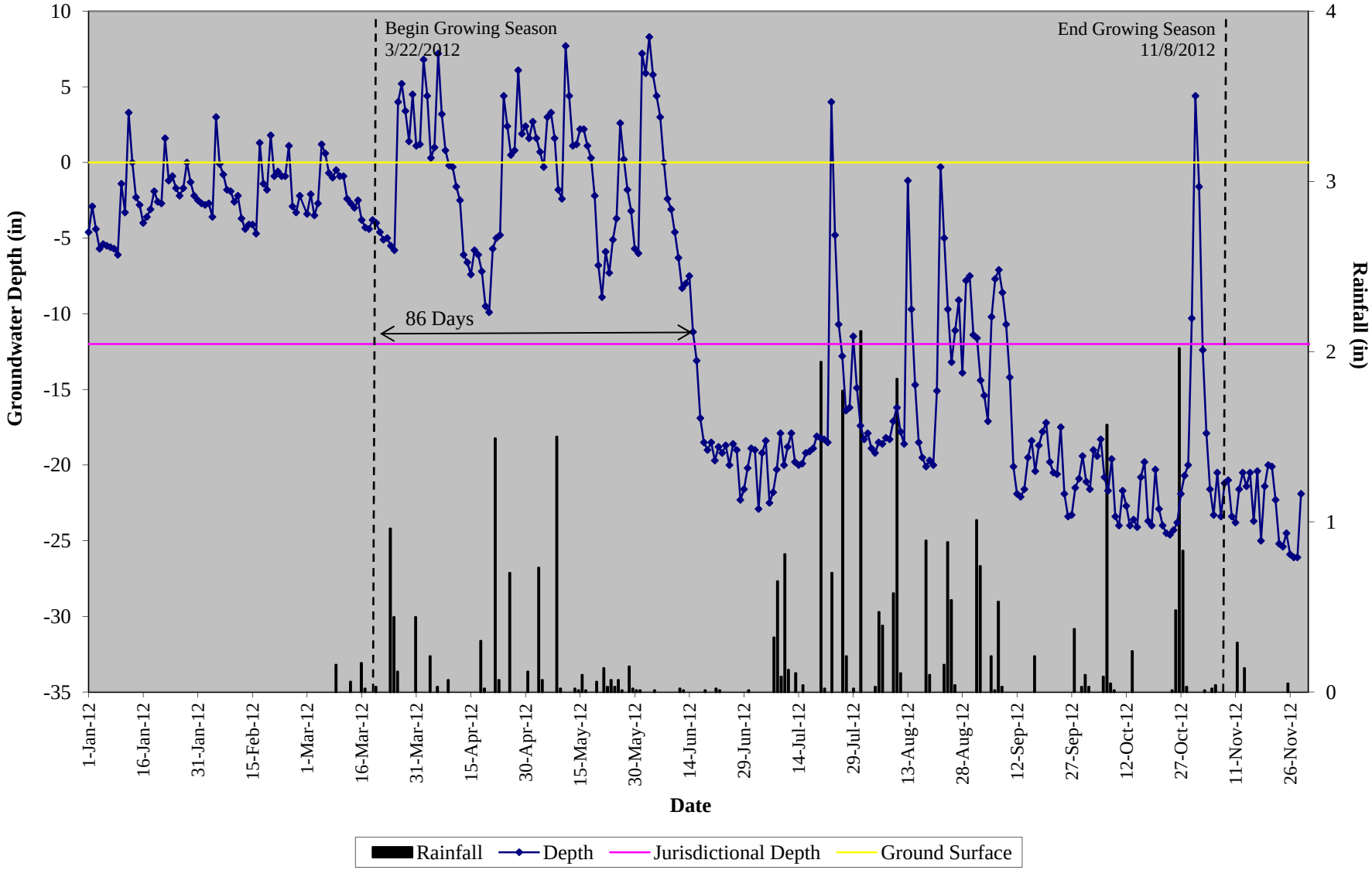
Roquist MY05
Groundwater Monitoring Gauge #3b



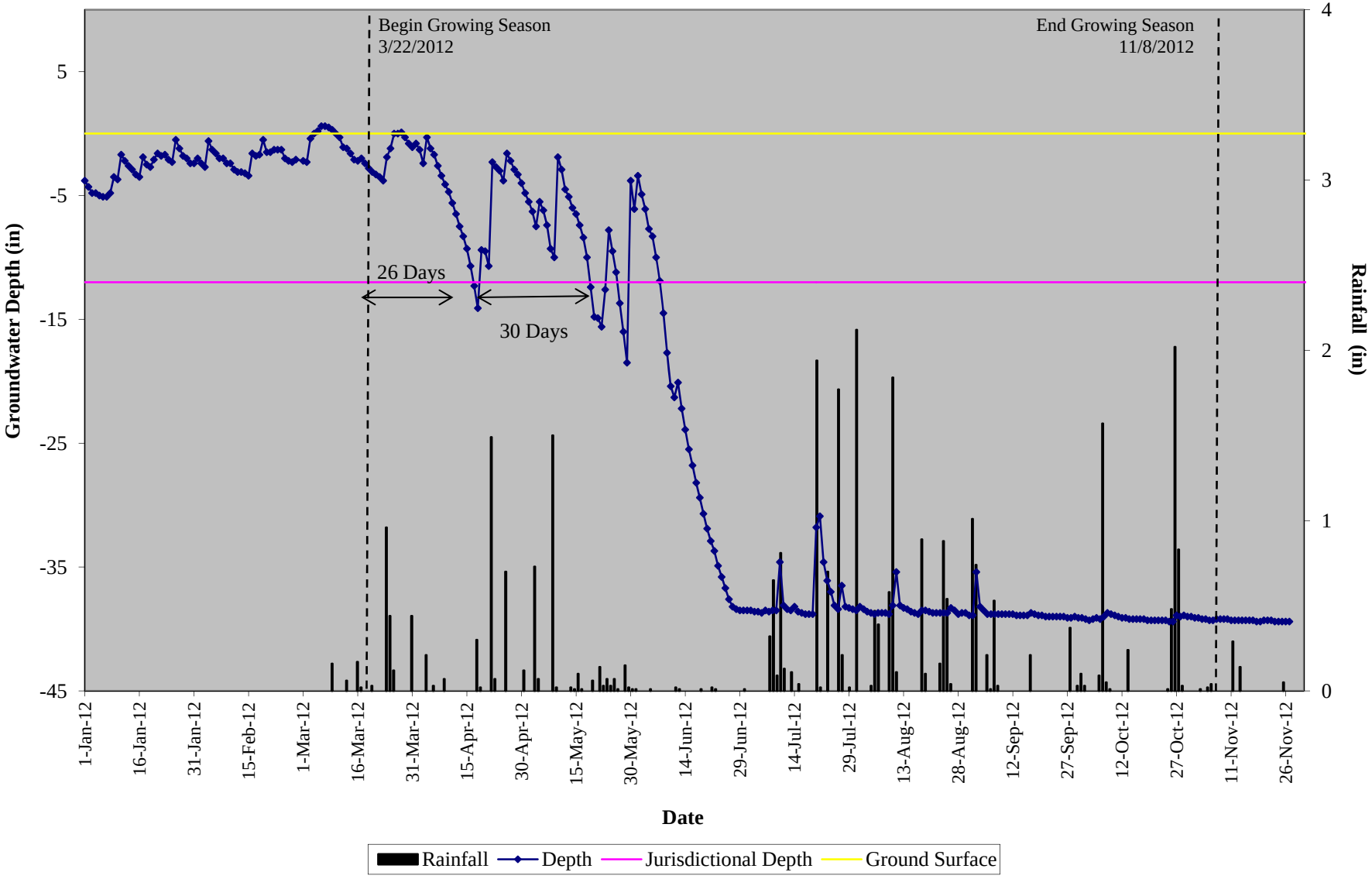
Roquist MY05
Groundwater Monitoring Gauge #4 (Reference for Gauge #3b)



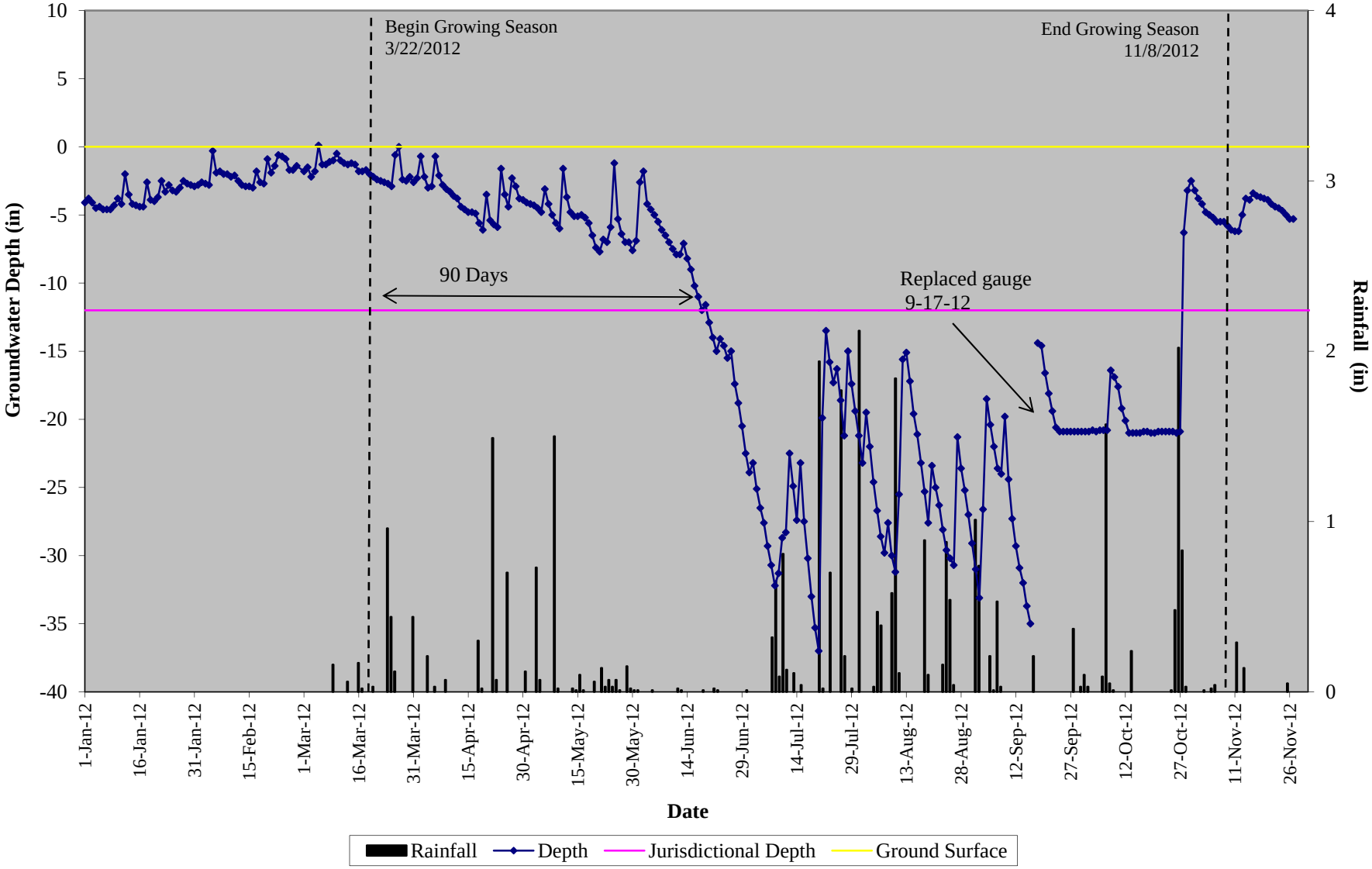
Roquist MY05
Groundwater Monitoring Gauge #5



