YEAR 2 (2012)
ANNUAL WETLAND MONITORING REPORT

SUMMIT SEEP NON-RIPARIAN WETLAND MITIGATION SITE

RFP # 16-002835 Contract # 003244
NC EEP Project ID # 94646
Davidson County, North Carolina
Data Collected March 3, 2012 – October 24, 2012

PREPARED FOR:

NC Department of Environment & Natural Resources
Ecosystem Enhancement Program
Raleigh, North Carolina

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December 2012

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Part 1: EXECUTIVE SUMMARY / PROJECT ABSTRACT

1.1 Project Goals & Objectives

The 2009 *Yadkin Pee-Dee River Basin Restoration Priorities* document (NCEEP 2009) identified stormwater runoff and other development impacts as likely contributors to turbidity and chlorophyll violations within the Sites Targeted Local Watershed (TLW) - 14-Digit Cataloging Unit 03040103020010. The Summit Seep Wetland Mitigation Project (hereby referred to as "Site") was identified as a non-riparian wetland restoration opportunity to improve water quality, enhance flood attenuation, and to restore wildlife habitat within the TLW.

The project goals address stressors identified in the TLW and include the following:

- Remove nonpoint sources of pollution associated with vegetation maintenance including:
  a. the cessation of broadcasting fertilizer, pesticides, and other agricultural chemicals into and adjacent to Site drainage ditches; and
  b. providing a vegetated wetland to aid in the treatment of runoff.
- Restore wetland hydro-periods that satisfy wetland jurisdictional requirements and approximate the Site's natural range and variation.
- Promote floodwater attenuation by filling ditches and enhancing groundwater storage capacity.
- Restore and reestablish natural community structure, habitat diversity, and functional continuity.
- Enhance and protect the Site's full potential of wetland functions and values in perpetuity.

The project goals will be addressed through the following project objectives:

- Providing 4.0 Non-riparian Wetland Mitigation Units (WMU's), as calculated in accordance with the requirements stipulated in RFP #16-002835, by restoring 3.91 acres and enhancing 0.18 acres of non-riparian wetland. This will be accomplished by filling ditches, removing spoil castings, excluding livestock, redirecting hydrology from a spring across the Site, and planting with native forest vegetation.
- Protecting the Site in perpetuity with a conservation easement.

1.2 Background Summary

Located in western Davidson County and within the 14-Digit Cataloging Unit 03040103020010, the Site is approximately five miles southwest of Lexington, NC (Figure 1, Appendix A). Within the Southern Outer Piedmont physiographic province of NC, the regional physiography is characterized by dissected irregular plains, some low rounded hills and ridges, and low to moderate gradient streams with mostly cobble, gravel, and sandy substrates (Griffith et al. 2002). The wetland restoration and enhancement area is located upslope along the western edge of an unnamed tributary's floodplain. The project drains 35.6 acres and ultimately connects to North Potts Creek. The 6.4 acre Site sits on both sides of the unnamed tributary, of which 4.1 acres have been restored. The North Carolina Ecosystem Enhancement Program currently holds the conservation easement for the Site, the property is owned by Hillcrest Acres, LLC.

1.3 Vegetation Assessment

After planting was completed, six sample vegetation plots (10-meter by 10-meter) were installed and measured within the Site as per guidelines established in *CVS-EEP Protocol for Recording Vegetation, Version 4.0* (Lee et al. 2006). Vegetation plots are permanently monumented with 5-foot metal garden posts at each corner. In each sample plot, vegetation parameters to be monitored include species composition and species density. Visual observations of the percent cover of shrub and herbaceous species will also be documented by photograph. Vegetation plot information can be found in Appendix C. Year 2 (2012) stem count measurements indicate an average of 600 planted stems per acre across the Site. In addition, each individual plot met success criteria.

1.3.1 Vegetation Success Criteria

Characteristic Tree Species include woody tree and shrub species planted at the Site, observed within a reference forest, or outlined for the appropriate plant community in Schafale and Weakley (1990). An average density of 320 stems per acre of Characteristic Tree Species must be surviving in the first three monitoring years. Subsequently, 260 Characteristic Tree Species per acre must be surviving by the end of year 5 and 210 Characteristic Tree Species per acre by the end of year 7. The Interagency Review Team (IRT) may allow counting of acceptable volunteer species toward the 210-tree per acre density upon review and evaluation of the annual monitoring data.

No single volunteer species (most notably red maple, loblolly pine, and sweet gum) will comprise more than 20 percent of the total composition at years 3, 5, or 7. If this occurs, remedial procedures/protocols outlined in the contingency plan will be implemented. During years 3, 5, and 7, no single volunteer species, comprising over 20 percent of the total composition, may be more than twice the height of the planted trees. If this occurs, remedial procedures outlined in the contingency plan will be implemented.

If, within the first 3 years, any species exhibits greater than 50 percent mortality, the species will either be replanted or an acceptable replacement species will be planted in its place as specified in the contingency plan.

1.3.2 Vegetative Problem Areas

The Year 1 (2011) Annual Monitoring Report indicated problems with Chinese privet (*Ligustrum sinense*) and *Arthraxon hispidus*. Invasive species treatments for Chinese Privet (*Arthraxon hispidus* is not an invasive species) were conducted in the spring of 2012 and will continue throughout the 7 year monitoring period. Treatment of Chinese privet was very effective and no occurrences of Chinese privet were noted during 2012 monitoring. This species will be watched during future monitoring visits.

No vegetation problem areas were identified within the Bank during Year 2 (2012) Monitoring.

1.3.3 Vegetative Contingency Plan

If vegetation success criteria are not achieved based on average density calculations from combined plots over the entire restoration area, supplemental planting may be performed with tree species approved by regulatory agencies. Supplemental planting will be performed as needed until achievement of vegetation success criteria.

1.4 Wetland Assessment

Initially four groundwater monitoring gauges were installed at the Site. After the completion of the Baseline Monitoring Report, an additional monitoring gauge was installed Figure 2, Appendix B. The additional gauge was installed on June 8, 2011.

Hydrological sampling was conducted throughout the growing season at intervals no greater than thirty days, and was done so to satisfy the determination of jurisdictional hydrology success within the Site (USEPA 1990). In addition, rainfall data will be used for comparison of groundwater conditions with extended drought conditions. Graphs of groundwater hydrology and precipitation from an onsite rain gauge, supplemented with data from a nearby weather station, are included in Appendix D.

1.4.1 Wetland Success Criteria

Target hydrological characteristics include saturation or inundation for 7.5 percent of the growing season, which during average climatic conditions is from March 28 – November 3, 220 days (2002 NRCS WETS Data). Restored / enhanced wetland areas are expected to support hydrophytic vegetation; if wetland

parameters are marginal as indicated by vegetation and/or hydrology monitoring, a jurisdictional determination will be performed.

Based on the US Army Corps of Engineers (USACE) Regional Supplement (USACE 2010), the growing season begins when biological indicators of plant growth (bud burst, emergence of herbs from the ground, or elongation of leaves, etc.) has occurred, and/or the soil temperature indicates microbial activity (soil temperature of 50-55 degrees at a depth of 12 inches from the soil surface). For the purpose of this Year 2 (2012) Annual Monitoring Report, a growing season initiation of March 1, 2012 is being used to compare with the standard Natural Resource Conservation Service (NRCS) published growing season dates. Future monitoring data collection (documentation of bud burst and soil temperature) will be used to verify the initiation of the growing season.

1.4.2 Wetland Contingency Plan

Hydrologic contingency may include floodplain surface modifications such as construction of ephemeral pools, deep ripping of the soil profile, and installation of berms to retard surface water flows. Recommendations for contingency to establish wetland hydrology may be implemented and monitored until hydrology success criteria are achieved.

1.4.3 Wetland Problem Areas

Groundwater gauge 5 did not meet hydrology success criteria during the 2012 monitoring year. The gauge is located near the wetland restoration boundary, immediately adjacent to an existing wetland depression. This depression may be affecting groundwater in this portion of the Site. Continued monitoring may be required to determine if wetland hydrology will develop in this portion of the Site.

1.5 Supporting Data

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 NC Ecosystem Enhancement Program (NCEEP) website. All raw data supporting the tables and figures in the appendices is available from NCEEP upon request.

Part 2: METHODS

2.1 Hydrology

Measurement of wetland hydrology was performed in accordance with traditional methods as per the April 2003 USACE Wilmington District Stream Mitigation Guidelines. Five continuously recording, surficial monitoring gauges were installed in accordance with specifications in *Installing Monitoring Wells/Piezometers in Wetlands* (NCWRP 1993). The fifth monitoring gauge was installed on June, 8 2011 per NCEEP recommendations received on May 31 2011. Monitoring gauges were set to a depth of approximately 24 inches below the soil surface. Screened portions of each gauge were surrounded by filter fabric, buried in screened well sand, and sealed with a bentonite cap to prevent siltation and surface flow infiltration during floods. Data will be downloaded at least every 30 days during the growing season. Additionally, an electronic rain water recording gauge was installed at the Site.

2.2 Vegetation

The monitoring of planted vegetation precisely followed the Carolina Vegetation Survey (CVS) NCEEP Protocol for Recording Vegetation (Lee et al. 2006). Six, 10 by 10-meter vegetation plots have been placed within the 4.1 acres of restored / enhanced wetlands (Figure 2, Appendix B). Vegetation received a visual evaluation at least once every thirty days and CVS data collection took place on October 1, 2012.

Part 3: CONCLUSIONS

3.1 Hydrology

Two of the monitored gauges within restoration areas were inundated / saturated within 12 Inches of the surface for greater than 7.5 percent of the growing season (16 days), which extends from March 28 to November 3 (220 days). Gauge 3 missed hydrology success criteria by one day (6.8 percent of the growing season), if the NRCS established growing season is used. However, the true growing season should be based on biological activity in the soil, measured by soil temperature (50-55 degrees at a depth of 12 inches from the soil surface) and bud burst, which is consistently early to late February in the Piedmont of North Carolina. If the growing season is presumed to extend from March 1 to November 3 (248 days) then four of five monitoring gauges exceed success criteria, as depicted in the following table.

