Moccasin Creek Buffer and Wetland Restoration, Enhancement, and Preservation Project
Wake and Franklin Counties
North Carolina

CU: 03020203
SCO# 040611501
EEP Project No. 256

Year 3 of 5 Monitoring Report
July 2011

Prepared for:

North Carolina Department of Environment and Natural Resources
Ecosystem Enhancement Program
Parker Lincoln Building
2728 Capital Boulevard, Suite 1H-103
Raleigh, NC 27606

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Prepared by:

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2010 Moccasin Creek Year 3 Monitoring Abstract

Moccasin Creek was previously pursued as a restoration, enhancement, and preservation project through the North Carolina Ecosystem Enhancement Program (EEP). The goals and objectives of this project were to ensure that functioning wetlands, natural channel configurations in the five stream sections, and buffers along the streams have been established by the restoration efforts. Due to the widespread beaver population and continued destruction of planted stems, replanting in order to achieve stream, buffer and wetland restoration success criteria is futile. In 2011, after reevaluated preconstruction and current site conditions, EEP has determined that pursuing preservation credits is a more appropriate mitigation strategy for Moccasin Creek.

Table 1. Background Information

Project Name	Moccasin Creek
Designer's Name	Ward Consulting Engineers, P.C. 8386 Six Forks Road, Suite 101 Raleigh, NC 27615-5088
Contractor's Name	Husky Construction Corporation
Project County	Wake and Franklin Counties
Directions to Project Site	From Raleigh, take the U.S. 64 Highway Bypass to the N.C. Highway 97 exit near Zebulon. Take a left onto Highway 97, and then next left onto Highway 39. The site is approximately half a mile on the right.
Drainage Area	20.4 Square Miles
USGS Hydro Unit	03020203
NCDWQ Subbasin	03-04-07
Project Area & Length	65.14 acres of wetland preservation 4,808 linear feet of stream preservation
Date of Completion	Construction including planting from January to March, 2006
Monitoring Dates	April through November 2010

Table 2. Summary of Vegetation Plot Data

Zone 1: Plot 1

Species	# Stems (03/08/06)	# Stems (11/07)	# Stems (10/10)
Taxodium distichum	14	10	12
Quercus lyrata	9	4	3
Quercus michauxii	7	3	0
Nyssa sylvatica var. *biflora*	4	0	0

Year 3 Result- 606 stems/acre

Zone 1: Plot 2

Species	# Stems (04/08/06)	# Stems (11/07)	# Stems (10/10)
Taxodium distichum	3	0	0
Cephalanthus occidentalis	3	0	0
Quercus lyrata	5	3	2
Nyssa sylvatica var. *biflora*	9	1	0

Year 3 Result- 81 stems/ acre

Zone 1: Plot 3

Species	# Stems (04/08/06)	# Stems (11/07)	# Stems (10/10)
Quercus sp.	14	1	0
Nyssa sylvatica var. *biflora*	21	4	0

Year 3 Results- 0 stems/ acre

Zone 1: Plot 4

Species	# Stems (04/08/06)	# Stems (11/07)	# Stems (10/10)
Taxodium distichum	5	0	0
Quercus lyrata	5	0	0
Nyssa sylvatica var. *biflora*	4	0	0

Year 3 Results-0 stems/ acre

Zone 2: Plot 1

Species	# Stems (04/08/06)	# Stems (11/07)	# Stems (10/10)
Platanus occidentalis	10	1	0
Quercus phellos	15	10	0

Year 3 Results- 0 stems/ acre

Zone 3: Plot 1

Species	# Stems (04/08/06)	# Stems (11/07)	# Stems (10/10)
Taxodium distichum	14	2	2
Nyssa sylvatica var. *biflora*	5	1	0

Year 3 Results- 81 stems/ acre

Zone 3: Plot 2

Species	# Stems (04/08/06)	# Stems (11/07)	# Stems (10/10)
Taxodium distichum	20	3	2
Nyssa sylvatica var. *biflora*	7	0	0

Year 3 Results- 81 stems/ acre

Table 2a - Total and Planted Counts (Species by Plot with Annual Means)

CURRENT DATA (MY3 2010)																		ANNUAL MEANS							
			Zone 1 Plot 1		Zone 1 Plot 2		Zone 1 Plot 3		Zone 1 Plot 4		Zone 2 Plot 1		Zone 3 Plot 1		Zone 3 Plot 2		Zone 3 Plot 3		Current Mean		MY2 (2007)		MY1 (11/2006)		AB (3/2006)	
Scientific Name	Common Name	Type	P	T	P	T	P	T	P	T	P	T	P	T	P	T	P	T	P	T	P	T	P	T	P	T
Taxodium distichum	Bald Cypress	Tree	12	12	0	0			0	0			2	2	2	2			16	16	15	15	15	15	56	56
Quercus lyrata	Overcup Oak	Tree	3	3	2	2			0	0							2	2	7	7	13	13	14	14	34	34
Quercus michauxii	Sw Chestnut Oak	Tree	0	0															0	0	3	3	2	2	7	7
Nyssa sylvatica var. *biflora*	Black gum	Tree	0	0	0	0	0	0	0	0			0	0	0	0	0	0	0	0	10	10	23	23	71	71
Cephalanthus occidentalis	Buttonbush	Shrub			0	0					0	0							0	0	1	1	1	1	13	13
Quercus sp.	Oak sp.	Tree					0	0											0	0	1	1	2	2	14	14
Quercus phellos	Willow Oak	Tree									0	0							0	0	10	10	9	9	15	15
		Plot Area (acres)	0.025		0.025		0.025		0.025		0.025		0.025		0.025		0.025									
		Species Count	2	2	1	1	0	0	0	0	0	0	1	1	1	1	1	1	2	2	7	7	7	7	7	7
Type = Tree or Shrub		Stem Count	15	15	2	2	0	0	0	0	0	0	2	2	2	2	2	2	23	23	53	53	66	66	210	210
P = Planted, T = Total		Stems/Acre	606	606	80.8	80.8	0	0	0	0	0	0	80.8	80.8	80.8	80.8	80.8	80.8	116	116	283	283	333	333	1061	1061

Zone3: Plot 3

Species	# Stems (04/08/06)	# Stems (11/07)	# Stems (10/10)
Quercus lyrata	**15**	**6**	**2**
Nyssa sylvatica var. *biflora*	**21**	**4**	**0**

Year 3 Results- 81 stems/ acre

Table 3. Vegetation Density

Vegetation	Zone 1	Zone 2	Zone 3
Herb (% cover)	100	98	98
Shrub (% cover)	12	15	10
Tree (stems/acre)	172	0	81

Results and Discussion

For the 2010 monitoring year, groundwater gauge data and CVS vegetation plot data was collected. Data show 2 out of 3 gauges achieved jurisdictional hydrology and only 1 out of 8 vegetation monitoring plots met the minimum success criteria.

