

# JUMPING RUN CREEK

## CARTERET-CRAVEN ELECTRICAL COOPERATIVE WETLAND RESTORATION CARTERET COUNTY, NORTH CAROLINA (Project Number 200)

Monitoring Year 5 of 5 (2006)



Submitted to:  
North Carolina Department of Environment and Natural Resources  
Ecosystem Enhancement Program  
Raleigh, North Carolina

Prepared by:  
Axiom Environmental, Inc.  
2126 Rowland Pond Drive  
Willow Spring, North Carolina 27592

Design Firm:  
Soil and Environmental Consultants, PA.  
11010 Raven Ridge Road  
Raleigh, North Carolina 27614



January 2007

## EXECUTIVE SUMMARY

The Jumping Run Creek Wetland Restoration Site (Site) is located within the United States Geological Survey (USGS) Hydrologic Unit 03020106 (North Carolina Division of Water Quality [NCDWQ] subbasin 03-05-03) of the White Oak River Basin. The Site occupies just over 3 acres within the grounds of the Carteret Craven Electrical Cooperative offices north of North Carolina State Highway 24, approximately three and a half miles west of Morehead City. The Site includes two main areas (cells) located on each side of the Electrical Cooperative building. One cell is located on the east side of the building and a larger cell is located to the west of the building.

The primary goals of the project include the following.

- 1) Reduce nutrient inputs to estuarine system.
- 2) Contribute to effort to reopen closed shellfish waters.
- 3) Provide educational opportunities to show the importance of wetlands for water quality.

Four vegetation plots had been previously established by North Carolina State University. The plots are 10 meters by 10 meters and are located in two distinct wetland areas identified as the 1) west cell and 2) east cell. Plots were surveyed June 21, 2006 for the 2006 (year 5) monitoring season. Based on the number of stems counted, all plots monitored at this Site have greater than 260 stems per acre and are considered successful. The average plot density has been measured at 1123 stems per acre, or 28 stems per plot for 2006 (year 5) monitoring. The most dominant species identified at the Site were bald cypress (*Taxodium distichum*), loblolly pine (*Pinus taeda*), water tupelo (*Nyssa aquatica*), and swamp black gum (*Nyssa biflora*). No vegetative problem areas were identified during the year-5 (2006) monitoring year.

No wetland problem areas have been identified during the year-5 (2006) monitoring year. All gauges are currently functioning and recording groundwater hydrology within 12 inches of the ground surface for greater than 12.5 percent of the growing season. Saturation of the soil surface is occurring for 100 percent of the growing season. Planted seedlings do not appear to be adversely affected by water levels and/or current duration of saturation.

In summary, the restoration site achieved success criteria for hydrology and vegetation in the Fifth Monitoring Year (2006). In addition, based on available data the site achieved success criteria for hydrology and vegetation over the entire 5-year monitoring period.

**Table of Contents**

EXECUTIVE SUMMARY ..... i  
1.0 PROJECT BACKGROUND ..... 1  
    1.1 Location and Setting ..... 1  
    1.2 Mitigation Structure and Objectives ..... 1  
    1.3 Project History and Background ..... 3  
    1.4 Monitoring Plan View ..... 4  
2.0 PROJECT CONDITION AND MONITORING RESULTS ..... 6  
    2.1 Vegetation Assessment ..... 6  
        2.1.1 Soil Data ..... 6  
        2.1.2 Vegetative Problem Areas ..... 6  
        2.1.3 Stem Counts ..... 6  
        2.1.4 Vegetation Plot Photos ..... 8  
    2.2 Wetland Assessment ..... 8  
        2.2.1 Wetland Problem Area Plan View ..... 9  
        2.2.2 Wetland Criteria Attainment ..... 9  
3.0 FIVE-YEAR MONITORING ASSESSMENT ..... 10  
4.0 REFERENCES ..... 11

**Appendices**

- APPENDIX A. VEGETATION PLOT PHOTOGRAPHS
- APPENDIX B. GROUNDWATER GAUGE GRAPHS
- APPENDIX C. GROUNDWATER GAUGE RAW DATA
- APPENDIX D. CVS LEVELS 1 & 2 DATA FORMS
- APPENDIX E. YEAR 3 (2004) GROUNDWATER GAUGE GRAPHS
- APPENDIX F. YEAR 4 (2005) GROUNDWATER GAUGE GRAPHS

**List of Figures**

Figure 1. Site Location ..... 2  
Figure 2. Monitoring Plan ..... 5

**List of Tables**

Table 1. Project Mitigation Structures and Objectives ..... 3  
Table 2. Project Activity and Reporting History ..... 3  
Table 3. Project Contact Table ..... 4  
Table 4. Project Background Table ..... 4  
Table 5. Preliminary Soil Data ..... 6  
Table 6. Stem Counts for Planted Species Arranged by Plot ..... 7  
Table 7. Summary of Groundwater Gauge Results for Years 1 through 5 ..... 9  
Table 8. Wetland Criteria Attainment ..... 9

## 1.0 PROJECT BACKGROUND

### 1.1 Location and Setting

The Jumping Run Creek Wetland Restoration Site (Site) is located within the United States Geological Survey (USGS) Hydrologic Unit 03020106 (North Carolina Division of Water Quality [NCDWQ] subbasin 03-05-03) of the White Oak River Basin. The Site occupies just over 3 acres within the grounds of the Carteret Craven Electrical Cooperative offices north of North Carolina State Highway 24, approximately three and a half miles west of Morehead City (Figure 1). The Site includes two main areas (cells) located on each side of the Electrical Cooperative building. One cell is located on the east side of the building and a larger cell is located to the west of the building.

The Site is located in the Middle Atlantic Coastal Plain Physiographic Province, within the Carolina Flatwoods ecoregion and is in close proximity to coastal marshes and beaches associated with Bogue Sound. The Site is characterized by industrial property utilized by the Carteret-Craven Electrical Cooperative.

### 1.2 Mitigation Structure and Objectives

Prior to wetland restoration activities the Site was characterized by maintained, landscape grasses associated with the Electrical Cooperative. Perimeter ditches surrounded the margins of the property to provide suitable drainage of the groundwater table to allow for Site development.

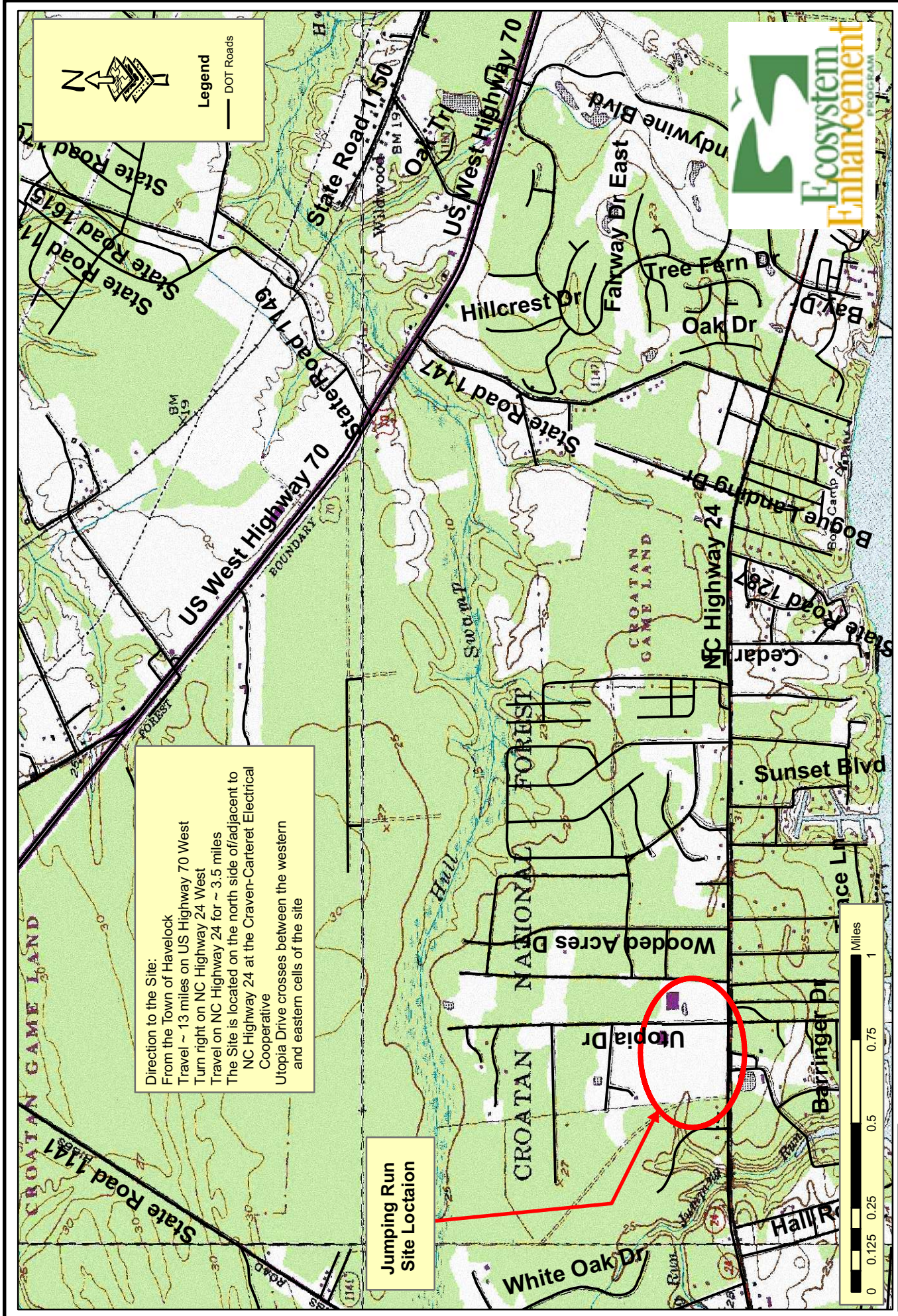
Site design services were provided by Soil and Environmental Consultants, PA. (S&EC). The Site was constructed in two phases. The first phase consisted of construction on the eastern portion of the Site. Grading for phase I was done by the North Carolina Department of Transportation (NCDOT). Construction at the Site began in February of 2000 and planting was completed that summer. The second phase of construction began in December of 2000. This phase of construction was completed by a private contractor. This phase included the construction of a low head weir/bulkhead structure to control hydrology in the upper area of the Site. The weir was installed during February of 2001. The west cell was planted in March and April of 2001. Some additional work was undertaken to improve conditions in the western cell in December of 2001. This work included plugging portions of the ditch, repair of erosion near the weir, and repair of damage caused by surface water flow down the banks of the wetland. An additional planting within the western cell was completed in the spring of 2004.

The primary goals of the project, as included in the *Monitoring Report for Carteret-Craven Electrical Cooperative Wetlands* (S&EC 2003), were to restore freshwater wetlands on a Site that had been destroyed by filling and drainage activities, to provide water quality improvements, and to augment habitat in the area. The goals of the project as listed by the North Carolina Wetlands Restoration Program (NCWRP) include the following.

- 1) Reduce nutrient inputs to estuarine system.
- 2) Contribute to effort to reopen closed shellfish waters.
- 3) Provide educational opportunities to show the importance of wetlands for water quality.


The margins of each cell were delineated and located utilizing Global Positioning Systems equipment with reported submeter accuracy. Based on this mapping effort the project included the construction of 0.96 acres of wetland in the eastern cell and 2.04 acres of wetland in the western cell. Project structures and objectives are summarized in Table 1.





Direction to the Site:  
 From the Town of Havelock  
 Travel ~ 13 miles on US Highway 70 West  
 Turn right on NC Highway 24 West  
 Travel on NC Highway 24 for ~ 3.5 miles  
 The Site is located on the north side of/adjacent to  
 NC Highway 24 at the Craven-Carteret Electrical  
 Cooperative  
 Utopia Drive crosses between the western  
 and eastern cells of the site

**Jumping Run  
 Site Location**

Drawn by: CLF Date: Sept 2006 Project: 06-002.01		FIGURE <h1>1</h1>
<b>SITE LOCATION</b> <b>JUMPING RUN WETLAND RESTORATION SITE (Project Number 200)</b> <b>Year 5 (2006) Monitoring Report</b> <b>Carteret County, North Carolina</b>		
Aecom Environmental, Inc. 2126 Rowland Pond Drive Willow Spring, NC 27792 (919) 215-6893 (919) 341-8839 fax 		



<b>Table 1. Project Mitigation Structures and Objectives</b>					
<b>Jumping Run Creek (Project Number 200)</b>					
<b>Project Segment or Reach ID</b>	<b>Mitigation Type</b>	<b>Approach</b>	<b>Linear Footage or Acreage</b>	<b>Stationing</b>	<b>Comment</b>
Eastern Cell	R	---	0.96	---	Project included excavation, planting, and weir installation
Western Cell	R	---	2.04	---	

R = Restoration

### 1.3 Project History and Background

Completed project activities, reporting history, and completion dates are summarized in Table 2.

