Modlin Property Wetland Mitigation Project
Martin County, NC

2010 Annual Monitoring Report
Year 4

NCEEP Project Number D050241
Roanoke River Basin

Submitted to
NCDENR/Ecosystem Enhancement Program
2728 Capital Blvd.
Raleigh, NC 27604

Date: October, 2010

Monitoring:
Albemarle Restorations, LLC
P. O. Box 176
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Ecosystem Enhancement PROGRAM

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Executive Summary

The Modlin Property Wetland Mitigation Site is a riverine wetland project located on Poplar Chapel Road near Jamesville, in Martin County, North Carolina. It was constructed by Albemarle Restorations, LLC, under contract with EEP to provide compensatory wetland mitigation credits in the Roanoke River Basin. Construction activities, in accordance with the approved restoration plan, began October 13, 2006, and were completed on March 12, 2007. Tree and shrub planting on the project site occurred between April 1st and 4th, 2007. An emergent wetland seed mixture was sown at the end of April, 2007. The planting plan produced three distinct plant communities. The lowest, wettest zone which surrounds the drainage course is an emergent wetland community dominated by hydrophytic herbaceous species. The next step up in the flood plain is a shrub/scrub zone planted with woody shrubs and trees. The highest and largest community is a forested wetland ecosystem consisting of both trees and woody shrubs. All planting was done in accordance with the approved restoration plan.

Hydrologic monitoring began in 2007 with the installation of six water level monitoring gauges at varying elevations throughout the site to measure subsurface water elevations. Two more gauges were added in 2009 to help determine the effects perimeter ditches and compacted soils are having on hydrology in part of the project. This year (2010), two of the original onsite gauges (1 and 4) failed to meet the hydrologic success criterion of maintained groundwater levels within 12 inches of the soil surface for 21 consecutive days during the growing season. Precipitation patterns resulted in rainfall drought conditions for a large portion of the growing season including the early portion when rainfall is critical to hydrologic success. The two additional gauges that were installed last year helped to define the area of the project that required remedial treatment. In September of 2010, 5 acres around Gauge/Plot 1 were subsoiled to break up heavy surface compaction and improve water infiltration and retention.

Four vegetative monitoring plots were installed and permanently monumented, one coincident with each of the original monitoring gauges, such that both forested and shrub/scrub vegetative communities are represented. Each plot is a 10m X 10m square, as recommended by the CVS-EEP Protocol for recording vegetation sampling. All four plots met the year 5 success criterion of 260 living planted stems per acre this year, a success rate of 100%. Table ES-1 shows the levels of success attained by each of the water level monitoring gauges and the vegetation plots since monitoring began. Success criterion for hydrology is 8% of the growing season (21 days). Table C-1 in Appendix C has the actual number of days of hydrologic success. Success criterion for the vegetation plots is 260 live stems per acre (the year 5 level of survival).

Table ES-1. Project Success Summary

	Gauge (longest hydro-period as a percent of the growing season)								Percent	Veg. Plot				Percent
	1	1A	2	3	4	5	6	7 REF	Success	1	2	3	4	Success
Yr 1 (2007) Success	1.2		2.4	0	2	0	1	N/A	0%	Y	N	N	N	25%
Yr 2 (2008) Success	2.4		38	5.9	6.3	23.9	7.1	14.5	33%	Y	Y	Y	Y	100%
Yr 3 (2009) Success	3.6	4.7	20.4	18.8	9.8	19.6	18.8	23.9	71%	Y	Y	Y	Y	100%
Yr 4 (2010) Success	1.5	7.1	16.1	10.6	4.7	12.2	13.7	15.3	57%	Y	Y	Y	Y	100%

Percentage of the growing season gauge showed continuous hydrology: Green: met 8%, Red: did not.

* Gauge 7 is a reference gauge and is not included in the Percent Success

I. Project Background

1.0 Project Objectives

The goal of the Modlin Property Mitigation Project was to create a riverine wetland system typically found in the middle to upper reaches of first or zero order tributary systems. The project is to serve as compensation for wetland loss in the Roanoke River Basin. The mitigation plan was developed and implemented to eliminate pattern drainage and restore topography and hydrology that more closely resembled that of similar undisturbed land. Construction resulted in the development of a broad, frequently flooded swamp run following the historical path as evidenced by aerial photographs and signature topography. Subsequent planting was designed to restore a wetland forest ecosystem that is typically found in the immediate area characteristic of similar soils, topography and hydrology.

The specific project goals and objectives include:

1) Provide floodflow attenuation.
2) Water quality improvement through sediment, toxicant, and nutrient retention and reduction.
3) Slow over bank flow rates and provide storage and desynchronization of flood waters.
4) Alleviate downstream flooding issues by lessening the effect of pulse or flashy flows.
5) Provide shading through forest cover to reduce algae growth and associated low dissolved oxygen levels in surface water moving through the site.
6) The production and export of food sources.
7) The creation of wildlife habitat and recreational opportunities.

2.0 Project Structure, Restoration Type, and Approach

Table I lists the estimated wetland acreage to be restored on the Modlin Property. The mitigation plan provides for the restoration of 40.0 acres of riverine wetlands. Prior to construction, the 40.0 acre easement area was used entirely for row crop agriculture, primarily soy beans and cotton. A drainage ditch, built in the 1970's, divided the project area and provided drainage of the seasonally high water table to allow the agricultural uses. Construction activities, in accordance with the approved restoration plan, began in October, 2006 with the removal of existing hedgerows from within the project area. Some of the whole trees found in the hedgerows were placed along the length of the restored swamp run to facilitate water retention and to provide wildlife habitat. Also included as part of the water retention strategy is a low berm, approximately three quarters of the way down the swamp run that functions like a natural ridge within a swamp by creating a "pinch-point", which helps create back-flooding across the restored floodplain. In its entirety, the project functions as a broad hardwood flat that is subject to seasonal periodic flooding. The lower end of the swamp run retains water for longer periods which contributes to the vegetation diversity, as does the increase in site elevation moving laterally away from the run. Other topographical features include irregular depressions that remain flooded or wet for most of the year.

Table I. Project Restoration Components Modlin Property Wetland Mitigation Site/EEP #D050241				
Restoration Type	**Pre-Existing Acreage**	**Post Construction Acreage**	**Credit Ratio WMU**	**Wetland Mitigation Units**
Riverine Wetland	0.0	40.0	1:1	40.0
			Total	40.0

3.0 Location and Setting

The Modlin Property Mitigation Site is located in Martin County, approximately 4.5 miles southeast of Jamesville, NC on Poplar Chapel Road. The easement area is situated in the middle of the Modlin property, also known locally as the Cooper Swamp Farm and lies along the mid and upper reaches of an unnamed tributary to Cooper Swamp. Downstream from this site, the tributary flows almost exclusively through wooded areas containing extensive wetland communities before emptying into the main run of Cooper Swamp. The surrounding area is primarily forest and agricultural land with residential properties as a minor component.

Figure 1 is a location map for the project site. Directions to the site are as follows: travel east from Jamesville on US Hwy 64 approximately 3.8 miles and turn right (south) on Poplar Chapel Rd. Access to the site is approximately 1.5 miles south of US Hwy 64, on the left via a farm path.

4.0 Project History and Background

Table II provides the history of data collection and actual completion of various milestones of the Modlin Property Wetland Mitigation Site.

Table II. Project Activity and Reporting History Modlin Property Wetland Mitigation Project/EEP D050241		
Activity or Report	**Data Collection Complete**	**Actual Completion or Delivery**
Restoration Plan	Feb. 2006	June 2006
Final Design -90%	Feb. 2006	June 2006
Construction	N/A	March 2007
Temporary S & E mix applied to entire project area	N/A	April 2007
Permanent seed mix applied to entire project area	N/A	April 2007
Containerized and Bare Root Planting	N/A	April 2007
Mitigation Plan/As-built (Year 1 monitoring - baseline)	Oct. 2007	December 2007
Year 2 monitoring	September 2008	December 2008
Year 3 monitoring	September 2009	December 2009
Year 4 monitoring	September 2010	October 2010
Year 5 monitoring		

ALBEMARLE RESTORATIONS, LLC
WETLAND RESTORATION,
STREAM RESTORATION,
& WILDLIFE HABITAT CREATION
404 COURT STREET • SATTERWILLE, NC 27608
(252) 333-0249 • FAX (252) 357-4892
ECOTONE, INC.
ENVIRONMENTAL CONSULTING, PERMITTING & DESIGN,
FOREST & WETLAND CREATION &
STREAM RESTORATION.
P.O. BOX 5• 1304 BALTIMORE MILL ROAD• JARRETTSVILLE, MARYLAND 21084
(410) 692-7500• FAX (410) 692-7503• EMAIL: INFO@ECOTONEINC.COM
PLAN PREPARED BY:
EnhancementSystem
MODLIN PROPERTY
RIVERINE WETLAND MITIGATION MONITORING
40.0 ACRES
MARTIN COUNTY, NORTH CAROLINA
EEP CONTRACT #: D06024-I
VICINITY MAP
DECEMBER 10, 2007
FIGURE 1
LEGEND
PROPERTY LINE
EASEMENT BOUNDARY
2,000
1,000
0
1,000
PROPERTY BOUNDARY
EASEMENT BOUNDARY
RIVERINE WETLAND MITIGATION, 40 ACRES
Fleming
Poplar Chapel
Cem
BM 38
BM 35
1561
1562
1552
1553
1510
64
46
45
40
35
LOCATION AND SETTING
The Modlin Property Mitigation Site is located in Martin County, approximately 4.5 miles southeast of Jamesville, NC on Poplar Chapel Road. The easement area is situated in the middle of the Modlin Property, also known locally as the Cooper Swamp Farm and lies along the mid and upper reaches of an unnamed tributary to Cooper Swamp. Downstream from this site, the tributary flows almost exclusively through wooded areas containing extensive wetland communities before mingling into the main run of Cooper Swamp. The surrounding area is primarily forest and agricultural land with residential properties as a minor component.
Directions to the site are as follows: travel east from Jamesville on US Hwy 64 approximately 3.3 miles and turn right (south) on Poplar Chapel Road. Access to the site is approximately 1.5 miles south of US Hwy 64, on the left via a farm path.