Due to the vegetation mortality caused by beaver activity and inundation, mitigation units (MU) for the Moccasin Creek Site will be accrued by shifting all MU credits to preservation. Restoration and enhancement MU will not be pursued at close out for the Moccasin Creek site.

In 2006, stands of blackberry were treated with an herbicidal application. Since then, more patches of blackberry have appeared and may require herbicidal treatment. It is recommended that the site be traversed every spring, when new growth appears, to identify patches and eradicate if deemed necessary. In 2009, Moccasin Creek was eradicated of beavers and dams were removed. However, the prolong inundation periods caused by beaver dams before removal resulted in high mortality rates in planted stems.

The Moccasin Creek Site also comprises of four (4) stream repair areas (repaired in 2005) that are performing adequately. The vegetation is doing well and the banks are stable. The beaver dams located directly downstream of the repair area were removed and no damage to the stream channel was evident.

1.0 Background Information

The North Carolina Ecosystem Enhancement Program (EEP) purchased the Moccasin Creek Project Site to preserve, enhance, and restore wetlands and streams. The site is an 84-acre undeveloped tract along Moccasin Creek. Moccasin Creek runs north-south through the property and is the county line.

The site was originally forested with thirty to forty year old hardwoods, which were timbered in the early 1980's by the previous owner. Pine trees were then replanted in a majority of the timbered area. The planted pines were pre-commercially thinned in 1999 - 2000 to promote growth of the larger trees. A small area straddling Moccasin Creek that was deemed too wet for pines was left to naturally regenerate in hardwoods. The majority of this area failed to regenerate and prior to construction in January 2005 appeared to have been actively maintained as a cleared area.

Haul roads were established for accessing timber removal in the early 1980's and culverts were installed over the streams on the property. A primary access roadway was constructed within the property from Hwy 39, which crossed over Moccasin Creek. Approximately 650 linear feet of this roadway was constructed through wetlands. Four culverts were installed along this main access road: one in Wolf Creek, two in Moccasin Creek, and one in an unnamed tributary west of Moccasin Creek S3. One additional pipe was placed for a haul road crossing of tributary S2 located within the northeastern portion of the site.

Beavers were a problem to the previous owner after the land was cleared for timber in the early 1980's. Prior to the state acquiring the land the previous owner routinely removed the beaver dams on the property and trapping was performed every other year.

The Moccasin Creek site was acquired by the State of North Carolina in May 2004 and site construction occurred in 2005.

1.1. Goals and Objectives

The mitigation goals and objectives of this project are to ensure that functioning wetlands, natural channel configurations in the five stream sections, and buffers along the streams have been established and maintained through preservation efforts. The goals and objectives of this project are as follows:

1. Preservation of 65.14 acres of existing wetlands.
2. Stream preservation of 4,808 lf that includes the removal of existing culverts.

1.2. Project Location

The project property is located on NC Highway 39 approximately 0.6 miles north of the intersection of NC 39 and NC Highway 97 in Wake County and Franklin County, (Figure 1). From Raleigh, take U.S. Highway 64 Bypass east around Knightdale. Take U.S. Highway 264 east then take the exit for N.C. Highway 97. Take a left onto Highway 97, then another left onto Highway 39. The site is approximately 0.6 miles on the right. A gated, gravel road off NC 39 accesses the property (Latitude 35°50'33" and Longitude 78°16'17"). The site is in the Neuse River Basin in Cataloging Unit 03020203, NCDWQ Subbasin 03-04-07.

1.3. Project Description

The project site consists of approximately 65 acres of jurisdictional wetlands consisting of bottomland swamp hardwoods in various stages of succession, freshwater marsh, and pine plantation. In 2005, 0.42 acres of wetlands on site were restored and 5.3 acres of wetlands were enhanced. Although these areas have established as jurisdiction wetlands, they do not meet the regulatory woody stem density mitigation criteria. Approximately 65 acres of wetlands within the easement boundary are preserved.

There are three named streams, Moccasin Creek, Wolf Creek, and Beaverdam Creek, and three unnamed streams, S1, S2, and S3, located on the property. Moccasin Creek, the main drainage feature, is an E type sand bed perennial stream, with very little incision, that enters the property through the northern property line, travels south to bisect the upper one-third of the property, and then becomes the western property line below Beaverdam Creek. The overall length within the project site is approximately 4,808 linear feet.

2.0 Year 2010 Results and Discussion

2.1 Wetland Vegetation

A total of eight 10 x 10 meter (30' X 30') vegetation-monitoring plots were established within the three planting zones on the Moccasin Creek Wetland Mitigation Site. The DOT Stem Counting Protocol was used to monitor each plot for baseline, MY1 and MY2. A subsequent CVS Protocol evaluation was utilized to determine plot statistics for 2010 MY3. Zone 1 (5.12 acres) contains four plots (1-4), Zone 2 (0.6 acres) contains one plot (1), and Zone 3 (3.56 acres) contains three plots (1-3). Vegetation monitoring results are displayed in Table 2a.

A new rain gauge and a replacement Gauge 3 were installed on site in December of 2006. Due to evidence of trespassing, the gate was locked with a combination lock. Please contact EEP for the lock combination.

2.1.1 Results and Discussion

On March 8, 2006 the initial vegetation monitoring count was performed for all eight plots. The initial planting resulted in 2516 stems/ acre for Zone 1, 1210 stems/ acre for 8 Zone 2, and 1322 stems/ acre for Zone 3. The totals were 1276 stems/ acre for the entire Moccasin Creek Mitigation Site. During October 2010, the year three vegetation counts were performed. Results of sampled vegetation stem counts within the eight plots are shown in Table 2a, and estimated density of tree stems (representative tree species) and percent cover of herb and shrub cover is presented in Table 3. Locations of the vegetation plots are shown in the Current Conditions Plan View (Figure 3), and photographs of the vegetation monitoring plots are located in Section 3.0, Photo Log.

Zone 1: (5.12 acres) The average density of Zone 1 is 172 stems per acre. Plot 1 had a density of 606 stems per acre. Plot 2 had a density of 81 stems per acre, Plot 3 (0 stems), and Plot 4 (0 stems). "Blackberry" *Rubus* sp., "knot weed" *Polygonum sp.*, and "common rush" *Juncus effusus,* are located within the vegetation plots and have out competed the planted stems.