<b>Table 2. Project Activity and Reporting History</b>			
<b>Jumping Run Creek (Project Number 200)</b>			
<b>Activity or Report</b>	<b>Scheduled Completion</b>	<b>Data Collection Completion</b>	<b>Actual Completion or Delivery</b>
Construction Completion Phase I	2000	*	Summer 2000
Construction Completion Phase II	2001	*	April 2001
Maintenance (Erosion, Ditch Plugging, etc.)	*	*	Dec 2001
Year 1 Monitoring (2002)	Dec 2002	Nov 2002	Nov 2002
Year 2 Monitoring (2003)	Dec 2003	Nov 2003	Dec 2003
Year 3 Monitoring (2004)	Dec 2004	Nov 2004	Dec 2004
Year 4 Monitoring (2005)	Dec 2005	Nov 2005	Dec 2005
Year 5 Monitoring (2006)	Dec 2006	June 2006	Sept 2006

\* - Historical project documents necessary to provide this data were unavailable at the time of this report submission.

Contact information regarding project designer, construction, planting contractor, and monitoring personnel are summarized in Table 3 and relevant project background information is summarized in Table 4.

<b>Table 3. Project Contact Table</b>	
<b>Jumping Run Creek (Project Number 200)</b>	
<b>Designer</b>	Soil and Environmental Consultants, PA. 11010 Raven Ridge Road Raleigh, North Carolina 27614
<b>Construction Contractor</b>	East Cell: North Carolina Department of Transportation West Cell: Unknown Private Contractor
<b>Planting Contractor</b>	*
<b>Monitoring Performers</b>	Axiom Environmental, Inc. 2126 Rowland Pond Dr. Willow Spring, NC 27592
<b>Monitoring Point of Contact</b>	Grant Lewis 919-215-1693

\* - Historical project documents necessary to provide this data were unavailable at the time of this report submission.

<b>Table 4. Project Background Table</b>	
<b>Jumping Run Creek (Project Number 200)</b>	
Project County	Carteret County, North Carolina
Drainage Area	1.25 square mile
Drainage impervious cover estimate (%)	<5
Stream Order	first
Physiographic Region	Middle Atlantic Coastal Plain
Ecoregion	Carolina Flatwoods
Rosgen Classification of As-built	Not Applicable
Cowardin Classification	PF02
Dominant Soil Types	Mapped as Kureb, Leon, and Murville
Reference Site ID	*
USGS HUC for Project and Reference	Project – 03020106 Reference – Unknown
NCDWQ Sub-basin for Project and Reference	Project – 03-05-03 Reference – Unknown
Any portion of any project segment 303d listed?	No, project drains to Spooner Creek - SA, HQW (Stream Index #20-36-(10))
Any portion of any project segment upstream of a 303d listed segment?	Yes, Bouge Sound – Stream Index # 20-36-(8.5)g
Reasons for 303d listing or stressor	Shellfish Harvest Closure: Fecal Coliform
% of project easement fenced	0

\* - Historical project documents necessary to provide this data were unavailable at the time of this report submission.

#### 1.4 Monitoring Plan View

Monitoring activities for the Site, including relevant structures and utilities, project features, specific project structures, and monitoring features are detailed in Figure 2.



**Legend**

- Infinite Groundwater Gauge
- RDS Ecotone WM Groundwater Gauges
- Vegetation Plot Corners
- Wetland GPS Points
- Ditch
- Vegetation Plots
- Wetland Restoration = 3.00 acres



**Craven-Cartert Electrical Cooperative Buildings**

Western Cell  
~ 2.04 acres  
wetland restoration

CCEC1

RDS Ecotone WM  
SN A2898FE

Note: Calibration point is set  
6 inches above the soil surface.

2

CCEC2

Infinite Gauge  
SN N3E4C160

1

Eastern Cell  
~ 0.96 acre  
wetland restoration

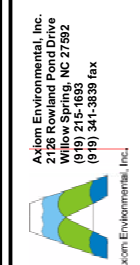
CCEC3

RDS Ecotone WM  
SN AB3702D

3

4

HIGHWAY 24



**MONITORING PLAN**  
**JUMPING RUN WETLAND RESTORATION SITE (Project Number 200)**  
**Year 5 (2006) Monitoring Report**  
**Carteret County, North Carolina**

Drawn by:	CLF
Date:	Sept 2006
Project:	06-002.01

FIGURE  
**2**



## 2.0 PROJECT CONDITION AND MONITORING RESULTS

### 2.1 Vegetation Assessment

As described in the *Draft Vegetation Monitoring Plan for NCWRP Riparian Buffer and Wetland Restoration Projects* document (undated), the monitoring set up for the Site was a series of nested plots. Two-10 meter by 10 meter plots were set up in each of the wetland cells. The plots were permanently marked with pipe so measurements can be replicated in subsequent years. Smaller nested plots were set up to record shrub and herbaceous cover.

#### 2.1.1 Soil Data

General soil conditions found onsite, including level of erosion and percentage of organic matter, are summarized in Table 5.

Series	Max Depth (inches)	% Clay on Surface	K	T	OM %
Kureb sand, 0 to 6 percent slopes (KuB)	+ 80	0-3	0.10	5	< 0.5
Leon Sand (Ln)	+ 80	1-6	0.10	5	0.5-4
Murville mucky sand (Mu)	+ 80	2-8	0.10	5	9-20

Excavation associated with Site implementation resulted in the exposure of subsurface soil horizons. As the mapped soil series are typically characterized by deep sands, the maximum depth of the soil horizon is not likely to be altered. However, a reduction in percent clay and organic matter in the soil surface layers is likely to have occurred. In addition, erosion factors are calculated based on percentage of silt, sand, and organic matter and are likely to have been affected by Site development and implementation as well. Values of erosion factors K and T have likely been elevated above the amount published in the *Soil Survey of Carteret County, North Carolina* (USDA 1987).

#### 2.1.2 Vegetative Problem Areas

A plan view illustrating vegetative problem areas was not included in this report due to an absence of observed vegetative problems. Within plot 2 of the east cell, climbing hempweed (*Mikania scandens*) was becoming a problem during surveys completed in June 2006; however, this native species is not invasive as indicated in previous monitoring reports. Climbing hempweed is a vigorous growing species that may compete with planted species. Climbing hempweed does not appear to be resulting in significant mortality of planted or naturally recruited plant species.

The Site is characterized by planted seedlings exhibiting various degrees of vigor. Overall, vigor was noted as good, although a few seedlings appeared to be lacking vigor possibly as the result of poor nutrient levels within the soil. In addition, several seedlings in the eastern cell appear stressed due to competition with climbing hempweed. Climbing hempweed currently appears to be affecting bald cypress (*Taxodium distichum*) more than other species; however, significant mortality of these species is not occurring.

#### 2.1.3 Stem Counts

Four vegetation plots had been previously established by North Carolina State University as depicted in Figure 2. The plots are 10 meters by 10 meters and are located in two distinct wetland areas identified as the 1) west cell and 2) east cell. Plots were surveyed June 21, 2006 for the 2006 (year 5) monitoring

season; results are included in Table 6. No reference area was studied; therefore, no comparisons are made to reference conditions.

During preparation of the 2006 (year 5) monitoring report, no as-built mitigation plan or data for 2002 (year 1) totals were available; therefore, planted species have been based upon previous annual monitoring reports, no survivability estimates could be made between initial planting and the current monitoring year, and no totals are given for 2002 (year 1).

**Table 6. Stem Counts for Planted Species Arranged by Plot**

**Jumping Run Creek (Project Number 200)**

Species	Plots** (0.0247 acre each)				Initial Totals	Year 1 (2002) Totals	Year 2 (2003) Totals	Year 3 (2004) Totals	Year 4 (2005) Totals	Year 5 (2006) Totals	% Survival
	1	2	3	4							
<i>Nyssa aquatica</i>	6	--	9	7	*	*	30	25	22	22	*
<i>Nyssa biflora</i>	1	4	1	4	*	*	2	1	1	10	*
<i>Taxodium distichum</i>	7	9	7	14	*	*	30	37	35	37	*
<i>Pinus serotina</i>	--	--	--	--	*	*	5	4	6	--	*
<i>Pinus taeda</i>	27	8	--	4	*	*	--	35	33	39	*
<i>Cephalanthus occidentalis</i>	--	--	--	--	*	*	2	--	--	--	*
<i>Chamaecyparis thyoides</i>	1	--	--	--	*	*	--	--	--	1	*
<i>Quercus phellos</i>	1	--	--	--	*	*	--	--	--	1	*
<i>Fraxinus pennsylvanica</i>	1	--	--	--	*	*	--	1	1	1	*
<b>Total Stems Per Plot</b>	<b>44</b>	<b>21</b>	<b>17</b>	<b>29</b>	*	*	<b>69</b>	<b>103</b>	<b>98</b>	<b>111</b>	*
<b>Stems Per Acre</b>	<b>1780</b>	<b>850</b>	<b>688</b>	<b>1174</b>	*	*	<b>698</b>	<b>1043</b>	<b>992</b>	<b>1123</b>	*

\* - Historical project documents necessary to provide this data were unavailable at the time of this report submission.

\*\* - Plot 1 - West Cell (South), Plot 2 - West Cell (North), Plot 3 - East Cell (South), Plot 4 - East Cell (North)

Based on the number of stems counted, all plots monitored at this Site have greater than 260 stems per acre and are considered successful. The average plot density has been measured at 1123 stems per acre, or 28 stems per plot for 2006 (year 5) monitoring. The most dominant species identified at the Site were bald cypress (*Taxodium distichum*), loblolly pine (*Pinus taeda*), water tupelo (*Nyssa aquatica*), and swamp black gum (*Nyssa biflora*).

It should be noted that the estimated stems per acre have increased from previously monitoring years and two new species were recorded this year: 1) Atlantic white cedar (*Chamaecyparis thyoides*) and 2) willow oak (*Quercus phellos*). This is likely due to an earlier sampling time and subsequent lower densities of vigorous herbaceous/vine coverage (climbing hempweed) associated with previous years late season sampling.

Shrub diversity is not particularly high within plots; however, various species would be expected to colonize the Site over time. Species documented within the shrub layer include the following:

- button bush (*Cephalanthus occidentalis*)
- bitter gallberry (*Ilex glabra*)
- wax myrtle (*Myrica cerifera*)
- swamp rose (*Rosa palustris*)
- swamp willow (*Salix caroliniana*)

The herbaceous vegetation is dense in all plots. An inventory of the dominant herbaceous species on the Site was also taken. It should be noted that species composition is significantly seasonally dependant; surveys for 2006 (year 5) were completed in June. Dominant herbaceous species over the Site as a whole are listed below:

Asiatic pennywort (*Centella asiatica*)  
square-stemmed spikerush (*Eleocharis quadrangulata*)  
spring lady's tresses (*Spiranthes vernalis*)  
rush species (*Juncus* spp.)  
hairy umbrella sedge (*Fuirena squarrosa*)  
mock Bishop's-weed (*Ptilimnium capillaceum*)  
bladderwort (*Utricularia* sp.)  
camphorweed (*Pluchea* sp.)  
climbing hempweed (*Mikania scandens*)  
cone-cup spikerush (*Eleocharis tuberculosa*)  
cattail (*Typha* sp.)  
lippia (*Lippia* sp.)  
hydrocotyle (*Hydrocotyle* sp.)  
goldenrod species (*Solidago* spp.)  
buttonweed (*Diodia* sp.)

#### **2.1.4 Vegetation Plot Photos**

Photographs were taken at all permanent photo points and are included in Appendix A. The photographs show that vegetation is generally growing well and consists of a good combination of woody and herbaceous species.

#### **2.2 Wetland Assessment**

Three groundwater monitoring gauges have been maintained and monitored throughout the year-5 (2006) growing season. The groundwater gauges record daily readings of groundwater depth. Daily rainfall data recorded from a rain gauge maintained by the State Climate Office of North Carolina (SCONC) at the Craven County Airport in New Bern, North Carolina was used for estimation of seasonal comparison (SCONC 2006, SCONC 2007). Graphs of groundwater hydrology and precipitation are included in Appendix B.

Success criteria for wetland hydrology require that the area be inundated or saturated within 12 inches of the ground surface for a consecutive period of 12.5 percent of the growing season. The growing season in Carteret County begins February 27 and ends November 29 (275 days). Areas inundated less than 5 percent of the growing season (13 days) are classified as nonwetlands. Areas inundated between 5 percent and 12.5 percent of the growing season can be classified as wetlands depending upon factors such as the presence of hydrophytic vegetation and hydric soils. In order to attain hydrologic success, saturation within 12 inches of the ground surface is required for at least 13 consecutive days (5 percent of the growing season) or 34 consecutive days (12.5 percent of the growing season). Groundwater hydrology within 12 inches of the soil surface is occurring for 100 percent of the year-5 (2006) growing season.