Points of contact for the various phases of the MPWMS are provided in Table III.

Table III. Project Contacts Modlin Property Wetland Mitigation Site/EEP #D050241	
Designer Primary Project design POC	Ecotone, Inc. 1204 Baldwin Mill Road Jarrettsville, MD 21804 Scott McGill (410-692-7500)
Construction Contractor Construction contractor POC	Armstrong, Inc. P. O. Box 96 25852 US Hwy 64 Pantego, NC 27860 Tink Armstrong (252-943-2082)
Planting Contractor Planting contractor POC	Williams Forestry Service, Inc. P. O. Box 189 Millville, PA 17846 Christian Duffy (570-458-0766)
Seeding Contractor Seed planting contractor POC	Carolina Silvics, Inc. 908 Indian Trail Road Edenton, NC 27932 Mary-Margaret McKinney (252-482-8491)
Seed mix sources	Earnst Conservation Seeds, LLP, Meadville, PA
Nursery stock suppliers	Williams Forestry Service, Inc., International Paper, Inc.
Monitoring Consultants Wetland and Vegetation POC	Woods, Water and Wildlife, Inc. P. O. Box 176 Fairfield, NC 27826 Ashby Brown (800-509-0190)

Project background information for the MPWMS is provided in Table IV.

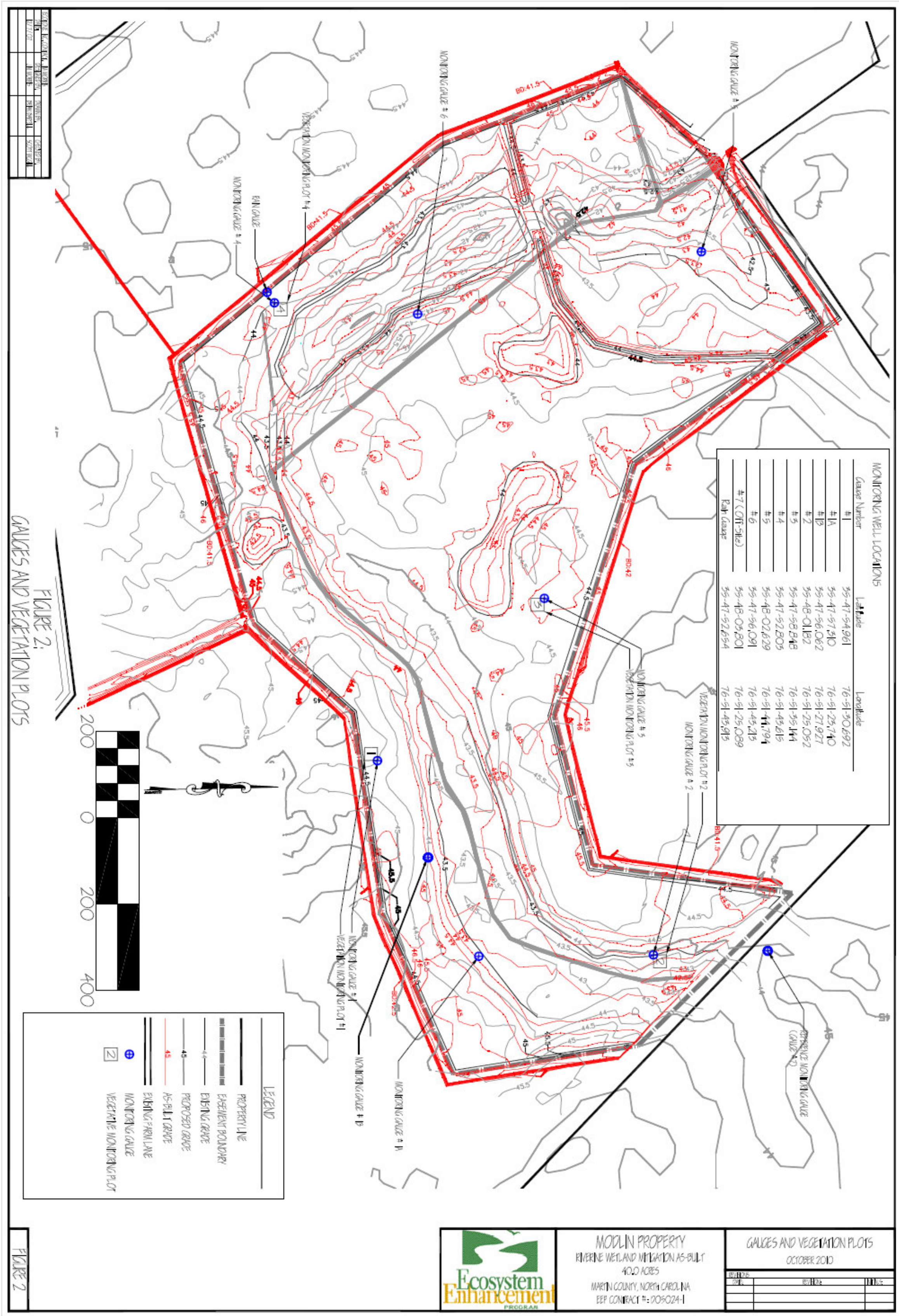
Table IV. Project Background Modlin Property Wetland Mitigation Site/EEP #D050241	
Project County	Martin County
Drainage Area	40.0 acres within easement boundary.
Drainage impervious cover estimate (%)	0
Physiographic Region	Coastal Plain
Ecoregion	8.5.1 Middle Atlantic Coastal Plain
Rosgen Classification of As-built	N/A
Cowardin Classification	PEM, PSS, PFO
Dominant Soil Types	Bethera loam, Lenoir loam
Reference site ID	Cooper Swamp, Martin County, NC
USGS HUC for Project and Reference	03010107
NCDWQ Sub-basin for Project and Reference	03-02-09
NCDWQ classification for Project and Reference	C
Any portion of any project segment 303d listed?	No
Any portion of any project segment upstream of a 303d listed segment?	No
Reasons for 303d listing or stressor?	N/A
% of project easement fenced	Gate at access path

5.0 Monitoring Plan View

This year there were are eight water level monitors (gauges) installed at key locations across the property. These loggers are suspended in two-inch pvc pipe that is set approximately four feet vertically into the ground. The loggers have been located to assess the groundwater levels throughout the year at various elevations and topographies within the site. In addition, there is a rain gauge on site to capture and record onsite precipitation.

Vegetation monitoring is accomplished by resurveying the four permanent sampling plots. Each plot is referenced by a monitoring gauge which serves as the plot origin and as a photo station for that plot. The plots are ten meters square and are situated to give an accurate sample of the planted and natural woody vegetation. For each site, the data recorded matches that required of the *CVS-EEP Protocol for Recording Vegetation, v 4.0, 2006,* level 1-2.

Figures 2 and 3 provide plan views of the site showing all monitoring features including gauges, sampling plots and the rain gauge.



MONITORING WELL LOCATIONS
Gauge Number | Latitude | Longitude
#1 | 35-47-54.961 | 76-51-30.692
#1A | 35-47-57.310 | 76-51-23.740
#1B | 35-47-56.062 | 76-51-27.927
#2 | 35-48-01.182 | 76-51-25.052
#3 | 35-47-58.848 | 76-51-35.144
#4 | 35-47-52.803 | 76-51-43.615
#5 | 35-48-02.629 | 76-51-44.794
#6 | 35-47-56.091 | 76-51-43.215
#7 (Off-Site) | 35-48-05.801 | 76-51-25.089
Rain Gauge | 35-47-52.654 | 76-51-43.915
MONITORING GAUGE # 5
MONITORING GAUGE # 6
VEGETATION MONITORING PLOT # 4
RAIN GAUGE
MONITORING GAUGE # 4
MONITORING GAUGE # 3
VEGETATION MONITORING PLOT # 3
VEGETATION MONITORING PLOT # 2
MONITORING GAUGE # 2
REFERENCE MONITORING GAUGE (GAUGE # 7)
MONITORING GAUGE # 1A
MONITORING GAUGE # 1B
MONITORING GAUGE # 1
VEGETATION MONITORING PLOT # 1
LEGEND
PROPERTY LINE
EASEMENT BOUNDARY
EXISTING GRADE
PROPOSED GRADE
AS-BUILT GRADE
EXISTING FARM LANE
MONITORING GAUGE
VEGETATIVE MONITORING PLOT
200 0 200 400
FIGURE 2:
GAUGES AND VEGETATION PLOTS
Ecosystem Enhancement PROGRAM
MODLIN PROPERTY
RIVERINE WETLAND MITIGATION AS-BUILT
40.0 ACRES
MARTIN COUNTY, NORTH CAROLINA
EEP CONTRACT #: D05024-1
GAUGES AND VEGETATION PLOTS
OCTOBER 2010
FIGURE 2