Zone 2: (0.6 acres) The average density of Zone 2 is 0 stems per acre. Plot 1 of Zone 2 resulted in a density of 0 stems per acre. The mortality rate is due to the competition of "Blackberry" *Rubus* sp., "knot weed" *Polygonum sp.*, and "common rush" *Juncus effusus* along with the beaver flooding that occurred previously.

Zone 3: (3.56 acres) The average density of Zone 3 is 81 stems per acre. Plots 1, Plot 2, and Plot 3 each resulted in 81 stems per acre. The mortality rate is due to the competition of "Blackberry" *Rubus* sp., "knot weed" *Polygonum sp.*, and "common rush" *Juncus effusus* along with the beaver flooding that occurred previously.

The low survivorship of the planted tree species is due to the following contributing factors:

1. Competition from native successional species
2. Small plant material size used for at planting
3. Long periods of water inundation for saplings to become established which may have been caused by the beaver dam.
5. Drought conditions (2006 and 2007)

2.2 Wetland Hydrology

Three groundwater gauges were installed and one rain gauge was installed on site and are shown in the Current Conditions Plan View (Figure 3). Gauge 1 is located in the northwest quadrant of the project site at an elevation of 220.34 feet. Groundwater Gauge 2 is located in the southeast quadrant of the project site at an elevation of 219.91 feet. Groundwater Gauge 3 is located in the center of the project site on the east side of Wolf Creek at an elevation of 219.40. For the intermittently exposed and semi-permanently flooded regions, the criteria to meet the soil conditions is having ponded, flooded, or saturated soils within 12 inches of the soil surface for 12.5 % of the growing season during years of normal precipitation.

2.2.1 Results and Discussion

The initial monitoring of Groundwater Gauge 1, 2, and 3 commenced on January 30, 2005. The growing season is considered to be 213 days (April 5-November 3). Gauge locations are depicted in Figure 3 and rainfall amounts along with groundwater gauge data can be seen in Appendix A. Analysis of Groundwater Gauge 1 and Gauge 2 indicate that groundwater levels were within 12 inches of the soil surface or more than 12.5 % of the growing season. Gauge 1 yielded 17%, Gauge 2 yielded 13%, and Gauge 3 yielded 2% of the hydro-period respectively. It appears that Gauge 3 may be experiencing drawdown from its installed location next to Wolf Creek resulting in a skewed data set.

2.3 Stream Restoration

Stream restoration was completed in conjunction with vegetation establishment and removal of the existing culverts and roadway. Removal of the culverts restored natural channel configurations to approximately 311 linear feet of sections of Moccasin Creek, Wolf Creek, and unnamed tributaries S1, S2, and S3. Culverts were removed along with fill material and the streambed and bank were re-established to match the stable channel conditions directly upstream and downstream of the repair area.

2.3.1 Results and Discussion

The areas of repair were examined and it was determined that there has been no damage since construction. However, beaver dams downstream of the repair area on Moccasin Creek caused site flooding in 2008 and 2009. These dams were removed in 2009 and the stream levels returned to normal flow conditions. No damage to the stream restoration has occurred as a result of beaver dams or dam removal.

2.4 Areas of Concern & Site Recommendations

Mitigation Units (MU) for the Moccasin Creek Site will be accrued by shifting all MU credits to preservation. Restoration and enhancement MU will not be pursued on the Moccasin Creek site after the 2010 MY3 monitoring year.

Colonies of “blackberry” (*Rubus sp.*), that were previously treated with an herbicidal application may need additional treatments under optimal seasonal conditions to eradicate these plants. It is recommend that an annual spring assessment of blackberry be conducted to determine if subsequent herbicidal application is warranted.

