ANNUAL WETLAND MONITORING REPORT
YEAR 5 (2010)

GATLIN SWAMP WETLAND RESTORATION SITE
MARTIN COUNTY, NORTH CAROLINA
(Contract # D05024-2)

Prepared for:

NORTH CAROLINA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
ECOSYSTEM ENHANCEMENT PROGRAM
RALEIGH, NORTH CAROLINA

Prepared by:

Restoration Systems, LLC
1101 Haynes Street, Suite 211
Raleigh, North Carolina 27604

And

Axiom Environmental, Inc.
20 Enterprise Street, Suite 7
Raleigh, North Carolina 27607

August 2010

EXECUTIVE SUMMARY

Restoration Systems, L.L.C. (Restoration Systems) has completed restoration of nonriverine wetlands at the Gatlin Swamp Wetland Restoration Site (hereafter referred to as the "Site") to assist the North Carolina Ecosystem Enhancement Program (EEP) in fulfilling restoration goals in the region. The Site is located approximately 1.5 miles southwest of Oak City, in Martin County. The Site encompasses approximately 150.2 acres of land situated in an expansive interstream flat characterized primarily by timber production and agriculture. The project provides 138.7 acres of non-riverine wetland restoration, with benefits to water quality and wildlife in a watershed that is highly dissected for agriculture and timber production.

The Site is located within sub-basin 03-02-09 of the Roanoke River Basin. This area is part of United States Geological Survey (USGS) Hydrologic Unit (HU) 03010107 of the South Atlantic/Gulf Region (14-digit HU 03010107120020). Site features drain to Etheridge Swamp and Conoho Creek, a major tributary to the Roanoke River.

A Detailed Wetland Restoration Plan was completed for the Site in September 2005. The plan outlined methods designed to restore agricultural fields that had been ditched, drained, and cleared for row crop production. Prior to implementation, the entire 150.2 acre Site contained 138.7 acres of hydric soil that had been effectively drained and contained no jurisdictional wetlands. The Detailed Wetland Restoration Plan outlined restoration procedures including 1) ditch cleaning prior to backfill, 2) depression construction, 3) impervious ditch plug construction, 4) ditch backfilling, 5) floodplain soil scarification, and 6) plant community restoration.

The following objectives were proposed to provide mitigation credit requested under the EEP Request For Proposal (RFP) #16-D05024 dated October 22, 2004:

- Provide 125 acres of nonriverine Wetland Mitigation Units, as calculated in accordance with the requirements stipulated in RFP #16-D05024.
- Restore a minimum of 125 acres of wetland through filling agricultural ditches, removal of spoil castings, eliminating row crop production activities, and/or planting with native forest species.
- Protect the Site in perpetuity with a conservation easement held by the State of North Carolina.

As constructed, the Site provides 138.7 acres of non-riverine wetland restoration and 11.5 acres of forested upland buffer. In summary, the Site achieved the defined (or targeted) success criteria for the entire five-year monitoring period.

1. Saturation (free water) within one foot of the soil surface for a minimum of 5 percent (12 consecutive days) of the growing season, for all Site groundwater gauges in every monitoring year.
2. Vegetation plots across the Site were well above the required stems per acre in every monitoring year.

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GATLIN SWAMP WETLAND RESTORATION SITE
ANNUAL MONITORING REPORT
YEAR 5 (2010)
MARTIN COUNTY, NORTH CAROLINA

1.0 INTRODUCTION

Restoration Systems established the Gatlin Swamp Wetland Restoration Site (Site) in the Coastal Plain region of the Roanoke River Basin (14-digit HU 03010107120020). The Site is located approximately 1.5 miles southwest of Oak City, in Martin County (Figure 1). The Site encompasses approximately 150.2 acres of land situated in an expansive interstream flat characterized primarily by timber production and agriculture. The project offers 138.7 acres of nonriverine wetland restoration, with benefits to water quality and wildlife in a watershed that is highly dissected for agriculture and timber production.

A Detailed Wetland Restoration Plan was completed for the Site in September 2005. The plan outlined methods designed to restore agricultural fields that had been ditched, drained, and cleared for row crop production. Prior to implementation, the entire 150.2 acre Site contained 138.7 acres of hydric soil that had been effectively drained and contained no jurisdictional wetlands. The Detailed Wetland Restoration Plan outlined restoration procedures including 1) ditch cleaning prior to backfill, 2) depression construction, 3) impervious ditch plug construction, 4) ditch backfilling, 5) floodplain soil scarification, and 6) plant community restoration.

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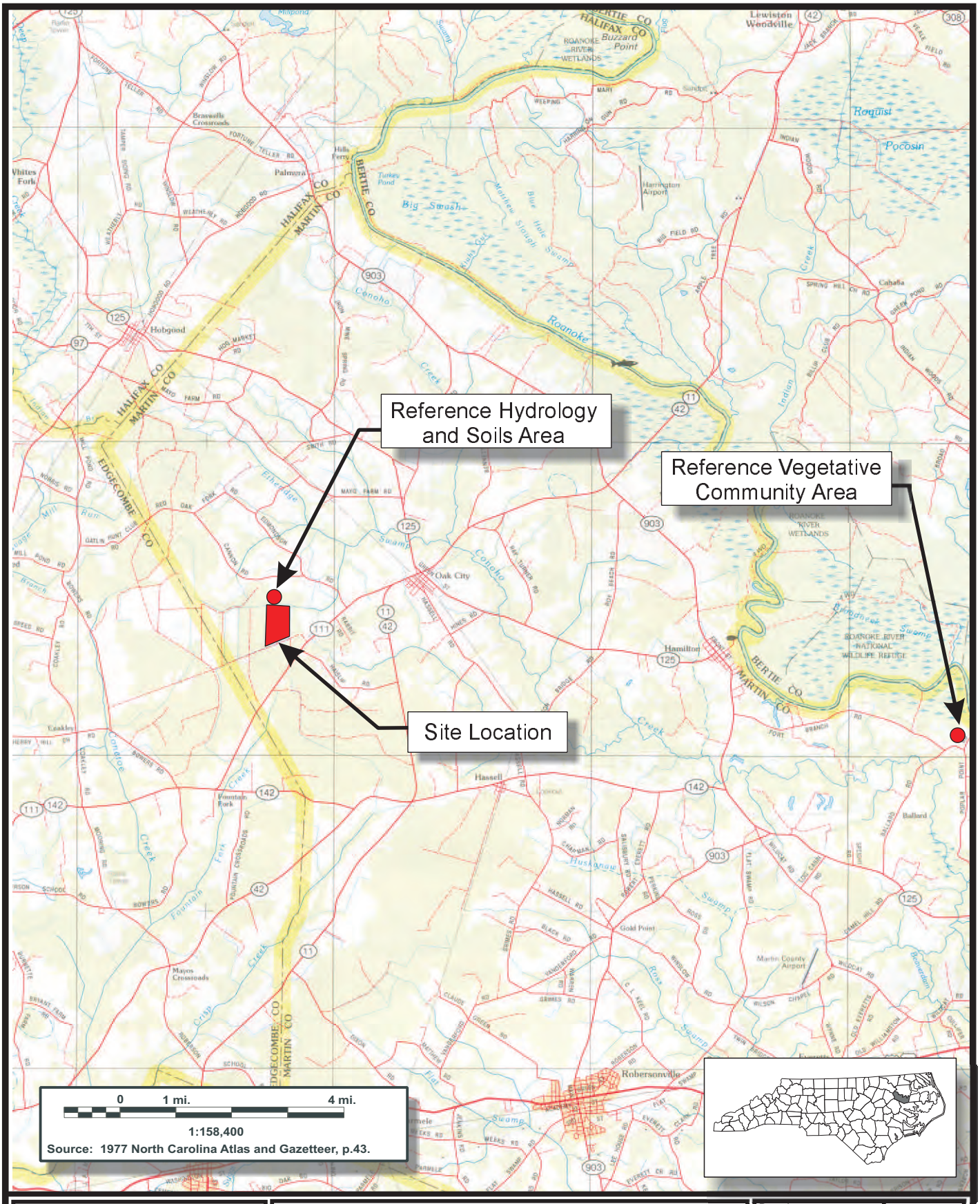
- Protect the Site in perpetuity with a conservation easement held by the State of North Carolina.