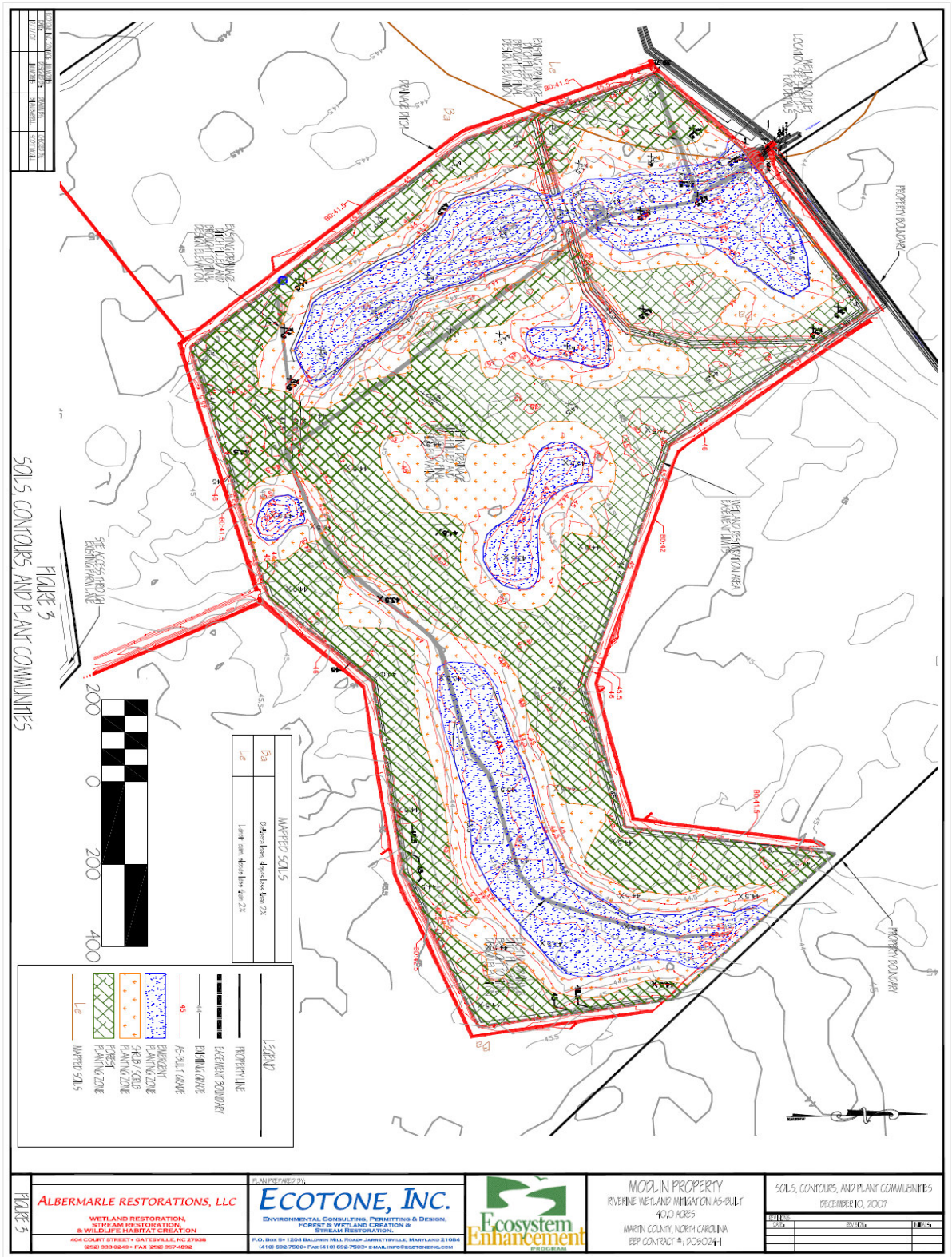


FIGURE 3
SOILS, CONTOURS AND PLANT COMMUNITIES
ALBEMARLE RESTORATIONS, LLC
WETLAND RESTORATION, STREAM RESTORATION, & WILDLIFE HABITAT CREATION
ECOTONE, INC.
ENVIRONMENTAL CONSULTING, PERMITTING & DESIGN, FOREST & WETLAND CREATION & STREAM RESTORATION
Ecosystem Enhancement Program
MODLIN PROPERTY
RIVERINE WETLAND MITIGATION AS-BUILT
40.0 ACRES
MARTIN COUNTY, NORTH CAROLINA
EEP CONTRACT #: 305024
SOILS, CONTOURS, AND PLANT COMMUNITIES
DECEMBER 10, 2007

II. Project Condition and Monitoring Results

1.0 Vegetation Assessment

The vegetation success criterion was developed in accordance with the CVS-EEP protocol. The Modlin project was planned to include various plant communities. The Palustrine emergent (PEM) wetland zone immediately adjacent to the drainage course and other isolated depressions are populated by vegetation consisting primarily of herbaceous material, grasses, sedges and other hydrophytic plants. Beyond the emergent zone is the Palustrine shrub/scrub (PSS) community consisting of a mixture of woody shrubs interspersed with trees. The emphasis in this zone is on the shorter, scrubby vegetation typical of lower areas of native branch bottoms and poorly drained, broad hardwood flats. The outer, largest Palustrine forested (PFO) zone was planted to a mixture of trees and shrubs, but with the emphasis on trees. The species mix was based on the vegetation noted at the two reference sites and all species are classified from FAC to OBL (Table V). The site was planted at a rate of 350 stems per acre in the spring of 2007. Due to poor survival attributed to the drought conditions experienced during the first growing season, replacement planting and supplemental planting took place in the winter of 2008. The species used were chosen from Table V.

Table V. Species by Community Type		
Modlin Property Wetland Mitigation Project/EEP #D050241		
Forested Wetland 18.5 Acres		
Common Name	**Scientific Name**	**Wetland Indicator Status**
Bald Cypress	Taxodium distichum	OBL
Red Maple	Acer rubrum	FACW-
Water tupelo	Nyssa aquatica	OBL
Swamp Black Gum	Nyssa biflora	FAC
Willow Oak	Quercus phellos	FACW-
Swamp White Oak	Quercus bicolor	FACW+
Water Oak	Quercus nigra	FAC
Highbush Blueberry	Vaccinium corymbosum	FACW
Swamp Cyrilla	Cyrilla racemiflora	FACW
Sweet Pepperbush	Clethra alnifolia	FACW
Virginia Sweetspire	Itea virginica	FACW+
Button Bush	Cephalanthus occidentalis	OBL
Shrub/Scrub 11.85 Acres		
Common Name	**Scientific Name**	**Wetland Indicator Status**
Button Bush	Cephalanthus occidentalis	OBL
Tag Alder	Alnus serrulata	FACW
Wax Myrtle	Myrica cerifera	FAC+
Black Willow	Salix nigra	OBL
Gallberry	Ilex glabra	FACW
Swamp Cyrilla	Cyrilla racemiflora	FACW
Highbush Blueberry	Vaccinium corymbosum	FACW
Sweetbay	Magnolia virginiana	FACW+

1.1 Vegetation Discussion and Problem Areas

All four plots met the Year 5 success criterion of a minimum of 260 stems per acre. Over the entire project, the survival rate averaged 486 live stems per acre. A total of 12 different species were tallied in September of 2010. Once again, willow oak (Q. phellos) and bald cypress (T. distichum) showed the best survival rates.

Rainfall data collected on site show total precipitation for January through September 2010 to be well below normal with an 11.52" deficit. It appears that lack of rain had little effect on vegetation mortality, but intense herbaceous competition continues to take a toll on vegetation development and growth. The photos in Appendix C illustrate the dense, heavy layer of vegetation that the trees and shrubs must compete with for scarce moisture during the peak of the growing season.

1.2 Vegetation Monitoring Plan View (Integrated)

Figure 4 in Appendix D illustrates an area of the site where hydrology is a potential problem, but there are no apparent micro scale problems with vegetation.

2.0 Wetland Assessment

The hydrologic success criterion is to achieve a minimum of 21 consecutive days where the groundwater level is within 12 inches of the soil surface during the growing season. The growing season for this site is from March 10 to November 20, a period of 255 days (WETS Table for Williamston, Martin County, NC). Success for any particular monitoring location is to show soil saturation to within 12 inches of the surface for 21 consecutive days during that period.

There are eight continuous water level monitoring devices deployed across the site (Gauges 1-6, 1A and 1B) to monitor fluctuations in the water table within the project area. A rain gauge is also kept onsite and its data are compared to that collected at the NOAA cooperator site in Willimaston, NC. To further gauge the affect of seasonal and annual variations in precipitation in restored wetlands, hydrologic success of the site was assessed in relation to the reference wetland site (Gauge 7).

2.1 Wetland Discussion and Problem Areas

Total monthly rainfall through March was very near normal, but April saw a severe deficit (2.33 inches). Gauges 1 and 4 were the only two that did not show successful hydrology, although gauge 4 performed much better than gauge 1 as has been the case for the past two years. The possibility of connectivity to the perimeter ditches near these two gauges was investigated in the spring of 2010 and it was determined that the ditch had little, if any effect on gauge 4, especially in light of the fact that with spring rainfall near normal as in 2009, gauge 4 showed successful hydrology (25 days in March/April of 2009 and another 15 days in April of 2009). But rainfall patterns in 2010 were such that the hydrology around gauge 4 was unsuccessful. While March rainfall was near normal, only 1.9 inches fell after the 15th of the month, followed by a total of

.83 inches in April. The result was a 45 day period when total rainfall amounted to only 2.73 inches. This is a critical period for hydrology success since it is tied to the start of the growing season.

The hydrology pattern around gauge 1 continued to be unsuccessful and in fact, largely unchanged since monitoring began in 2007. Since gauge 4 is actually closer to the perimeter ditch than gauge 1, and gauge 4 will show successful hydrology given normal rainfall patterns, the problem at gauge 1 appeared to be something other than connectivity to the perimeter ditch. Despite that, and in order to make all efforts toward successful hydrology, the perimeter ditch at gauge 1 was plugged in both directions and the berm was reshaped to allow overflow from the ditch onto the project (as protection to the adjoining land).

Also, after experimenting with various configurations of additional gauges (1A and 1B**) near gauge 1, it was determined that soil compaction may be at least a contributing factor to the problem since plugging the perimeter ditch had little affect on groundwater levels within the project site. To alleviate the potential problem of compacted soil, five acres along the perimeter ditch from west of gauge 1 all the way to gauge 1A were subsoiled to a depth of approximately 24 to 30 inches in September of 2010. The photos in Appendix C show good fracturing of the clay layers since the ground was extremely dry when subsoiling was done. Gauges 1, 1A and 1B were reset after subsoiling and monitoring will continue. The area will receive supplemental planting with appropriately sized stock in the fall of 2010.

** Gauge 1B was moved several times during the year to collect data at various spots. Its chart is not included in this report.

2.2 Wetland Monitoring Plan View (Integrated)

Figure 4 in Appendix D provides an overview of the site. The area shaded in green on the plan view indicates where subsoiling took place and where replanting will be done in the fall of 2010. The remainder of the site appears to be functioning properly in the event of normal rainfall.