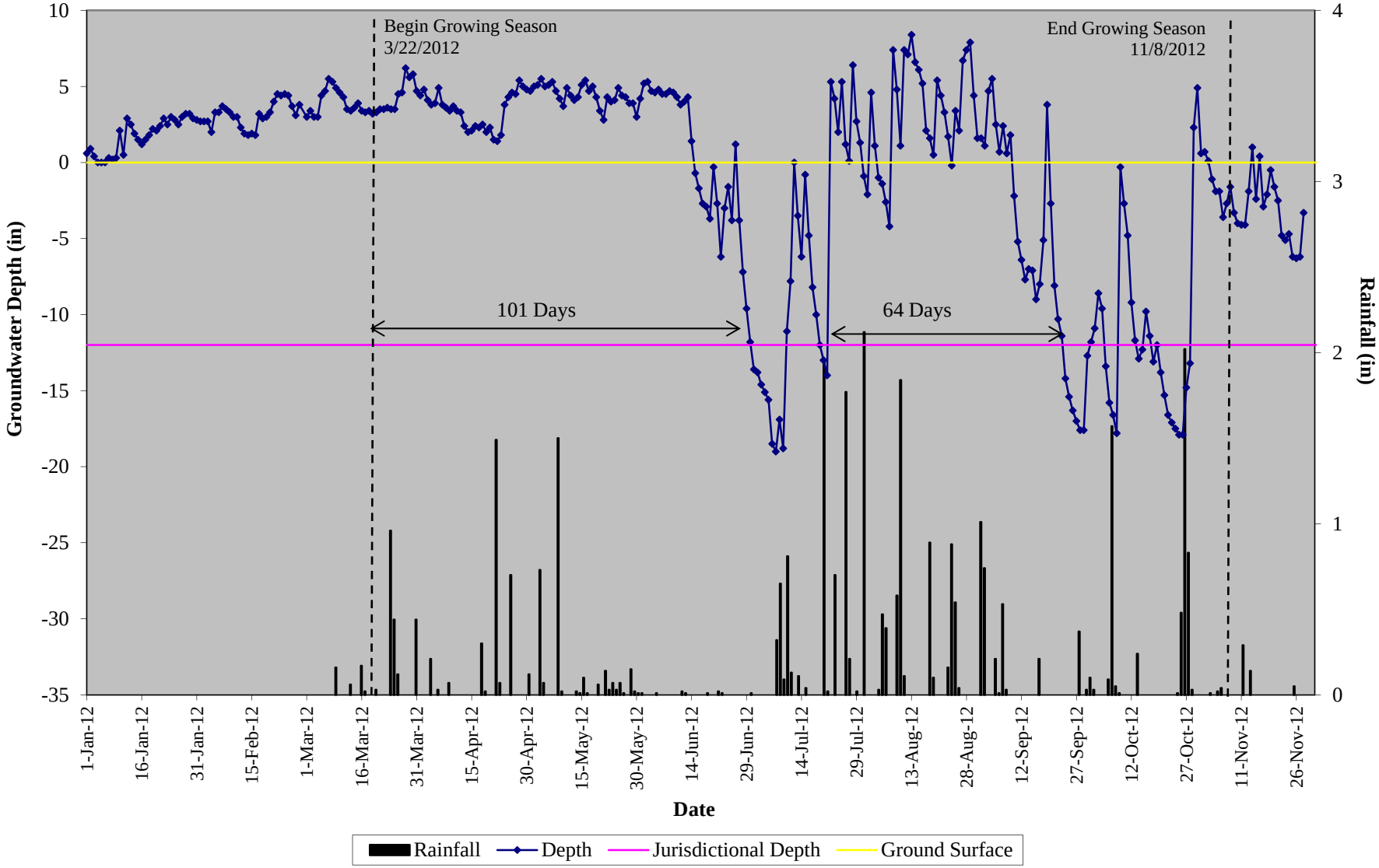
Roquist MY05
Groundwater Monitoring Gauge #6 (Reference for Gauge #5)



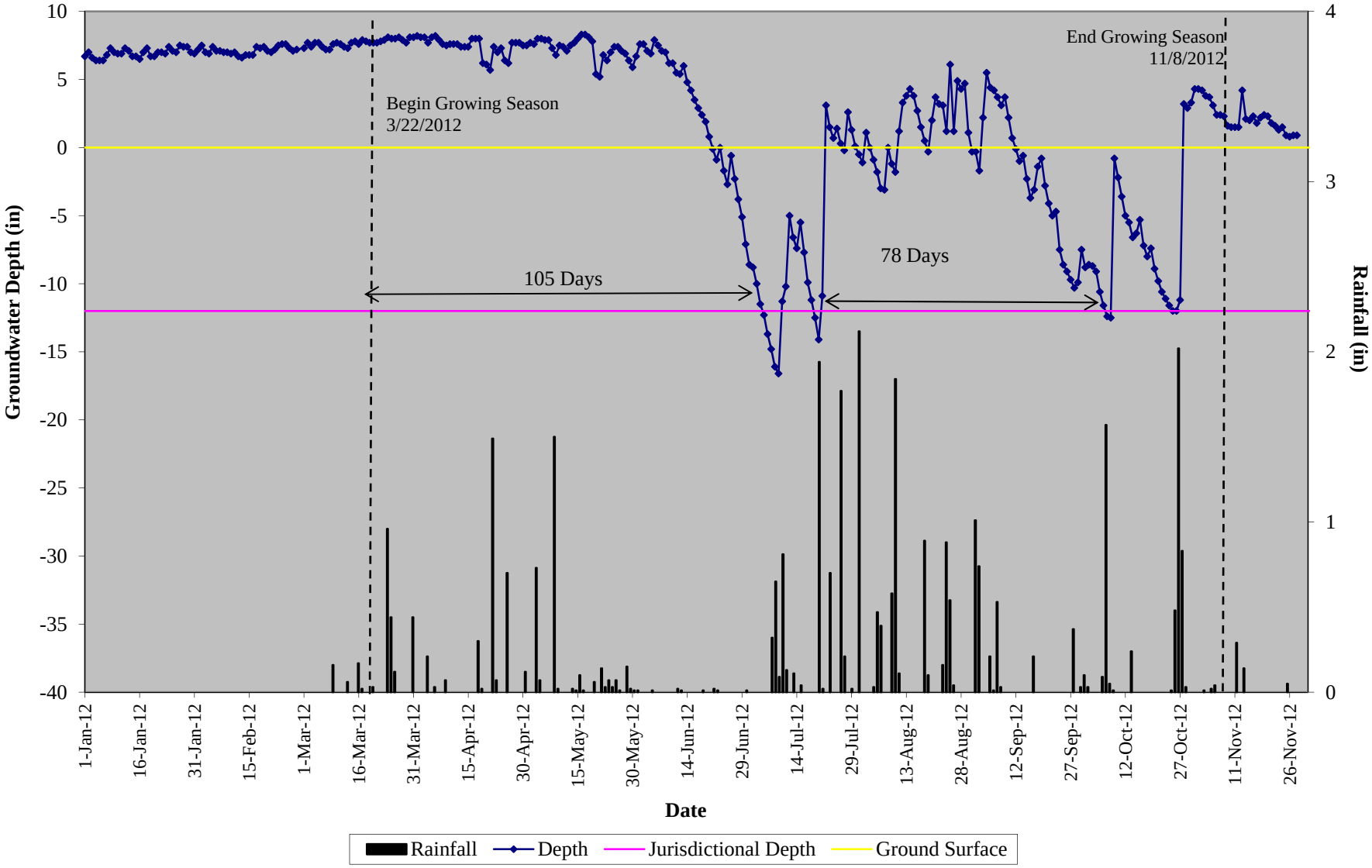
Roquist MY05
Groundwater Monitoring Gauge #9



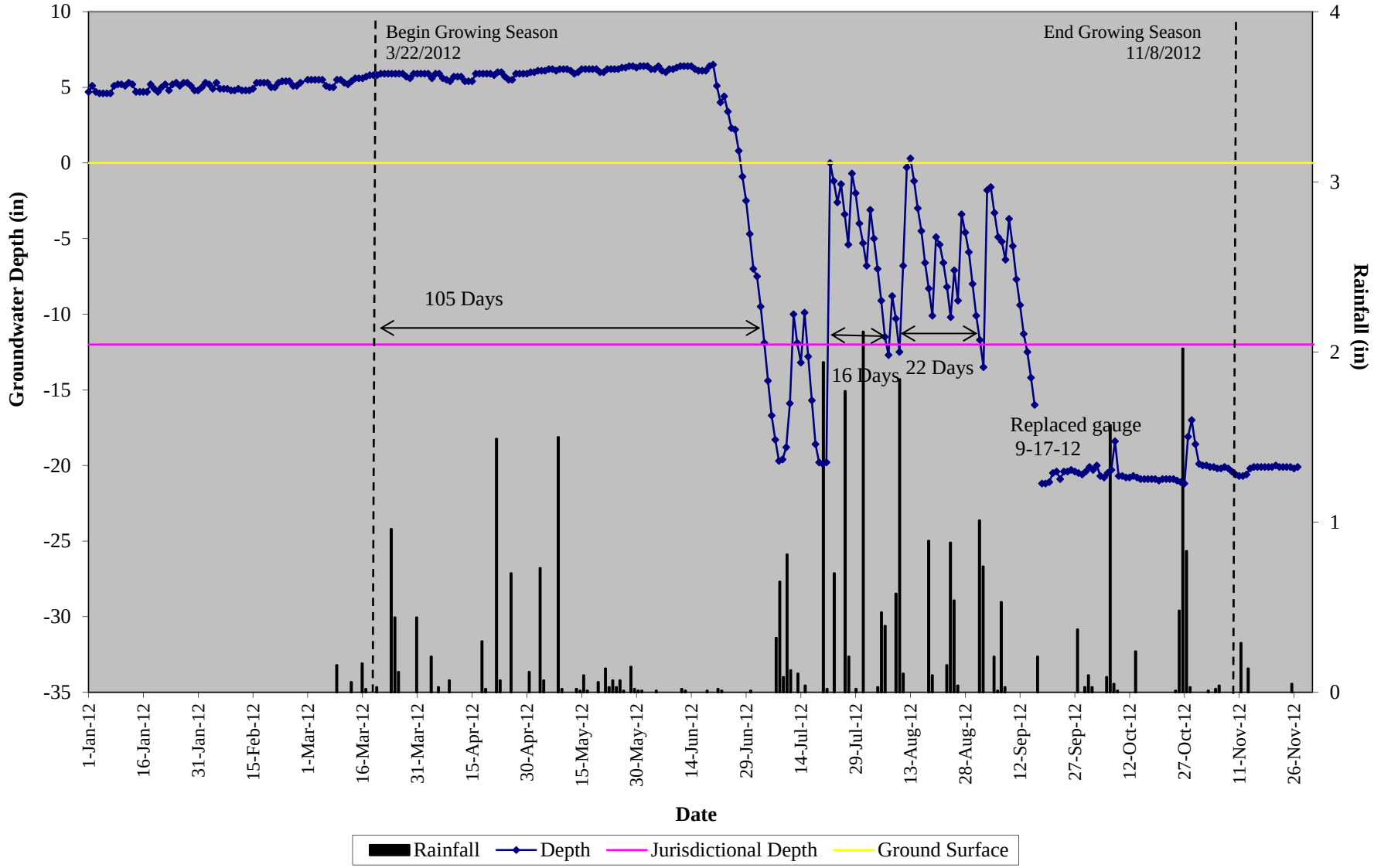
Roquist MY05
Groundwater Monitoring Gauge #11b