Summary of Groundwater Gauge Results

Gauge	Success Criteria Achieved / Max Consecutive Days During Growing Season (Percentage)					
	Year 1 (2011)	Year 2 (2012) March 28 Growing Season Start	Year 2 (2012) March 1 Growing Season Start	Year 3 (2013)	Year 4 (2014)	Year 5 (2015)
1	Yes / 37 days (16.81 percent)	Yes / 16 days (7.3 percent)	Yes / 40 days (16.1 percent)			
2	Yes / 73 days (33.18 percent)	Yes / 92 days (41.8 percent)	Yes / 118 days (47.6 percent)			
3	Yes / 23 days (10.45 percent)	No / 15 days (6.8 percent)	Yes / 40 days (16.1 percent)			
4	Yes / 67 days (30.45 percent)	Yes / 81 days (36.8 percent)	Yes / 115 days (46.4 percent)			
5	NA** / 4 days (1.8 percent)	No / 8 days (3.6 percent)	No / 8 days (3.2 percent)			

** This gauge was installed in early June 2011; therefore, data from the beginning of the growing season is not available. Based on the data form other gauges, it is likely that this gauge would have met criteria.

Observations made during the 2012 growing season indicated that the original ditch plug and ditch running along the southern portion of the Site have settled below anticipated levels. This settling has allowed water from the spring to follow historic ditch paths instead of being dispersed throughout the Site as planned. This has resulted in unsatisfactory inundation of the Site in the area of Gauge 5, as shown in the data. Restoration Systems has prepared a remedial action plan to correct the elevation of the ditch plug, ultimately restoring groundwater levels throughout the Site. It is anticipated that our remedial action will increase groundwater saturation for gauges 1, 3, and 5.

3.2 Vegetation

Vegetation sampling across the Site was above the required average density with 600 planted stems per acre surviving. In addition, each individual plot was above success criteria.

It should be noted that there were variations in species documented between Year 1 (2011) and Year 2 (2012). Multiple plants appear to have been misidentified during Year 1 (2011) monitoring. The species were corrected during Year 2 (2012) monitoring, resulting in differences in species identified within each vegetation monitoring plot.

Summary of Planted Vegetation Plot Results

Plot	Planted Stems / Acre Counting Towards Success Criteria				
	Year 1 (2011)	Year 2 (2012)	Year 3 (2013)	Year 5 (2015)	Year 7 (2017)
1	404	445			
2	485	526			
3	687	648			
4	526	526			
5	1133	1052			
6	607	405			
Average of All Plots (1-6)	**640**	**600**			

Part 4: REFERENCES

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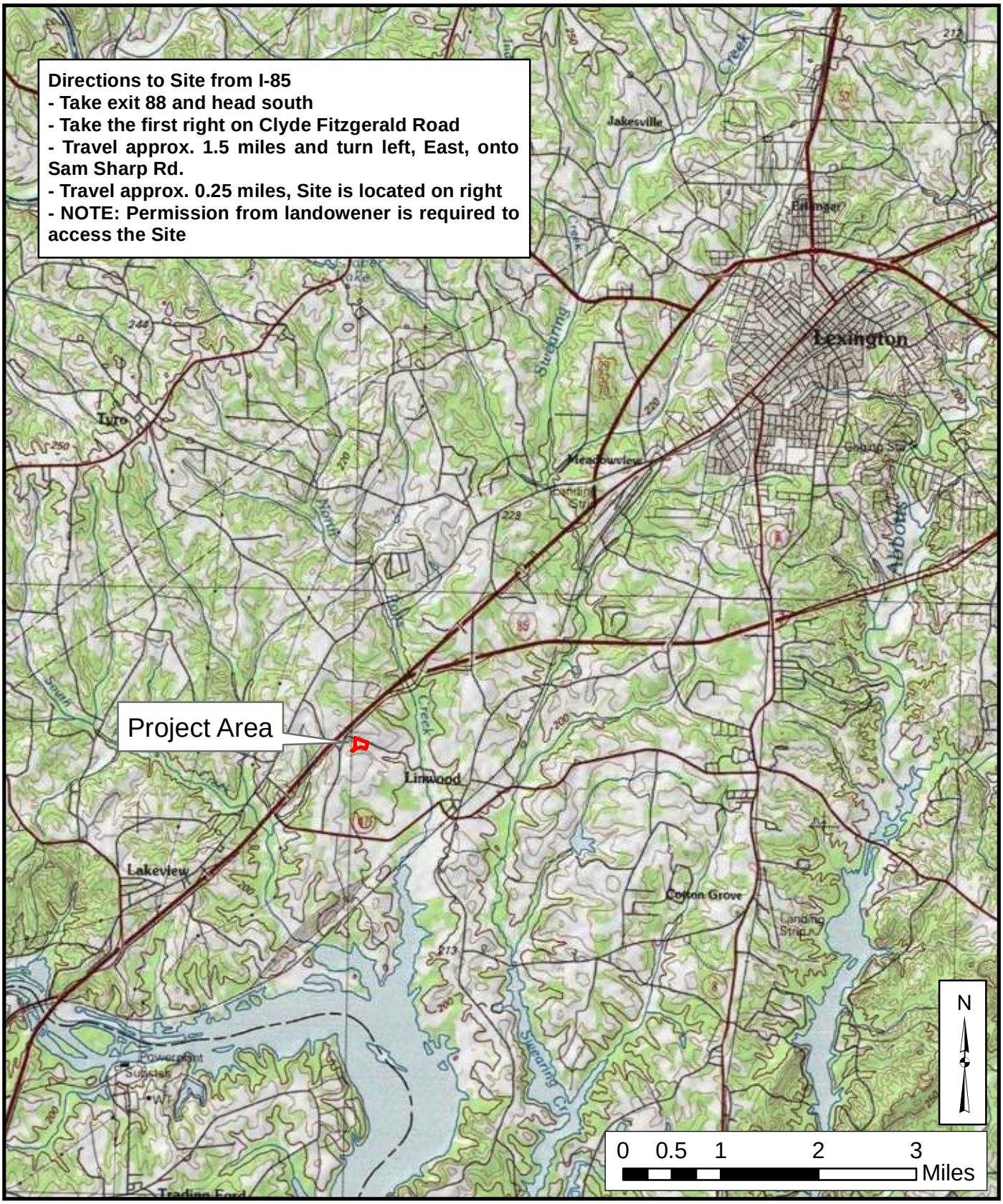
Appendix A: General Figures and Tables

Figure 1. Vicinity Map & Directions
Table 1. Project Components and Mitigation Credits
Table 2. Project Activity and Reporting History
Table 3. Project Contacts
Table 4. Project Baseline Information and Attributes



Axiom Environmental, Inc.
Axiom Environmental
218 Snow Ave
Raleigh, NC 27603

VICINITY MAP & DIRECTIONS
SUMMIT SEEP NON-RIPARIAN WETLAND
MITIGATION SITE
Davidson County, North Carolina

Dwn. by.	FIGURE
KRJ	1
Date: Sept 2012	
Project: 10-001	

Table 1. Project Components and Mitigation Credits
Summit Seep Non-Riparian Wetland Mitigation Site Contract # 003244

Mitigation Credits									
	Stream		Riparian Wetland		Non-riparian Wetland		Buffer	Nitrogen Nutrient Offset	Phosphorous Nutrient Offset
Type	R	RE	R	RE	R	RE			
Totals					3.91	0.18			

Project Components						
Project Component -or- Reach ID	Stationing / Location	Existing Footage/Acreage	Approach (PI,PII etc.)	Restoration – or- Restoration Equivalent	Restoration Footage or Acreage	Mitigation Ratio
Non-riparian restoration	NA	3.91	NA	Restoration	3.91	1.0
Non-riparian enhancement	NA	0.18	NA	Enhancement	0.18	0.5

Component Summation						
Restoration Level	Stream (linear feet)	Riparian Wetland (acres)		Non-riparian Wetland (acres)	Buffer (square feet)	Upland (acres)
		Riverine	Non-Riverine			
Restoration	0	0	0	3.91	0	0
Enhancement		0	0	0.18	0	0
Enhancement 1	0					
Enhancement II	0					
Creation		0	0	0		
Preservation	0	0	0	0		0
High Quality Preservation	0	0	0	0		0

Table 2: Project Activity and Reporting History

Elapsed Time Since Grading Complete: 1 Year and 7 Months
Elapsed Time Since Planting Complete: 1 Year and 7 Months
Number of Reporting Years: 2 Years

Summit Seep Non-Riparian Wetland Mitigation Site Contract # 003244		
Activity or Report	Data Collection Complete	Completion or Delivery
CE Document	NA	Oct-2010
Conservation Easement	Apr-2011	Apr-2011
Mitigation Plan	NA	Nov-2010
Construction	NA	Apr-2011
Bare Root Planting	NA	Apr-2011
Baseline Monitoring Document	Apr-2011	June-2011
Year 1 (2011) Monitoring	Sep-2011	Nov-2011
Year 2 (2012) Monitoring	Oct-2012	Nov-2012