Table VI. Hydrology and Vegetation Criteria Success by Plot
Modlin Property Wetland Mitigation Project/EEP #D050241

Well	Hydrology Success Met	Hydrology Mean	Vegetation Plot	Vegetation Success Met	Vegetation Mean
1	N	57%	1	Y	100%
1A	N		2	Y	
2	Y		3	Y	
3	Y		4	Y	
4	N				
5	Y				
6	Y				
7	Y*				

*Well 7 is on the reference site

3.0 Project Success Discussion

During the first two years of monitoring on the Modlin site, the Jamesville area had been almost continuously classified as being in a moderate to severe rainfall drought according to the United States Drought Monitor. Because of the drought conditions, the groundwater table had been below normal, thereby hindering normal wetland hydrology from becoming established on the site. In the third year of monitoring, with close to normal precipitation, hydrology appeared to be responding appropriately at all but one gauge. The area around gauge 1 has been a perennial problem since monitoring began, so remedial action was taken in 2010 to enhance the hydrology in that part of the project. The remainder of the site appears to have regained wetland functions, showing rapid recharge of groundwater, and longer hydroperiods especially in the presence of normal precipitation.

Vegetation criteria have been met for monitoring year 4, with 100% of surveyed plant material being FAC or wetter. The survival of the planted species, colonization of the site by wetland pioneer species, the presence of herbaceous hydrophytes and greater hydrology success all points toward overall success for the site.

III. Methodology Section

Year 4 monitoring for the Modlin project occurred in 2010. Monitoring and vegetation sampling procedures were established in the mitigation plan for this project and no deviations were made.

Appendix A

Vegetation Data Tables

Site Photos

1. Vegetation Data Tables

Table 1. Project Metadata

Report Prepared By	Ashby B. Brown
Date Prepared	9/23/2010 16:05
DESCRIPTION OF WORKSHEETS IN THIS DOCUMENT----------	
Metadata	This worksheet, which is a summary of the project and the project data.
Vigor by Spp	Frequency distribution of vigor classes listed by species.
Damage by Spp	Damage values tallied by type for each species.
Damage by Plot	Damage values tallied by type for each plot.
ALL Stems by Plot and spp	Count of total living stems of each species (planted and natural volunteers combined) for each plot; dead and missing stems are excluded.
PROJECT SUMMARY----------	
Project Code	D050241
project Name	Modlin Riverine
Description	Modlin property Riverine Wetland mitigation project, Martin county, NC
River Basin	Roanoke
Sampled Plots	4

Table 2. Vegetation Vigor by Species

	Species	4	3	2	1	0	Missing
	Alnus serrulata			1			
	Clethra alnifolia		1				
	Cyrilla racemiflora			1			
	Ilex glabra		1				2
	Nyssa biflora		1				
	Quercus bicolor		3	1	1		2
	Quercus phellos	3	8	2			9
	Salix nigra						1
	Taxodium distichum	4	6	1			3
	Vaccinium corymbosum	2	2				1
	Magnolia virginiana		4	1			1
	Acer rubrum		1	2			
	Unknown						1
	Myrica cerifera	2					
TOT:	**14**	**11**	**27**	**9**	**1**		**20**

Table 3. Vegetation Damage by Species

	Species	All Damage Categories	(no damage)
	Acer rubrum	3	3
	Alnus serrulata	1	1
	Clethra alnifolia	1	1
	Cyrilla racemiflora	1	1
	Ilex glabra	3	3
	Magnolia virginiana	6	6
	Myrica cerifera	2	2
	Nyssa biflora	1	1
	Quercus bicolor	7	7
	Quercus phellos	22	22
	Salix nigra	1	1
	Taxodium distichum	14	14
	Unknown	1	1
	Vaccinium corymbosum	5	5
TOT:	**14**	**68**	**68**

Table 4. Vegetation Damage by Plot

	Plot	All Damage Categories	(no damage)
	D050241-ABET-0001-year:3	15	15
	D050241-ABET-0002-year:3	20	20
	D050241-ABET-0003-year:3	18	18
	D050241-ABET-0004-year:3	15	15
TOT:	**4**	**68**	**68**

Table 5. Planted Stem Count by Plot and Species

	Species	Total Planted Stems	# plots	avg# stems	plot D050241-ABET-0001-year:4	plot D050241-ABET-0002-year:4	plot D050241-ABET-0003-year:4	plot D050241-ABET-0004-year:4
	Acer rubrum	3	1	3	3			
	Alnus serrulata	1	1	1				1
	Clethra alnifolia	1	1	1		1		
	Cyrilla racemiflora	1	1	1				1
	Ilex glabra	1	1	1	1			
	Magnolia virginiana	5	2	2.5		2	3	
	Myrica cerifera	2	1	2				2
	Nyssa biflora	1	1	1	1			
	Quercus bicolor	5	3	1.67	3	1	1	
	Quercus phellos	13	3	4.33	2		8	3
	Taxodium distichum	11	3	3.67	2	6	3	
	Vaccinium corymbosum	4	2	2		1		3
TOT:	**12**	**48**	**12**		**12**	**11**	**15**	**10**
	Stems per acre				486	445	607	405
	Average stems per acre	486						

Table 6. Vegetation Problem Areas			
Feature/Issue	Plot	Probable Cause	Photo #
Herbaceous competition causing slow tree and shrub growth	All, but a minor problem at this point. Most stems are well established.	Dense herbaceous cover	Visible in all general photos

2. Site Photos

Ditch near Gauge 1 after plugging

Reprofiling of berm near Gauge 1 to allow water onto site

Low areas are completely filled in April of 2010


Extremely dense herbaceous vegetation in Sept. Blueberry bush in heavy competition