3.0 Photo Log

Vegetation Plot Photographs, Zone 1, Plot 1

October 2010

Vegetation Plot Photographs, Zone 1, Plot 2

October 2010

Vegetation Plot Photographs, Zone 1, Plot 3

October 2010

Vegetation Plot Photographs, Zone 1, Plot 4

October 2010

Vegetation Plot Photographs, Zone 2, Plot 1

October 2010

Vegetation Plot Photographs, Zone 3, Plot 1

October 2010

Vegetation Plot Photographs, Zone 3, Plot 2

October 2010

Vegetation Plot Photographs, Zone 3, Plot 3

October 2010

Stream Restoration Area

December 2010

Appendix A
Figures and Tables

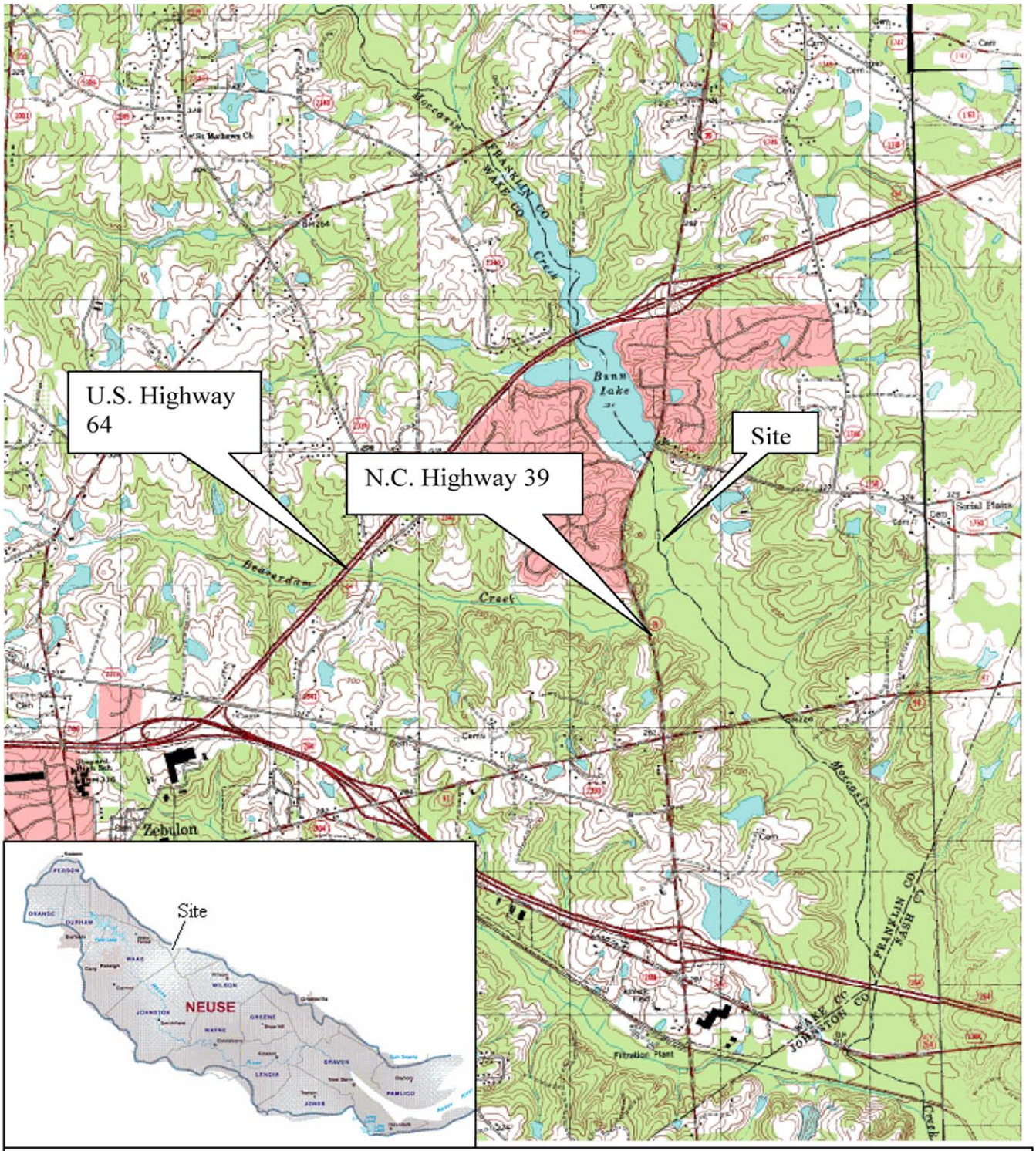


Figure 1: Location Map
Moccasin Creek Buffer & Wetland Restoration, Enhancement & Preservation Project, Wake & Franklin Counties
CU: 03020203
Latitude 35°50'33", Longitude 78°16'17"
Scale: 1" = 100,000 feet

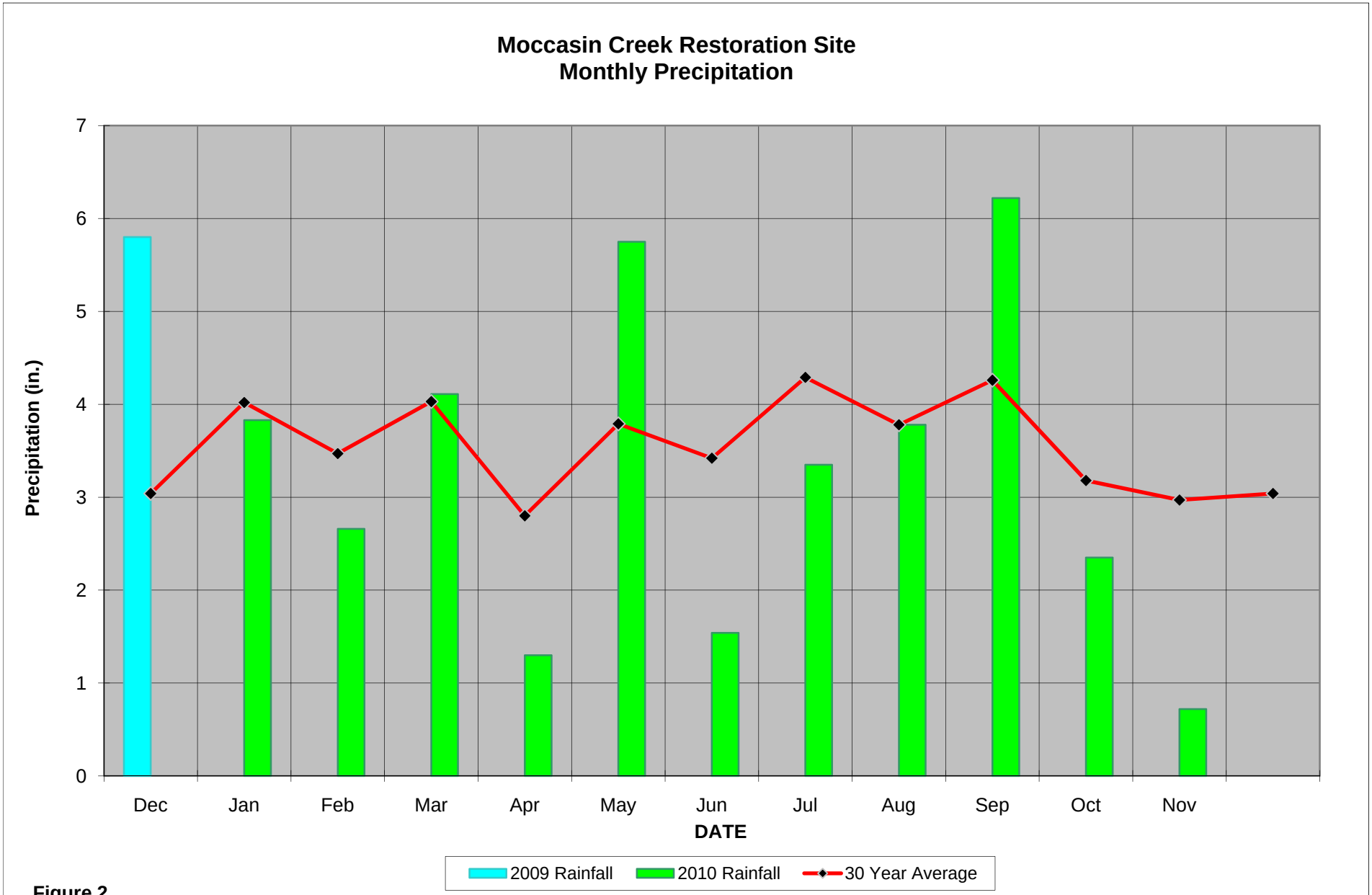
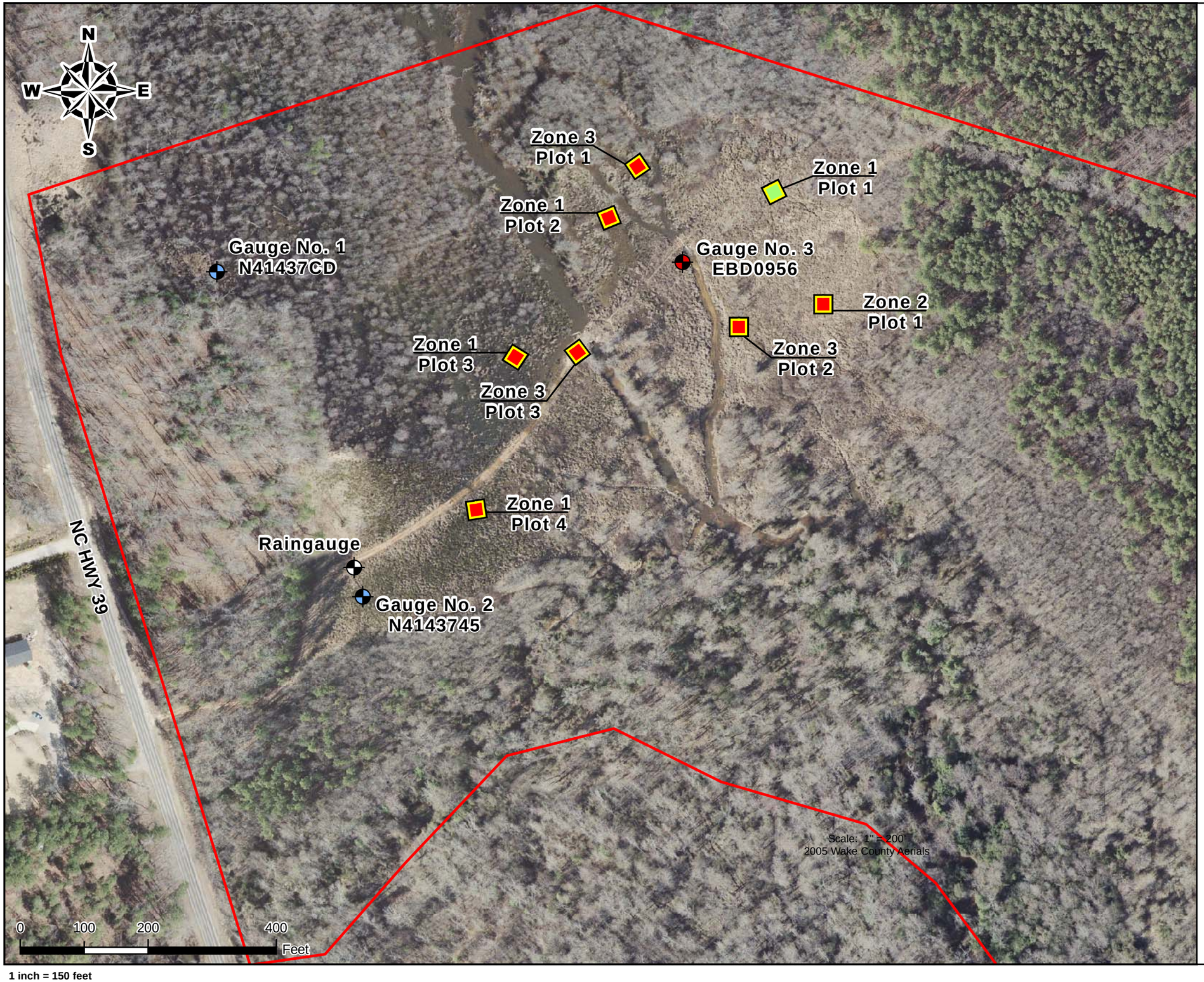