As constructed, the Site provides 138.7 acres of non-riverine wetland restoration and 11.5 acres of forested upland buffer (Figure 2).

Upon completion of the detailed restoration plan, construction schematics were developed and construction was initiated in October 2005. Anderson Farms completed earthwork and grading at the Site in December of 2005. Carolina Silvics completed planting of the Site in January 2006. Axiom Environmental, Inc. completed as-built mitigation plans and as-built construction drawings in January 2006.



Axiom Environmental
2126 Rowland Pond Dr
Willow Springs, NC 27592
(919) 215-1693
(919) 341-3839 fax

SITE LOCATION
GATLIN SWAMP WETLAND RESTORATION SITE
Martin County, North Carolina

Dwn. by:	CLF
Ckd by:	WGL
Date:	June 2008
Project:	08-007

FIGURE
1

LEGEND		
DESCRIPTION	SYMBOL	AREA
SITE BOUNDARY		150.2 AC
WETLAND RESTORATION		138.7 AC
UPLAND		11.5 AC
GROUNDWATER GAUGE	1	
VEGETATION PLOTS		

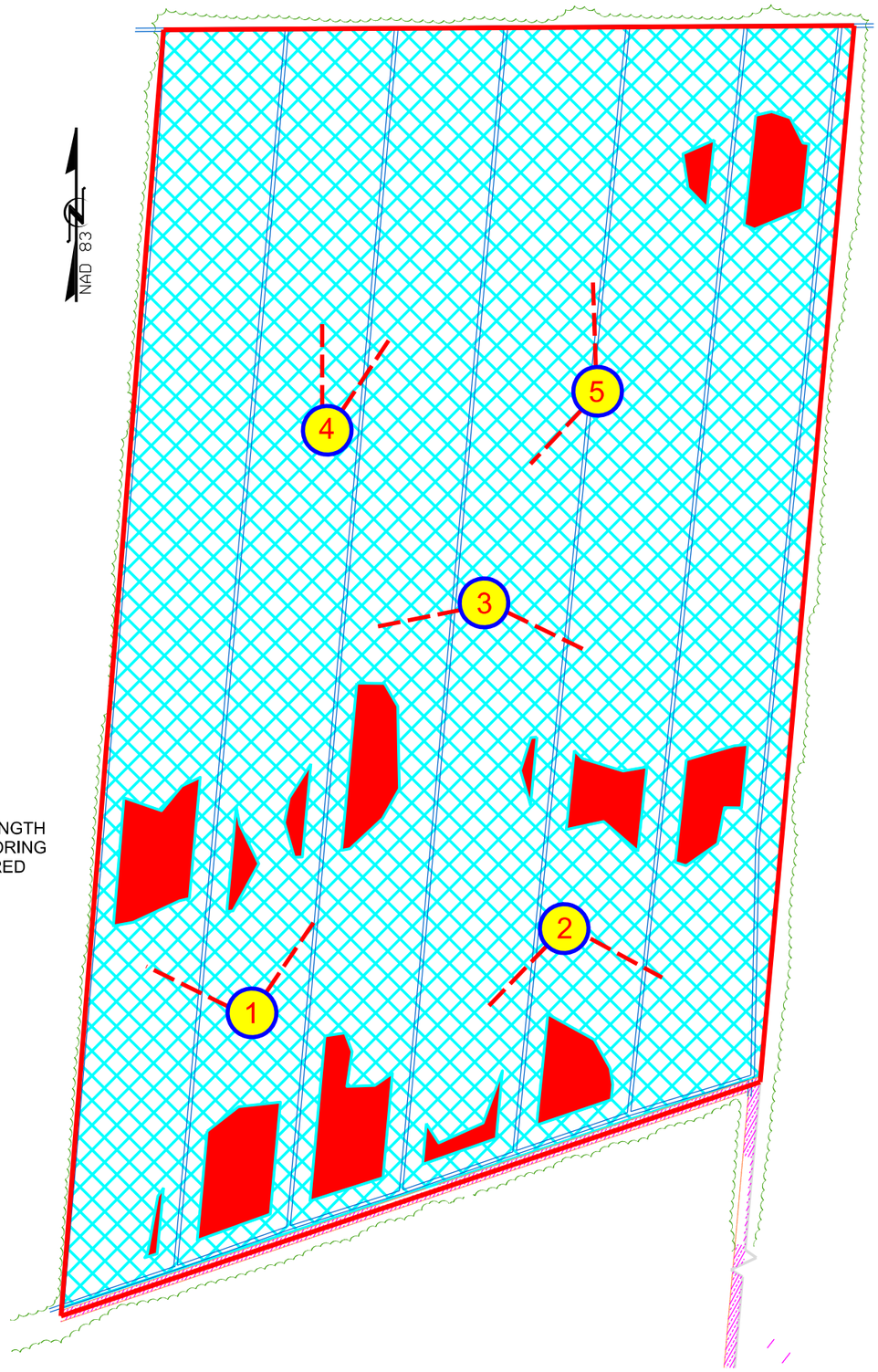
GROUNDWATER GAUGES

INFINITY CONTINUOUS MONITORING GAUGES INSTALLED IN ACCORDANCE WITH SPECIFICATIONS OUTLINED IN U.S. ARMY CORPS OF ENGINEERS, INSTALLING MONITORING WELLS/PIEZOMETERS IN WETLANDS (WRP TECHNICAL NOTE HY-IA-3.1, AUGUST 1993). SCREENS ARE SET TO A DEPTH OF APPROXIMATELY 18 INCHES. GAUGES ARE PROGRAMMED TO RECORD AT 24-HOUR INTERVALS. DAILY RAINFALL IS CORRELATED FROM DATA OBTAINED AT A NATIONAL WEATHER SERVICE STATION LOCATED IN TARBORO (STATION 318500 - COOP).

REFERENCE GAUGES (R1 AND R2) - LOCATED 250 AND 295 FEET NORTH OF PROJECT PROPERTY LINE

VEGETATION MONITORING PLOT

VEGETATION MONITORING PLOTS ARE COMPRISED OF TRANSECTS, 600 FEET IN LENGTH AND 7.25 FEET IN WIDTH CENTERED ON EACH OF THE FIVE GROUNDWATER MONITORING GAUGES. IN EACH MONITORING PLOT, VEGETATION PARAMATERS TO BE MONITOIRED INCLUDE SPECIES COMPOSITION AND DENSITY.



Axiom Environmental, Inc.

RESTORATION SYSTEMS
1101 HAYNES STREET, #211
RALEIGH, NC 27604

NOTES/REVISIONS

Project:

Gatlin Swamp Wetland Restoration Site

Martin County
North Carolina

Title:

MONITORING PLAN

Scale:	FIGURE NO.
1" = 400'	2
Date: June 2008	
Project No.: 08-007	

Information on project managers, owners, and contractors follows:

Owner Information
Restoration Systems, L.L.C.
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2.0 MONITORING PROGRAM

The Site monitoring protocol consists of a comparison between reference and restoration areas along with evaluation of jurisdictional wetland criteria (Environmental Laboratory 1987). Monitoring will entail analysis of two primary parameters: hydrology and vegetation. Monitoring of restoration efforts was performed for five years, achieving success criteria each year. The monitoring program is described below.