A view after subsoiling in September of 2010

Another view of subsoiled area showing good clay fracturing

View of subsoiled area near Gauge/Plot 1

A healthy Cypress stem in extremely dense herbaceous layer

Appendix B

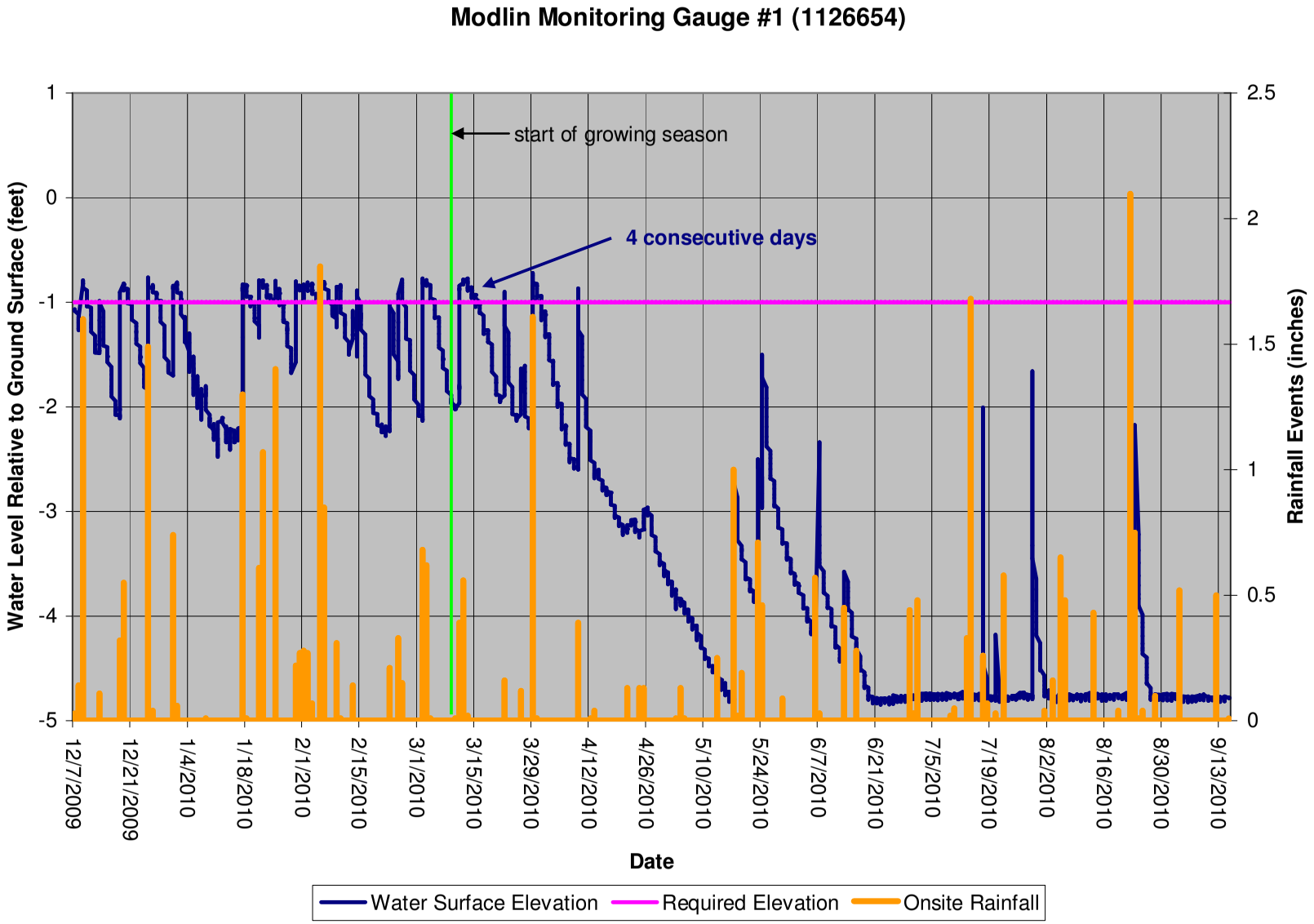
Geomorphologic Raw Data

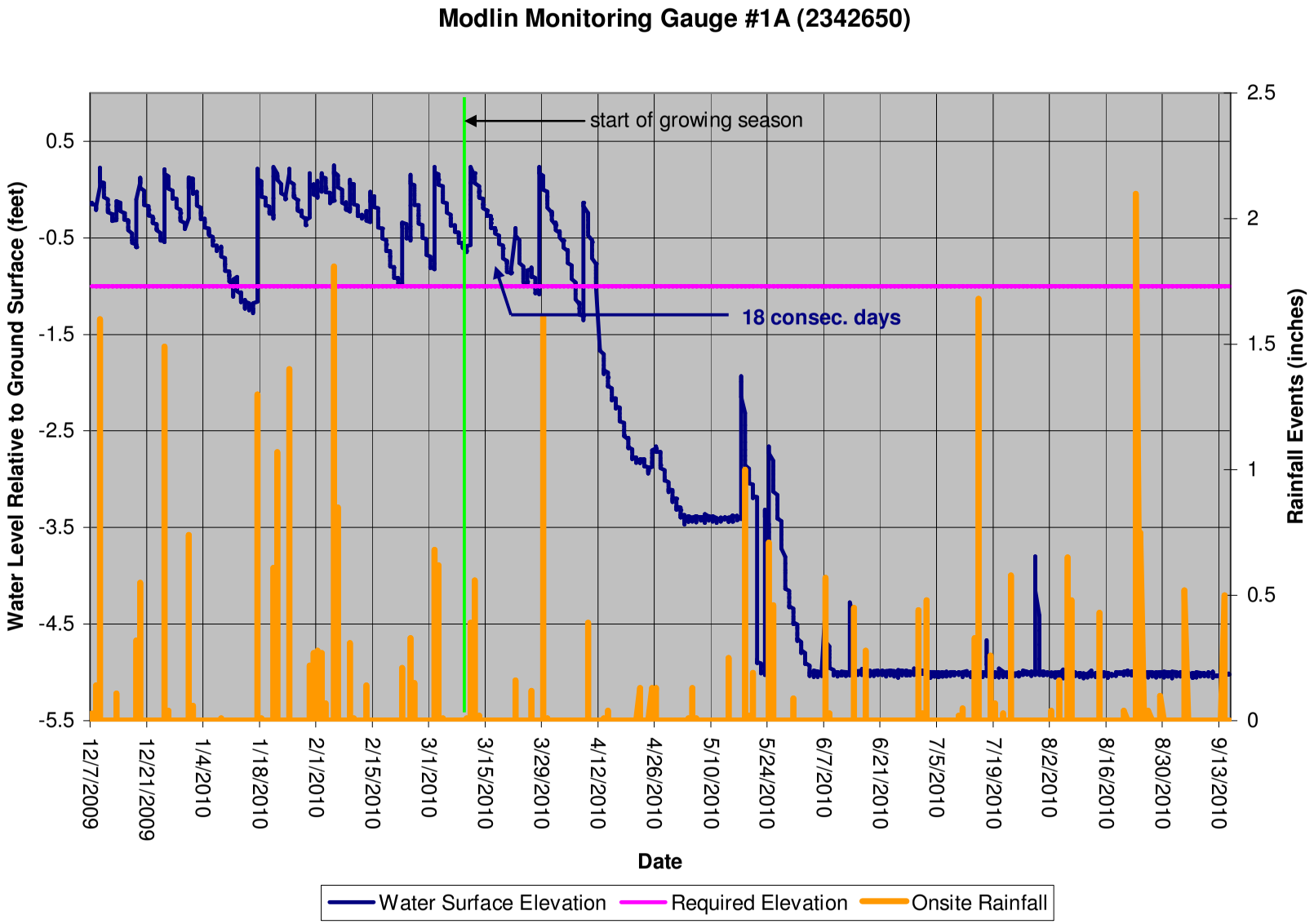
Not used in this report

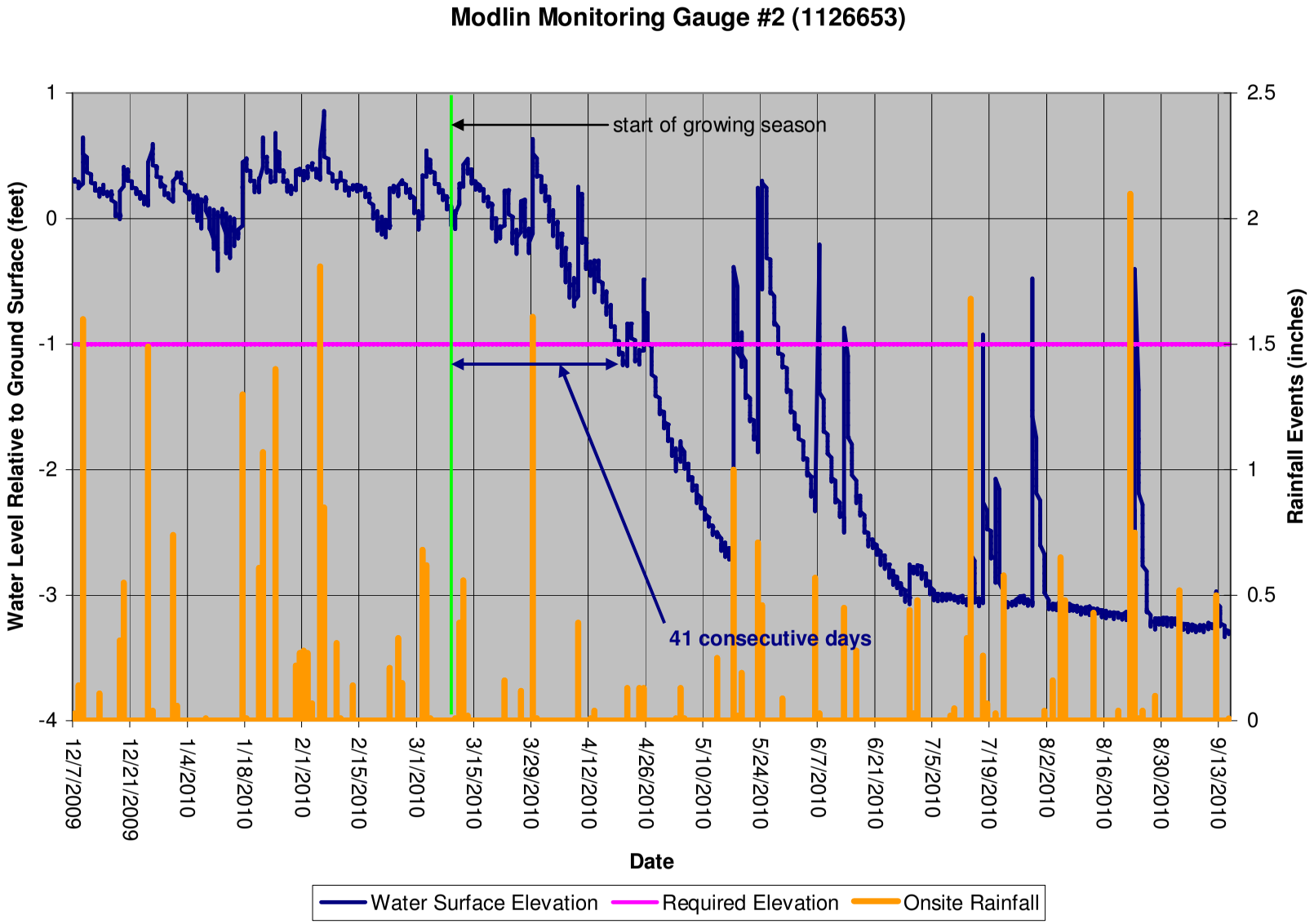
Appendix C

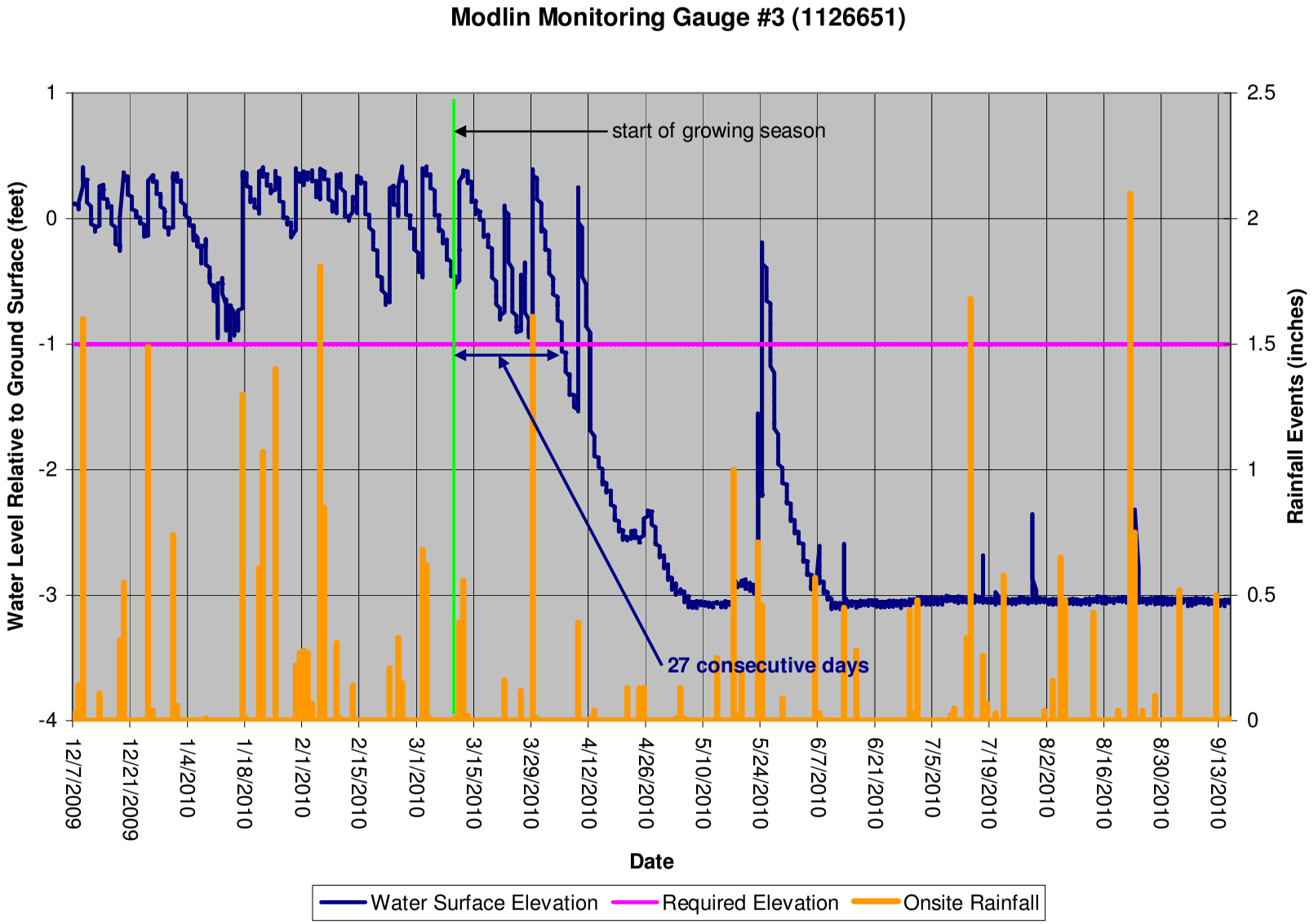
Hydrologic Data Tables

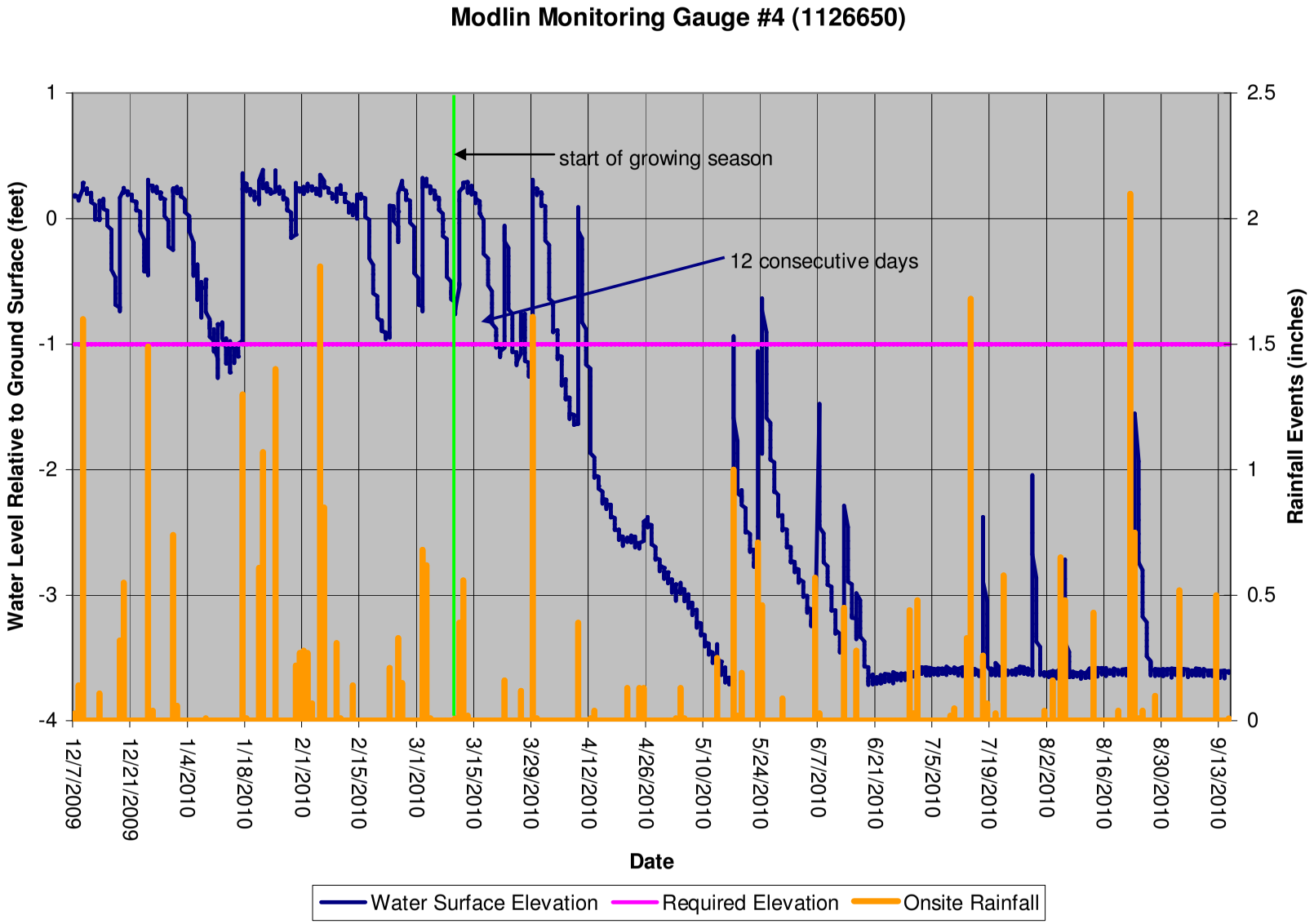
Note: since gauge 1B was moved during the monitoring season and its data is non-continuous, its chart is not included in this