During preparation of the 2006 (year 5) monitoring report, no graphs for year 1 (2002) or year 2 (2003) groundwater gauge data were available, or raw groundwater gauge data for years 1 through 4 (2002 to 2005). Groundwater gauge graphs for year 3 (2004) and year 4 (2005) are included in Appendices E and F, respectively. The following table summarizes success criteria achievement for groundwater gauges over the 5-year monitoring period. Groundwater gauge hydrology has remained within 12 inches of the

soil surface for years 3 through 5 with the exception of a few short extents during June and July 2004 (year 3). From year 3 to year 5 groundwater hydrology levels appear to be rising with longer extents of inundation during the growing season.

Gauge**	Success Criteria Achieved				
	Year 1 (2002)	Year 2 (2003)	Year 3 (2004)	Year 4 (2005)	Year 5 (2006)
CCEC1	*	*	Yes	Yes	Yes
CCEC2	*	*	Yes	Yes	Yes
CCEC3	*	*	Yes	malfunctioned	Yes

\* - Historical project documents necessary to provide this data were unavailable at the time of this report submission.

\*\* - CCEC1 - West Cell (North), CCEC2 – West Cell (south), CCEC3 – East Cell (North and South)

### 2.2.1 Wetland Problem Area Plan View

No wetland problem areas have been identified during the year-5 (2006) monitoring year. As depicted in Appendix B, all gauges are currently functioning and recording groundwater hydrology within 12 inches of the ground surface for greater than 12.5 percent of the growing season. Saturation of the soil surface is occurring for 100 percent of the growing season. Planted seedlings do not appear to be adversely affected by water levels and/or current duration of saturation.

### 2.2.2 Wetland Criteria Attainment

During the year-5 (2006) monitoring period, all four vegetation plots met success criteria with greater than 260 stems per acre and all three of the monitored gauges met the success criteria of inundation/saturation within 12 inches of the surface for at least 12.5 percent of the growing season (Table 8). Hydrographs containing precipitation data and raw data for each gauge can be found in Appendices B and C, respectively. Photographs and CVS Levels 1 & 2 Data Forms for vegetation plots can be found in Appendices A and D, respectively.

Tract	Well ID	Hydrology Threshold Met?	Tract Mean	Vegetation Plot ID	Vegetation Survival Threshold Met?	Tract Mean
West Cell, Northern	CCEC 1	Yes	100%	Plot 1	Yes	100%
West Cell, Southern	CCEC 2	Yes		Plot 2	Yes	
East Cell, Southern	CCEC 3	Yes		Plot 3	Yes	
East Cell, Northern				Plot 4	Yes	



### 3.0 FIVE-YEAR MONITORING ASSESSMENT

In summary, the restoration site achieved success criteria for hydrology and vegetation in the Fifth Monitoring Year (2006). In addition, based on available data the site achieved success criteria for hydrology and vegetation over the entire 5-year monitoring period.

Results from vegetation surveys exceeded success criteria with 698, 1043, 992, and 1123 stems per acre present in years 2 through 5, respectively with an increase in species diversity over the 5-year monitoring period. No data was available for year 1 monitoring.

There are currently no vegetative problem areas within the Site. Climbing hempweed is a vigorous growing species present within the Site that may compete with planted species; however, this native species is not invasive as indicated in previous monitoring reports. Climbing hempweed does not appear to be resulting in significant mortality of planted or naturally recruited plant species within the Site.

Hydrology success criteria were met during the three years of available data for the Site (years 3 through 5) with inundated or saturated within 12 inches of the ground surface for a consecutive period of 12.5 percent of the growing season. In addition, wetland criteria set forth in the *Corps of Engineers Wetland Delineation Manual* were met with the presence of the three criteria, 1) hydric soils, 2) hydrophytic vegetation, and 3) wetland hydrology. Delineations of the jurisdictional wetlands within the Site were conducted in February 2006 and are depicted on Figure 2. The entire Site has been hydrologically successful.

#### 4.0. REFERENCES

North Carolina Wetlands Restoration Program (NCWRP). Undated. Draft Internal Guidance for Vegetation Monitoring Plans for NCWRP Riparian Buffer and Wetland Restoration Projects. North Carolina Department of Environment and Natural Resources, Raleigh, North Carolina.

State Climate Office of North Carolina (SCONC). 2006. North Carolina Climate Retrieval and Observations Network of the Southeast Database. (online). Available: <http://www.nc-climate.ncsu.edu/cronos/> [August 29, 2006]. State Climate Office of North Carolina, Raleigh, North Carolina.

State Climate Office of North Carolina (SCONC). 2007. North Carolina Climate Retrieval and Observations Network of the Southeast Database. (online). Available: <http://www.nc-climate.ncsu.edu/cronos/> [January 24, 2007]. State Climate Office of North Carolina, Raleigh, North Carolina.

Soil and Environmental Consultants (S&EC). 2003. Monitoring Report for Carteret-Craven Electrical Cooperative Wetlands. Soil and Environmental Consultants, Raleigh North Carolina.

United States. Department of Agriculture (USDA). 1987. Soil Survey of Carteret County, North Carolina. United States Department of Agriculture.