Table 3: Project Contacts

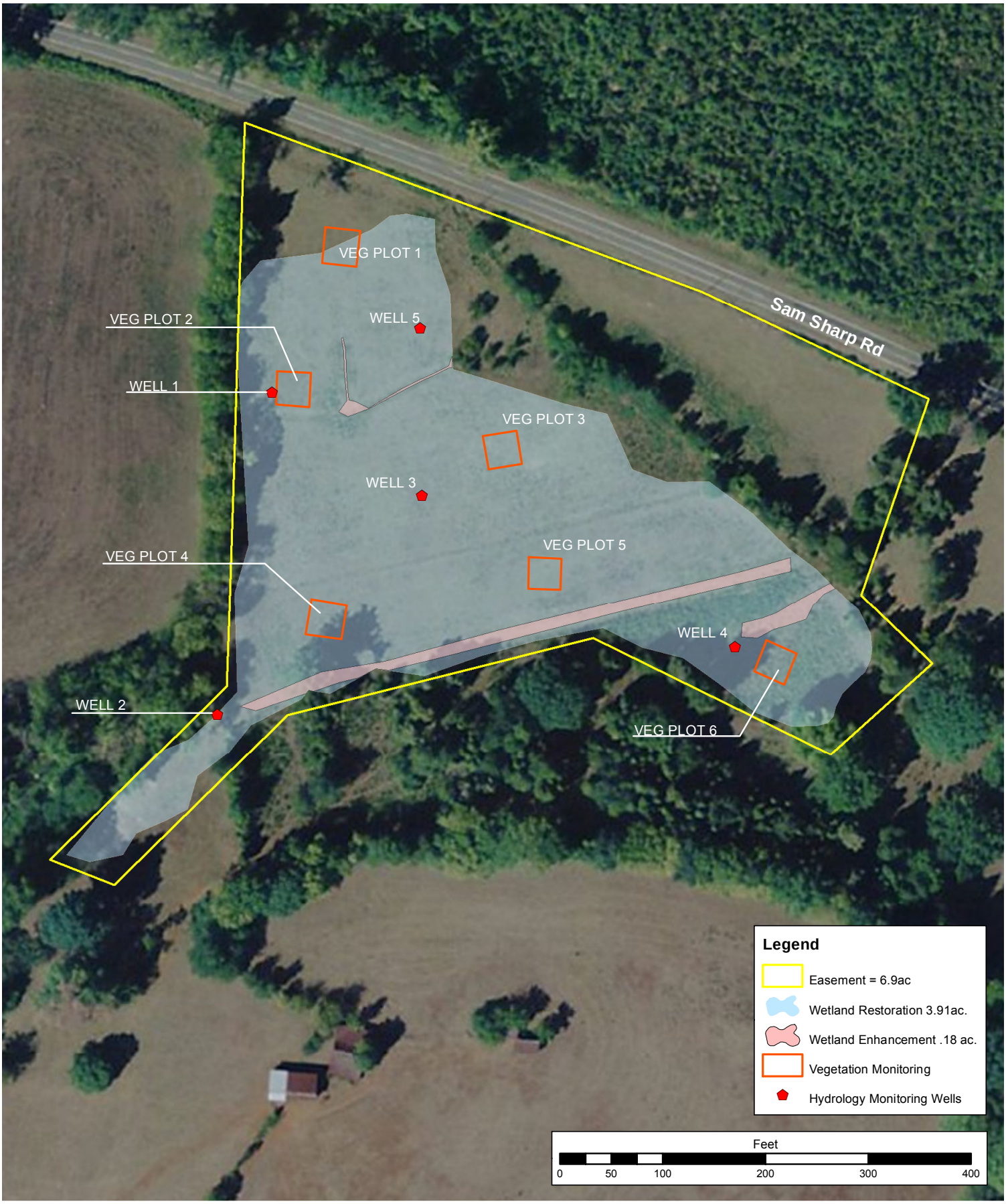
Summit Seep Non-Riparian Wetland Mitigation Site Contract # 003244		
	Firm	**POC & Address**
Designer:	Axiom Environmental, Inc.	Grant Lewis; 919.215.1693 218 Snow Ave. Raleigh, NC 27603
Construction Contractor:	Land Mechanics, Inc.	Lloyd Glover; 919.422.3392 780 Landmark Road Willow Spring, NC 27592-7756
Planting Contractor:	Restoration Systems, LLC	Worth Creech; 919.334.9114 1101 Haynes St. Suite 211 Raleigh, NC 2604
Seeding Contractor:	Land Mechanics, Inc.	Lloyd Glover; 919.422.3392 780 Landmark Road Willow Spring, NC 27592-7756
Nursery Stock Suppliers:	ArborGen	1.888.888.7158
Baseline Data Collection	Axiom Environmental, Inc.	Grant Lewis; 919.215.1693 218 Snow Ave. Raleigh, NC 27603
Vegetation Monitoring:	Restoration Systems, LLC and Axiom Environmental, Inc.	Ray Holz; 919.604.9314 and Grant Lewis; 919.215.1693 218 Snow Ave. Raleigh, NC 27603
Wetland Monitoring:	Restoration Systems, LLC and Axiom Environmental, Inc.	Ray Holz; 919.604.9314 and Grant Lewis; 919.215.1693 218 Snow Ave. Raleigh, NC 27603

Table 4: Project Baseline Information & Attributes

Summit Seep Non-Riparian Wetland Mitigation Site Contract # 003244			
Project Information			
Project Name	Summit Seep		
County	Davidson		
Project Area (acres)	6.4		
Project Coordinates (latitude and longitude)	35.76130, 80.33430		
Project Watershed Summary Information			
Physiographic Province		Southern Outer Piedmont	
River Basin		Yadkin	
USGS Hydrologic Unit 8-digit	3040103	USGS Hydrologic Unit 14-digit	3040103020010
DWQ Sub-basin		3/7/2004	
Project Drainage Area, Total Outfall (acres)		51.5	
Groundwater Treated by Site (acres)		35.6	
Project Drainage Area Percentage of Impervious Area		< 3%	
CGIA Land Use Classification		Cropland and Pasture	
Wetland Summary Information			
Parameters		**Wetland 1**	
Size of Wetland (acres)		4.1	
Wetland Type (non-riparian, riparian riverine or riparian non riverine)		Non-riparian	
Mapped Soil Series		Armenia silt loam	
Drainage class		Class A	
Soil Hydric Status		Hydric	
Source of Hydrology		Natural Seep	
Hydrologic Impairment		Ditches	
Native vegetation community		Low Elevation Seep	
Percent composition of exotic invasive vegetation		0%	
Regulatory Considerations			
Regulation	**Applicable?**	**Resolved?**	**Supporting Documentation**
Waters of the United States – Section 404	Yes	Yes	Yes, Appendix A
Waters of the United States – Section 401	Yes	Yes	Yes, Appendix A
Endangered Species Act	No		
Historic Preservation Act	No		
Coastal Zone Management Act [CZMA/Coastal Area Management Act (CAMA)]	No		
FEMA Floodplain Compliance	No		
Essential Fisheries Habitat	No		

Appendix B: Visual Assessment Data

Figure 2. Current Condition Plan View (CCPV)
Table 5. Vegetation Condition Assessment



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FAX : 919.755.9492

SCALE: 1 inch = 125 feet

DATE: December 2012

EEP Project ID: 94646

FIGURE 2:
CURRENT CONDITION ASSESSMENT

OVERALL SITE FIGURE SHOWING CURRENT CONDITIONS AND YEAR ONE (2011) MONITORING VISUAL ASSESSMENT.

AERIAL SOURCE: ESRI, i-cubed, USDA FSA, USGS, AEX, GeoEye, Getmapping, Aerogrid, & IGP
COORDINATE SYSTEM: NAD 1983 SPNC FT

Table 5: Vegetation Condition Assessment

Summit Seep Non-Riparian Wetland Mitigation Site Contract # 003244

Planted Acreage - 6.9 acres (Entire Easement)					
Vegetation Category		Mapped Acreage	CCPV Symbol	Number of Polygons	% of planted Acreage
Areas of Concern	No areas of vegetation concern observed at the Site during 2012 monitoring.	NA	NA	NA	0%
Exotic Invasive Species	Scattered Chinese privet in the easement. However, Chinese privet is not expected to present problems during the immediate monitoring period.	NA	NA	NA	<1%

Appendix C: Vegetation Plot Data

Table 6. Vegetation Plot Criteria Attainment
Table 7. CVS Vegetation Plot Metadata
Table 8. Planted & Total Stem Counts
Vegetation Plot Photos

Table 6: Vegetation Plot Criteria Attainment

Summit Seep Non-Riparian Wetland Mitigation Site
Contract # 003244

Plot	Planted Stems / Acre Counting Towards Success Criteria				
	Year 1 (2011)	Year 2 (2012)	Year 3 (2013)	Year 5 (2015)	Year 7 (2017)
1	404	445			
2	485	526			
3	687	648			
4	526	526			
5	1133	1052			
6	607	405			
Average of All Plots (1-6)	**640**	**600**			

Table 7. CVS Vegetation Plot Metadata

Summit Seep Non-Riparian Wetland Mitigation Site Contract # 003244

Report Prepared By:	Phillip Perkinson
Date Prepared	10/6/2012 15:12
database name	cvs-eep-entrytool-v2.2.7.mdb
database location	S:\Projects\Projects (Existing)\Summit Seep\Task 7-Monitoring
computer name	SPARE
file size	37326848
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.

Table 7. CVS Vegetation Plot Metadata Continued

Summit Seep Non-Riparian Wetland Mitigation Site Contract # 003244

PROJECT SUMMARY----------	
Project Code	Summit
project Name	Summit Seep
Description	Non-Riparian Wetland Mitigation Site
River Basin	Yadkin-Pee Dee
area (sq m)	16,592
Required Plots (calculated)	6
Sampled Plots	6

Table 8. Planted and Total Stems/Acre Counts

Project Name: Summit Seep Non-Riparian Mitigation Site

			Current Plot Data (MY2 2012)																			Annual Means								
			Summit-RS-0001			Summit-RS-0002			Summit-RS-0003			Summit-RS-0004			Summit-RS-0005			Summit-RS-0006			MY2 (2012)			MY1 (2011)			MY0 (2011)		
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
Asimina triloba	pawpaw	Tree	1	1	1							1	1	1	1	1	1	1	1	1	4	4	4	9	9	9	14	14	14
Betula nigra	river birch	Tree	4	4	4				2	2	2	2	2	2	1	1	1	1	1	1	10	10	10	10	10	10	10	10	10
Carpinus caroliniana	American hornbeam	Tree				3	3	3	1	1	1	1	1	1	1	1	1				6	6	6	19	19	19	9	9	9
Celtis laevigata	sugarberry	Tree													1	1	1				1	1	1						
Celtis occidentalis	common hackberry	Tree																									3	3	3
Cornus	dogwood	Shrub or Tree				1	1	1													1	1	1						
Diospyros virginiana	common persimmon	Tree	2	2	28			12	3	3	25			6	5	5	13				10	10	84	9	9	28	11	11	11
Fraxinus pennsylvanica	green ash	Tree			2				1	1	2										1	1	4						
Gleditsia triacanthos	honeylocust	Tree																								1			
Juniperus virginiana	eastern redcedar	Tree																								5			
Liquidambar styraciflua	sweetgum	Tree			17			28						11			4			6			66			13			
Pinus taeda	loblolly pine	Tree			1									3									4						
Platanus occidentalis	American sycamore	Tree				2	2	2	2	2	2	3	3	3	1	1	1	6	6	6	14	14	14	11	11	11	10	10	10
Quercus michauxii	swamp chestnut oak	Tree	2	2	2	5	5	5	2	2	2	3	3	3							12	12	12	15	15	15	15	15	15
Quercus pagoda	cherrybark oak	Tree							2	2	2	2	2	2							4	4	4	7	7	7	13	13	13
Quercus phellos	willow oak	Tree	2	2	2	1	1	1							3	3	3				6	6	6	7	7	7	7	7	7
Sambucus canadensis	Common Elderberry	Shrub																2	2	2	2	2	2						
Ulmus americana	American elm	Tree			3	1	1	21	3	3	6	1	1	3	13	13	20				18	18	53	8	8	8	8	8	8
Unknown		Shrub or Tree																									1	1	1
		Stem count	11	11	60	13	13	73	16	16	42	13	13	35	26	26	45	10	10	16	89	89	271	95	95	133	101	101	101
		size (ares)	1			1			1			1			1			1			6			6			6		
		size (ACRES)	0.02			0.02			0.02			0.02			0.02			0.02			0.15			0.15			0.15		
		Species count	5	5	9	6	6	8	8	8	8	7	7	10	8	8	9	4	4	5	13	13	15	9	9	12	11	11	11
		Stems per ACRE	445.2	445.2	2428	526.1	526.1	2954	647.5	647.5	1700	526.1	526.1	1416	1052	1052	1821	404.7	404.7	647.5	600.3	600.3	1828	640.8	640.8	897.1	681.2	681.2	681.2