Figure 2

Note: Precipitation totals through November 15th.



1 inch = 150 feet

FIGURE 3

Current Conditions Plan View

Moccasin Creek Buffer
& Wetland Restoration
and Preservation

CU: 03020203
SCO# 040611501

Wake and Franklin Counties

Vegetation Monitoring Counts

- Less Than 320 Stems per Acre
- More Than 320 Stems per Acre

Groundwater Monitoring Gauges

Gauge Success Criteria

- < 8%
- > 12.5%
- Raingauge

Site Boundary

Ecosystem Enhancement Program

December 2010

Table 1. Background Information

Project Name	Moccasin Creek
Designer's Name	Ward Consulting Engineers, P.C. 8386 Six Forks Road, Suite 101 Raleigh, NC 27615-5088
Contractor's Name	Husky Construction Corporation
Project County	Wake and Franklin Counties
Directions to Project Site	From Raleigh, take the U.S. 64 Highway Bypass to the N.C. Highway 97 exit near Zebulon. Take a left onto Highway 97, and then next left onto Highway 39. The site is approximately half a mile on the right.
Drainage Area	20.4 Square Miles
USGS Hydro Unit	03020203
NCDWQ Subbasin	03-04-07
Project Area & Length	311 linear feet of stream restoration 0.38 acres of wetland restoration 4.93 acres of wetland enhancement 43.21 acres of wetland preservation
Restoration Approach	311 linear feet of stream restoration accomplished by removing culverts and reshaping the channel to appropriate dimensions 0.38 acres wetland restoration accomplished by removing the access road and grading to match the surrounding wetlands' elevation 4.93 acres wetland enhancement in the altered fields was accomplished by restoring natural forested communities
Date of Completion	Construction including planting from January to March, 2006
Monitoring Dates	April through November 2010

Table 2. Summary of Vegetation Plot Data

Zone 1: Plot 1

Species	# Stems (03/08/06)	# Stems (11/07)	# Stems (10/10)
Taxodium distichum	14	10	12
Quercus lyrata	9	4	3
Quercus michauxii	7	3	0
Nyssa sylvatica var. *biflora*	4	0	0

Year 3 Result- 606 stems/acre

Zone 1: Plot 2

Species	# Stems (04/08/06)	# Stems (11/07)	# Stems (10/10)
Taxodium distichum	3	0	0
Cephalanthus occidentalis	3	0	0
Quercus lyrata	5	3	2
Nyssa sylvatica var. *biflora*	9	1	0

Year 3 Result- 81 stems/ acre

Zone 1: Plot 3

Species	# Stems (04/08/06)	# Stems (11/07)	# Stems (10/10)
Quercus sp.	14	1	0
Nyssa sylvatica var. *biflora*	21	4	0

Year 3 Results- 0 stems/ acre

Zone 1: Plot 4

Species	# Stems (04/08/06)	# Stems (11/07)	# Stems (10/10)
Taxodium distichum	5	0	0
Quercus lyrata	5	0	0
Nyssa sylvatica var. *biflora*	4	0	0

Year 3 Results-0 stems/ acre

Zone 2: Plot 1

Species	# Stems (04/08/06)	# Stems (11/07)	# Stems (10/10)
Platanus occidentalis	10	1	0
Quercus phellos	15	10	0

Year 3 Results- 0 stems/ acre

Zone 3: Plot 1

Species	# Stems (04/08/06)	# Stems (11/07)	# Stems (10/10)
Taxodium distichum	14	2	2
Nyssa sylvatica var. *biflora*	5	1	0

Year 3 Results- 81 stems/ acre

Zone 3: Plot 2

Species	# Stems (04/08/06)	# Stems (11/07)	# Stems (10/10)
Taxodium distichum	20	3	2
Nyssa sylvatica var. *biflora*	7	0	0