APPENDIX A  
VEGETATION PLOT PHOTOGRAPHS

**Appendix A**  
**Vegetation Plot Photographs**



Plot 1  
Western Cell, North Plot



Plot 2  
Western Cell, South Plot



Plot 3  
Eastern Cell, South Plot

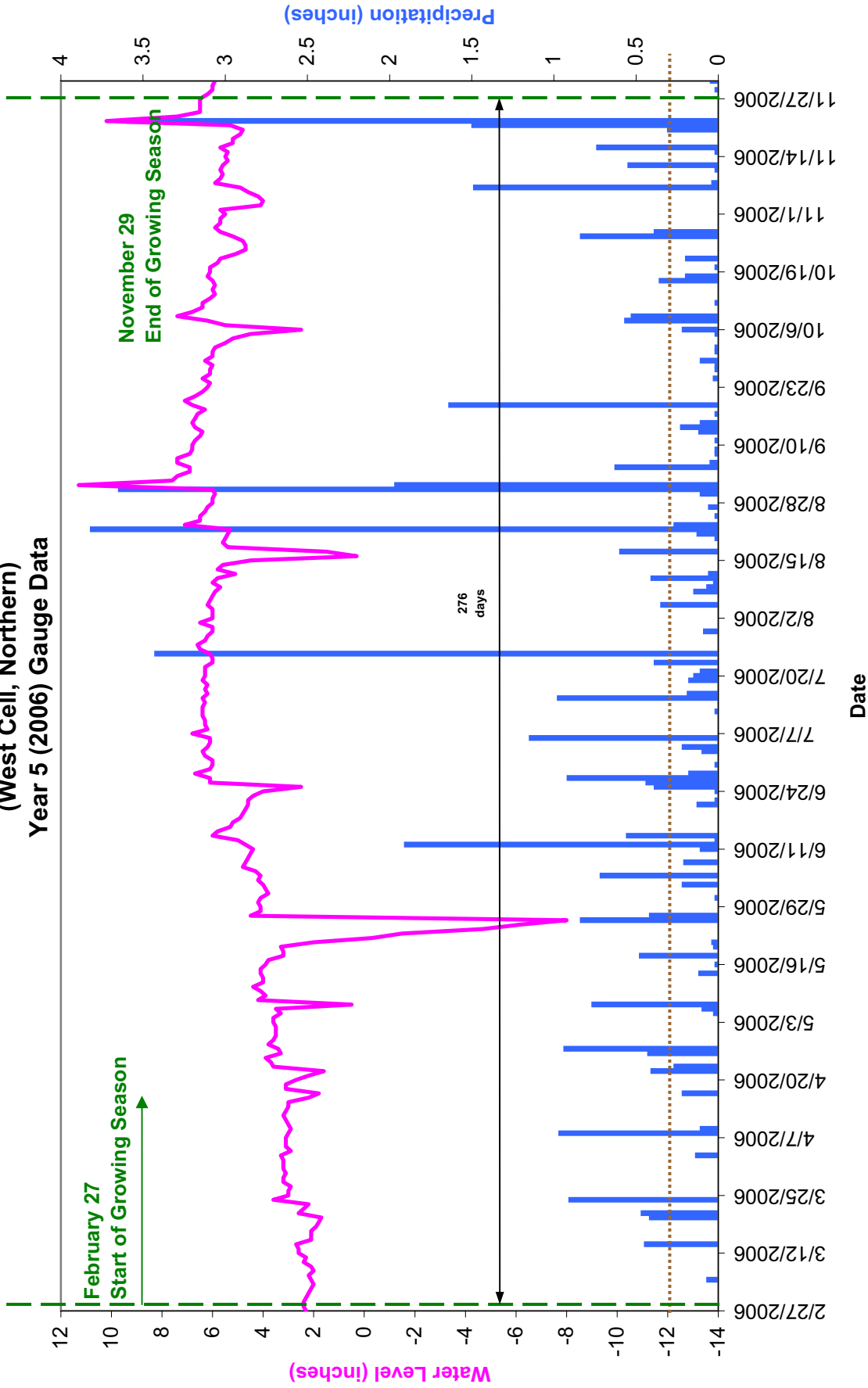


Plot 4  
Eastern Cell, North Plot

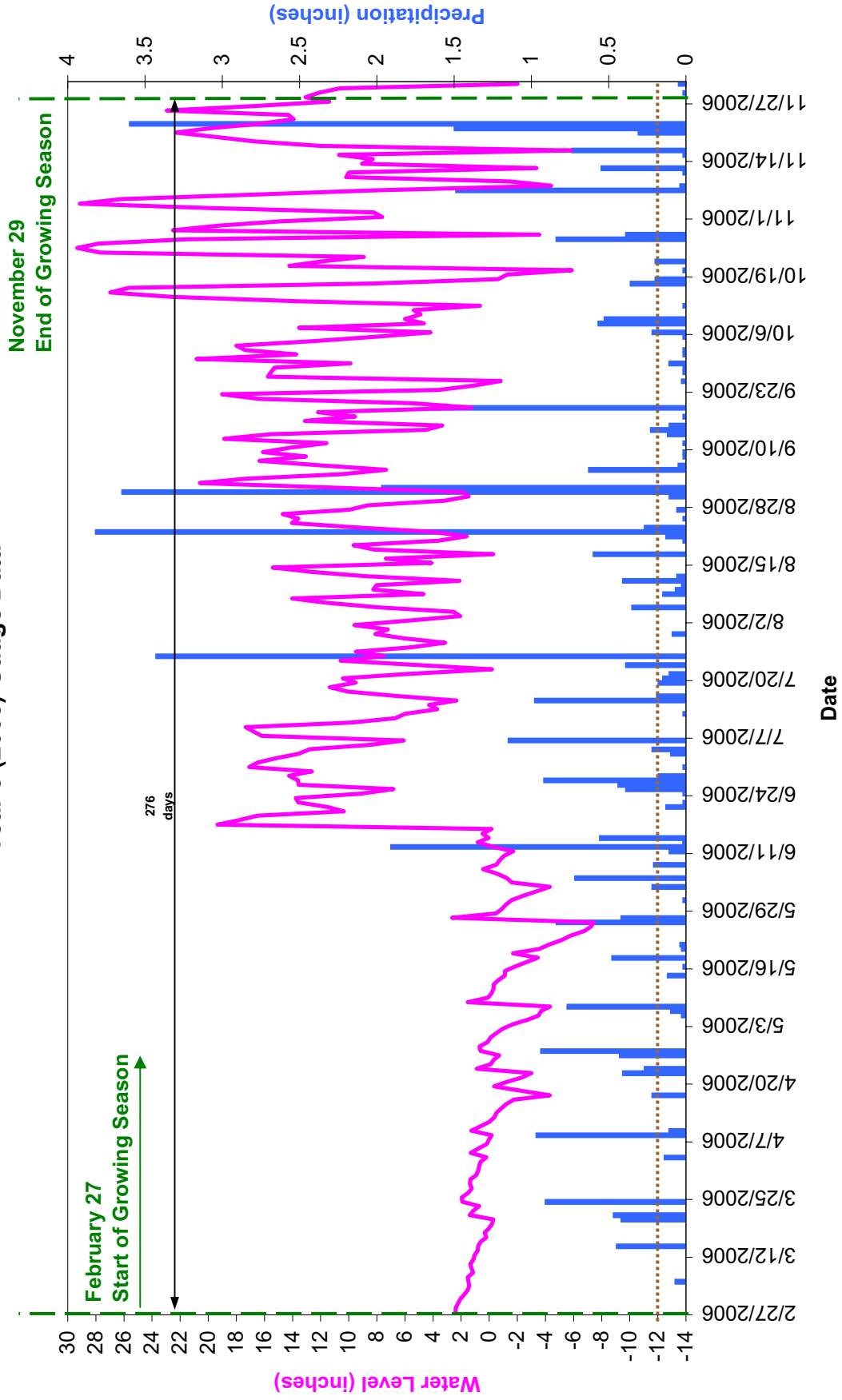


APPENDIX B  
GROUNDWATER GAUGE GRAPHS

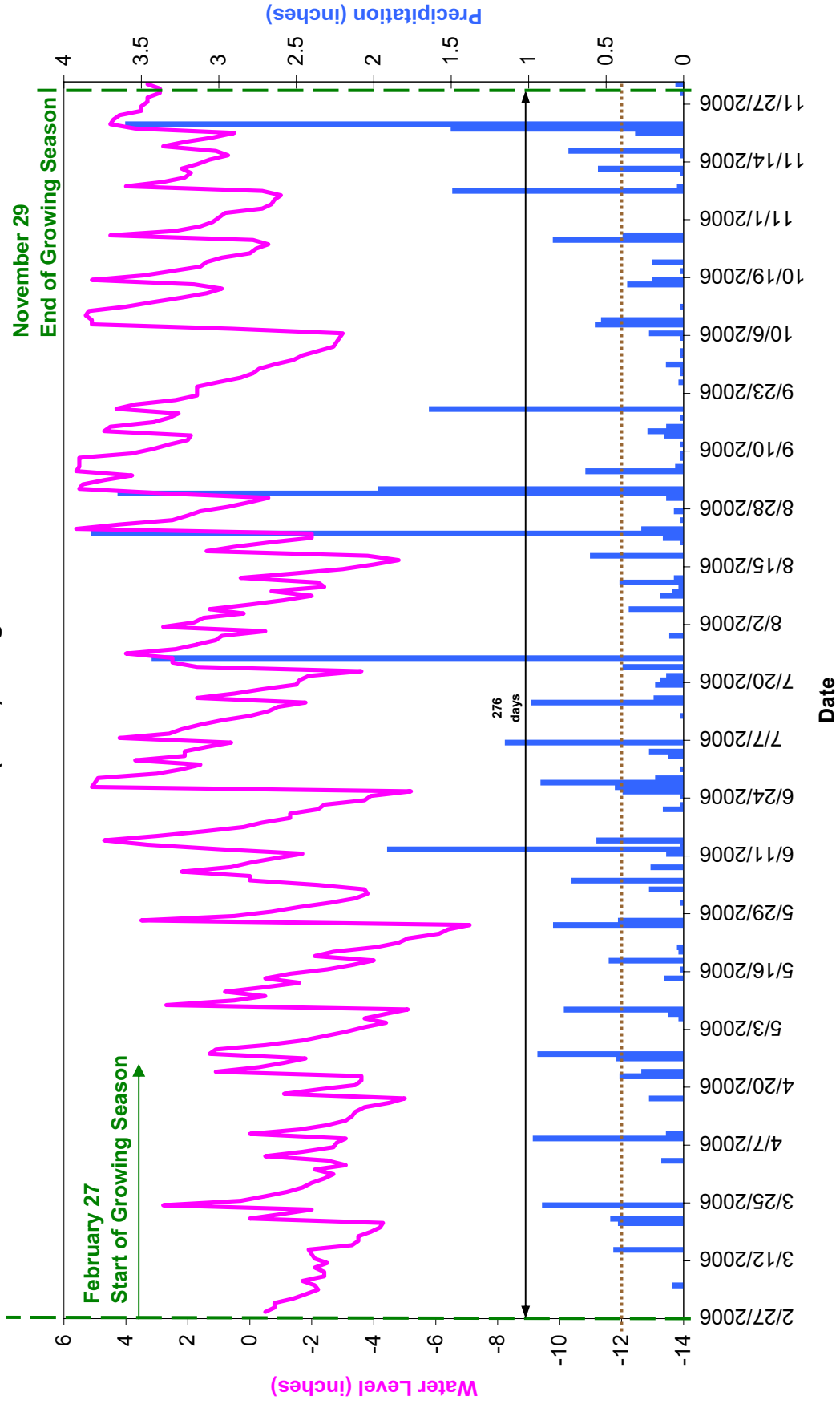
# CCEC1 (West Cell, Northern) Year 5 (2006) Gauge Data



**CCCE2  
(West Cell, Southern)  
Year 5 (2006) Gauge Data**



# CCEC3 (East Cell) Year 5 (2006) Gauge Data





APPENDIX C  
GROUNDWATER GAUGE RAW DATA

Gauge: CCEC1

Data Acquired: December 4, 2006

Serial Number: 0000A2898FE

CD: Consecutive Days Saturation (within 12 inches of the soil surface) During the Growing Season

JD: Julian Days During the Growing Season

					(continued)						(continued)					
Date	Time	Water Level (inches)	CD	JD	Date	Time	Water Level (inches)	CD	JD	Date	Time	Water Level (inches)	CD	JD		
gauge malfunctioned prior to this day					9-May-06	12:00:00	3.9	72	72	20-Jul-06	12:00:00	6.3	144	144		
27-Feb-06	12:00:00	2.3	1	1	10-May-06	12:00:00	4.1	73	73	21-Jul-06	12:00:00	6.3	145	145		
28-Feb-06	12:00:00	2.4	2	2	11-May-06	12:00:00	4.4	74	74	22-Jul-06	12:00:00	6.3	146	146		
1-Mar-06	12:00:00	2.4	3	3	12-May-06	12:00:00	4	75	75	23-Jul-06	12:00:00	6	147	147		
2-Mar-06	12:00:00	2.3	4	4	13-May-06	12:00:00	4	76	76	24-Jul-06	12:00:00	6	148	148		
3-Mar-06	12:00:00	2.2	5	5	14-May-06	12:00:00	4.1	77	77	25-Jul-06	12:00:00	6.1	149	149		
4-Mar-06	12:00:00	2.1	6	6	15-May-06	12:00:00	4.1	78	78	26-Jul-06	12:00:00	6.5	150	150		
5-Mar-06	12:00:00	2	7	7	16-May-06	12:00:00	3.9	79	79	27-Jul-06	12:00:00	6.6	151	151		
6-Mar-06	12:00:00	2.1	8	8	17-May-06	12:00:00	3.8	80	80	28-Jul-06	12:00:00	6.3	152	152		
7-Mar-06	12:00:00	2.2	9	9	18-May-06	12:00:00	3.2	81	81	29-Jul-06	12:00:00	6.2	153	153		
8-Mar-06	12:00:00	2	10	10	19-May-06	12:00:00	3.2	82	82	30-Jul-06	12:00:00	6	154	154		
9-Mar-06	12:00:00	2.1	11	11	20-May-06	12:00:00	3.3	83	83	31-Jul-06	12:00:00	6	155	155		
10-Mar-06	12:00:00	2.4	12	12	21-May-06	12:00:00	2	84	84	1-Aug-06	12:00:00	6.5	156	156		
11-Mar-06	12:00:00	2.3	13	13	22-May-06	12:00:00	-0.3	85	85	2-Aug-06	12:00:00	6	157	157		
12-Mar-06	12:00:00	2.6	14	14	23-May-06	12:00:00	-1.5	86	86	3-Aug-06	12:00:00	6	158	158		
13-Mar-06	12:00:00	2.6	15	15	24-May-06	12:00:00	-4.7	87	87	4-Aug-06	12:00:00	6	159	159		
14-Mar-06	12:00:00	2.7	16	16	25-May-06	12:00:00	-6.2	88	88	5-Aug-06	12:00:00	6.2	160	160		
15-Mar-06	12:00:00	2.1	17	17	26-May-06	12:00:00	-8	89	89	6-Aug-06	12:00:00	6.1	161	161		
16-Mar-06	12:00:00	2.1	18	18	27-May-06	12:00:00	4.5	90	90	7-Aug-06	12:00:00	6	162	162		
17-Mar-06	12:00:00	2.1	19	19	28-May-06	12:00:00	4.1	91	91	8-Aug-06	12:00:00	5.9	163	163		
18-Mar-06	12:00:00	1.9	20	20	29-May-06	12:00:00	4.1	92	92	9-Aug-06	12:00:00	5.7	164	164		
19-Mar-06	12:00:00	1.8	21	21	30-May-06	12:00:00	4.2	93	93	10-Aug-06	12:00:00	6	165	165		
20-Mar-06	12:00:00	1.7	22	22	31-May-06	12:00:00	4.1	94	94	11-Aug-06	12:00:00	5.8	166	166		
21-Mar-06	12:00:00	2.6	23	23	1-Jun-06	12:00:00	3.8	95	95	12-Aug-06	12:00:00	5.1	167	167		
22-Mar-06	12:00:00	2.4	24	24	2-Jun-06	12:00:00	3.9	96	96	13-Aug-06	12:00:00	5.8	168	168		
23-Mar-06	12:00:00	2.2	25	25	3-Jun-06	12:00:00	4	97	97	14-Aug-06	12:00:00	5.6	169	169		
24-Mar-06	12:00:00	3.6	26	26	4-Jun-06	12:00:00	4.2	98	98	15-Aug-06	12:00:00	4.5	170	170		
25-Mar-06	12:00:00	3	27	27	5-Jun-06	12:00:00	4.1	99	99	16-Aug-06	12:00:00	0.3	171	171		
26-Mar-06	12:00:00	3	28	28	6-Jun-06	12:00:00	4.3	100	100	17-Aug-06	12:00:00	1.5	172	172		
27-Mar-06	12:00:00	2.9	29	29	7-Jun-06	12:00:00	4.8	101	101	18-Aug-06	12:00:00	5.4	173	173		
28-Mar-06	12:00:00	3.2	30	30	8-Jun-06	12:00:00	4.7	102	102	19-Aug-06	12:00:00	5.6	174	174		
29-Mar-06	12:00:00	3.2	31	31	9-Jun-06	12:00:00	4.6	103	103	20-Aug-06	12:00:00	5.5	175	175		
30-Mar-06	12:00:00	3.1	32	32	10-Jun-06	12:00:00	4.5	104	104	21-Aug-06	12:00:00	5.4	176	176		
31-Mar-06	12:00:00	3.2	33	33	11-Jun-06	12:00:00	4.4	105	105	22-Aug-06	12:00:00	5.3	177	177		
1-Apr-06	12:00:00	3.2	34	34	12-Jun-06	12:00:00	4.7	106	106	23-Aug-06	12:00:00	7.1	178	178		
2-Apr-06	12:00:00	3.2	35	35	13-Jun-06	12:00:00	5	107	107	24-Aug-06	12:00:00	6.5	179	179		
3-Apr-06	12:00:00	3.3	36	36	14-Jun-06	12:00:00	6	108	108	25-Aug-06	12:00:00	6.5	180	180		
4-Apr-06	12:00:00	2.9	37	37	15-Jun-06	12:00:00	5.8	109	109	26-Aug-06	12:00:00	6.3	181	181		
5-Apr-06	12:00:00	3.1	38	38	16-Jun-06	12:00:00	5.3	110	110	27-Aug-06	12:00:00	6.2	182	182		
6-Apr-06	12:00:00	3.1	39	39	17-Jun-06	12:00:00	5.2	111	111	28-Aug-06	12:00:00	6	183	183		
7-Apr-06	12:00:00	3.1	40	40	18-Jun-06	12:00:00	4.9	112	112	29-Aug-06	12:00:00	6	184	184		
8-Apr-06	12:00:00	3	41	41	19-Jun-06	12:00:00	4.8	113	113	30-Aug-06	12:00:00	5.9	185	185		
9-Apr-06	12:00:00	2.9	42	42	20-Jun-06	12:00:00	4.7	114	114	31-Aug-06	12:00:00	6	186	186		
10-Apr-06	12:00:00	3	43	43	21-Jun-06	12:00:00	4.6	115	115	1-Sep-06	12:00:00	11.3	187	187		
11-Apr-06	12:00:00	3.1	44	44	22-Jun-06	12:00:00	4.6	116	116	2-Sep-06	12:00:00	7.6	188	188		
12-Apr-06	12:00:00	3.2	45	45	23-Jun-06	12:00:00	4.4	117	117	3-Sep-06	12:00:00	7.4	189	189		
13-Apr-06	12:00:00	3.1	46	46	24-Jun-06	12:00:00	4	118	118	4-Sep-06	12:00:00	6.9	190	190		
14-Apr-06	12:00:00	3	47	47	25-Jun-06	12:00:00	2.5	119	119	5-Sep-06	12:00:00	6.9	191	191		
15-Apr-06	12:00:00	3	48	48	26-Jun-06	12:00:00	6.1	120	120	6-Sep-06	12:00:00	7.4	192	192		
16-Apr-06	12:00:00	2.2	49	49	27-Jun-06	12:00:00	6.1	121	121	7-Sep-06	12:00:00	7.4	193	193		
17-Apr-06	12:00:00	1.8	50	50	28-Jun-06	12:00:00	6.7	122	122	8-Sep-06	12:00:00	6.9	194	194		
18-Apr-06	12:00:00	3.1	51	51	29-Jun-06	12:00:00	6.1	123	123	9-Sep-06	12:00:00	6.8	195	195		
19-Apr-06	12:00:00	3.1	52	52	30-Jun-06	12:00:00	6	124	124	10-Sep-06	12:00:00	6.8	196	196		
20-Apr-06	12:00:00	2.7	53	53	1-Jul-06	12:00:00	6	125	125	11-Sep-06	12:00:00	6.7	197	197		
21-Apr-06	12:00:00	2.2	54	54	2-Jul-06	12:00:00	6.3	126	126	12-Sep-06	12:00:00	6.5	198	198		
22-Apr-06	12:00:00	1.6	55	55	3-Jul-06	12:00:00	6.4	127	127	13-Sep-06	12:00:00	6.4	199	199		
23-Apr-06	12:00:00	3.6	56	56	4-Jul-06	12:00:00	6.2	128	128	14-Sep-06	12:00:00	6.7	200	200		
24-Apr-06	12:00:00	3.7	57	57	5-Jul-06	12:00:00	6.1	129	129	15-Sep-06	12:00:00	6.8	201	201		
25-Apr-06	12:00:00	3.9	58	58	6-Jul-06	12:00:00	6.1	130	130	16-Sep-06	12:00:00	6.7	202	202		
26-Apr-06	12:00:00	3.3	59	59	7-Jul-06	12:00:00	6.8	131	131	17-Sep-06	12:00:00	6.6	203	203		
27-Apr-06	12:00:00	3.4	60	60	8-Jul-06	12:00:00	6.2	132	132	18-Sep-06	12:00:00	6.3	204	204		
28-Apr-06	12:00:00	3.8	61	61	9-Jul-06	12:00:00	6.3	133	133	19-Sep-06	12:00:00	6.8	205	205		
29-Apr-06	12:00:00	3.6	62	62	10-Jul-06	12:00:00	6.3	134	134	20-Sep-06	12:00:00	7.1	206	206		
30-Apr-06	12:00:00	3.5	63	63	11-Jul-06	12:00:00	6.4	135	135	21-Sep-06	12:00:00	6.7	207	207		
1-May-06	12:00:00	3.5	64	64	12-Jul-06	12:00:00	6.4	136	136	22-Sep-06	12:00:00	6.4	208	208		
2-May-06	12:00:00	3.5	65	65	13-Jul-06	12:00:00	6.4	137	137	23-Sep-06	12:00:00	6.2	209	209		
3-May-06	12:00:00	3.6	66	66	14-Jul-06	12:00:00	6.3	138	138	24-Sep-06	12:00:00	6.1	210	210		
4-May-06	12:00:00	3.6	67	67	15-Jul-06	12:00:00	6.4	139	139	25-Sep-06	12:00:00	6.4	211	211		
5-May-06	12:00:00	3.3	68	68	16-Jul-06	12:00:00	6.2	140	140	26-Sep-06	12:00:00	6.1	212	212		
6-May-06	12:00:00	3.5	69	69	17-Jul-06	12:00:00	6.3	141	141	27-Sep-06	12:00:00	6.1	213	213		
7-May-06	12:00:00	0.5	70	70	18-Jul-06	12:00:00	6.2	142	142	28-Sep-06	12:00:00	6	214	214		
8-May-06	12:00:00	4.2	71	71	19-Jul-06	12:00:00	6.4	143	143	29-Sep-06	12:00:00	6.3	215	215		