Color for Density

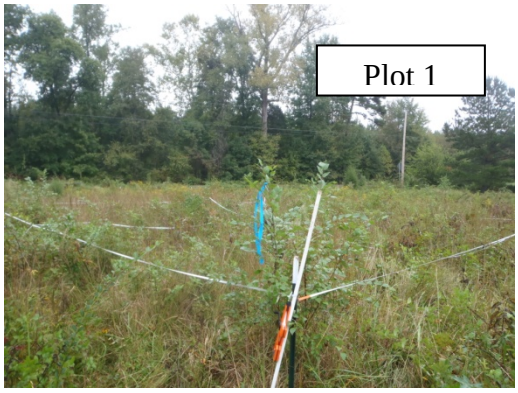
Exceeds requirements by 10%

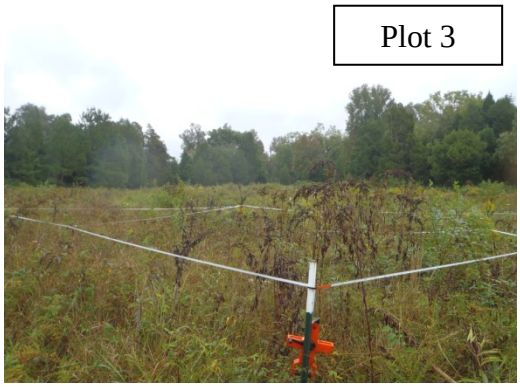
Exceeds requirements, but by less than 10%

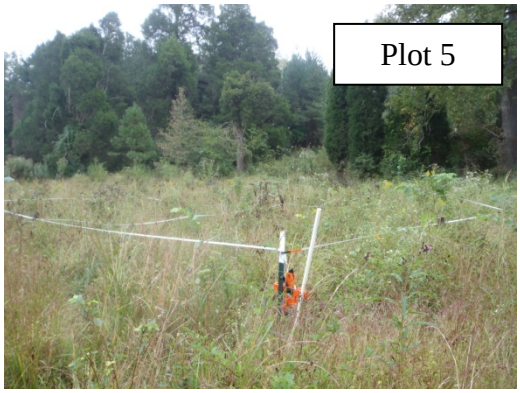
Fails to meet requirements, by less than 10%

Fails to meet requirements by more than 10%

Summit Seep
2012 (Year 2) Vegetation Monitoring Photographs
Taken October 2012







Appendix D: Hydrology Data

Table 9: Wetland Gauge Attainment Data
Figure 4: Summit Seep 30-70 Percentile Graph for Rainfall - 2012
2012 Groundwater Gauge Graphs

Table 9: Ground Gauge Attainment Data

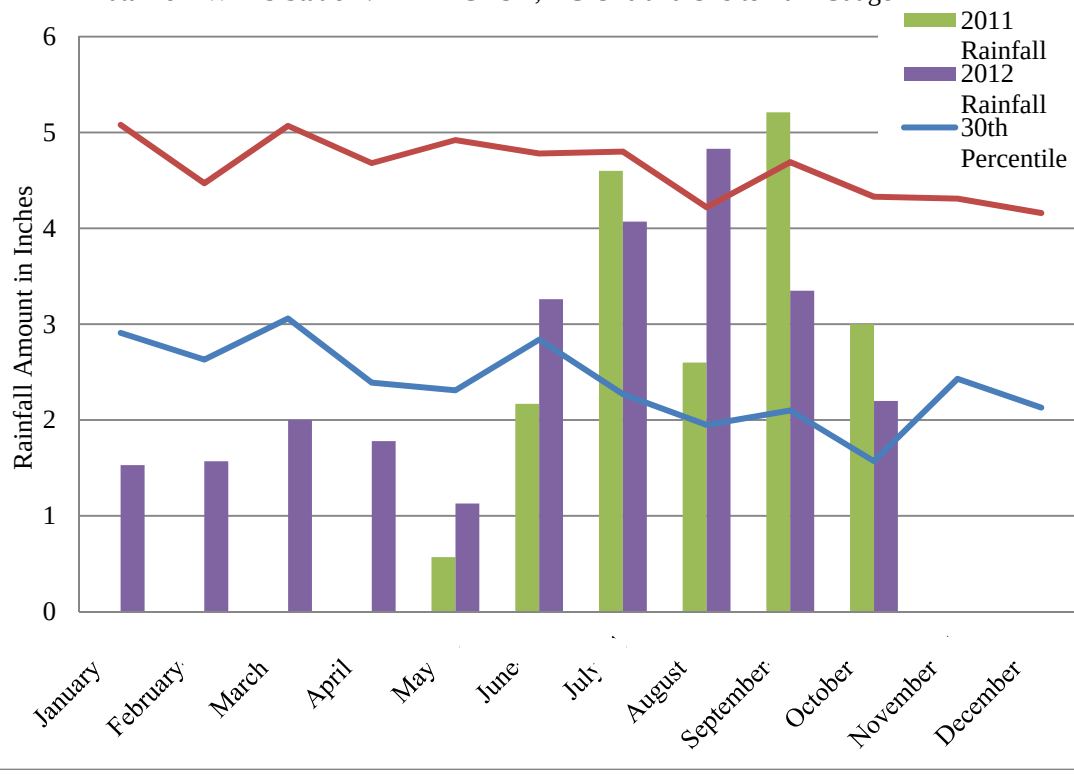
Summit Seep Non-Riparian Wetland Mitigation Site Contract # 003244

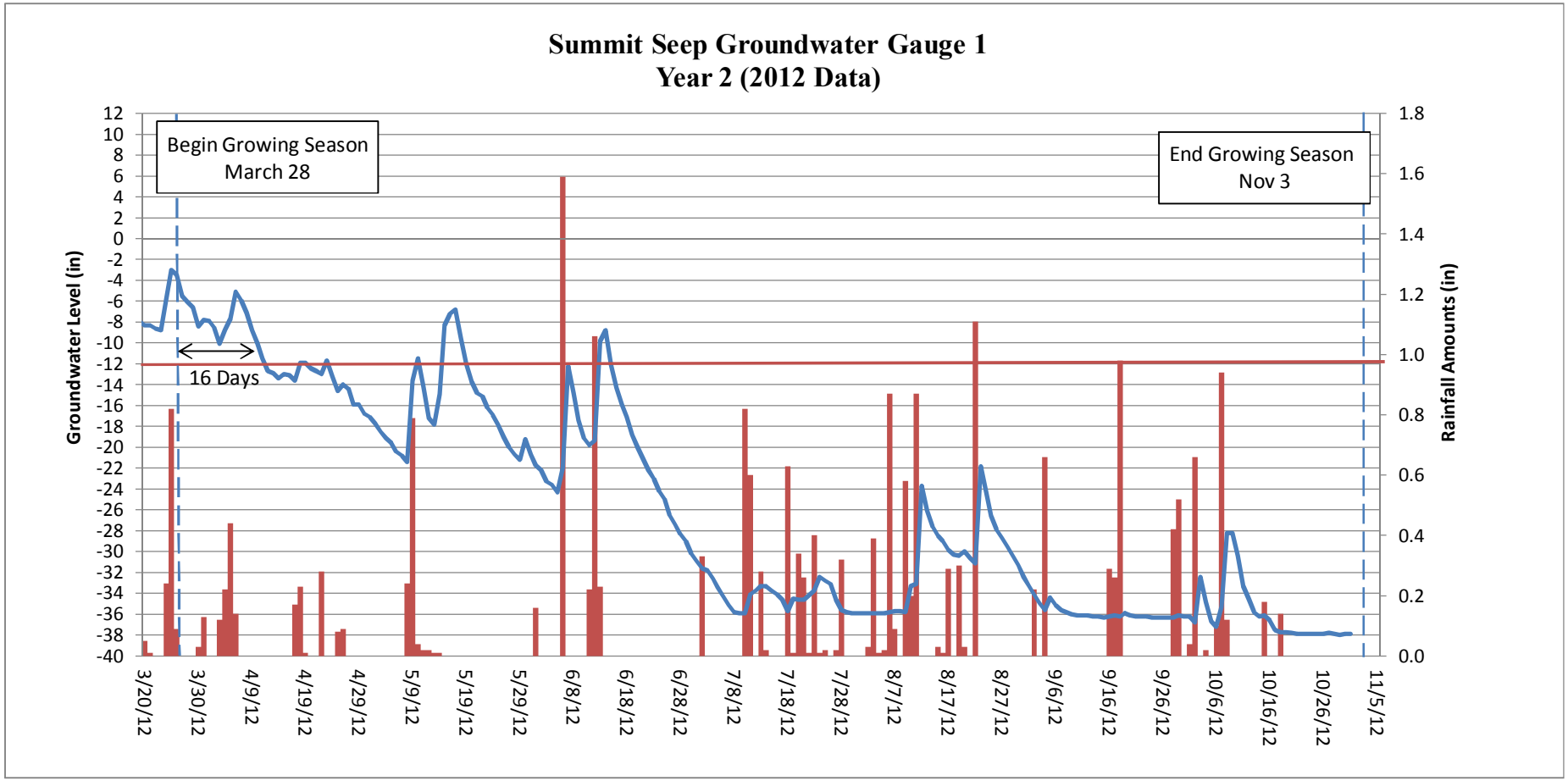
Gauge	Success Criteria Achieved / Max Consecutive Days During Growing Season (Percentage)					
	Year 1 (2011)	Year 2 (2012) March 28 Growing Season Start	Year 2 (2012) March 1 Growing Season Start	Year 3 (2013)	Year 4 (2014)	Year 5 (2015)
1	Yes / 37 days (16.81 percent)	Yes / 16 days (7.3 percent)	Yes / 40 days (16.1 percent)			
2	Yes / 73 days (33.18 percent)	Yes / 92 days (41.8 percent)	Yes / 118 days (47.6 percent)			
3	Yes / 23 days (10.45 percent)	No / 15 days (6.8 percent)	Yes / 40 days (16.1 percent)			
4	Yes / 67 days (30.45 percent)	Yes / 81 days (36.8 percent)	Yes / 115 days (46.4 percent)			
5	NA** / 4 days (1.8 percent)	No / 8 days (3.6 percent)	Yes / 8 days (3.2 percent)			

** This gauge was installed in early June 2011; therefore, data from the beginning of the growing season is not available. Based on the data form other gauges, it is likely that this gauge would have met criteria.