report. It was permanently installed after subsoiling in September of 2010 and its location is shown in Figures 2 and 4 of this report.

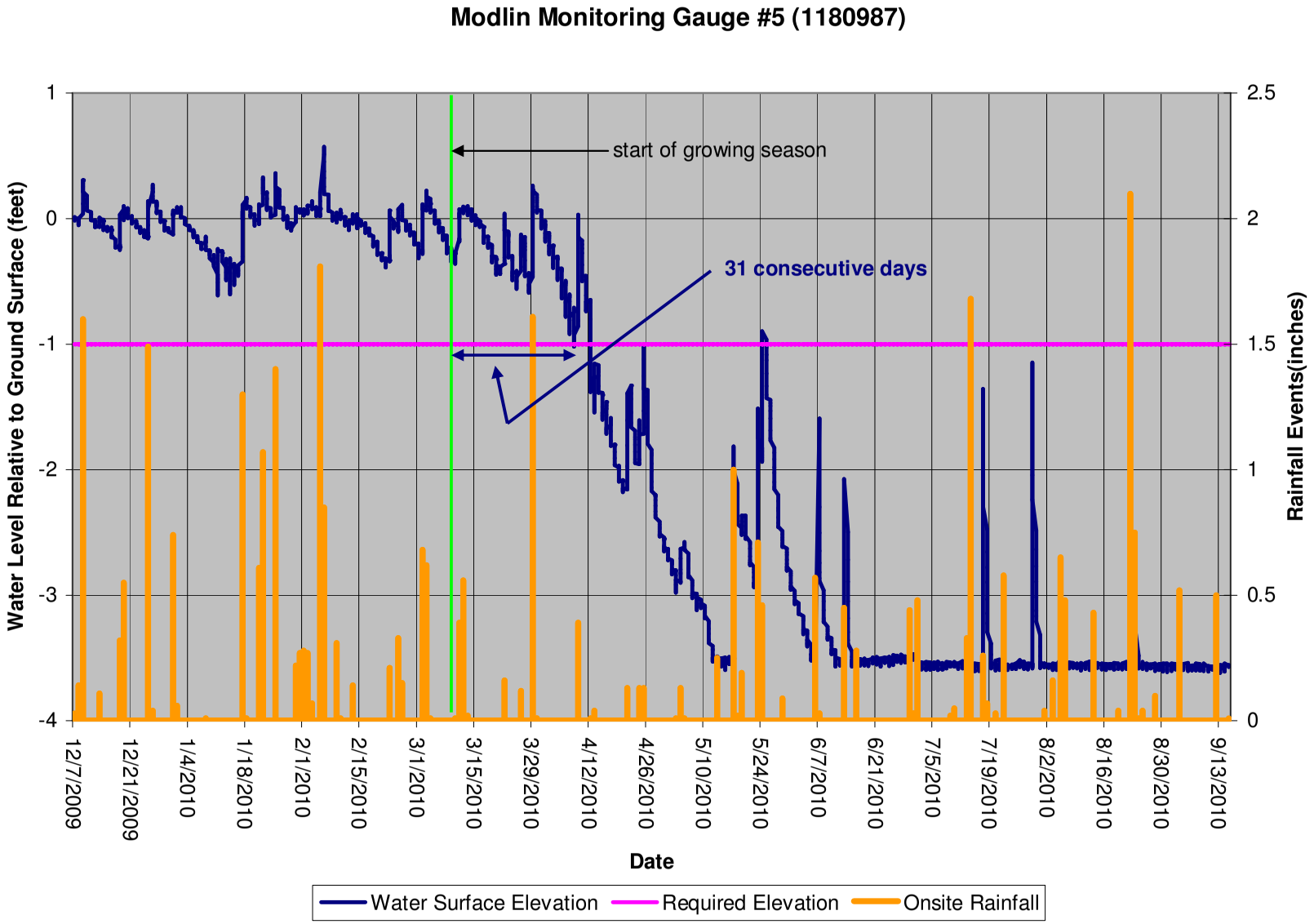

Modlin Monitoring Gauge #1 (1126654)
start of growing season
4 consecutive days
Water Level Relative to Ground Surface (feet)
Rainfall Events (inches)
1
0
-1
-2
-3
-4
-5
2.5
2
1.5
1
0.5
0
12/7/2009
12/21/2009
1/4/2010
1/18/2010
2/1/2010
2/15/2010
3/1/2010
3/15/2010
3/29/2010
4/12/2010
4/26/2010
5/10/2010
5/24/2010
6/7/2010
6/21/2010
7/5/2010
7/19/2010
8/2/2010
8/16/2010
8/30/2010
9/13/2010
Date
Water Surface Elevation
Required Elevation
Onsite Rainfall