Gauge: CCEC3

Data Acquired: December 4, 2006

Serial Number: 0000AB3702D

CD: Consecutive Days Saturation (within 12 inches of the soil surface) During the Growing Season

JD: Julian Days During the Growing Season

					(continued)						(continued)					
Date	Time	Water Level (inches)	CD	JD	Date	Time	Water Level (inches)	CD	JD	Date	Time	Water Level (inches)	CD	JD		
27-Feb-06	4:50:00	Out of Range	1	1	10-May-06	12:00:00	-0.5	73	73	21-Jul-06	12:00:00	-1.9	145	145		
28-Feb-06	12:00:00	-0.5	2	2	11-May-06	12:00:00	0.8	74	74	22-Jul-06	12:00:00	-3.6	146	146		
1-Mar-06	12:00:00	-0.8	3	3	12-May-06	12:00:00	-0.5	75	75	23-Jul-06	12:00:00	1.7	147	147		
2-Mar-06	12:00:00	-0.8	4	4	13-May-06	12:00:00	-1.6	76	76	24-Jul-06	12:00:00	2.5	148	148		
3-Mar-06	12:00:00	-1.4	5	5	14-May-06	12:00:00	-0.5	77	77	25-Jul-06	12:00:00	2.5	149	149		
4-Mar-06	12:00:00	-1.8	6	6	15-May-06	12:00:00	-1.3	78	78	26-Jul-06	12:00:00	4	150	150		
5-Mar-06	12:00:00	-2.2	7	7	16-May-06	12:00:00	-2.5	79	79	27-Jul-06	12:00:00	2.4	151	151		
6-Mar-06	12:00:00	-2.1	8	8	17-May-06	12:00:00	-3.3	80	80	28-Jul-06	12:00:00	1.7	152	152		
7-Mar-06	12:00:00	-1.7	9	9	18-May-06	12:00:00	-4	81	81	29-Jul-06	12:00:00	1.1	153	153		
8-Mar-06	12:00:00	-2.4	10	10	19-May-06	12:00:00	-2.1	82	82	30-Jul-06	12:00:00	0.9	154	154		
9-Mar-06	12:00:00	-2.4	11	11	20-May-06	12:00:00	-2.7	83	83	31-Jul-06	12:00:00	-0.5	155	155		
10-Mar-06	12:00:00	-2.1	12	12	21-May-06	12:00:00	-4.1	84	84	1-Aug-06	12:00:00	2.8	156	156		
11-Mar-06	12:00:00	-2.5	13	13	22-May-06	12:00:00	-4.8	85	85	2-Aug-06	12:00:00	1.8	157	157		
12-Mar-06	12:00:00	-2.1	14	14	23-May-06	12:00:00	-5.1	86	86	3-Aug-06	12:00:00	1.5	158	158		
13-Mar-06	12:00:00	-2	15	15	24-May-06	12:00:00	-6.1	87	87	4-Aug-06	12:00:00	0.2	159	159		
14-Mar-06	12:00:00	-1.9	16	16	25-May-06	12:00:00	-6.4	88	88	5-Aug-06	12:00:00	1.3	160	160		
15-Mar-06	12:00:00	-3.3	17	17	26-May-06	12:00:00	-7.1	89	89	6-Aug-06	12:00:00	0	161	161		
16-Mar-06	12:00:00	-3.5	18	18	27-May-06	12:00:00	3.5	90	90	7-Aug-06	12:00:00	-1.1	162	162		
17-Mar-06	12:00:00	-3.5	19	19	28-May-06	12:00:00	0.5	91	91	8-Aug-06	12:00:00	-2	163	163		
18-Mar-06	12:00:00	-3.9	20	20	29-May-06	12:00:00	-0.7	92	92	9-Aug-06	12:00:00	-0.7	164	164		
19-Mar-06	12:00:00	-4.2	21	21	30-May-06	12:00:00	-1.6	93	93	10-Aug-06	12:00:00	-2.4	165	165		
20-Mar-06	12:00:00	-4.3	22	22	31-May-06	12:00:00	-2.6	94	94	11-Aug-06	12:00:00	-2.2	166	166		
21-Mar-06	12:00:00	0	23	23	1-Jun-06	12:00:00	-3.4	95	95	12-Aug-06	12:00:00	0.3	167	167		
22-Mar-06	12:00:00	-1	24	24	2-Jun-06	12:00:00	-3.8	96	96	13-Aug-06	12:00:00	-1.4	168	168		
23-Mar-06	12:00:00	-2	25	25	3-Jun-06	12:00:00	-3.7	97	97	14-Aug-06	12:00:00	-3	169	169		
24-Mar-06	12:00:00	2.8	26	26	4-Jun-06	12:00:00	-2.2	98	98	15-Aug-06	12:00:00	-4	170	170		
25-Mar-06	12:00:00	0.3	27	27	5-Jun-06	12:00:00	0	99	99	16-Aug-06	12:00:00	-4.8	171	171		
26-Mar-06	12:00:00	-0.5	28	28	6-Jun-06	12:00:00	0	100	100	17-Aug-06	12:00:00	-3.8	172	172		
27-Mar-06	12:00:00	-1.2	29	29	7-Jun-06	12:00:00	2.2	101	101	18-Aug-06	12:00:00	1.4	173	173		
28-Mar-06	12:00:00	-1.7	30	30	8-Jun-06	12:00:00	0.6	102	102	19-Aug-06	12:00:00	0.5	174	174		
29-Mar-06	12:00:00	-2	31	31	9-Jun-06	12:00:00	0	103	103	20-Aug-06	12:00:00	-0.7	175	175		
30-Mar-06	12:00:00	-2.4	32	32	10-Jun-06	12:00:00	-0.8	104	104	21-Aug-06	12:00:00	-2	176	176		
31-Mar-06	12:00:00	-2.7	33	33	11-Jun-06	12:00:00	-1.7	105	105	22-Aug-06	12:00:00	-2	177	177		
1-Apr-06	12:00:00	-2.1	34	34	12-Jun-06	12:00:00	0.9	106	106	23-Aug-06	12:00:00	5.6	178	178		
2-Apr-06	12:00:00	-3.1	35	35	13-Jun-06	12:00:00	3.3	107	107	24-Aug-06	12:00:00	4.2	179	179		
3-Apr-06	12:00:00	-2.5	36	36	14-Jun-06	12:00:00	4.7	108	108	25-Aug-06	12:00:00	2.5	180	180		
4-Apr-06	12:00:00	-0.5	37	37	15-Jun-06	12:00:00	3	109	109	26-Aug-06	12:00:00	2	181	181		
5-Apr-06	12:00:00	-1.7	38	38	16-Jun-06	12:00:00	1.5	110	110	27-Aug-06	12:00:00	1.6	182	182		
6-Apr-06	12:00:00	-2.7	39	39	17-Jun-06	12:00:00	0.2	111	111	28-Aug-06	12:00:00	0.7	183	183		
7-Apr-06	12:00:00	-2.8	40	40	18-Jun-06	12:00:00	-0.4	112	112	29-Aug-06	12:00:00	0	184	184		
8-Apr-06	12:00:00	-3.1	41	41	19-Jun-06	12:00:00	-1.3	113	113	30-Aug-06	12:00:00	-0.6	185	185		
9-Apr-06	12:00:00	0	42	42	20-Jun-06	12:00:00	-1.3	114	114	31-Aug-06	12:00:00	2.7	186	186		
10-Apr-06	12:00:00	-1.6	43	43	21-Jun-06	12:00:00	-2.2	115	115	1-Sep-06	12:00:00	5.5	187	187		
11-Apr-06	12:00:00	-2.5	44	44	22-Jun-06	12:00:00	-2.4	116	116	2-Sep-06	12:00:00	5.4	188	188		
12-Apr-06	12:00:00	-3.1	45	45	23-Jun-06	12:00:00	-3.7	117	117	3-Sep-06	12:00:00	4.7	189	189		
13-Apr-06	12:00:00	-3.3	46	46	24-Jun-06	12:00:00	-3.9	118	118	4-Sep-06	12:00:00	3.8	190	190		
14-Apr-06	12:00:00	-3.4	47	47	25-Jun-06	12:00:00	-5.2	119	119	5-Sep-06	12:00:00	5.6	191	191		
15-Apr-06	12:00:00	-3.7	48	48	26-Jun-06	12:00:00	5.1	120	120	6-Sep-06	12:00:00	5.5	192	192		
16-Apr-06	12:00:00	-4.5	49	49	27-Jun-06	12:00:00	5	121	121	7-Sep-06	12:00:00	5.5	193	193		
17-Apr-06	12:00:00	-5	50	50	28-Jun-06	12:00:00	4.9	122	122	8-Sep-06	12:00:00	5.5	194	194		
18-Apr-06	12:00:00	-1.1	51	51	29-Jun-06	12:00:00	3	123	123	9-Sep-06	12:00:00	3.8	195	195		
19-Apr-06	12:00:00	-2.2	52	52	30-Jun-06	12:00:00	2.2	124	124	10-Sep-06	12:00:00	3.1	196	196		
20-Apr-06	12:00:00	-3.4	53	53	1-Jul-06	12:00:00	1.6	125	125	11-Sep-06	12:00:00	2.6	197	197		
21-Apr-06	12:00:00	-3.6	54	54	2-Jul-06	12:00:00	3.7	126	126	12-Sep-06	12:00:00	2	198	198		
22-Apr-06	12:00:00	-3.6	55	55	3-Jul-06	12:00:00	2.1	127	127	13-Sep-06	12:00:00	1.9	199	199		
23-Apr-06	12:00:00	1.1	56	56	4-Jul-06	12:00:00	2.1	128	128	14-Sep-06	12:00:00	4.7	200	200		
24-Apr-06	12:00:00	-0.3	57	57	5-Jul-06	12:00:00	1.4	129	129	15-Sep-06	12:00:00	4.5	201	201		
25-Apr-06	12:00:00	-1.1	58	58	6-Jul-06	12:00:00	0.6	130	130	16-Sep-06	12:00:00	3.1	202	202		
26-Apr-06	12:00:00	-1.8	59	59	7-Jul-06	12:00:00	4.2	131	131	17-Sep-06	12:00:00	2.6	203	203		
27-Apr-06	12:00:00	1.3	60	60	8-Jul-06	12:00:00	2.6	132	132	18-Sep-06	12:00:00	2.3	204	204		
28-Apr-06	12:00:00	1.1	61	61	9-Jul-06	12:00:00	2.2	133	133	19-Sep-06	12:00:00	4.3	205	205		
29-Apr-06	12:00:00	-0.5	62	62	10-Jul-06	12:00:00	1.6	134	134	20-Sep-06	12:00:00	3.7	206	206		
30-Apr-06	12:00:00	-1.7	63	63	11-Jul-06	12:00:00	0.9	135	135	21-Sep-06	12:00:00	2.4	207	207		
1-May-06	12:00:00	-2.4	64	64	12-Jul-06	12:00:00	0	136	136	22-Sep-06	12:00:00	1.7	208	208		
2-May-06	12:00:00	-3.1	65	65	13-Jul-06	12:00:00	-0.6	137	137	23-Sep-06	12:00:00	1.7	209	209		
3-May-06	12:00:00	-3.7	66	66	14-Jul-06	12:00:00	-0.9	138	138	24-Sep-06	12:00:00	1.7	210	210		
4-May-06	12:00:00	-4.4	67	67	15-Jul-06	12:00:00	-1.8	139	139	25-Sep-06	12:00:00	1	211	211		
5-May-06	12:00:00	-3.7	68	68	16-Jul-06	12:00:00	1.7	140	140	26-Sep-06	12:00:00	0.3	212	212		
6-May-06	12:00:00	-4.4	69	69	17-Jul-06	12:00:00	0.5	141	141	27-Sep-06	12:00:00	-0.1	213	213		
7-May-06	12:00:00	-5.1	70	70	18-Jul-06	12:00:00	-0.4	142	142	28-Sep-06	12:00:00	-0.3	214	214		
8-May-06	12:00:00	2.7	71	71	19-Jul-06	12:00:00	-1.5	143	143	29-Sep-06	12:00:00	-0.8	215	215		
9-May-06	12:00:00	0.5	72	72	20-Jul-06	12:00:00	-1.6	144	144	30-Sep-06	12:00:00	-1.4	216	216		