Year 3 Results- 81 stems/ acre

Zone3: Plot 3

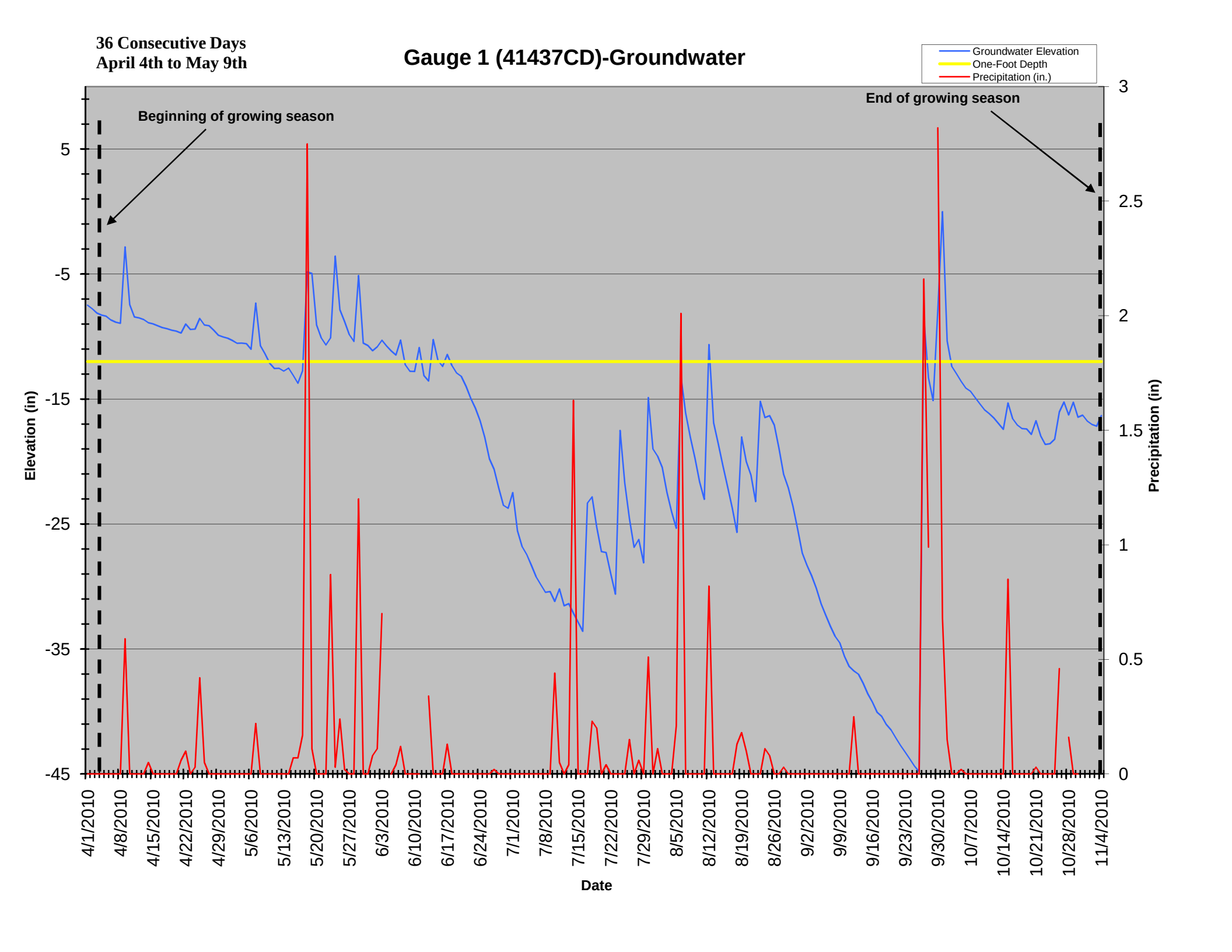
Species	**# Stems (04/08/06)**	**# Stems (11/07)**	**# Stems (10/10)**
Quercus lyrata	**15**	**6**	**2**
Nyssa sylvatica var. *biflora*	**21**	**4**	**0**