2.1 Wetland Hydrology

2.1.1 Hydrology Monitoring Procedure

After hydrological modifications were completed at the Site, continuously recording monitoring gauges were installed in accordance with specifications outlined in *Installing Monitoring Wells/Piezometers in Wetlands* (NCWRP 1993). 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 a sand screen, and sealed with a bentonite cap to prevent siltation and surface flow infiltration during floods.

Five monitoring gauges were installed in wetland restoration areas to provide representative coverage of the Site (Figure 2). Two gauges were also placed in a reference area in similar landscape positions to use as comparison with onsite conditions (Figure 1). Hydrological sampling was performed in restoration and reference areas during the growing season (March 16

and November 14) at daily intervals necessary to satisfy the hydrology success criteria within each physiographic landscape area.

2.1.2 Hydrologic Success Criteria

Target hydrologic goals were developed using regulatory wetland hydrology criteria and reference wetland sites.

Regulatory Wetland Hydrology Criteria

The regulatory wetland hydrology criterion requires saturation (free water) within 1 foot of the soil surface for 5 percent of the growing season under normal climatic conditions. In some instances, the regulatory wetland hydroperiod may extend between 5 and 12.5 percent of the growing season.

Reference Groundwater Modeling

The reference groundwater model forecasted the wetland hydroperiod in restoration areas will range between approximately 2 and 26 percent of the growing season in early successional phases. Because wetland hydroperiods during old field stages of wetland development are projected to extend for less than 12.5 percent of the growing season, wetland monitoring plans that extend for a five year period after restoration will utilize a minimum 5 percent wetland hydrology criterion to substantiate restoration success.

Reference Wetland Sites

Two monitoring gauges were installed in reference wetlands located in the northern periphery of the Site. Wetland hydroperiods measured by groundwater gauges located within the reference areas will be compared to hydroperiods exhibited by groundwater gauges in the restoration area to further evaluate restoration success. Success criteria outlined by the groundwater model indicates that the wetland restoration area should maintain saturation within one foot of the soil surface for at least 74 percent of the hydroperiod exhibited by the reference wetland gauges in any given year.

Under normal climatic conditions, the hydrologic success criterion requires saturation (free water) within one foot of the soil surface for a minimum of 5 percent of the growing season. This hydroperiod translates to saturation for a minimum, 12-day (5 percent) consecutive period during the growing season, which extends from March 16 and November 14 (244 days) (USDA 1977).

In atypical dry years, the hydroperiod must exceed 75 percent of the hydroperiod exhibited by the reference gauges. Reference gauge data will be used to compare wetland hydroperiods between the restoration areas and relatively undisturbed reference wetlands. This data will supplement regulatory evaluation of success criteria and also provide information that will allow interpretation of mitigation success in years not supporting ”normal” rainfall conditions.

2.1.3 Hydrological Monitoring Results and Comparison with Success Criteria

Hydrographs for each monitoring location are provided in Appendix A along with daily rainfall totals for 2010. Groundwater data presented in Table 1 were collected through July 23, 2010 for reference and restoration area gauges. Data will continue to be downloaded monthly until the end of the 2010 growing season (November 14, 2010) and will be available upon request.

All Site groundwater gauges achieved the defined (or targeted) success criteria for hydrology, saturation (free water) within one foot of the soil surface for a minimum of 5 percent (12 consecutive days) of the growing season, in the Fifth Monitoring Year (Year 2010) (Table 1).

Table 1. 2010 (Year 5) Groundwater Gauge Results

Gauge	Max Consecutive Days Saturated During Growing Season (Percentage) *	Defined (or Targeted) Success Criteria Achieved
1	33 days (13.5 %)	Yes
2	30 days (12.3 %)	Yes
3	32 days (13.1 %)	Yes
4	44 days (18.0 %)	Yes
5	31 days (12.7 %)	Yes
Ref 1	44 days (18.0 %)	Yes
Ref 2	34 days (13.9 %)	Yes

* Gauge data presented in the table were collected through July 23, 2010 for the Gatlin Swamp reference and restoration area gauges. Data will continue to be downloaded monthly for the remainder of the 2010 growing season (until November 14, 2010) and will be available upon request.

2.2 Vegetation

2.2.1 Vegetation Monitoring Procedure

Restoration monitoring procedures for vegetation are designed in accordance with United States Environmental Protection Agency guidelines presented in Mitigation Site Type (MiST) documentation (USEPA 1990) and United States Army Corps of Engineers (USACE) Compensatory Hardwood Mitigation Guidelines (USDOA 1993). The following presents a general discussion of the monitoring program.

During the first year, vegetation received visual evaluations on a periodic basis to ascertain the degree of overtopping of planted species by nuisance species. Quantitative sampling was conducted in late summer of the first year. Subsequently, quantitative sampling of vegetation will be performed between June 1 and September 30 of each monitoring year for five years or until the vegetation success criteria are achieved.

Five sample transects were installed within planted areas of the Site to equally represent the various hydrologic regimes (Figure 2). Each transect is 600 feet in length and 7.25 feet in width (0.1 acre). Transects were centered on the five groundwater monitoring gauges and are defined by the corresponding gauge number. In each sample plot, vegetation parameters monitored include species composition and species density. Photographs of the five vegetation plots are included in Appendix B.

2.2.2 Vegetation Success Criteria

Success criteria have been established to verify that the vegetation component supports community elements necessary for forest development. Success criteria are dependent upon the density and growth of Character forest species. Additional success criteria are dependent upon density and growth of "Character Tree Species." Character Tree Species include planted species

and species identified through inventory of an approved reference (relatively undisturbed) forest community used to design the planting plan. All canopy tree species planted and identified in the reference forest will be utilized to define "Character Tree Species" as termed in the success criteria.

Table 2. Character Tree Species

PLANTED SPECIES	REFERENCE SITE SPECIES
Loblolly Pine (*Pinus taeda*)	Northern Red Oak (*Quercus rubra*)
Pond Pine (*Pinus serotina*)	Red Maple (*Acer rubrum*)
Swamp Chestnut Oak (*Quercus michauxii*)	White Oak (*Quercus alba*)
Cherrybark Oak (*Quercus pagoda*)	Bitternut Hickory (*Carya cordiformis*)
Southern Red Oak (*Quercus falcata*)	Hop Hornbean (*Ostrya virginiana*)
Water Oak (*Quercus nigra*)	Tulip Tree (*Liriodendron tulipifera*)
Willow Oak (*Quercus phellos*)	Sweetgum (*Liquidambar styraciflua*)
Sweetbay (*Magnolia virginiana*)	American Beech (*Fagus grandiflora*)
River Birch (*Betula nigra*)	Mockernut Hickory (*Carya tomentosa*)
	American Sycamore (*Platanus occidentalis*)
	Ironwood (*Carpinus carolinia*)
	Black Walnut (*Juglans nigra*)
	Hackberry (*Celtis laevigata*)
	Green Ash (*Fraxinus pennsylvanica*)

An average density of 320 stems per acre of Character Tree Species must be surviving in the first three monitoring years. Subsequently, 290 Character Tree Species per acre must be surviving in year 4 and 260 Character Tree Species per acre in year 5. Planted species must represent a minimum of 30 percent of the required stems per acre total (87 stems per acre in year 4). Planted Character Tree Species may serve as a seed source for species maintenance during mid-successional phases of forest development. Each naturally recruited Character Tree Species may represent up to 10 percent of the required stems per acre total. In essence, seven naturally recruited Character Tree Species may represent a maximum of 70 percent of the required stems per acre total. Additional stems of naturally recruited species above the 10 percent and 70 percent thresholds are discarded from the statistical analysis.