Figure 3: Summit Seep 30-70 Percentile Graph for Rainfall in 2012

Data from WETS Station : LEXINGTON, NC4970 and Onsite Rain Gauge




Summit Seep Groundwater Gauge 1
Year 2 (2012 Data)
Begin Growing Season
March 28
End Growing Season
Nov 3
16 Days
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-30
-32
-34
-36
-38
-40
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
3/20/12
3/30/12
4/9/12
4/19/12
4/29/12
5/9/12
5/19/12
5/29/12
6/8/12
6/18/12
6/28/12
7/8/12
7/18/12
7/28/12
8/7/12
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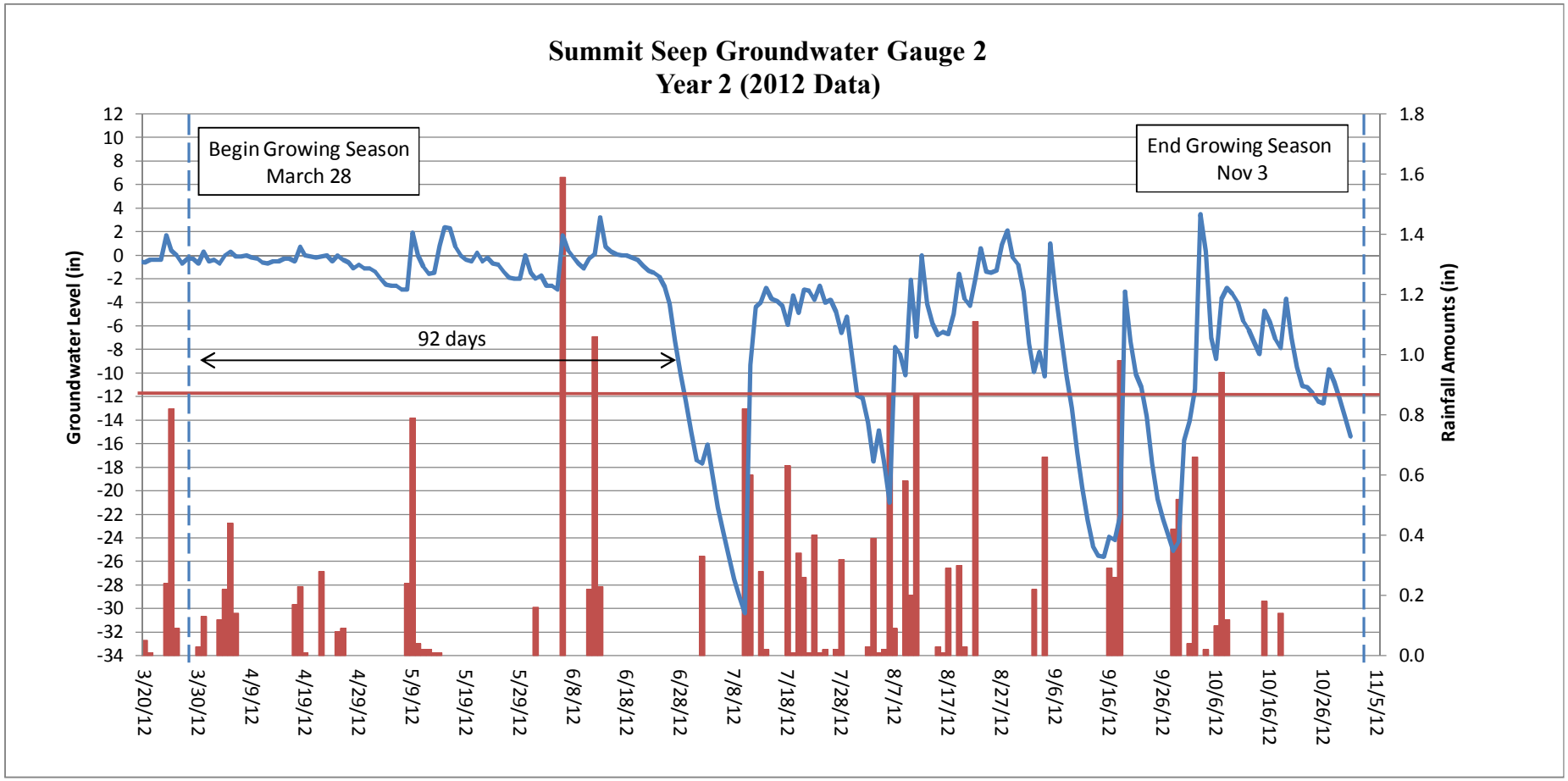
10/26/12
11/5/12