APPENDIX D  
CVS LEVELS 1 & 2 DATA FORMS

<b>GENERAL INFORMATION</b> <b>Project Label:</b> <u>Jumping Run</u> <b>Project Name:</b> <u>Jumping Run</u> <b>Team:</b> <u>1</u> <b>Plot:</b> <u>Plot 1 (west cell, quad 1, south plot)</u> <input type="checkbox"/> Level 1 (planted stems only) <input checked="" type="checkbox"/> Level 2 (planted and natural stems) <b>Start Date:</b> <u>JUN / 21 / 2006</u> e.g.: JAN / 15 / 2006 <b>End Date (if different):</b> <u>NA</u>		<b>LOCATION</b> <b>General:</b> <u>CCEC</u> <b>State:</b> <u>NC</u> <b>County:</b> <u>Carteret</u> <b>Quadrangle:</b> <u>Mansfield</u> <b>Place Names:</b> (1) 2) _____ 3) _____ <b>Land Owner:</b> <u>CCEC</u>		<b>Plot Diagram</b> Fill in <b>ONE</b> of the templates below, using the key to draw GPS location, photos and posts. Edit shape if plot doesn't match one of the templates. Draw any landmarks, such as streams, banks, fences, etc. * <b>Standard 10m x 10m</b> (14.142m diagonal):  <b>Key</b> Plot origin (0,0) point GPS location point photo taken, with direction posts	
<b>Party</b> <u>G. Lewis</u> <b>Role**</b> <u>E. Swab</u> <b>Plot Leader</b> <u>C. Mahan</u> <b>Botan.</b> _____ <b>Tech</b>		<b>GPS Receiver Location (m):</b> X= <u>0</u> y= <u>0</u> <b>Date:</b> <u>31.73489</u> (or UTM-N) decimal deg. meters e.g. 35.16623 e.g. 3962248 <b>Long:</b> <u>76.86830</u> (or UTM-E) e.g. -125.12413 e.g. 710524		<b>Plot Size</b> (area, default=1): <u>1</u> Photo Identifier(s): <u>taken at (10,0) across plot.</u> (An "area" is 100 m <sup>2</sup> ) <b>NOTES</b> if more space is needed, check the box and use back of datasheets. Layout: (anything unusual about plot layout and shape) <u>NA</u>	
<b>Soil Drainage*</b> <input type="checkbox"/> Excessively drained <input type="checkbox"/> Somewhat excessively drained <input type="checkbox"/> Well drained <input type="checkbox"/> Moderately well drained <input type="checkbox"/> Somewhat poorly drained <input type="checkbox"/> Poorly drained <input checked="" type="checkbox"/> Very poorly drained		<b>Coordinate Accuracy</b> (m radius): e.g. 30 <u>Submeter</u>		<b>Plot Location:</b> (directions to plot, landscape content) <u>west cell, south plot, 1 quad 1</u>	
<b>Soil Drainage*</b> <input type="checkbox"/> Excessively drained <input type="checkbox"/> Somewhat excessively drained <input type="checkbox"/> Well drained <input type="checkbox"/> Moderately well drained <input type="checkbox"/> Somewhat poorly drained <input type="checkbox"/> Poorly drained <input checked="" type="checkbox"/> Very poorly drained		<b>Plot Rationale:</b> (why location was chosen for the plot) <u>NA</u>		□ more...	
<b>WATER</b> Percent of Plot Submerged: <u>95</u> % Mean Water Depth: <u>7.5</u> cm		<b>Other Notes:</b> (invasive species, erosion, disturbances, etc.) <u>NO INVASIVES</u>		□ more...	
<b>TAXONOMIC STANDARD USED FOR PLANT IDENTIFICATION</b> <b>Authority:</b> <u>RAB</u> , <b>Publ. Date:</b> <u>1968</u>					





**Plot Data: CVS Levels 1 & 2**

<p><b>GENERAL INFORMATION</b></p> <p><b>Project Label:</b> <u>Jumping Run</u></p> <p><b>Project Name:</b> <u>Jumping Run</u></p> <p><b>Team:</b> <u>1</u></p> <p><b>Plot:</b> <u>Plot 2 (west cell, quad 2, north plot)</u></p> <p><input type="checkbox"/> Level 1 (planted stems only)  <input checked="" type="checkbox"/> Level 2 (planted and natural stems)</p> <p><b>Start Date:</b> <u>JUN / 21 / 2006</u>  <small>e.g.: JAN / 15 / 2006</small></p> <p>End Date (if different): <u>NA</u></p>	<p><b>LOCATION</b></p> <p><b>General:</b> <u>CCEC</u></p> <p><b>State:</b> <u>NC</u> <b>County:</b> <u>Carteret</u></p> <p><b>Quadrangle:</b> <u>Mansfield</u></p> <p><b>Place Names:</b> 1) _____          2) _____ 3) _____</p> <p><b>Land Owner:</b> <u>CCEC</u></p> <p><b>GPS Receiver Location (m):</b>  <input checked="" type="checkbox"/> x= <u>0</u> y= <u>0</u></p> <p><b>Datum:</b> <input checked="" type="checkbox"/> NAD83/WGS84 <input type="checkbox"/> NAD27 <b>UTM Zone:</b> _____  <small>if UTM's used</small></p> <p><b>Lat:</b> <u>34.73590</u> <b>(or UTM-N)</b>  <small>decimal deg. meters e.g.: 35.16623</small></p> <p><b>Long:</b> <u>76.86843</u> <b>(or UTM-E)</b>  <small>e.g.: -125.12413 710524</small></p> <p><b>Coordinate Accuracy (m radius):</b>  <small>e.g.: 30</small> <u>Submeter</u></p> <p><b>GPS File Name:</b> <u>Jumping - veg</u></p>	<p><b>Soil Drainage*</b></p> <p><input type="checkbox"/> Excessively drained  <input type="checkbox"/> Somewhat excessively drained  <input type="checkbox"/> Well drained  <input type="checkbox"/> Moderately well drained  <input type="checkbox"/> Somewhat poorly drained  <input type="checkbox"/> Poorly drained  <input checked="" type="checkbox"/> Very poorly drained</p> <p><b>WATER</b></p> <p>Percent of Plot Submerged: <u>100</u> %</p> <p>Mean Water Depth: <u>3</u> cm</p>	<p><b>TAXONOMIC STANDARD USED FOR PLANT IDENTIFICATION</b></p> <p><b>Authority:</b> <u>RAB</u>, <b>Publ. Date:</b> <u>1968</u></p>					
<p><b>Plot Diagram</b></p> <p>Fill in ONE of the templates below, using the key to draw GPS location, photos and posts. Edit shape if plot doesn't match one of the templates. Draw any landmarks, such as streams, banks, fences, etc.</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Standard 10m x 10m (14.142m diagonal):</p> </div> <div style="text-align: center;"> <p>Non-standard 5m x 20m (20.616m diagonal):</p> </div> </div> <p><b>Key</b></p> <ul style="list-style-type: none"> <li><span style="display: inline-block; width: 10px; height: 10px; border: 1px solid black; border-radius: 50%;"></span> Plot origin (0,0) point</li> <li><span style="display: inline-block; width: 10px; height: 10px; border: 1px solid black; border-radius: 50%;"></span> GPS location point</li> <li><span style="display: inline-block; width: 10px; height: 10px; border: 1px solid black; border-radius: 50%;"></span> photo taken, with direction</li> <li><span style="display: inline-block; width: 10px; height: 10px; border: 1px solid black; border-radius: 50%;"></span> posts</li> </ul> <p><b>Posits</b> (x,y) (meters)</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>(0, 0)</td></tr> <tr><td>(0, 10)</td></tr> <tr><td>(10, 10)</td></tr> <tr><td>(10, 0)</td></tr> <tr><td>( , )</td></tr> </table> <p><b>Bearing of Plot X-Axis:</b> <u>90°</u></p> <p><b>Photo Identifier(s):</b> <u>1</u> <b>Photo taken at (10,0) across plot</b></p> <p><b>NOTES</b></p> <p>If more space is needed, check the box and use back of datasheets.</p> <p><b>Layout: (anything unusual about plot layout and shape)</b></p> <p style="text-align: center;"><u>NA</u></p> <p><b>Plot Location: (directions to plot, landscape content)</b></p> <p style="text-align: center;"><u>west cell, north plot, quad 2</u></p> <p><b>Plot Rationale: (why location was chosen for the plot)</b></p> <p style="text-align: center;"><u>NA</u></p> <p><b>Other Notes: (invasive species, erosion, disturbances, etc.)</b></p> <p style="text-align: center;"><u>NA</u></p>				(0, 0)	(0, 10)	(10, 10)	(10, 0)	( , )
(0, 0)								
(0, 10)								
(10, 10)								
(10, 0)								
( , )								







GENERAL INFORMATION		LOCATION	
Project Label: <u>Jumping Run</u>		General: <u>CCEC</u>	
Project Name: <u>Jumping Run</u>		State: <u>NC</u> County: <u>Carteret</u>	
Team: <u>1</u>		Quadrangle: <u>Mansfield</u>	
Plot: <u>Plot 3 (East cell, south plot, quad 1)</u>		Place Names: 1)	
<input type="checkbox"/> Level 1 (planted stems only)		2) <u>3)</u>	
<input checked="" type="checkbox"/> Level 2 (planted and natural stems)		Land Owner: <u>CCEC</u>	
Start Date: <u>JUN/21 / 2006</u>		GPS Receiver Location (m):	
e.g.: JAN / 15 / 2006		X= <u>0</u> y= <u>0</u>	
End Date (if different): <u>NA</u>		Datum: <input checked="" type="checkbox"/> NAD83/WGS84 <input type="checkbox"/> NAD27	
Party		UTM Zone: (or UTM-N)	
Role:**		if UTM's used	
Plot Leader		Lat: <u>34.74880</u>	
G. Lewis		decimal deg. e.g. 35.16623	
E. Swab		Long: <u>76.86544</u>	
C. Mahan		e.g. -125.12413	
		Coordinate Accuracy (m radius):	
		e.g. 30 <u>Submeter</u>	
		GPS File Name: <u>Jumping-veg</u>	
		SITE CHARACTERISTICS	
Soil Drainage*		Elevation: <u>27</u> ± <u>2</u> <input type="checkbox"/> m <input checked="" type="checkbox"/> ft.	
<input type="checkbox"/> Excessively drained		Slope (deg): <u>0</u>	
<input type="checkbox"/> Somewhat excessively drained		Aspect (deg): <u>NA</u>	
<input type="checkbox"/> Well drained		Compass Type: <input checked="" type="checkbox"/> magnetic <input type="checkbox"/> true	
<input type="checkbox"/> Moderately well drained		Plot Placement	
<input type="checkbox"/> Somewhat poorly drained		<input checked="" type="checkbox"/> Representative	
<input type="checkbox"/> Poorly drained		<input type="checkbox"/> Random	
<input checked="" type="checkbox"/> Very poorly drained		<input type="checkbox"/> Stratified random	
WATER		<input type="checkbox"/> Transect component	
Percent of Plot Submerged: <u>100</u> %		<input type="checkbox"/> Systematic (grid)	
Mean Water Depth: <u>2</u> cm		<input type="checkbox"/> Capture specific feature	
TAXONOMIC STANDARD USED FOR PLANT IDENTIFICATION			
Authority: <u>RAB</u> , Publ. Date: <u>1968</u>			

**Plot Diagram**

Fill in ONE of the templates below, using the key to draw GPS location, photos and posts. Edit shape if plot doesn't match one of the templates. Draw any landmarks, such as streams, banks, fences, etc.