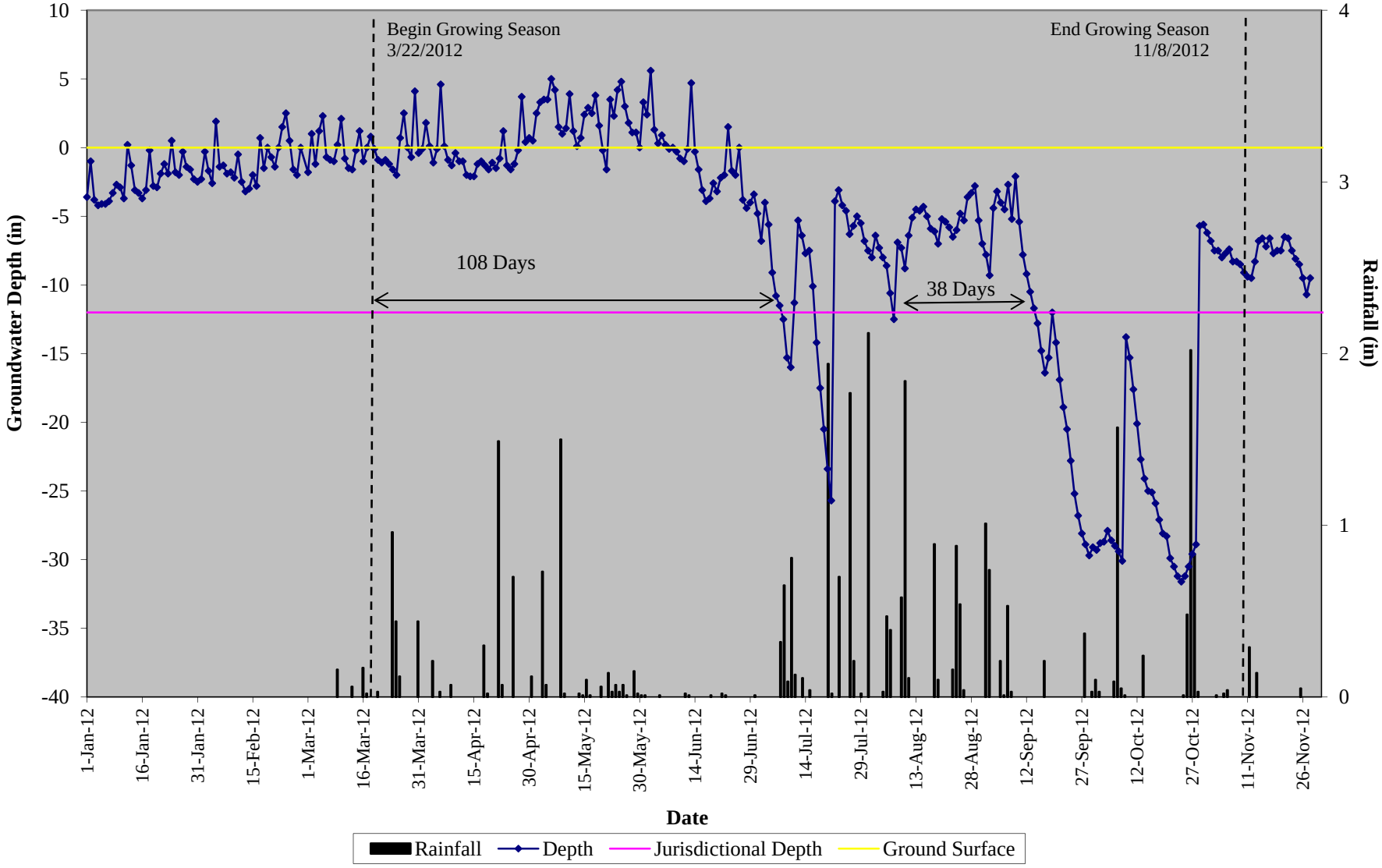
Roquist MY05
Groundwater Monitoring Gauge #12 (Reference for Gauge 11b)



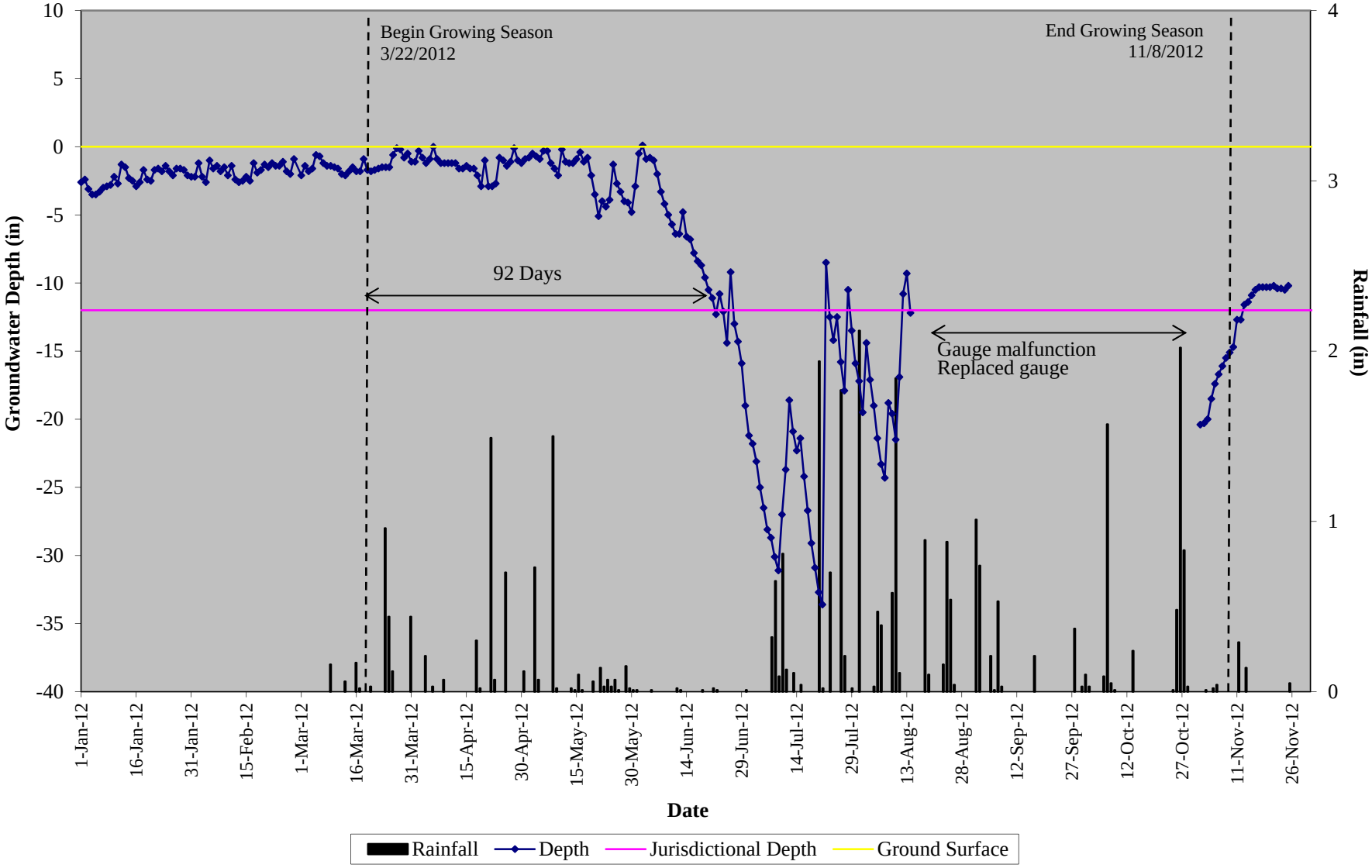
Roquist MY05
Groundwater Monitoring Gauge #13 (Reference for Gauge #9)



Roquist MY05
Groundwater Monitoring Gauge #14



Roquist MY05