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 listed in the Restoration Plan or observed in the Reference Site. Supplemental planting will be performed as needed until achievement of vegetation success criteria.

No quantitative sampling requirements are proposed for herb assemblages as part of the vegetation success criteria. Development of floodplain forests over several decades will dictate the success in migration and establishment of desired understory and groundcover populations.

2.2.3 Vegetation Sampling Results and Comparison to Success Criteria

Quantitative sampling of vegetation was conducted in June 2010. Results are provided in Table 3 (page 9). Vegetation success criteria for year 5 (260 tree stems per acre) were exceeded for the 2010 annual monitoring year with an average of 1130 tree stems per acre across the Site. Each individual vegetation plot met success criteria with a range of 852 to 1384 tree stems per acre.

3.0 CONCLUSIONS

The Site achieved the defined (or targeted) success criteria, with saturation (free water) within one foot of the soil surface for a minimum of 5 percent (12 consecutive days) of the growing season, for all Site groundwater gauges in all five monitoring years. A summary of groundwater gauge data for the year 1 (2006) through year 5 (2010) is included in Table 4. Also, vegetation plots across the Site were well above the required stems per acre in all five monitoring years (Table 5).

Table 4. Summary of Groundwater Gauge Results

Gauge	Success Criteria Achieved/Max Consecutive Days During Growing Season (Percentage)				
	Year 1 (2006)	Year 2 (2007)	Year 3 (2008)	Year 4 (2009)	Year 5 (2010)
1	Yes/56 days (23 percent)	Yes/25 days (10 percent)	Yes/132 days (54 percent)	Yes/43 days (17.6 %)	Yes/33 days (13.5 %)
2	Yes/56 days (23 percent)	Yes/25 days (10 percent)	Yes/71 days (29 percent)	Yes/43 days (17.6 %)	Yes/30 days (12.3 %)
3	Yes/56 days (23 percent)	Yes/48 days (20 percent)	Yes/88 days (36 percent)	Yes/46 days (18.9 %)	Yes/32 days (13.1 %)
4	Yes/56 days (23 percent)	Yes/48 days (20 percent)	Yes/71 days (29 percent)	Yes/44 days (18.0 %)	Yes/44 days (18.0 %)
5	Yes/174 days (71 percent)	Yes/99 days (41 percent)	Yes/60 days (25 percent)	Yes/45 days (18.4 %)	Yes/31 days (12.7 %)
Ref 1	Yes/101 days (41 percent)	--	Yes/68 days (28 percent)	Yes/43 days (17.6 %)	Yes/44 days (18.0 %)
Ref 2	Yes/117 days (48 percent)	Yes/66 days (27 percent)	Yes/70 days (29 percent)	Yes/48 days (19.7 %)	Yes/34 days (13.9 %)

Table 5. Summary of Vegetation Plot Results

Plot	Stems/Acre Counting Towards Success Criteria				
	Year 1 (2006)	Year 2 (2007)	Year 3 (2008)	Year 4 (2009)	Year 5 (2010)
1	770	730	744	1057	1294
2	670	650	664	738	852
3	640	900	854	998	1078
4	550	670	874	1176	1384
5	680	700	784	1028	988
Average of Plots 1-5	**708**	**736**	**784**	**1009**	**1130**

TABLE 3
2010 VEGETATION MONITORING DATA AND RESULTS

Note: Each plot totals 0.1 acre in size.

Community	Pine Flatwoods							
Species (Note: bold species were planted)	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5	Total Stems Plots 1-5	Total Stems/ Acre	Total Stems/Acre Counting Towards Success Criteria*
Character Tree Species (count toward success criteria)								
Acer rubrum (red maple)	4	2	3	13	3	25	50	26
***Betula nigra* (river birch)**	7	8	15	9	20	59	118	118
Diospyros virginiana (persimmon)	2		1	3		6	12	12
Liquidambar styraciflua (sweetgum)	11		2	9	1	23	46	26
***Magnolia virginiana* (sweetbay)**	6	1	3	1	6	17	34	34
Nyssa sp. (black gum)				1		1	2	2
***Pinus* sp. (pine)**	50	23	36	84	23	216	432	432
Populus heterophylla (cottonwood)	26	25	63	22	36	172	344	26
Prunus serotina (black cherry)				1		1	2	2
***Quercus falcata* (southern red oak)**				1	1	2	4	4
***Quercus michauxii* (swamp chestnut oak)**	8	18	17	5	11	59	118	118
***Quercus nigra* (water oak)**	10	6	10	10	8	44	88	88
***Quercus pagoda* (cherrybark oak)**	29	7	13	12	10	71	142	142
***Quercus phellos* (willow oak)**	7	15	3	1	9	35	70	70
Salix sp. (willow)	78	29	73	74	24	278	556	26
Ulmus sp. (elm)					2	2	4	4
Species That Don't Count Towards Success								
Baccharis halimifolia (eastern baccharis)	15	11	27	20	19	92	184	0
Rhus copallinum (winged sumac)		1	14	7	2	24	48	0
TOTAL	**253**	**146**	**280**	**273**	**175**	**1127**	**2254**	
TOTAL STEMS/PLOT COUNTING TOWARDS SUCCESS CRITERIA	**129**	**85**	**108**	**138**	**99**			
TOTAL STEMS/ACRE COUNTING TOWARDS SUCCESS CRITERIA	**1294**	**852**	**1078**	**1384**	**988**			**1130**

* Success criteria requires that no naturally recruited species may make up more than 10 percent of the 260 stem/acre total. Using this criteria, no naturally recruited species can provide more than 26 stems/acre towards success criteria (or 2.6 stems/0.1 acre plot).

4.0 REFERENCES

Environmental Laboratory. 1987. Corps of Engineers Wetland Delineation Manual. Technical Report Y-87-1. United States Army Corps of Engineers Waterways Experiment Station, Vicksburg, MS.