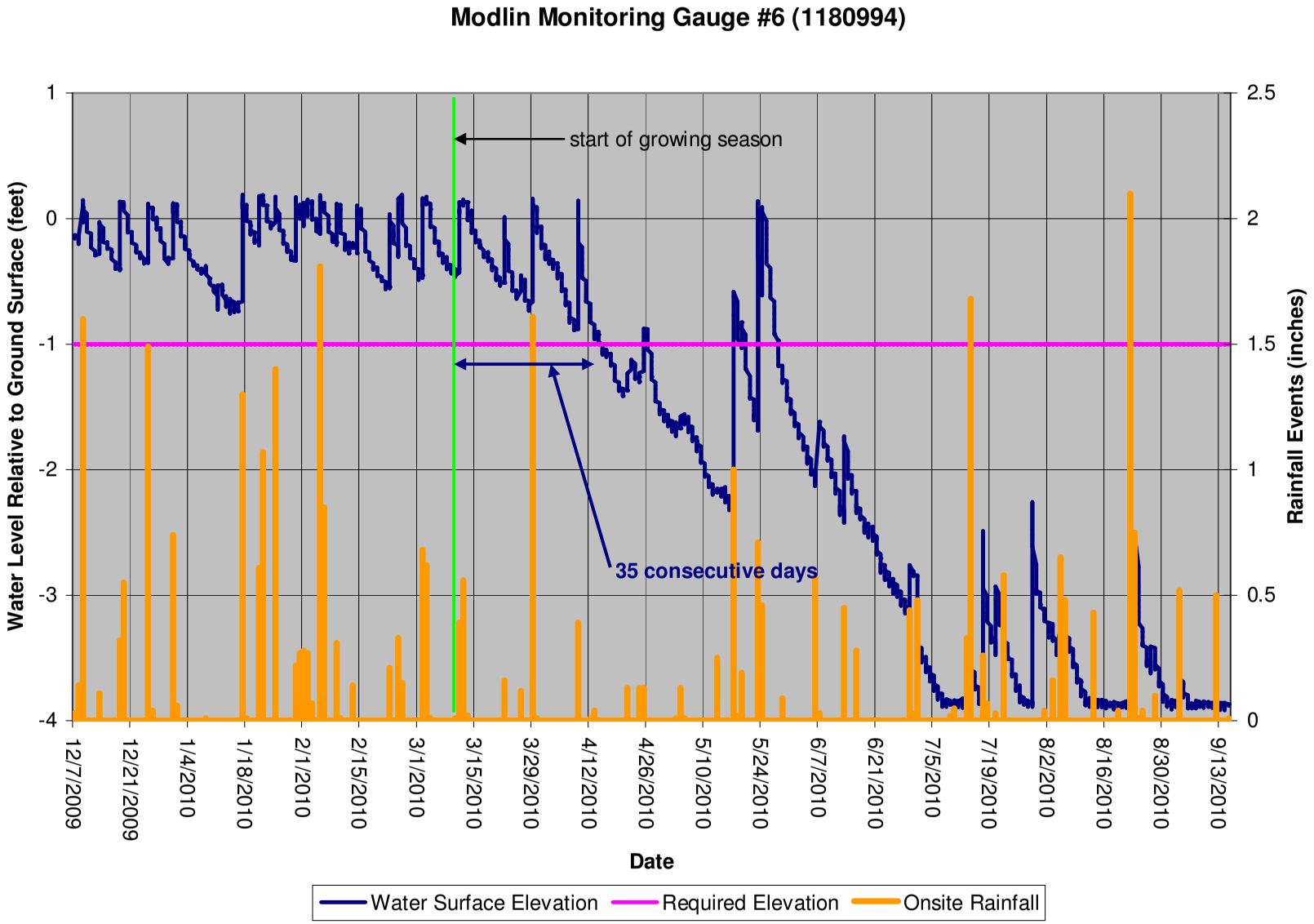

Modlin Monitoring Gauge #1A (2342650)
start of growing season
18 consec. days
Water Level Relative to Ground Surface (feet)
Rainfall Events (inches)
0.5
-0.5
-1.5
-2.5
-3.5
-4.5
-5.5
2.5
2
1.5
1
0.5
0
12/7/2009
12/21/2009
1/4/2010
1/18/2010
2/1/2010
2/15/2010
3/1/2010
3/15/2010
3/29/2010
4/12/2010
4/26/2010
5/10/2010
5/24/2010
6/7/2010
6/21/2010
7/5/2010
7/19/2010
8/2/2010
8/16/2010
8/30/2010
9/13/2010
Date
Water Surface Elevation
Required Elevation
Onsite Rainfall


Modlin Monitoring Gauge #2 (1126653)
start of growing season
41 consecutive days
Water Level Relative to Ground Surface (feet)
Rainfall Events (inches)
Date
1
0
-1
-2
-3
-4
2.5
2
1.5
1
0.5
0
12/7/2009
12/21/2009
1/4/2010
1/18/2010
2/1/2010
2/15/2010
3/1/2010
3/15/2010
3/29/2010
4/12/2010
4/26/2010
5/10/2010
5/24/2010
6/7/2010
6/21/2010
7/5/2010
7/19/2010
8/2/2010
8/16/2010
8/30/2010
9/13/2010
Water Surface Elevation
Required Elevation
Onsite Rainfall


Modlin Monitoring Gauge #3 (1126651)
start of growing season
27 consecutive days
Water Level Relative to Ground Surface (feet)
Rainfall Events (inches)
Date
1
0
-1
-2
-3
-4
2.5
2
1.5
1
0.5
0
12/7/2009
12/21/2009
1/4/2010
1/18/2010
2/1/2010
2/15/2010
3/1/2010
3/15/2010
3/29/2010
4/12/2010
4/26/2010
5/10/2010
5/24/2010
6/7/2010
6/21/2010
7/5/2010
7/19/2010
8/2/2010
8/16/2010
8/30/2010
9/13/2010
Water Surface Elevation
Required Elevation
Onsite Rainfall


Modlin Monitoring Gauge #4 (1126650)
start of growing season
12 consecutive days
Water Level Relative to Ground Surface (feet)
Rainfall Events (inches)
1
0
-1
-2
-3
-4
2.5
2
1.5
1
0.5
0
12/7/2009
12/21/2009
1/4/2010
1/18/2010
2/1/2010
2/15/2010
3/1/2010
3/15/2010
3/29/2010
4/12/2010
4/26/2010
5/10/2010
5/24/2010
6/7/2010
6/21/2010
7/5/2010
7/19/2010
8/2/2010
8/16/2010
8/30/2010
9/13/2010
Date
Water Surface Elevation
Required Elevation
Onsite Rainfall


Modlin Monitoring Gauge #5 (1180987)
start of growing season
31 consecutive days
Water Level Relative to Ground Surface (feet)
Rainfall Events(inches)
1
0
-1
-2
-3
-4
2.5
2
1.5
1
0.5
0
12/7/2009
12/21/2009
1/4/2010
1/18/2010
2/1/2010
2/15/2010
3/1/2010
3/15/2010
3/29/2010
4/12/2010
4/26/2010
5/10/2010
5/24/2010
6/7/2010
6/21/2010
7/5/2010
7/19/2010
8/2/2010
8/16/2010
8/30/2010
9/13/2010
Date
Water Surface Elevation
Required Elevation
Onsite Rainfall


Modlin Monitoring Gauge #6 (1180994)
start of growing season
35 consecutive days
Water Level Relative to Ground Surface (feet)
Rainfall Events (inches)
1
0
-1
-2
-3
-4
2.5
2
1.5
1
0.5
0
12/7/2009
12/21/2009
1/4/2010
1/18/2010
2/1/2010
2/15/2010
3/1/2010
3/15/2010
3/29/2010
4/12/2010
4/26/2010
5/10/2010
5/24/2010
6/7/2010
6/21/2010
7/5/2010
7/19/2010
8/2/2010
8/16/2010
8/30/2010
9/13/2010
Date
Water Surface Elevation
Required Elevation
Onsite Rainfall

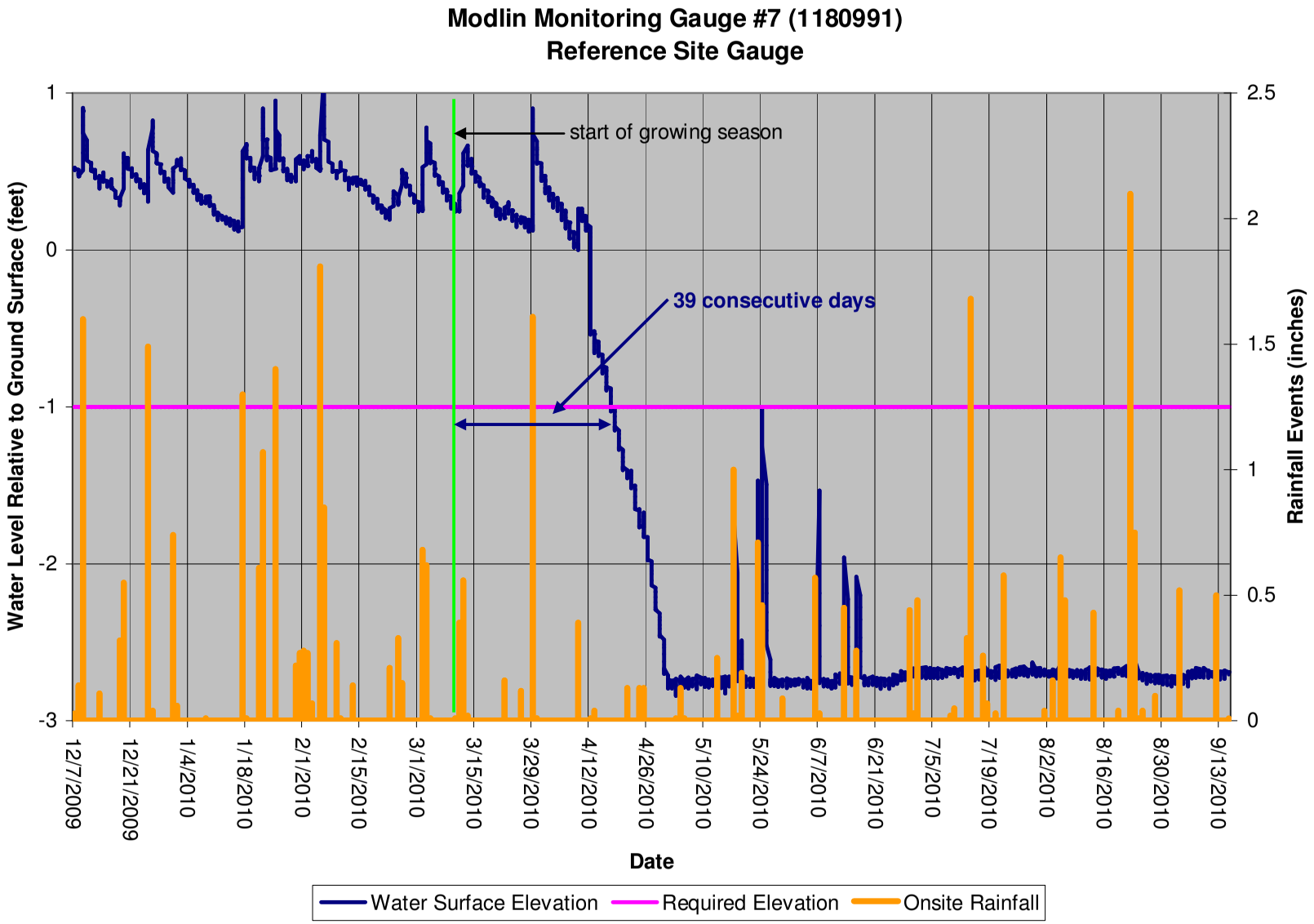
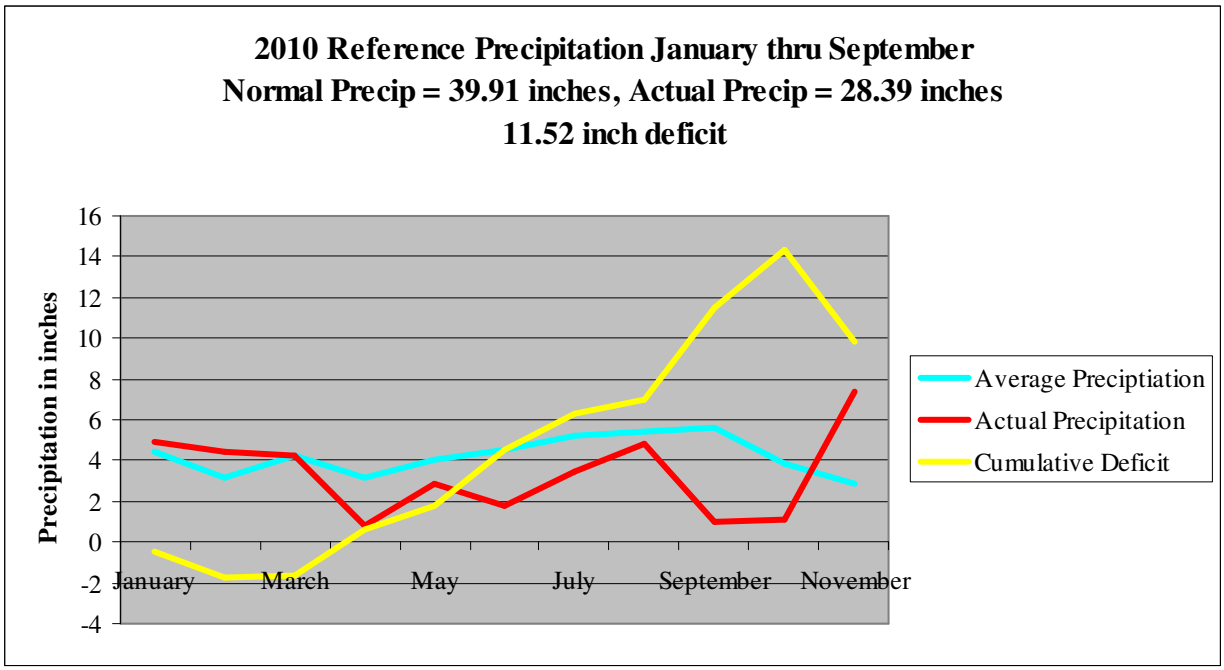