\* Standard 10m x 10m (14.142m diagonal):

Non-standard 5m x 20m (20.616m diagonal):

**Key**

- Plot origin (0,0) point
- GPS location point
- photo taken, with direction
- posts

**Posits** (X,Y) (meters)

(0, 0)
(0, 10)
(10, 10)
(10, 0)
( , )

**Plot Size** (area, default=1): 1 Photo Identifier(s): taken at (0,0) across plot

(An "area" is 100 m<sup>2</sup>)

**NOTES**

If more space is needed, check the box and use back of datasheets.

Layout: (anything unusual about plot layout and shape)

NA

Plot Location: (directions to plot, landscape content)

East cell, south plot, quad 1

Plot Rationale: (why location was chosen for the plot)

NA

Other Notes: (invasive species, erosion, disturbances, etc.)

prevalence of Mikania scandens (climbing hempweed)

□ more...

## Planted Woody Stem Data: CVS Levels 1 & 2

Leader: <u>G. Lewis</u>		Project: <u>Jumping Run</u>		Team: <u>1</u>	Plot: <u>3</u>	Date: <u>JUN / 21 / 2006</u>		Page <u>1</u> of <u>1</u>	
Species Name	Source	Coordinates		ddh (mm)	Height (cm)	DBH (cm)	Vigor	Damage	
		X (m)	Y (m)						
Cephalanthus occid.	C	2.1	0.7	9	45	-	2	-	
Cephalanthus occid.	C	0.7	1.0	5	40	-	2	-	
Nyssa aquatica	C	0.8	3.0	33	175	10	3	-	
Taxodium distichum	C	2.0	2.5	14	75	-	2	-	
Nyssa aquatica	C	3.0	1.0	41	200	10	3	-	
Taxodium distichum	C	3.0	4.0	26	100	-	2	competition	
Cephalanthus occid.	C	2.0	4.0	18	60	-	3	-	
Taxodium distichum	C	0.1	5.5	45	200	6	3	-	
Cephalanthus occid.	C	3.0	5.5	6	40	-	2	-	
Nyssa aquatica	C	2.5	6.0	29	170	8	3	-	
Taxodium distichum	C	0.7	8.5	37	90	-	2	competition	
Cephalanthus occid.	C	2.0	8.4	5	40	-	2	competition	
Cephalanthus occid.	C	1.0	9.6	15	70	-	3	-	
Nyssa biflora	C	3.0	9.0	28	165	7	3	-	
Nyssa aquatica	C	4.5	9.0	38	180	9	3	-	
Cephalanthus occid.	C	4.5	6.5	9	50	-	2	competition	
Cephalanthus occid.	C	5.5	6.4	14	95	-	2	competition	
Cephalanthus occid.	C	6.0	5.0	9	70	-	3	-	
Nyssa aquatica	C	6.0	4.0	19	120	-	2	-	
Taxodium distichum	C	6.0	2.2	21	80	-	R	competition	
Cephalanthus occid.	C	5.1	1.2	14	100	-	3	-	
Cephalanthus occid.	C	5.1	1.0	6	50	-	3	-	
Taxodium distichum	C	8.5	0.5	18	80	-	2	competition	
Nyssa aquatica	C	8.3	0.2	11	75	-	3	-	
Taxodium distichum	C	8.6	2.5	25	120	-	3	-	
Nyssa aquatica	C	7.0	4.0	19	125	-	3	-	
Nyssa aquatica	C	9.0	6.0	18	110	-	3	-	
Nyssa aquatica	C	8.0	6.5	23	205	8	2	competition	
Cephalanthus occid.	C	9.5	7.0	15	100	-	3	-	
Cephalanthus occid.	C	6.0	10.0	7	45	-	3	-	
Cephalanthus occid.	C	8.0	3.0	8	40	-	3	-	

Source: Cultivated, Transplant, Live stake, Ball and Burlap, Pot, Bare Root

Vigor: 4=excellent, 3=good, 2=weak, 1=unlikely to survive year, 0=Dead, Missing.



Damage: Removal, Cut, Mowing, Beaver, Deer, Rodents, Insects, Game, Livestock, Other/Unknown Animal, Human Trampled, Site Too Wet, Site Too Dry, Flood, Drought, Storm, Hurricane, Diseased, Vine Strangulation, Unknown, specify other.



# Plot Data: CVS Levels 1 & 2

GENERAL INFORMATION		LOCATION
<b>Project Label:</b> <u>Jumping Run</u> <b>Project Name:</b> <u>Jumping Run</u> <b>Team:</b> <u>1</u> <b>Plot:</b> <u>Plot 4 (East cell, quad 2)</u> <input type="checkbox"/> Level 1 (planted stems only) <input checked="" type="checkbox"/> Level 2 (planted and natural stems)		General: <u>CC EC</u> State: <u>NC</u> County: <u>Carteret</u> Quadrangle: <u>Mansfield</u> Place Names: 1) _____ 2) _____ 3) _____ Land Owner: <u>CCEC</u>
<b>Start Date:</b> <u>JUN / 21 / 2006</u> e.g.: JAN / 15 / 2006 End Date (if different): <u>NA</u>		<b>GPS Receiver Location</b> (m): X= <u>0</u> Y= <u>0</u>
<b>Party</b> _____ <b>Role**</b> _____ <b>G. Lewis</b> <u>Plot Leader</u> <b>E. Swab</b> <u>Botan.</u> <b>C. Mahan</b> <u>Tech</u>		<b>Datum:</b> <input checked="" type="checkbox"/> NAD83/WGS84 <input type="checkbox"/> NAD27 if UTM's used <b>Lat:</b> <u>34.73514</u> (or UTM-N) decimal deg. e.g. 35.16623 <b>Long:</b> <u>76.86542</u> (or UTM-E) e.g. -125.12413 e.g. 710524
**Roles: Co-leader, Assistant, Guide, Land owner, Taxonomist, Other <b>Soil Drainage*</b> <input type="checkbox"/> Excessively drained <input type="checkbox"/> Somewhat excessively drained <input type="checkbox"/> Well drained <input type="checkbox"/> Moderately well drained <input type="checkbox"/> Somewhat poorly drained <input type="checkbox"/> Poorly drained <input checked="" type="checkbox"/> Very poorly drained		<b>Plot Size</b> (ares, default=1): <u>1</u> (An "are" is 100 m <sup>2</sup> ) Photo Identifier(s): <u>1</u> Photo taken at (10,0) across plot
<b>Soil Drainage*</b> <input type="checkbox"/> Excessively drained <input type="checkbox"/> Somewhat excessively drained <input type="checkbox"/> Well drained <input type="checkbox"/> Moderately well drained <input type="checkbox"/> Somewhat poorly drained <input type="checkbox"/> Poorly drained <input checked="" type="checkbox"/> Very poorly drained		<b>Notes</b> if more space is needed, check the box and use back of datasheets. Layout: (anything unusual about plot layout and shape) <u>NA</u>
<b>Water</b> Percent of Plot Submerged: _____ % Mean Water Depth: <u>3</u> cm		Plot Location: (directions to plot, landscape content) <u>East cell, north plot, quad 2</u>
Plot Rationale: (why location was chosen for the plot) <u>NA</u>		Plot Rationale: (why location was chosen for the plot) <u>NA</u>
<b>TAXONOMIC STANDARD USED FOR PLANT IDENTIFICATION</b> Authority: <u>RAB</u> , Publ. Date: <u>1968</u>		Other Notes: (invasive species, erosion, disturbances, etc.) <u>NA</u>

\*Definitions and/or values are in the Definitions section of the CVS Field Guide. ©2006 Carolina Vegetation Survey. Form PLT12, ver 6.2

## Planted Woody Stem Data: CVS Levels 1 & 2

Leader: G. Lewis		Project: <u>Jumping Run</u>		Team: <u>1</u>	Plot: <u>4</u>	Date: <u>JUN / 21 / 2006</u>	Page 1 of 1	
Species Name	Source	Coordinates		ddh (mm)	Height (cm)	DBH (cm)	Vigor	Damage
		X (m)	Y (m)					
Nyssa aquatica	C	0.1	0.1	28	170	6	3	-
Taxodium distichum	C	1.5	0.7	39	152	6	3	-
Taxodium distichum	C	2.0	2.5	66	130	-	3	unknown
Taxodium distichum	C	1.0	2.0	20	75	-	2	-
Taxodium distichum	C	2.5	3.5	41	137	-	3	-
Nyssa biflora	C	3.0	3.0	30	210	10	3	-
Taxodium distichum	C	3.0	3.5	40	160	4	3	-
Taxodium distichum	C	3.1	3.5	38	140	5	3	-
Taxodium distichum	C	3.1	3.6	33	130	-	3	-
Nyssa biflora	C	1.7	4.5	22	147	5	3	-
Taxodium distichum	C	1.5	6.0	29	115	-	3	-
Taxodium distichum	C	1.5	6.1	18	95	-	3	-
Taxodium distichum	C	3.0	8.0	25	85	-	3	-
Nyssa biflora	C	0.4	9.0	30	165	7	3	-
Nyssa biflora	C	4.0	9.5	17	115	-	3	-
Taxodium distichum	C	5.0	5.0	44	155	6	3	-
Nyssa aquatica	C	4.0	4.0	34	200	10	3	-
Nyssa aquatica	C	4.5	4.0	41	205	12	3	-
Nyssa aquatica	C	4.4	3.6	43	200	10	3	-
Nyssa aquatica	C	4.2	3.4	39	200	11	3	-
Nyssa aquatica	C	4.5	2.0	40	155	11	3	-
Nyssa aquatica	C	4.0	0.5	27	137	3	3	-
Taxodium distichum	C	8.0	1.0	16	65	-	2	unknown
Taxodium distichum	C	9.0	4.0	14	80	-	2	unknown
Taxodium distichum	C	8.5	9.7	23	90	-	3	-

Source: Cultivated, Transplant, Live stake, Ball and Burlap, Pot, Bare Root      Vigor: 4=excellent, 3=good, 2=weak, 1=unlikely to survive year, 0=Dead, Missing.

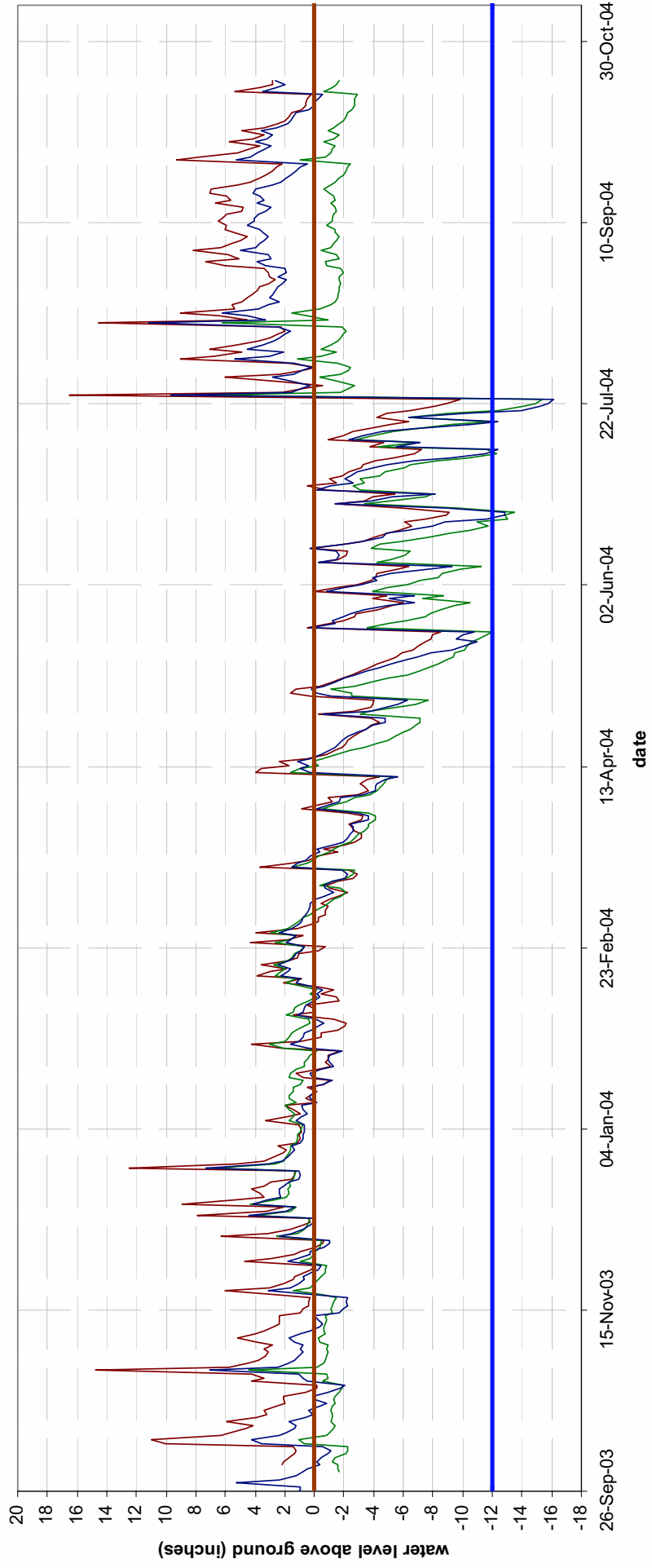
Damage: Removal, Cut, Mowing, Beaver, Deer, Rodents, Insects, Game, Livestock, Other/Unknown Animal, Human Trampled, Site Too Wet, Site Too Dry, Flood, Drought, Storm, Hurricane, Diseased, Vine Strangulation, Unknown, specify other.