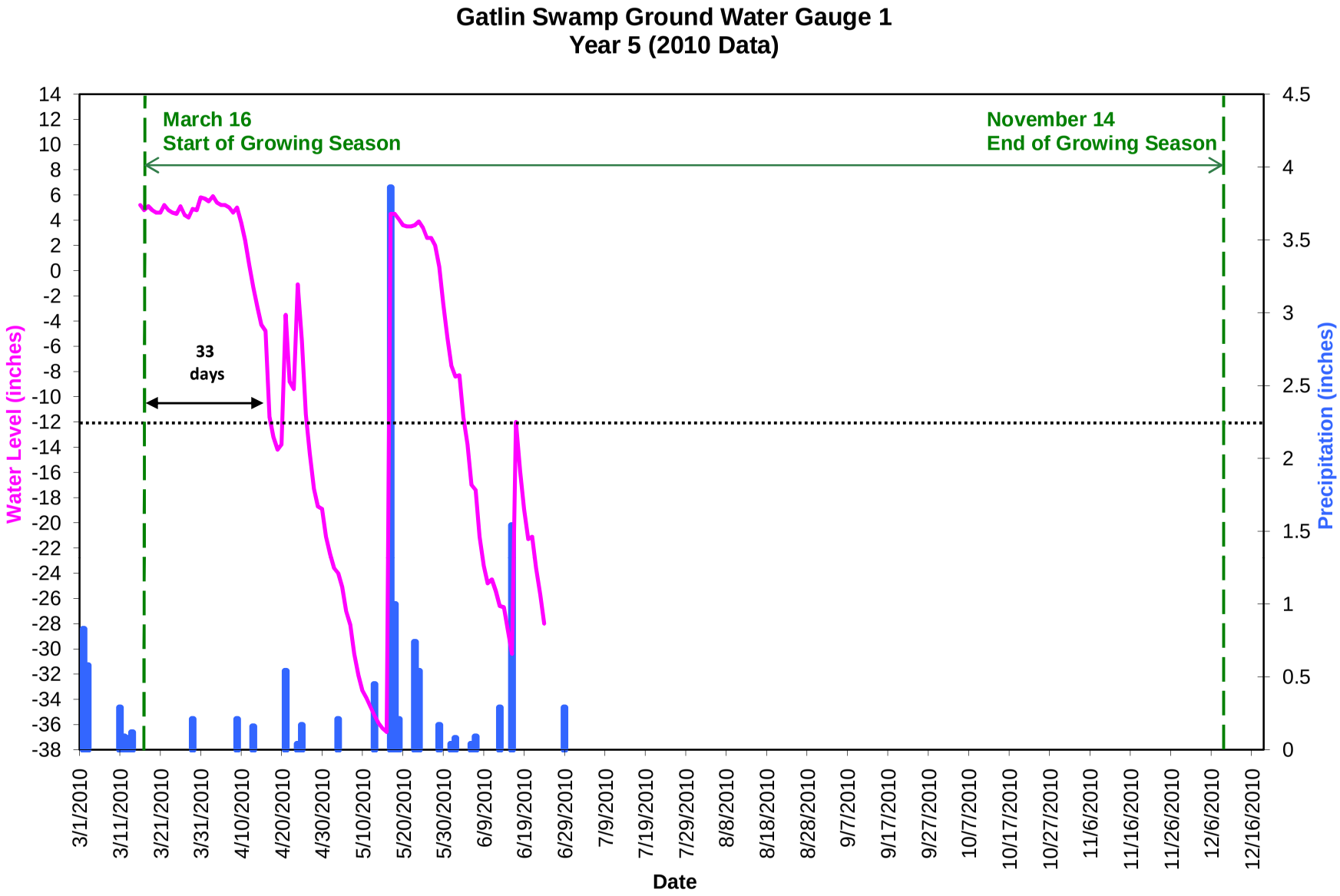
North Carolina Wetlands Restoration Program (NCWRP). 1993. Installing Monitoring Wells/Piezometers in Wetlands (WRP Technical Note HY-IA-3.1). North Carolina Department of Environment, Health, and Natural Resources, Raleigh, North Carolina.

United States Department of Agriculture (USDA). 1977. Soil Survey of Martin County, North Carolina. United States Department of Agriculture, Natural Resources Conservation Service.

United States Department of the Army (USDOA). 1993 (unpublished). Compensatory Hardwood Mitigation Guidelines. United States Army Corps of Engineers, Wilmington District.

United States Environmental Protection Agency (USEPA). 1990. Mitigation Site Classification (MiST). A Methodology to Classify Pre-Project Mitigation Sites and Develop Performance Standards for Construction and Restoration of Forested Wetlands. USEPA Workshop, August 13-15, 1989. USEPA Region IV and Hardwood Research Cooperative, North Carolina State University, Raleigh, NC.