Summit Seep Groundwater Gauge 2
Year 2 (2012 Data)
Begin Growing Season
March 28
End Growing Season
Nov 3
92 days
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-30
-32
-34
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
3/20/12
3/30/12
4/9/12
4/19/12
4/29/12
5/9/12
5/19/12
5/29/12
6/8/12
6/18/12
6/28/12
7/8/12
7/18/12
7/28/12
8/7/12
8/17/12
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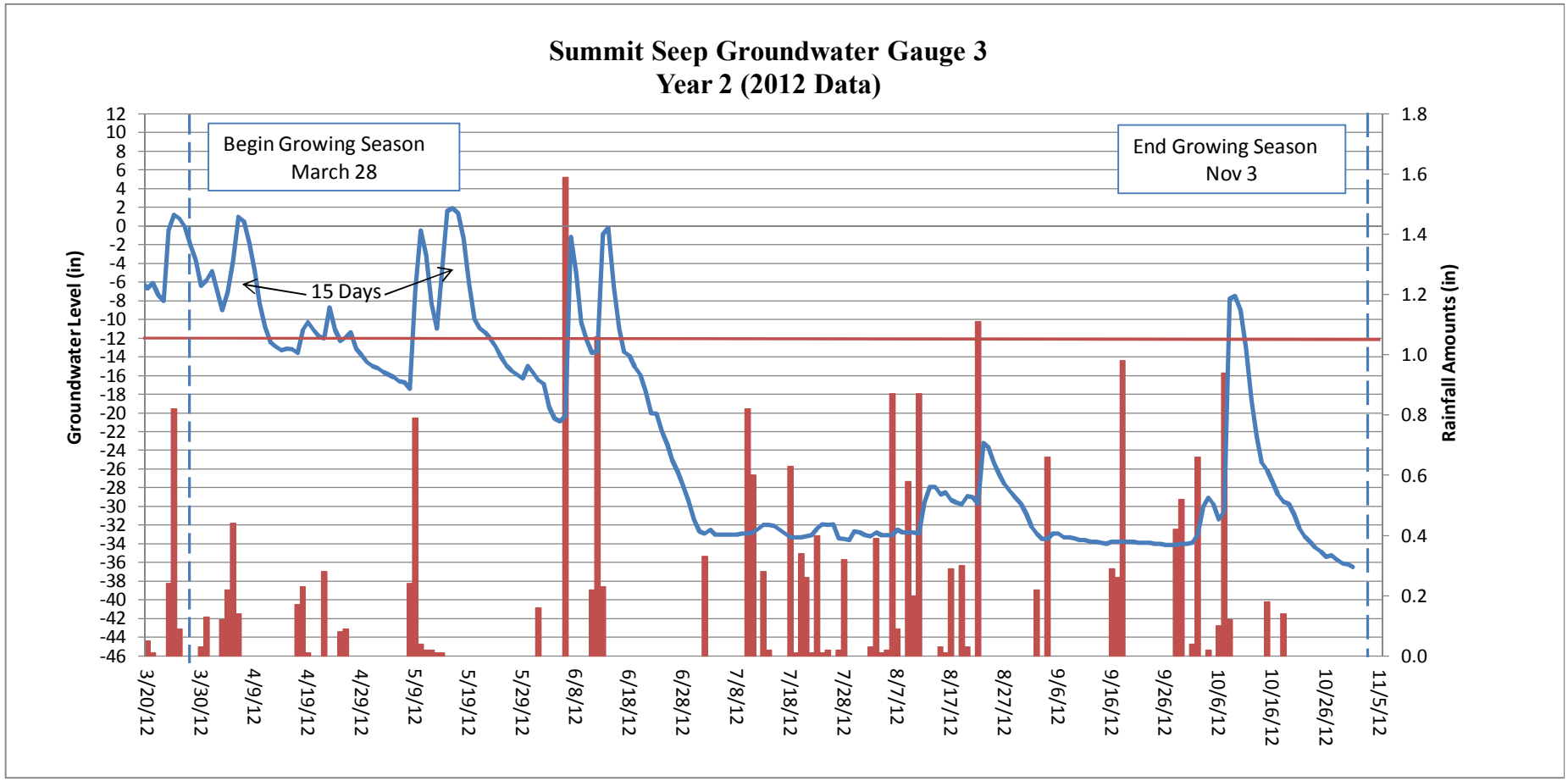
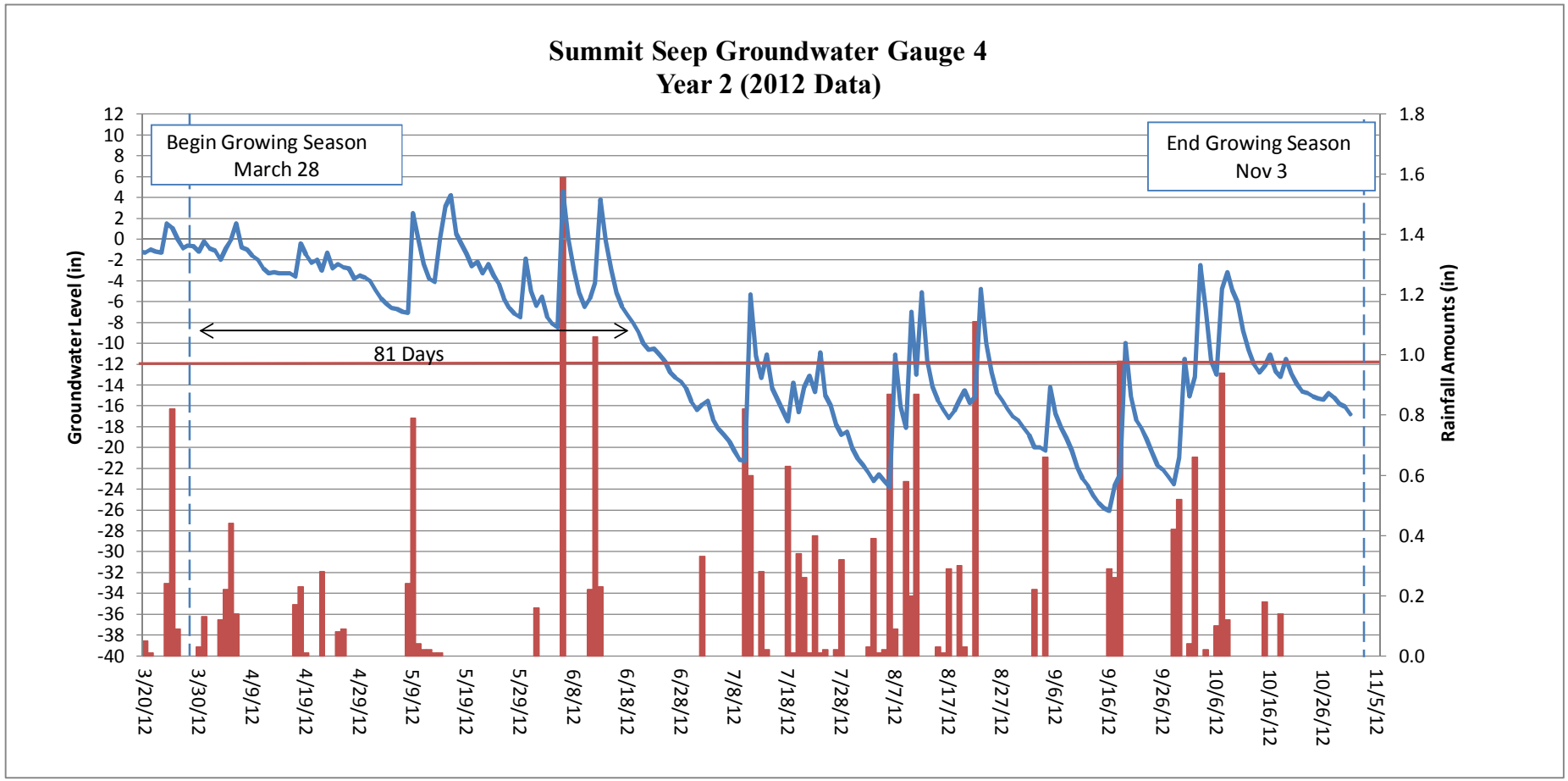
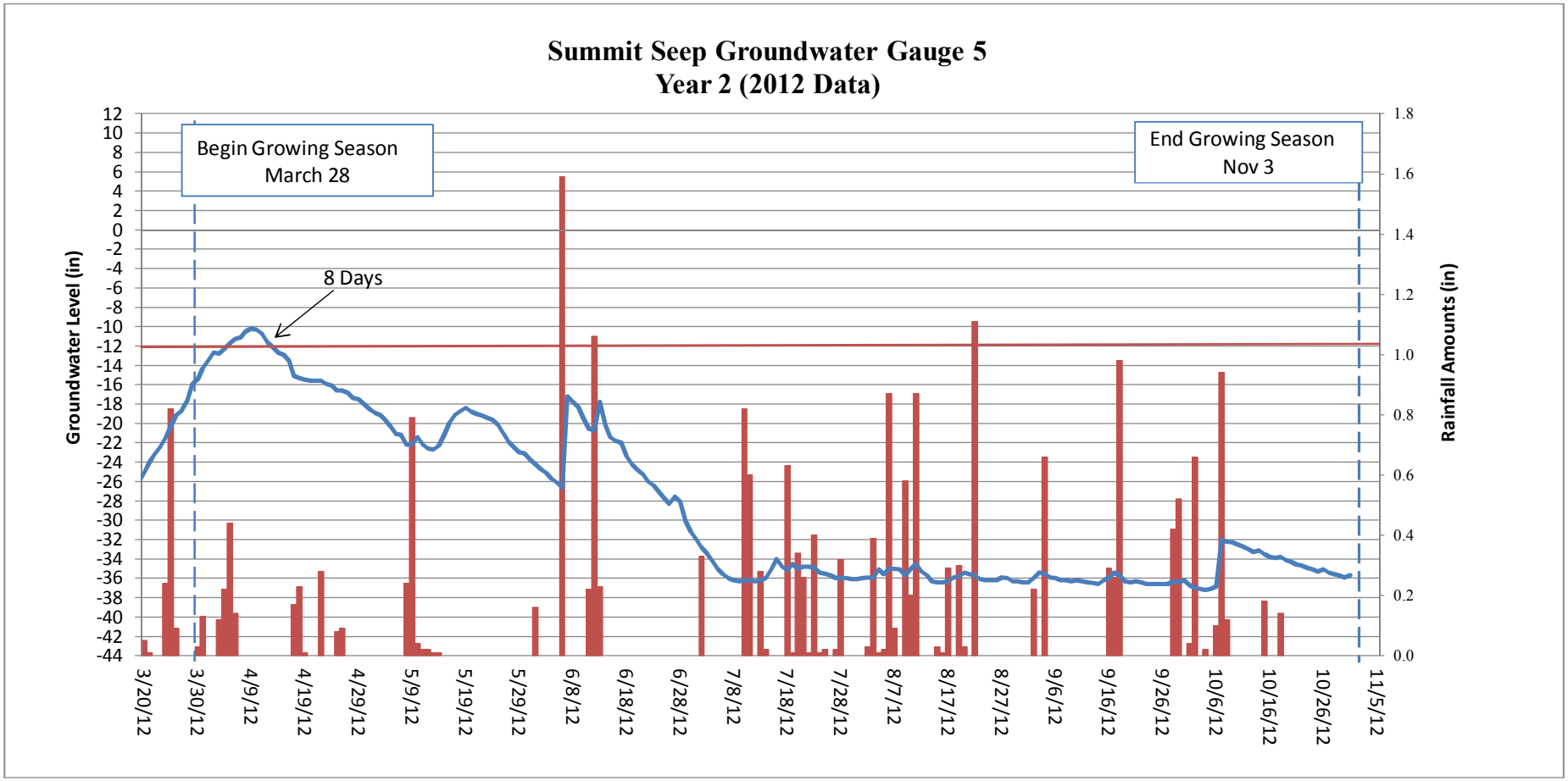
10/6/12
10/16/12
10/26/12
11/5/12


Summit Seep Groundwater Gauge 3
Year 2 (2012 Data)
Begin Growing Season
March 28
End Growing Season
Nov 3
15 Days
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-30
-32
-34
-36
-38
-40
-42
-44
-46
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
3/20/12
3/30/12
4/9/12
4/19/12
4/29/12
5/9/12
5/19/12
5/29/12
6/8/12
6/18/12
6/28/12
7/8/12
7/18/12
7/28/12
8/7/12
8/17/12
8/27/12
9/6/12
9/16/12
9/26/12
10/6/12
10/16/12
10/26/12
11/5/12


Summit Seep Groundwater Gauge 4
Year 2 (2012 Data)
Begin Growing Season
March 28
End Growing Season
Nov 3
81 Days
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-30
-32
-34
-36
-38
-40
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
3/20/12
3/30/12
4/9/12
4/19/12
4/29/12
5/9/12
5/19/12
5/29/12
6/8/12
6/18/12
6/28/12
7/8/12
7/18/12
7/28/12
8/7/12
8/17/12
8/27/12
9/6/12
9/16/12
9/26/12
10/6/12
10/16/12
10/26/12
11/5/12