Groundwater Monitoring Gauge #15



Roquist 30-70 Percentile Graph 2011-2012
Edenton, NC Monthly Rainfall

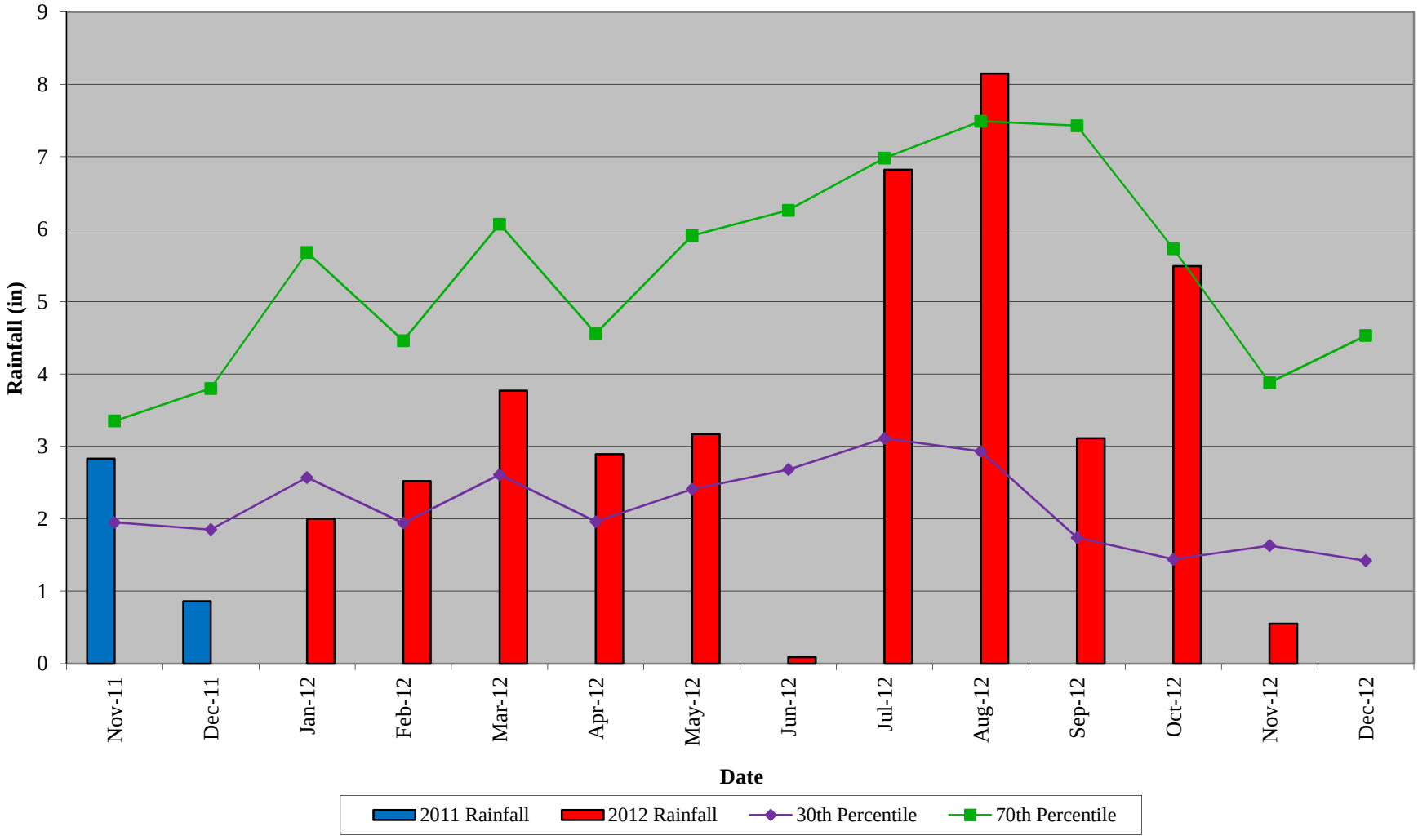


Table 9. Wetland Hydrology Criteria Attainment Table Project Number and Name: 312 - Roquist Wetland					