Modlin Monitoring Gauge #7 (1180991)
Reference Site Gauge
start of growing season
39 consecutive days
Water Level Relative to Ground Surface (feet)
Rainfall Events (inches)
1
0
-1
-2
-3
2.5
2
1.5
1
0.5
0
12/7/2009
12/21/2009
1/4/2010
1/18/2010
2/1/2010
2/15/2010
3/1/2010
3/15/2010
3/29/2010
4/12/2010
4/26/2010
5/10/2010
5/24/2010
6/7/2010
6/21/2010
7/5/2010
7/19/2010
8/2/2010
8/16/2010
8/30/2010
9/13/2010
Date
Water Surface Elevation
Required Elevation
Onsite Rainfall

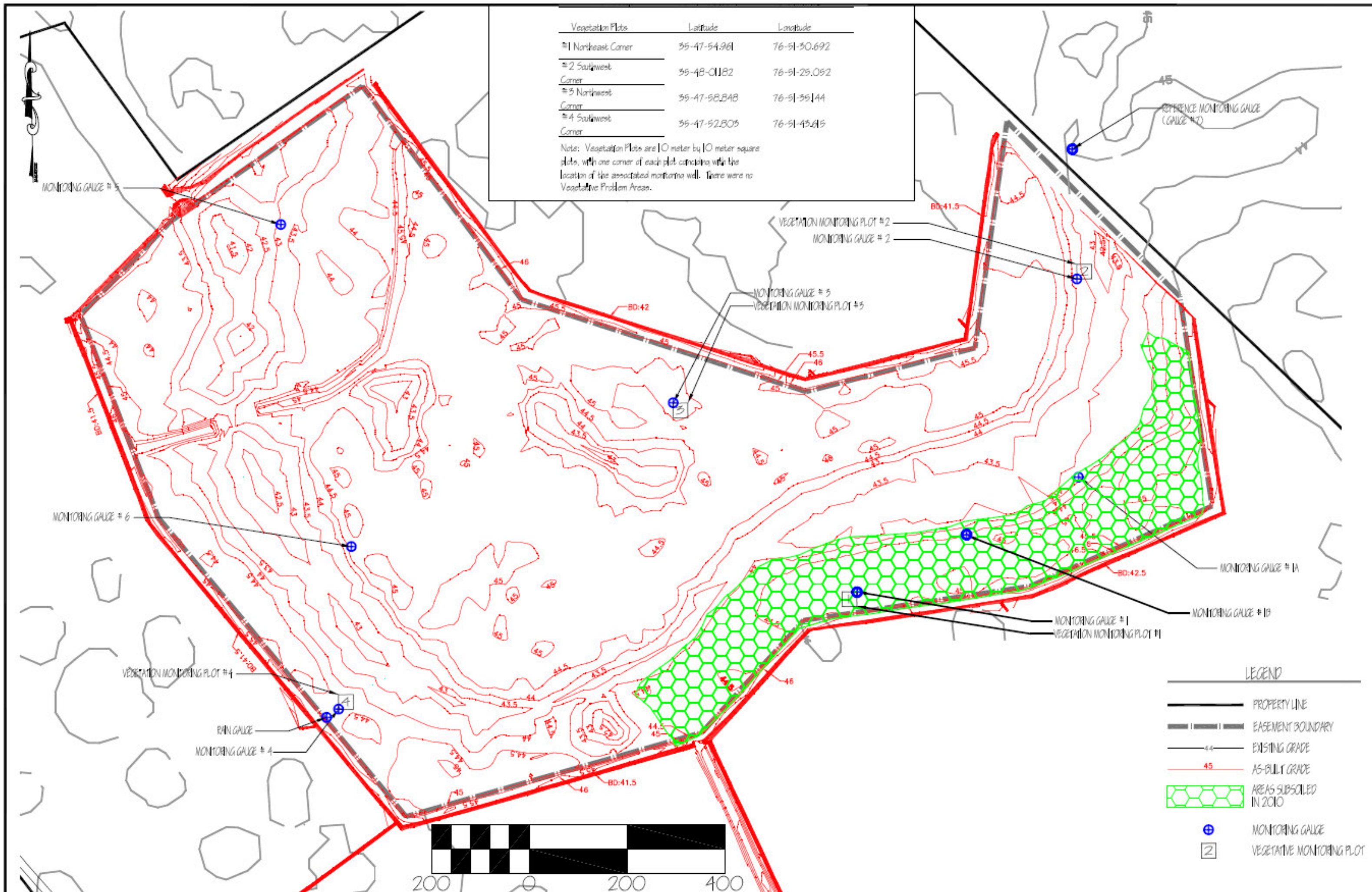
Table C-1 Longest Consecutive Successful Hydrologic Period in Days and Success at 5% and 8% of Growing Season															
	Year 1			Year 2			Year 3			Current Year			Year 5		
Gauge	Days	5%	8%	Days	5%	8%	Days	5%	8%	Days	5%	8%	Days	5%	8%
1	4	N	N	6	N	N	9	N	N	4	N	N			
1A	N/A	---	---	N/A	---	---	12	N	N	18	Y	N			
2	7	N	N	97	Y	Y	52	Y	Y	41	Y	Y			
3	1	N	N	15	Y	N	48	Y	Y	27	Y	Y			
4	4	N	N	16	Y	N	25	Y	Y	12	N	N			
5	2	N	N	61	Y	Y	59	Y	Y	31	Y	Y			
6	2	N	N	18	Y	Y	48	Y	Y	35	Y	Y			
7(Ref)	N/A	N		37	Y	Y	61	Y	Y	39	Y	Y			

Growing season is 255 days. 5% is 13 days, 8% is 21 days.



Appendix D

Monitoring Plan View (Integrated)



Vegetation Plots	Latitude	Longitude
#1 Northeast Corner	35-47-54.961	76-51-30.692
#2 Southwest Corner	35-48-01.182	76-51-25.052
#3 Northwest Corner	35-47-58.848	76-51-35.144
#4 Southwest Corner	35-47-52.805	76-51-45.615

Note: Vegetation Plots are 10 meter by 10 meter square plots, with one corner of each plot coinciding with the location of the associated monitoring well. There were no Vegetative Problem Areas.

APPENDIX D:
MONITORING REPORT YEAR #3

ALBERMARLE RESTORATIONS, LLC
WETLAND RESTORATION, STREAM RESTORATION, & WILDLIFE HABITAT CREATION
404 COURT STREET• GATESVILLE, NC 27938
(252) 333-0249• FAX (252) 357-4892

PLAN PREPARED BY:
ECOTONE, INC.
ENVIRONMENTAL CONSULTING, PERMITTING & DESIGN, FOREST & WETLAND CREATION & STREAM RESTORATION.
P.O. BOX 5• 1204 BALDWIN MILL ROAD• JARRETTSVILLE, MARYLAND 21084
(410) 692-7500• FAX (410) 692-7503• E-MAIL INFO@ECOTONEINC.COM

Ecosystem Enhancement PROGRAM

MODLIN PROPERTY
RIVERINE WETLAND MITIGATION MONITORING
40.0 ACRES
MARTIN COUNTY, NORTH CAROLINA
EEP CONTRACT #: D05024-I

VEGETATION ASSESSMENT
SEPTEMBER 2010

FIGURE 4