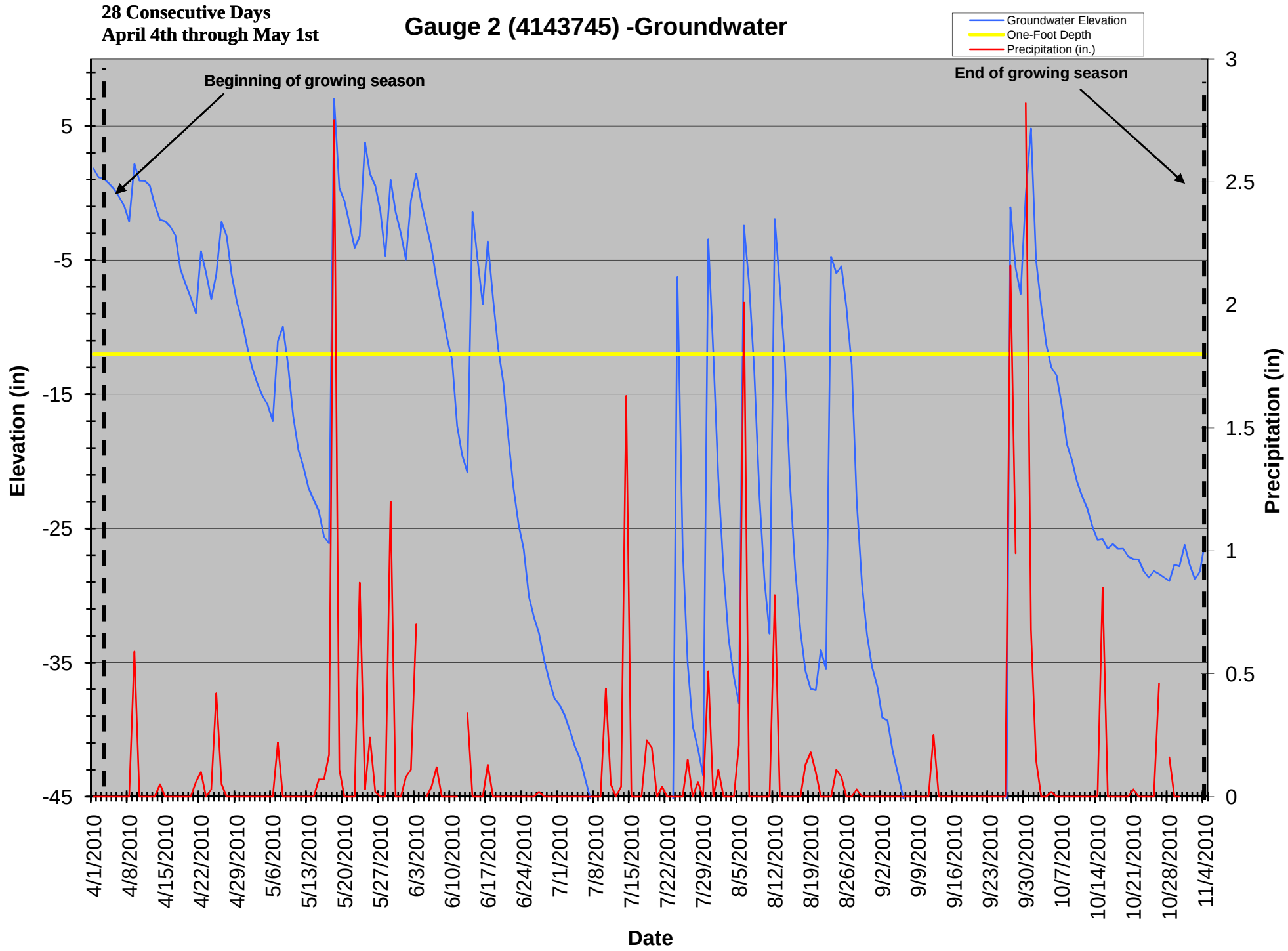
Year 3 Results- 81 stems/ acre

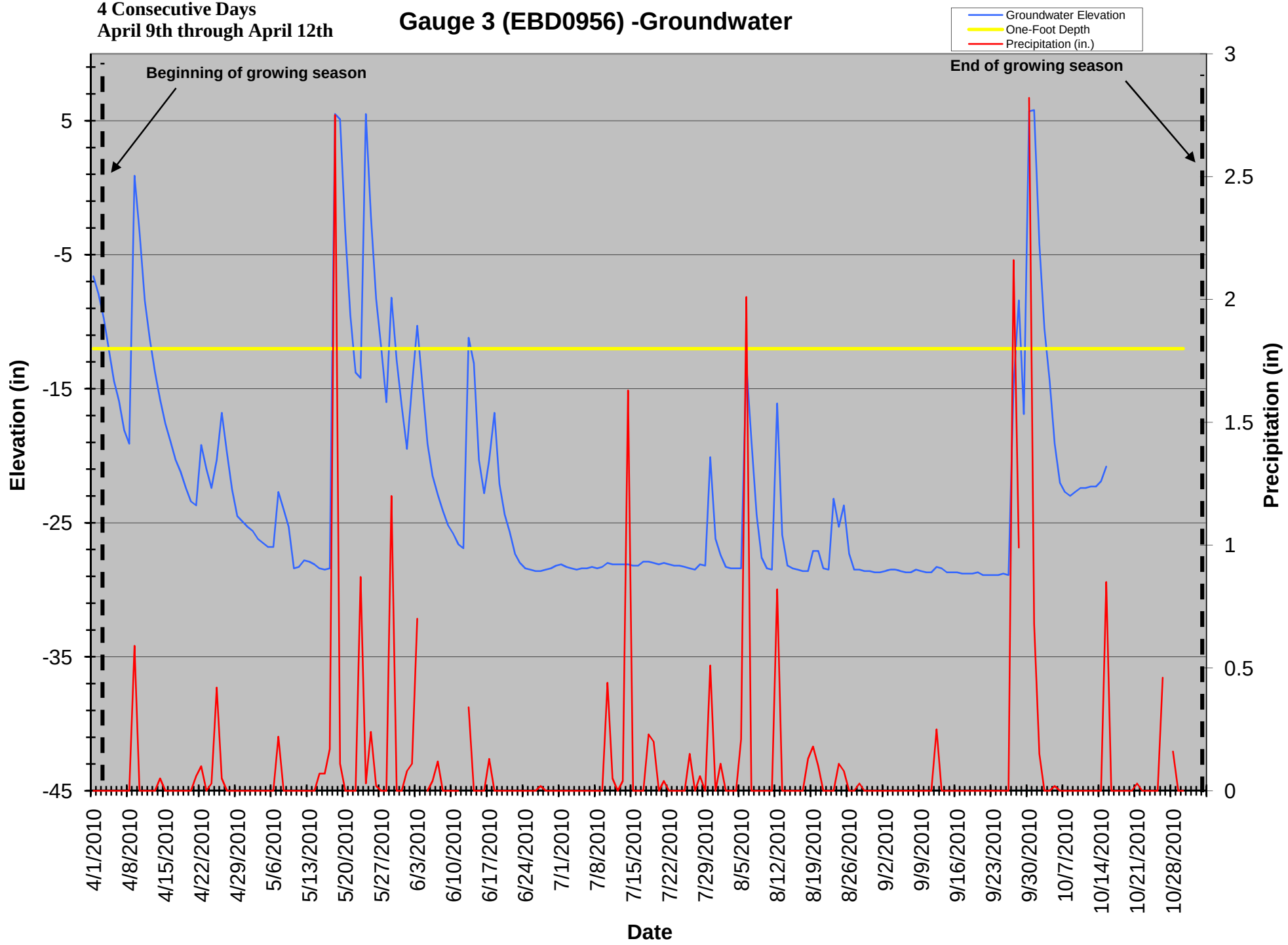
Table 3. Vegetation Density

Vegetation	**Zone 1**	**Zone 2**	**Zone 3**
Herb (% cover)	100	98	98
Shrub (% cover)	12	15	10
Tree (stems/acre)	172	0	81