APPENDIX E  
YEAR 3 (2004) GROUNDWATER GAUGE GRAPHS

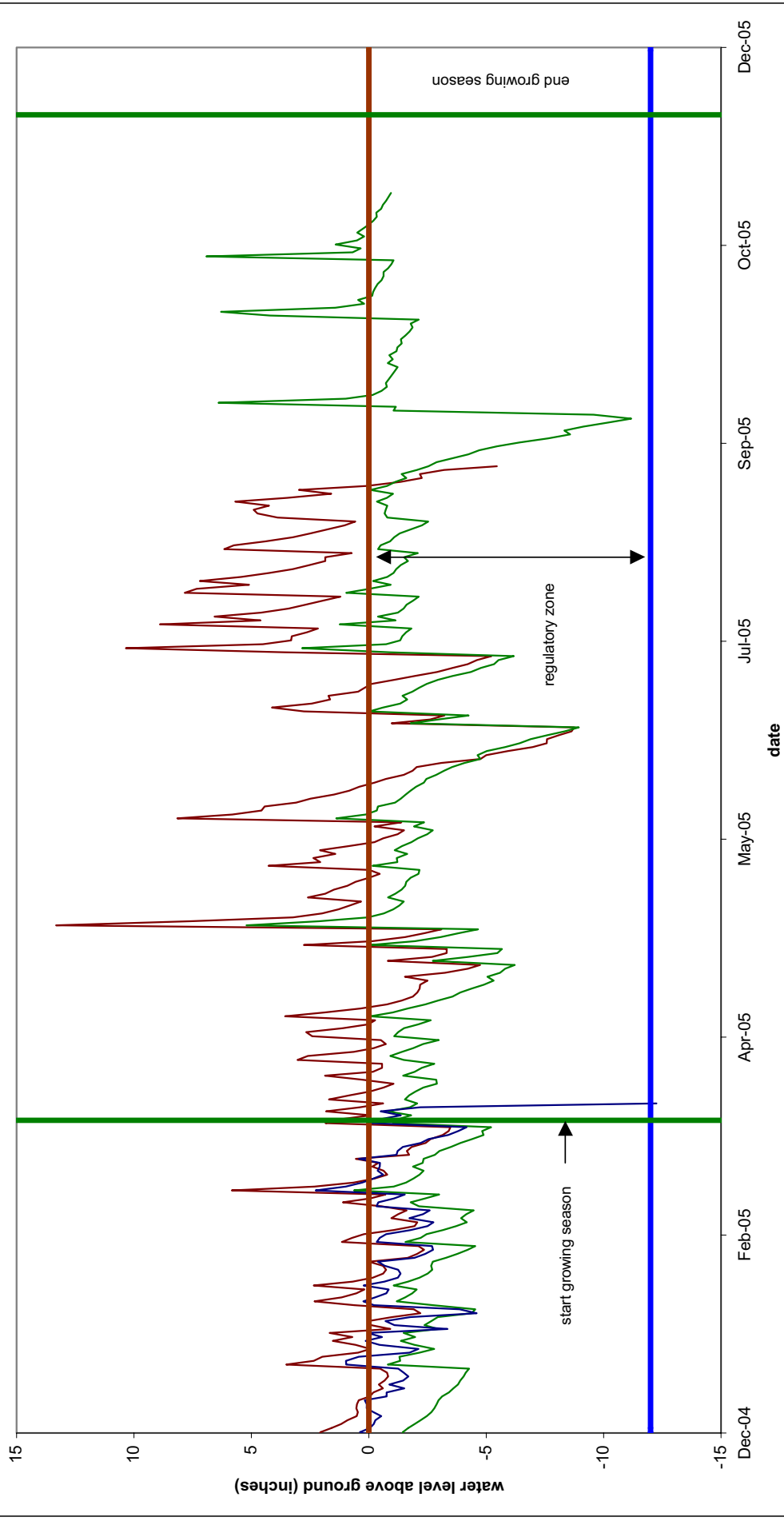


### 2004 Groundwater Levels Carteret-Craven Electrical Cooperative

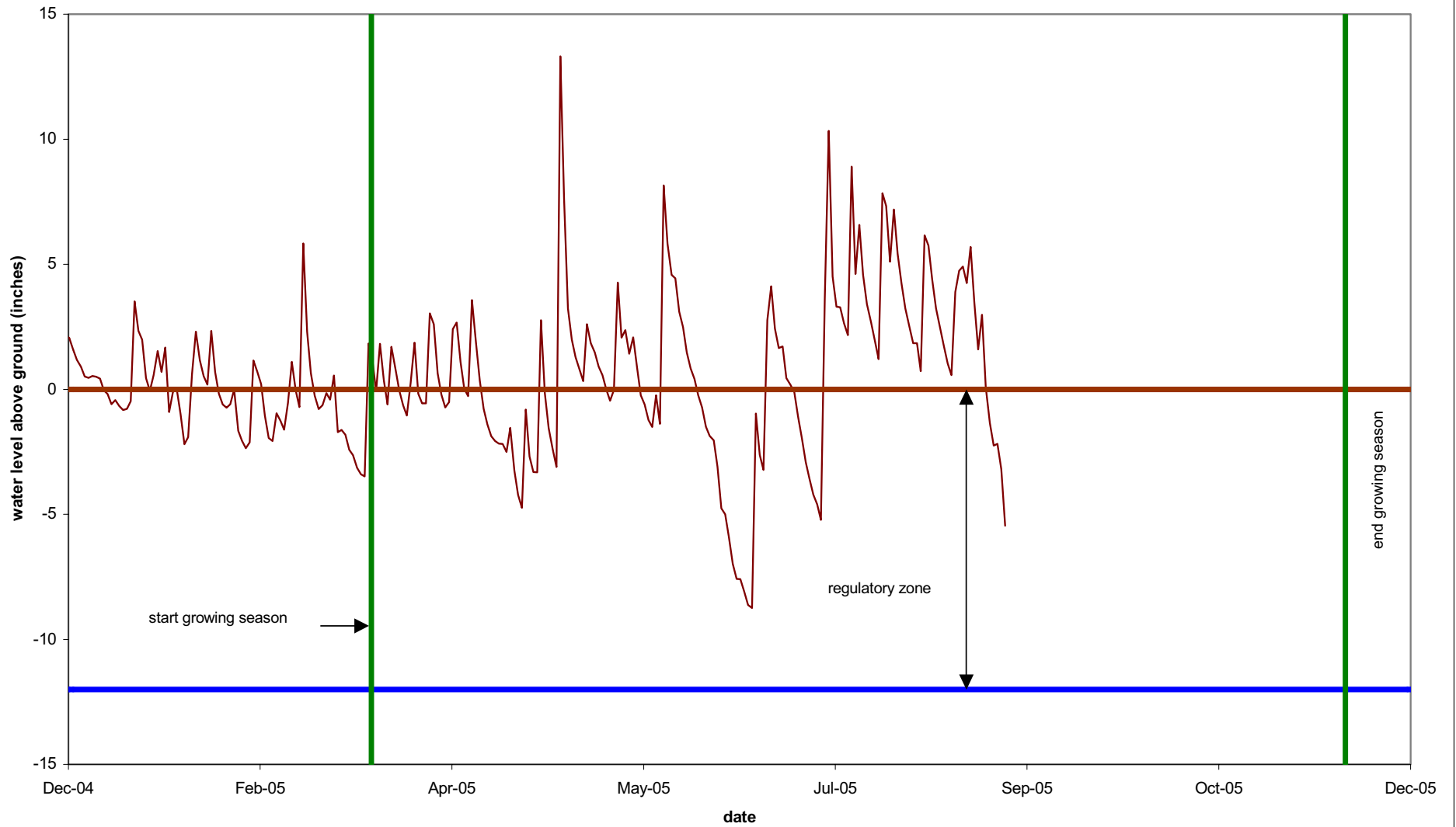


APPENDIX F  
YEAR 4 (2005) GROUNDWATER GAUGE GRAPHS

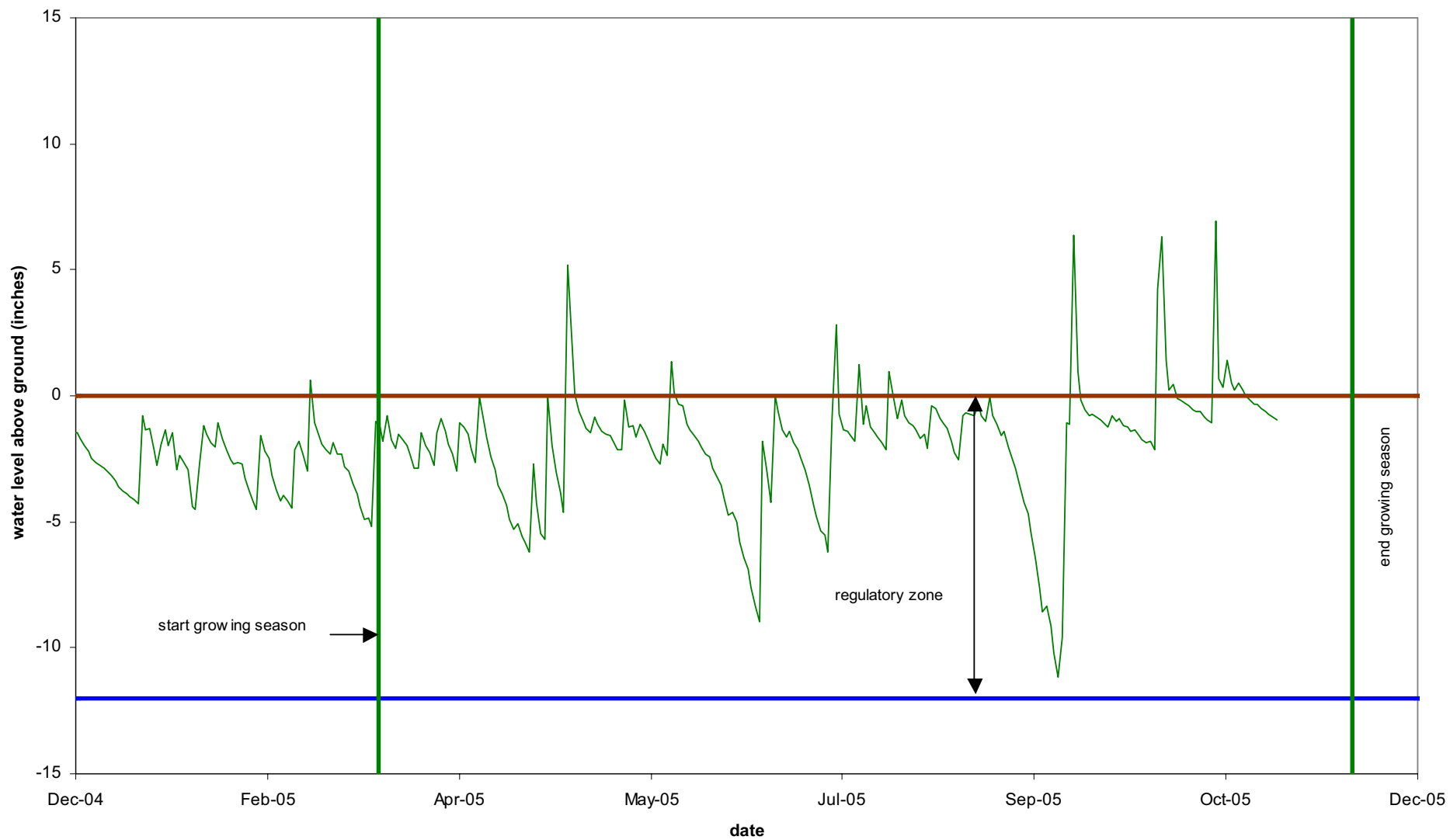
# 2005 Groundwater Levels Carteret-Craven Electrical Cooperative



2005 Groundwater Levels - CCEC1  
Carteret-Craven Electrical Cooperative



### 2005 Groundwater Levels - CCEC2 Carteret-Craven Electrical Cooperative



### 2005 Groundwater Levels - CCEC3 Carteret-Craven Electrical Cooperative