APPPENDIX A
2010 GROUNDWATER GAUGE DATA


Gatlin Swamp Ground Water Gauge 1
Year 5 (2010 Data)
March 16
Start of Growing Season
November 14
End of Growing Season
33
days
Water Level (inches)
Precipitation (inches)
Date
14
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
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-36
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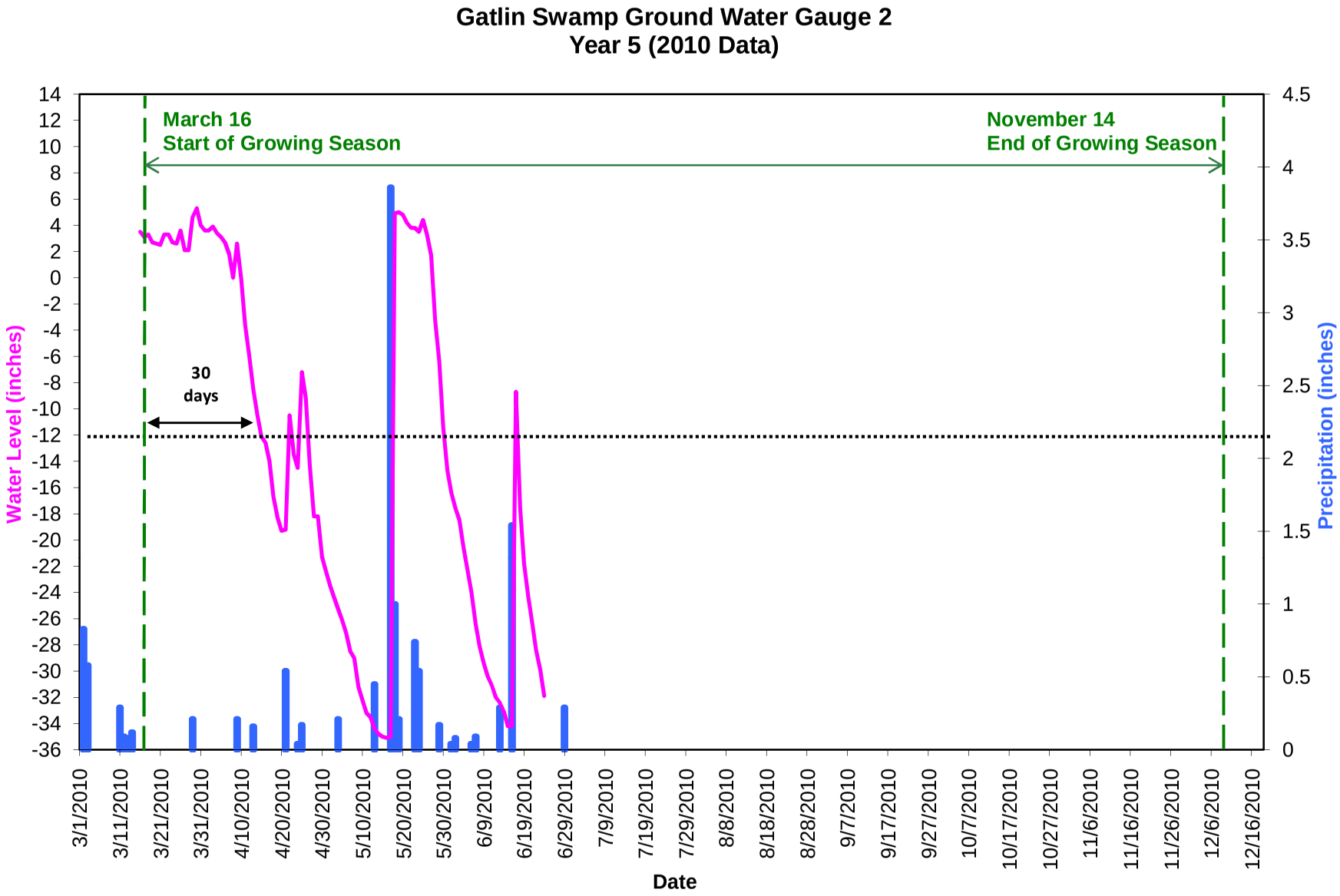
Gatlin Swamp Ground Water Gauge 2
Year 5 (2010 Data)
March 16
Start of Growing Season
November 14
End of Growing Season
30
days