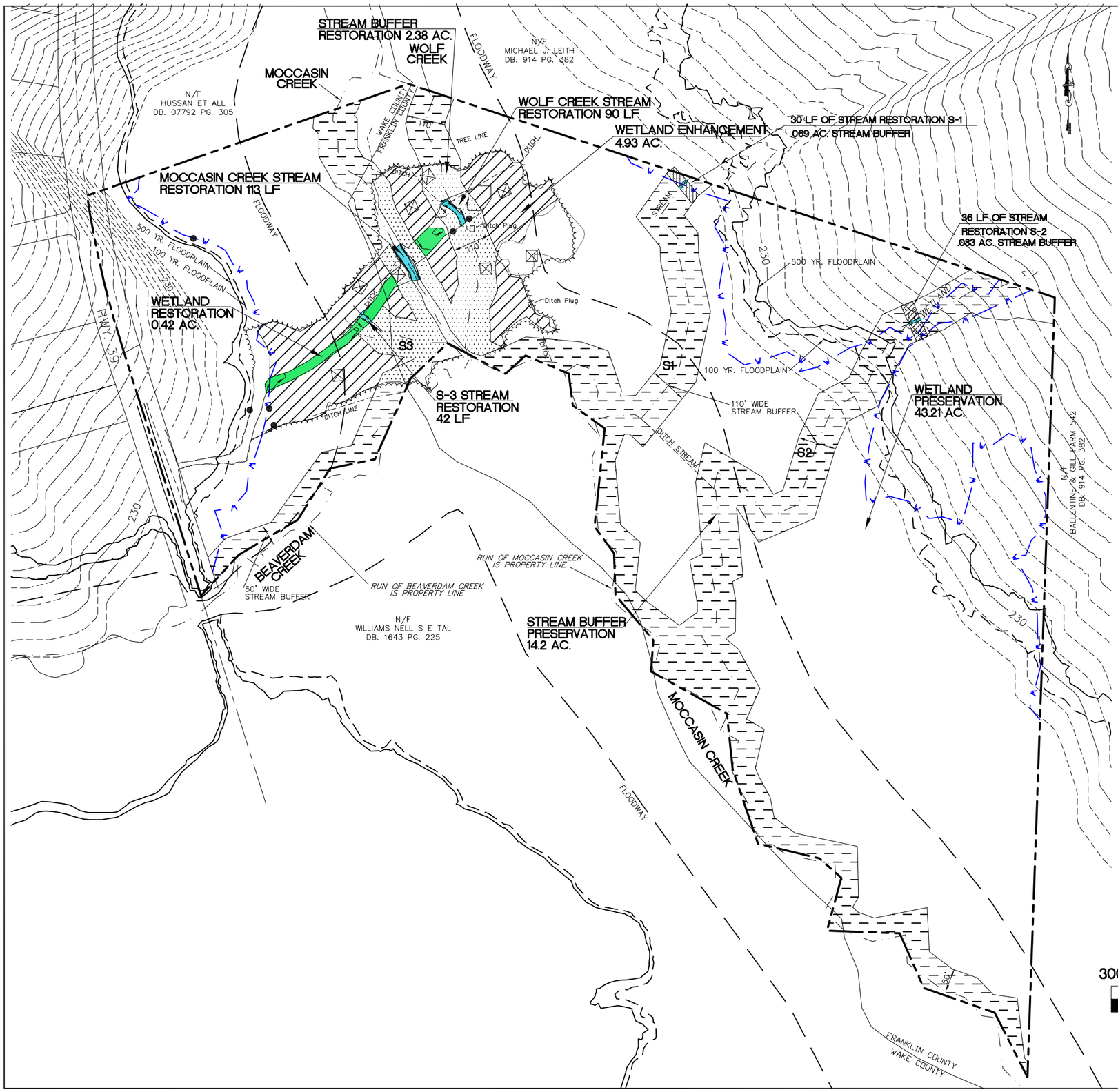
Appendix B
Gauge Graphs


36 Consecutive Days
April 4th to May 9th
Gauge 1 (41437CD)-Groundwater
Groundwater Elevation
One-Foot Depth
Precipitation (in.)
Beginning of growing season
End of growing season
Elevation (in)
Precipitation (in)
Date
5
-5
-15
-25
-35
-45
3
2.5
2
1.5
1
0.5
0
4/1/2010
4/8/2010
4/15/2010
4/22/2010
4/29/2010
5/6/2010
5/13/2010
5/20/2010
5/27/2010
6/3/2010
6/10/2010
6/17/2010
6/24/2010
7/1/2010
7/8/2010
7/15/2010
7/22/2010
7/29/2010
8/5/2010
8/12/2010
8/19/2010
8/26/2010
9/2/2010
9/9/2010
9/16/2010
9/23/2010
9/30/2010
10/7/2010
10/14/2010
10/21/2010
10/28/2010
11/4/2010


28 Consecutive Days
April 4th through May 1st
Gauge 2 (4143745) -Groundwater
Groundwater Elevation
One-Foot Depth
Precipitation (in.)
Beginning of growing season
End of growing season
Elevation (in)
Precipitation (in)
Date
5
-5
-15
-25
-35
-45
3
2.5
2
1.5
1
0.5
0
4/1/2010
4/8/2010
4/15/2010
4/22/2010
4/29/2010
5/6/2010
5/13/2010
5/20/2010
5/27/2010
6/3/2010
6/10/2010
6/17/2010
6/24/2010
7/1/2010
7/8/2010
7/15/2010
7/22/2010
7/29/2010
8/5/2010
8/12/2010
8/19/2010
8/26/2010
9/2/2010
9/9/2010
9/16/2010
9/23/2010
9/30/2010
10/7/2010
10/14/2010
10/21/2010
10/28/2010
11/4/2010


4 Consecutive Days
April 9th through April 12th
Gauge 3 (EBD0956) -Groundwater
Groundwater Elevation
One-Foot Depth
Precipitation (in.)
Beginning of growing season
End of growing season
Elevation (in)
Precipitation (in)
Date
5
-5
-15
-25
-35
-45
3
2.5
2
1.5
1
0.5
0
4/1/2010
4/8/2010
4/15/2010
4/22/2010
4/29/2010
5/6/2010
5/13/2010
5/20/2010
5/27/2010
6/3/2010
6/10/2010
6/17/2010
6/24/2010
7/1/2010
7/8/2010
7/15/2010
7/22/2010
7/29/2010
8/5/2010
8/12/2010
8/19/2010
8/26/2010
9/2/2010
9/9/2010
9/16/2010
9/23/2010
9/30/2010
10/7/2010
10/14/2010
10/21/2010
10/28/2010

Appendix C
Plan Drawings of Wetlands



Ecosystem type:
Successional Bottomland Hardwood Forest. Moccasin Creek is a Riverine System Surrounded by a Palustrine Wetland System.

PROJECT RESTORATION/ENHANCEMENT AND PRESERVATION

COLOR	TYPE	AREA (ACRES)	DISTANCE (FEET)
	WETLAND ENHANCEMENT	4.93	N/A
	WETLAND RESTORATION	0.38	N/A
	WETLAND PRESERVATION	43.21	N/A
	STREAM RESTORATION	N/A	311
	STREAM BUFFER RESTORATION	2.38	N/A
	STREAM BUFFER PRESERVATION	14.2	N/A
W	WETLAND BOUNDARY	N/A	N/A

300 150 0 300 600 900

SCALE IN FEET
1"=300'

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MOCCASIN CREEK MIIGATION PLAN

DATE: 05-15-06

PROJ./DWG. NAME: MOCCASIN CREEK ab-mitigation-11-17

SCALE: 1"=300'

SHEET NO. 1 OF 1