Summit Seep Groundwater Gauge 5
Year 2 (2012 Data)
Begin Growing Season
March 28
End Growing Season
Nov 3
8 Days
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-30
-32
-34
-36
-38
-40
-42
-44
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
3/20/12
3/30/12
4/9/12
4/19/12
4/29/12
5/9/12
5/19/12
5/29/12
6/8/12
6/18/12
6/28/12
7/8/12
7/18/12
7/28/12
8/7/12
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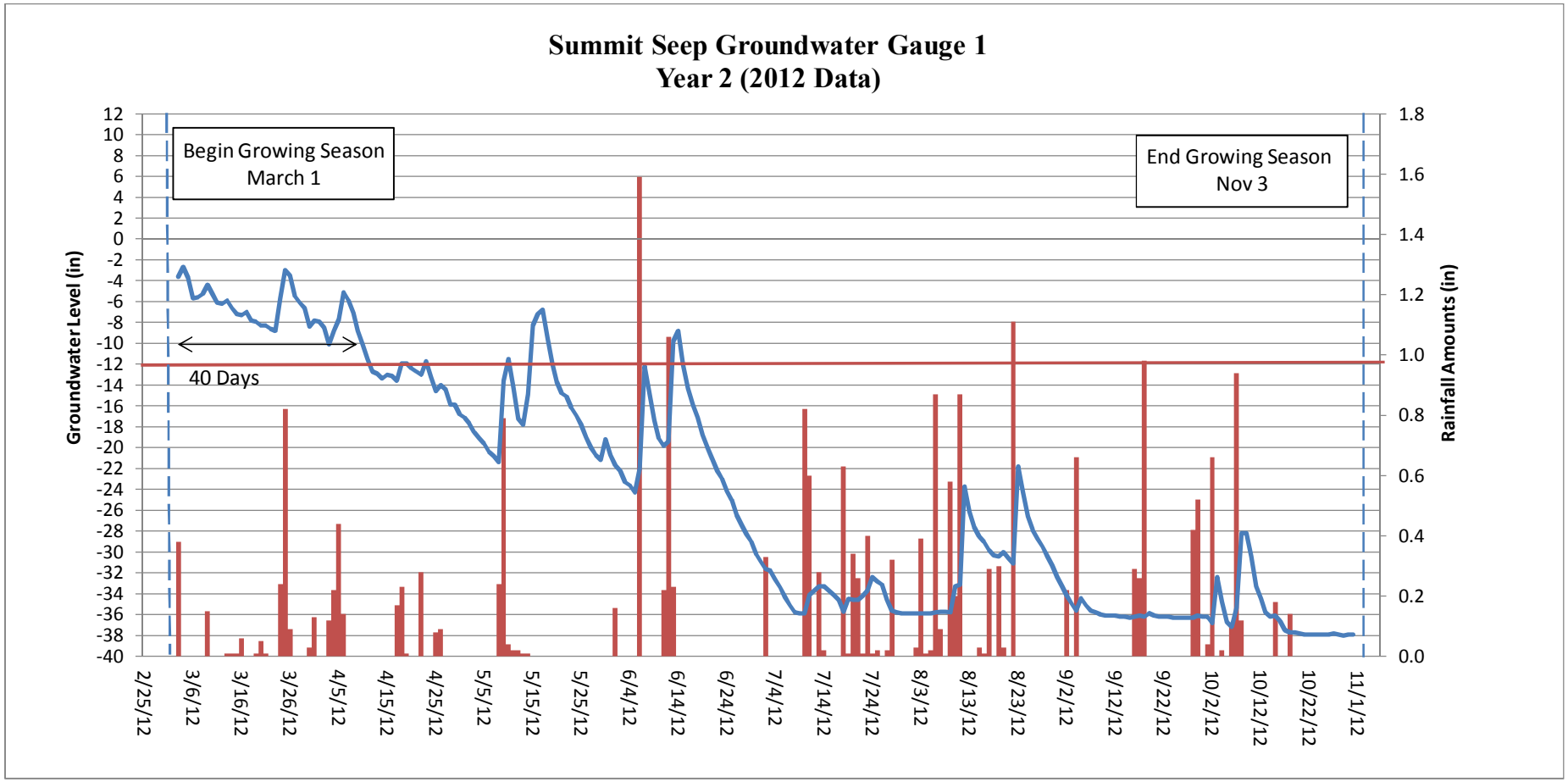
10/6/12
10/16/12
10/26/12
11/5/12


Summit Seep Groundwater Gauge 1
Year 2 (2012 Data)
Begin Growing Season
March 1
End Growing Season
Nov 3
40 Days
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-30
-32
-34
-36
-38
-40
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
2/25/12
3/6/12
3/16/12
3/26/12
4/5/12
4/15/12
4/25/12
5/5/12
5/15/12
5/25/12
6/4/12
6/14/12
6/24/12
7/4/12
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7/24/12
8/3/12
8/13/12
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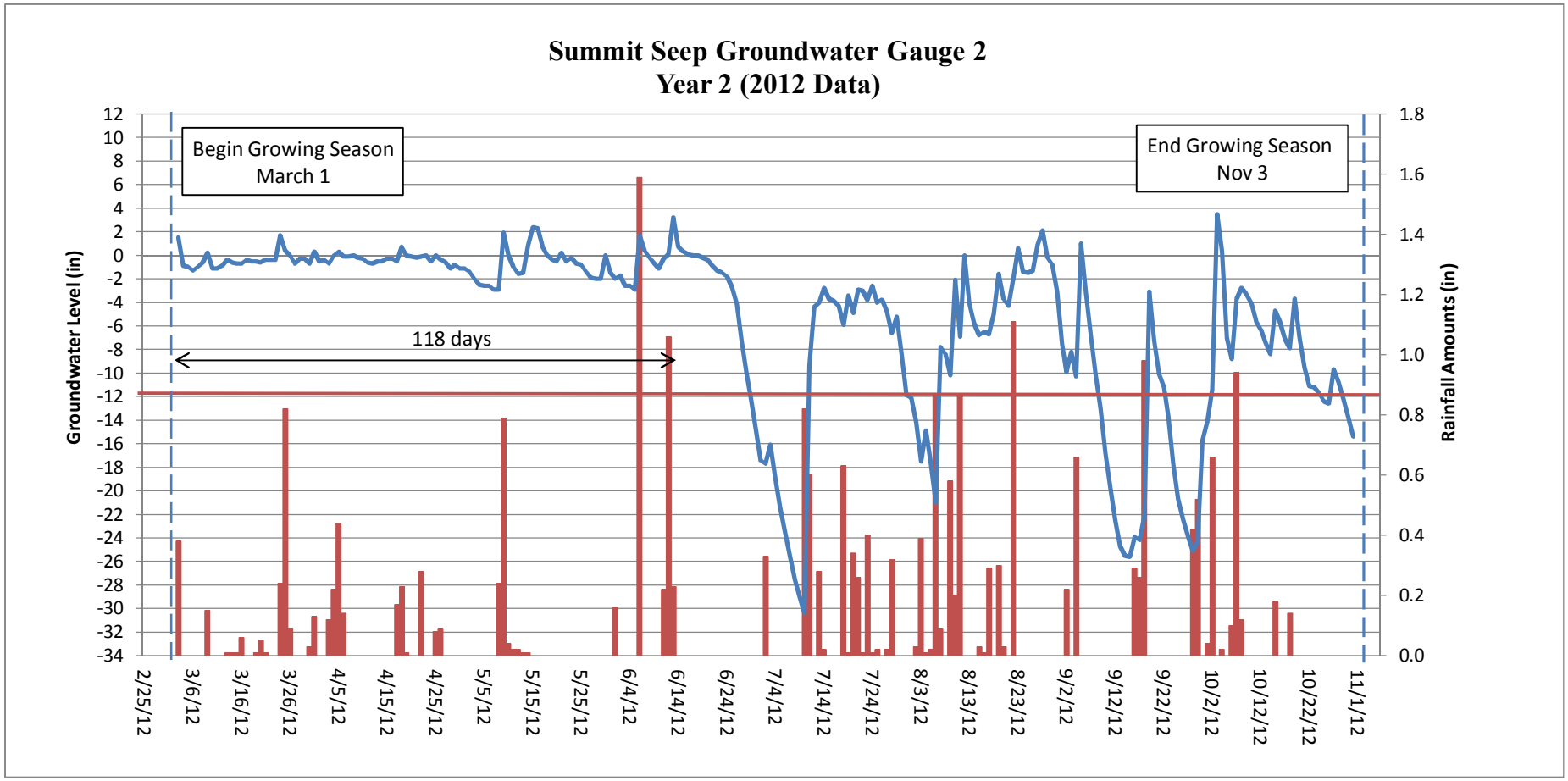
9/12/12
9/22/12
10/2/12
10/12/12
10/22/12
11/1/12


Summit Seep Groundwater Gauge 2
Year 2 (2012 Data)
Begin Growing Season
March 1
End Growing Season
Nov 3
118 days
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-30
-32
-34
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
2/25/12
3/6/12
3/16/12
3/26/12
4/5/12
4/15/12
4/25/12
5/5/12
5/15/12
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6/4/12
6/14/12
6/24/12
7/4/12
7/14/12
7/24/12
8/3/12
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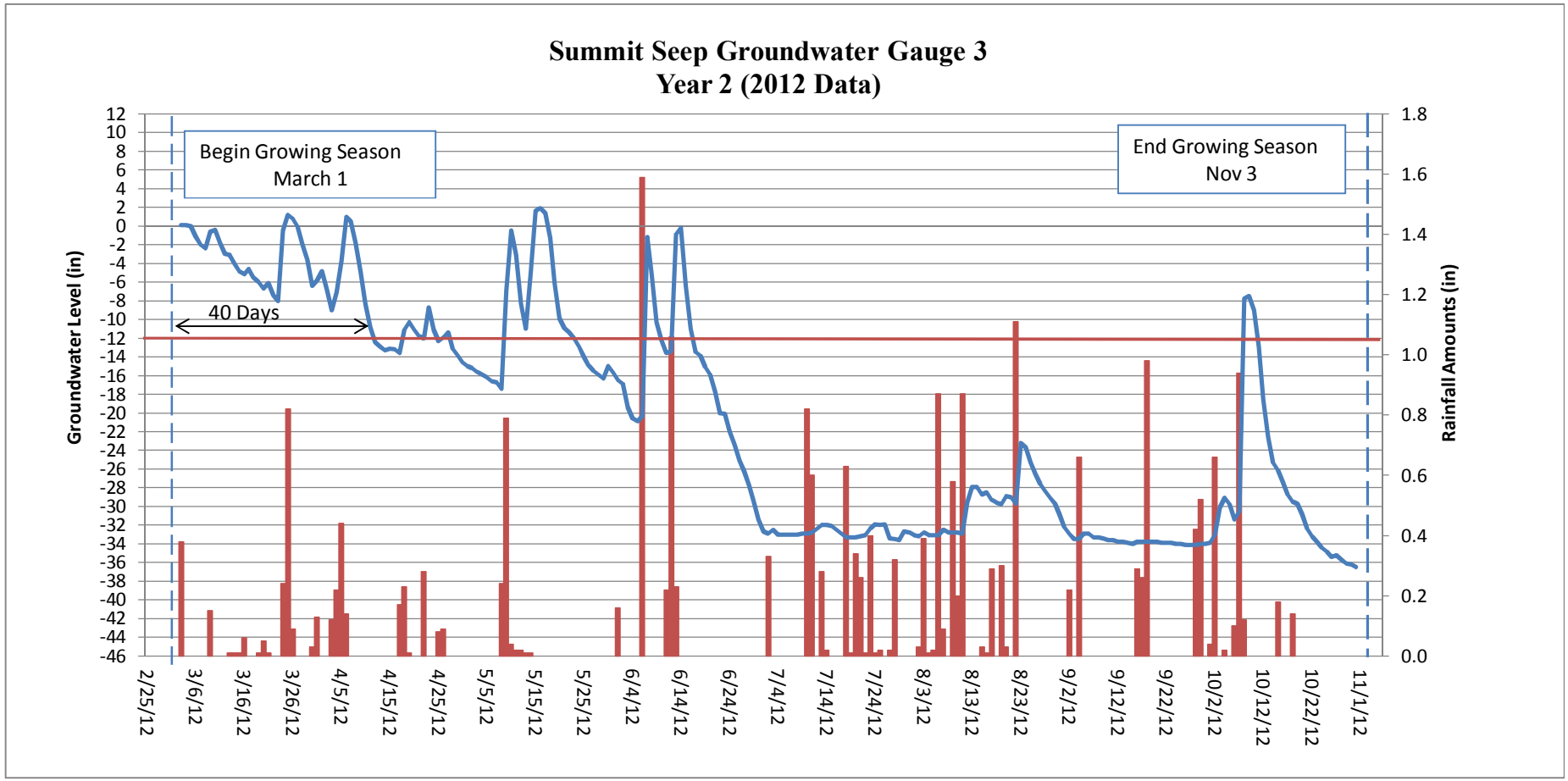
10/22/12
11/1/12