Water Level (inches)
Precipitation (inches)
Date
14
12
10
8
6
4
2
0
-2
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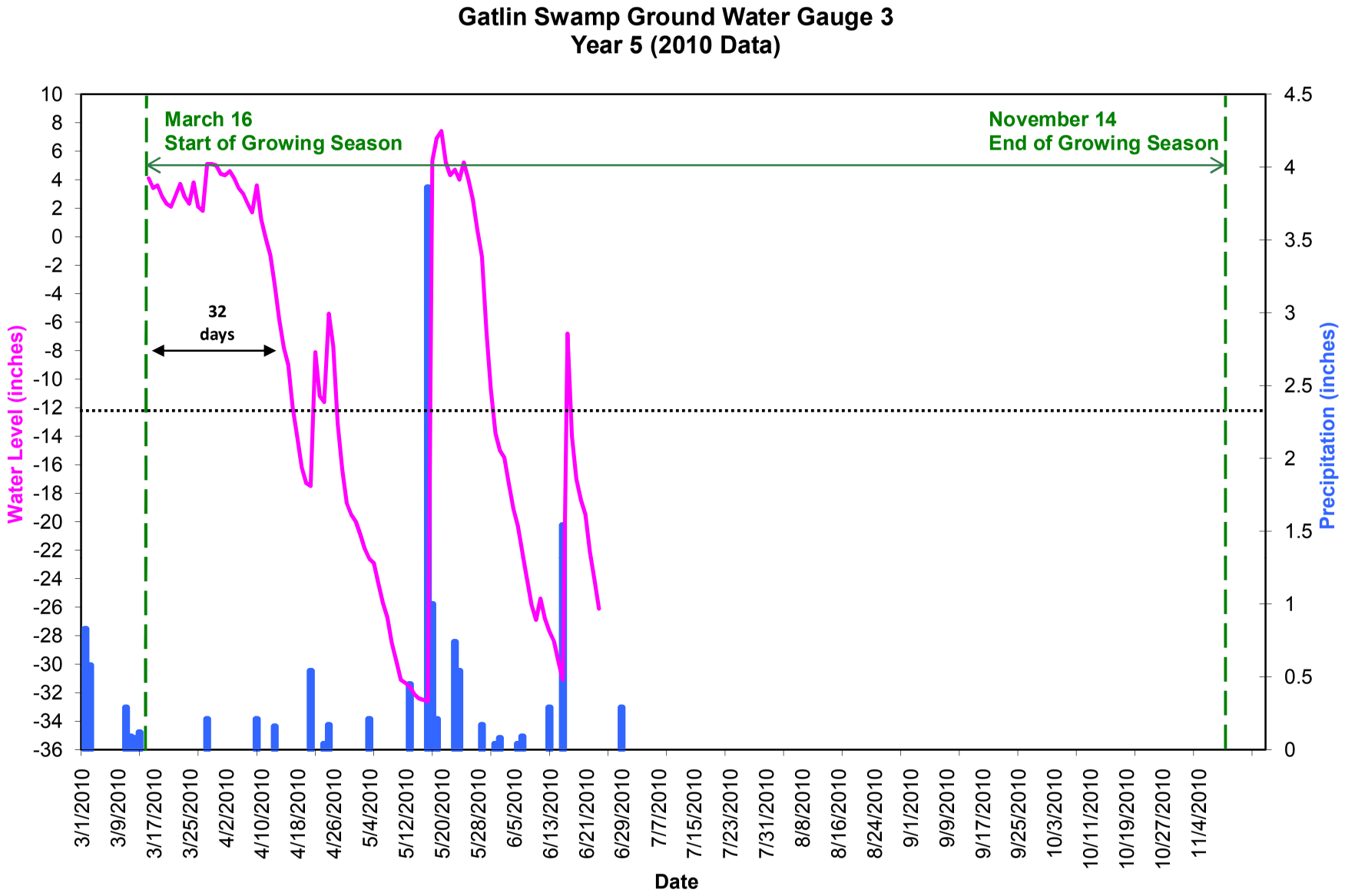
Gatlin Swamp Ground Water Gauge 3
Year 5 (2010 Data)
March 16
Start of Growing Season
November 14
End of Growing Season
32
days
Water Level (inches)
Precipitation (inches)
Date
10
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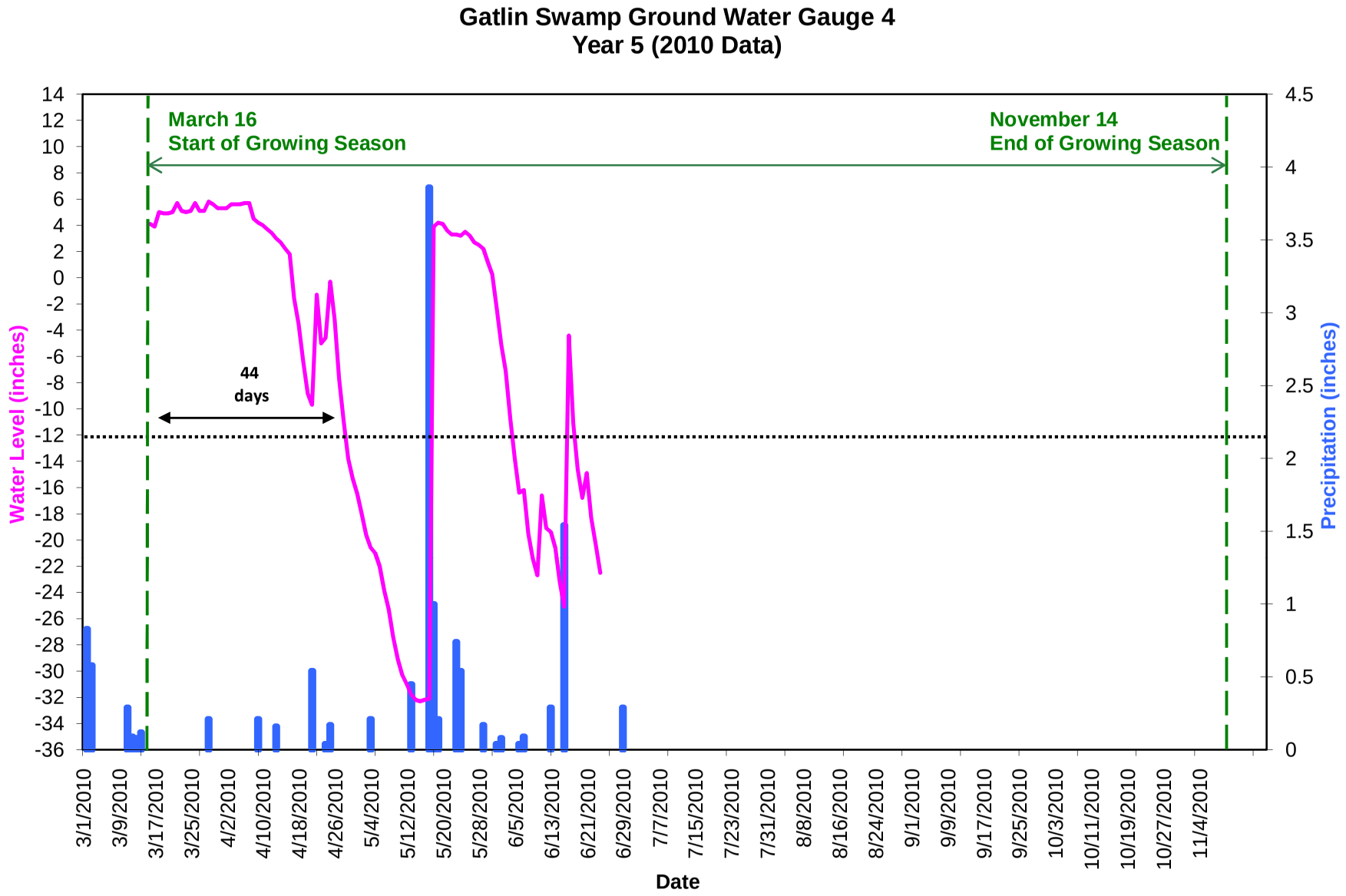
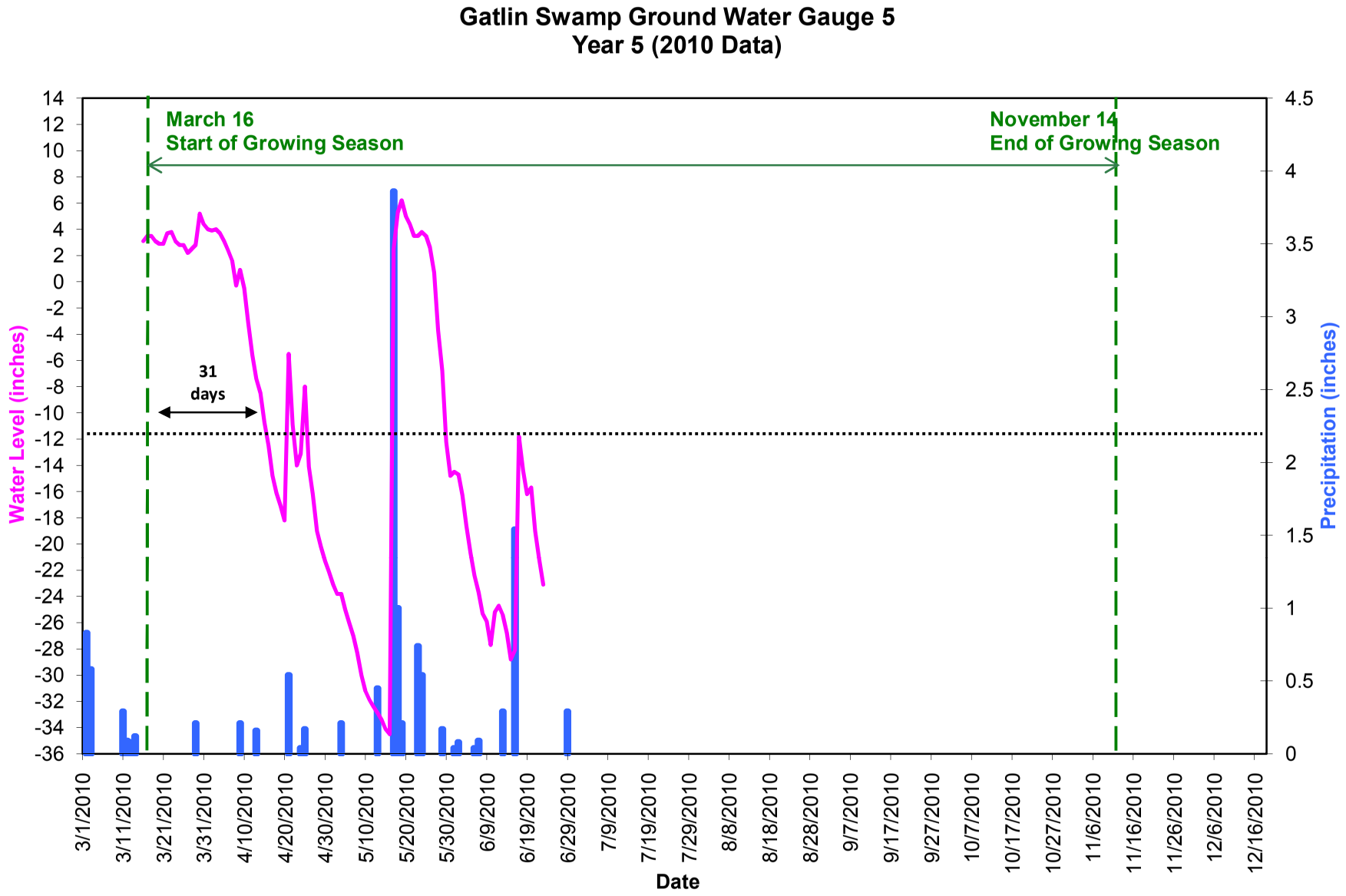
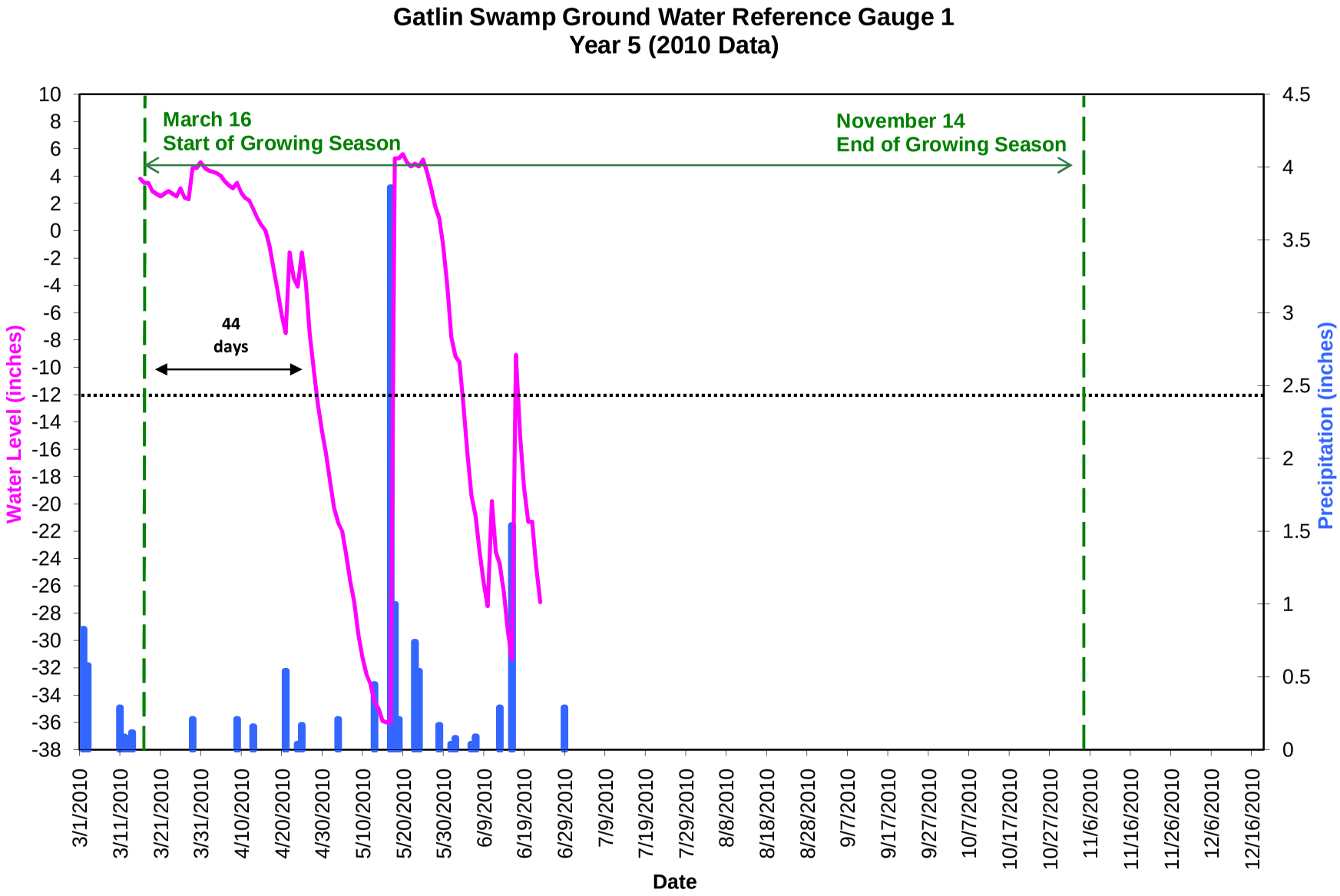
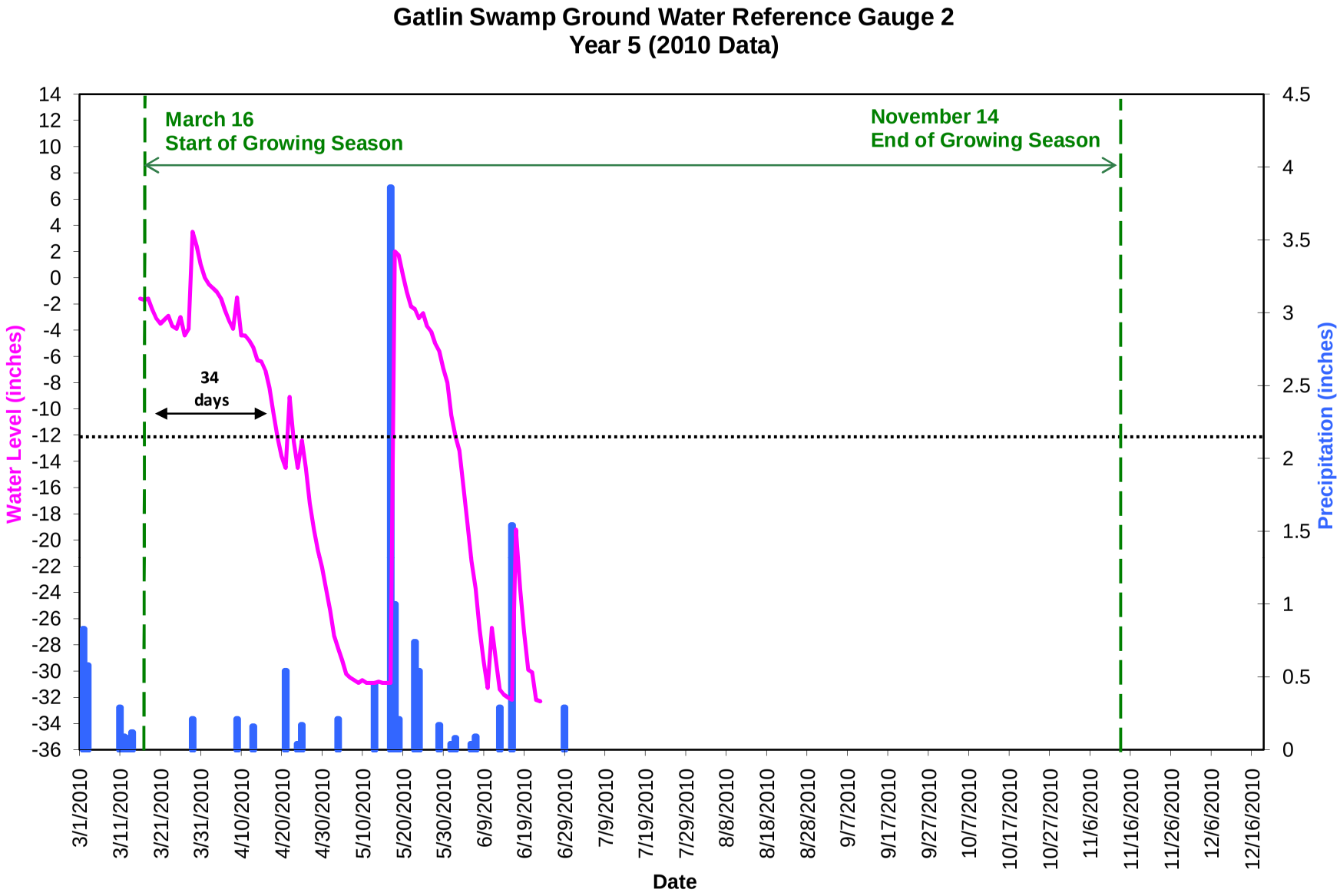
11/4/2010