Gauge	**Success Criteria Achieved / Max Consecutive Days During Growing Season (Percentage)**				
	Year 1 (2008)	**Year 2 (2009)**	**Year 3 (2010)**	**Year 4 (2011)**	**Year 5 (2012)**
Gauge 1	Yes/90	Yes/95	Yes/108	Yes/87	Yes/100
(Reference for Gauge 2)	(39%)	(41%)	(47%)	(38%)	(43%)
Gauge 2	Yes/79	Yes/71	Yes/85	Yes/74	Yes/99
	(32%)	(31%)	(37%)	(32%)	(42%)
Gauge 3b	Yes/76	Yes/44	Yes/40	Yes/73	Yes/232
	(33%)	(19%)	(17%)	(32%)	(100%)
Gauge 4	Yes/79	Yes/65	Yes/46	Yes/71	Yes/89
(Reference for Gauge 3b)	(34%)	(28%)	(20%)	(31%)	(38%)
Gauge 5	Yes/79	Yes/69	Yes/51	Yes/74	Yes/86
	(34%)	(30%)	(22%)	(32%)	(37%)
Gauge 6	Yes/85	Yes/73	Yes/101	Yes/74	Yes/30
(Reference for Gauge 5)	(37%)	(32%)	(46%)	(32%)	(13%)
Gauge 9	Yes/78	Yes/67	Yes/103	Yes/74	Yes/90
	(34%)	(29%)	(45%)	(32%)	(39%)
Gauge 13	Yes/98	Yes/93	Yes/108	Yes/87	Yes/105
(Reference for Gauge 9)	(42%)	(40%)	(47%)	(44%)	(45%)
Gauge 11b	Yes/92	Yes/73	Yes/114	Yes/87	Yes/101
	(40%)	(32%)	(49%)	(44%)	(44%)
Gauge 12	Yes/96	Yes/97	Yes/112	Yes/100	Yes/105
(Reference for Gauge 11b)	(42%)	(42%)	(49%)	(100%)	(45%)
Gauge 14	Yes/83	Yes/73	Yes/51	Yes/94	Yes/108
	(36%)	(32%)	(22%)	(41%)	(47%)
Gauge 15	Yes/76	Yes/66	Yes/48	Yes/73	Yes/92
	(33%)	(29%)	(21%)	(32%)	(40%)