Summit Seep Groundwater Gauge 3
Year 2 (2012 Data)
Begin Growing Season
March 1
End Growing Season
Nov 3
40 Days
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-30
-32
-34
-36
-38
-40
-42
-44
-46
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
2/25/12
3/6/12
3/16/12
3/26/12
4/5/12
4/15/12
4/25/12
5/5/12
5/15/12
5/25/12
6/4/12
6/14/12
6/24/12
7/4/12
7/14/12
7/24/12
8/3/12
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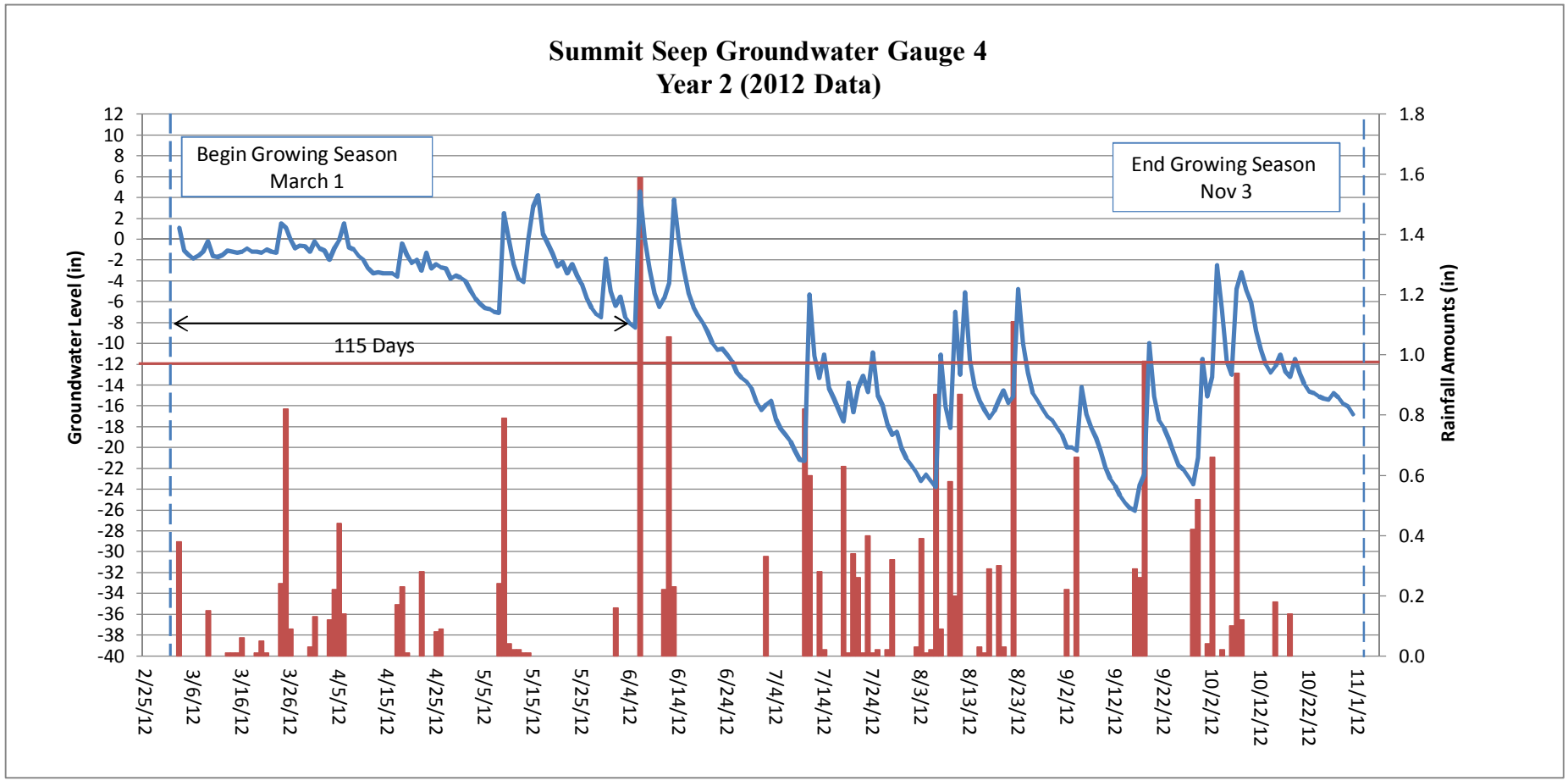
10/22/12
11/1/12


Summit Seep Groundwater Gauge 4
Year 2 (2012 Data)
Begin Growing Season
March 1
End Growing Season
Nov 3
115 Days
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-30
-32
-34
-36
-38
-40
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
2/25/12
3/6/12
3/16/12
3/26/12
4/5/12
4/15/12
4/25/12
5/5/12
5/15/12
5/25/12
6/4/12
6/14/12
6/24/12
7/4/12
7/14/12
7/24/12
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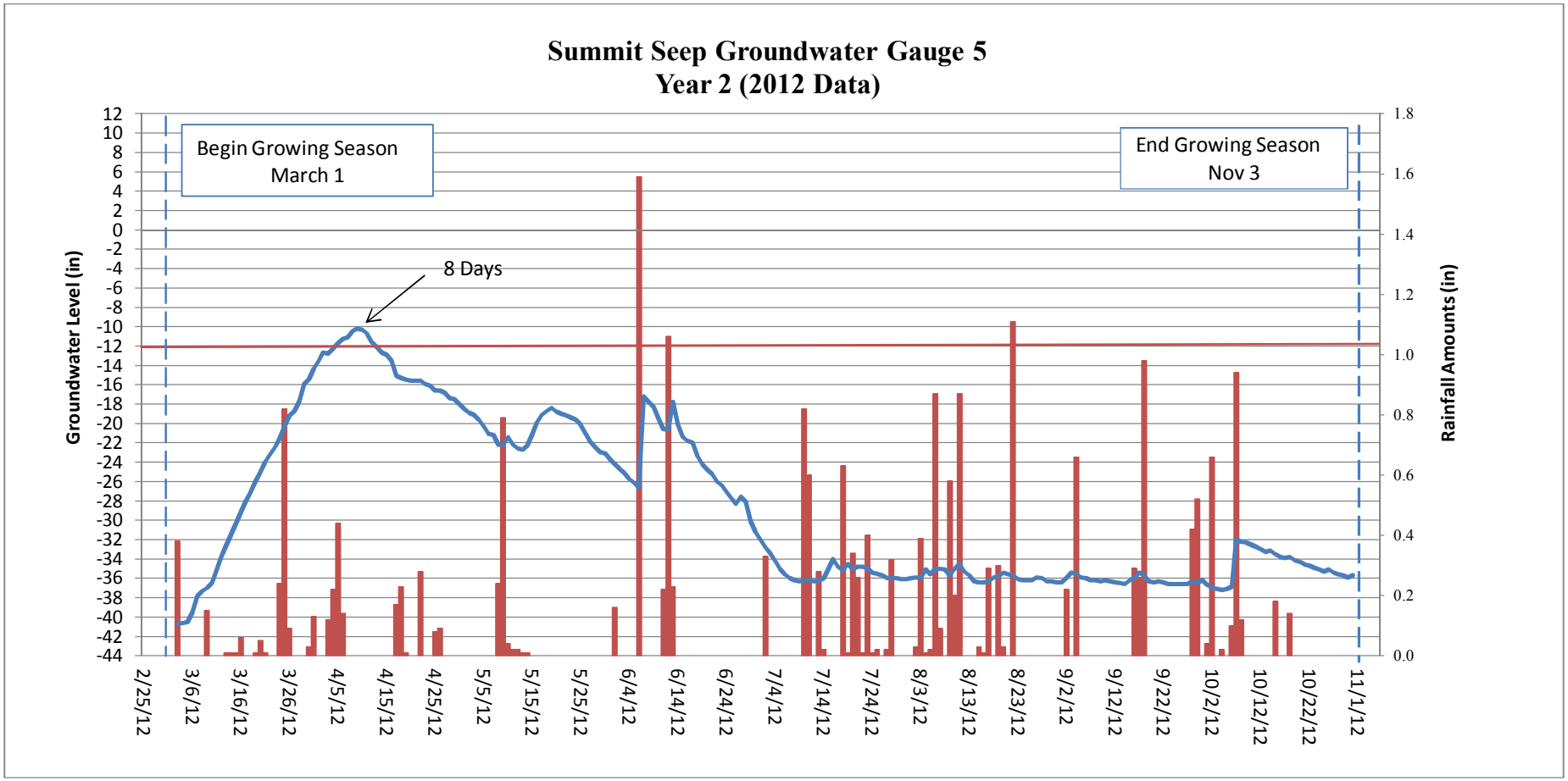
10/2/12
10/12/12
10/22/12
11/1/12


Summit Seep Groundwater Gauge 5
Year 2 (2012 Data)
Begin Growing Season
March 1
End Growing Season
Nov 3
8 Days
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-30
-32
-34
-36
-38
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-42
-44
1.8
1.6
1.4
1.2
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0.8
0.6
0.4
0.2
0.0
2/25/12
3/6/12
3/16/12
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4/25/12
5/5/12
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8/13/12
8/23/12
9/2/12
9/12/12
9/22/12
10/2/12
10/12/12
10/22/12
11/1/12