Gatlin Swamp Ground Water Gauge 4
Year 5 (2010 Data)
March 16
Start of Growing Season
November 14
End of Growing Season
44
days
Water Level (inches)
Precipitation (inches)
Date
14
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
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
3/1/2010
3/9/2010
3/17/2010
3/25/2010
4/2/2010
4/10/2010
4/18/2010
4/26/2010
5/4/2010
5/12/2010
5/20/2010
5/28/2010
6/5/2010
6/13/2010
6/21/2010
6/29/2010
7/7/2010
7/15/2010
7/23/2010
7/31/2010
8/8/2010
8/16/2010
8/24/2010
9/1/2010
9/9/2010
9/17/2010
9/25/2010
10/3/2010
10/11/2010
10/19/2010
10/27/2010
11/4/2010


Gatlin Swamp Ground Water Gauge 5
Year 5 (2010 Data)
March 16
Start of Growing Season
November 14
End of Growing Season
31
days
Water Level (inches)
Precipitation (inches)
Date
14
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
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
3/1/2010
3/11/2010
3/21/2010
3/31/2010
4/10/2010
4/20/2010
4/30/2010
5/10/2010
5/20/2010
5/30/2010
6/9/2010
6/19/2010
6/29/2010
7/9/2010
7/19/2010
7/29/2010
8/8/2010
8/18/2010
8/28/2010
9/7/2010
9/17/2010
9/27/2010
10/7/2010
10/17/2010
10/27/2010
11/6/2010
11/16/2010
11/26/2010
12/6/2010
12/16/2010


Gatlin Swamp Ground Water Reference Gauge 1
Year 5 (2010 Data)
March 16
Start of Growing Season
November 14
End of Growing Season
44
days
Water Level (inches)
Precipitation (inches)
Date
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
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
3/1/2010
3/11/2010
3/21/2010
3/31/2010
4/10/2010
4/20/2010
4/30/2010
5/10/2010
5/20/2010
5/30/2010
6/9/2010
6/19/2010
6/29/2010
7/9/2010
7/19/2010
7/29/2010
8/8/2010
8/18/2010
8/28/2010
9/7/2010
9/17/2010
9/27/2010
10/7/2010
10/17/2010
10/27/2010
11/6/2010
11/16/2010
11/26/2010
12/6/2010
12/16/2010


Gatlin Swamp Ground Water Reference Gauge 2
Year 5 (2010 Data)
March 16
Start of Growing Season
November 14
End of Growing Season
34
days
Water Level (inches)
Precipitation (inches)
Date
14
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
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
3/1/2010
3/11/2010
3/21/2010
3/31/2010
4/10/2010
4/20/2010
4/30/2010
5/10/2010
5/20/2010
5/30/2010
6/9/2010
6/19/2010
6/29/2010
7/9/2010
7/19/2010
7/29/2010
8/8/2010
8/18/2010
8/28/2010
9/7/2010
9/17/2010
9/27/2010
10/7/2010
10/17/2010
10/27/2010
11/6/2010
11/16/2010
11/26/2010
12/6/2010
12/16/2010

APPPENDIX B
VEGETATION PLOT PHOTOGRAPHS

Gatlin Swamp Wetland Restoration Site
Vegetation Plot Photographs
Taken June 2010

Veg Plot 1

Veg Plot 2

Veg Plot 3

Veg Plot 4

Veg Plot 5