Mason Property Wetland Mitigation Project

Hyde County, NC

2008 Annual Monitoring Report
Year 1, Baseline

NCEEP Project Number D06001
Tar-Pamlico River Basin

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

Date: December, 2008

Monitoring:
Albemarle Restorations, LLC
P. O. Box 176
Fairfield, NC 27826

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Executive Summary

The Mason Property Wetland Mitigation Site is a riverine and non-riverine wetland restoration project located on U. S. Rt. 264 at Rose Bay in Hyde County, North Carolina. It was constructed by Albemarle Restorations, LLC, under contract with EEP to provide compensatory wetland mitigation credits in the Tar-Pamlico River Basin. Construction activities, in accordance with the approved restoration plan, began March 14, 2007, and were completed on May 14, 2007. The resulting features include a main swamp run and adjacent areas of lower elevation that retain flood water for extended periods. Tree and shrub planting on the project site occurred in May, 2007 using bare-root seedlings and containerized stock from a species list that produced a diverse species mix across the site and throughout the various elevations. Due to insufficient planting in 2007, monitoring did not begin until 2008 after stocking levels were increased.

Six water level monitoring gauges were installed in May, 2007 at varying elevations throughout the site to measure subsurface water elevations. Two other gauges were also installed at reference sites for hydrology comparison. In 2008, all of the monitoring gauges met the hydrologic success criterion of maintained groundwater levels within 12 inches of the soil surface for 21 consecutive days during the growing season.

Four vegetative monitoring plots were installed and permanently monumented, one coincident with each of four of the monitoring gauges. Their locations ensure an accurate sampling of the entire vegetative community. Each plot is a 10m X 10m square, as recommended by the CVS-EEP Protocol for recording vegetation sampling. In this first year of monitoring, two out of the four plots met the Year 3 success criterion of 320 living planted stems per acre and two of the four met the Year 4 success criterion of 288 stems per acre. The inadequate survival rate is directly attributable to the extreme length of time standing water remained on site and heavy herbaceous competition. As a result, replacement and supplemental planting will occur in 2009 to replace those stems that did not survive.

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 the vegetation plots is the year 3 level of survival.

Table ES-1. Project Success Summary

	Gauge						Percent	Vegetation Plot				Percent
	1	**2**	**3**	**4**	**5**	**6**	**Success**	**1**	**2**	**3**	**4**	**Success**
Year 1 (2008) Success	Y	Y	Y	Y	Y	Y	100%	Y	Y	N	N	50%

I. Project Background

1.0 Project Objectives

The goal of the Mason Property Mitigation Project was to create both riverine and non-riverine wetland systems that will accomplish several goals. Primary among those goals is the establishment of functioning wetlands that will aid in flood attenuation and improve water quality on site and downstream. The project is to serve as compensation for wetland loss in the Tar-Pamlico River Basin. The restoration 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

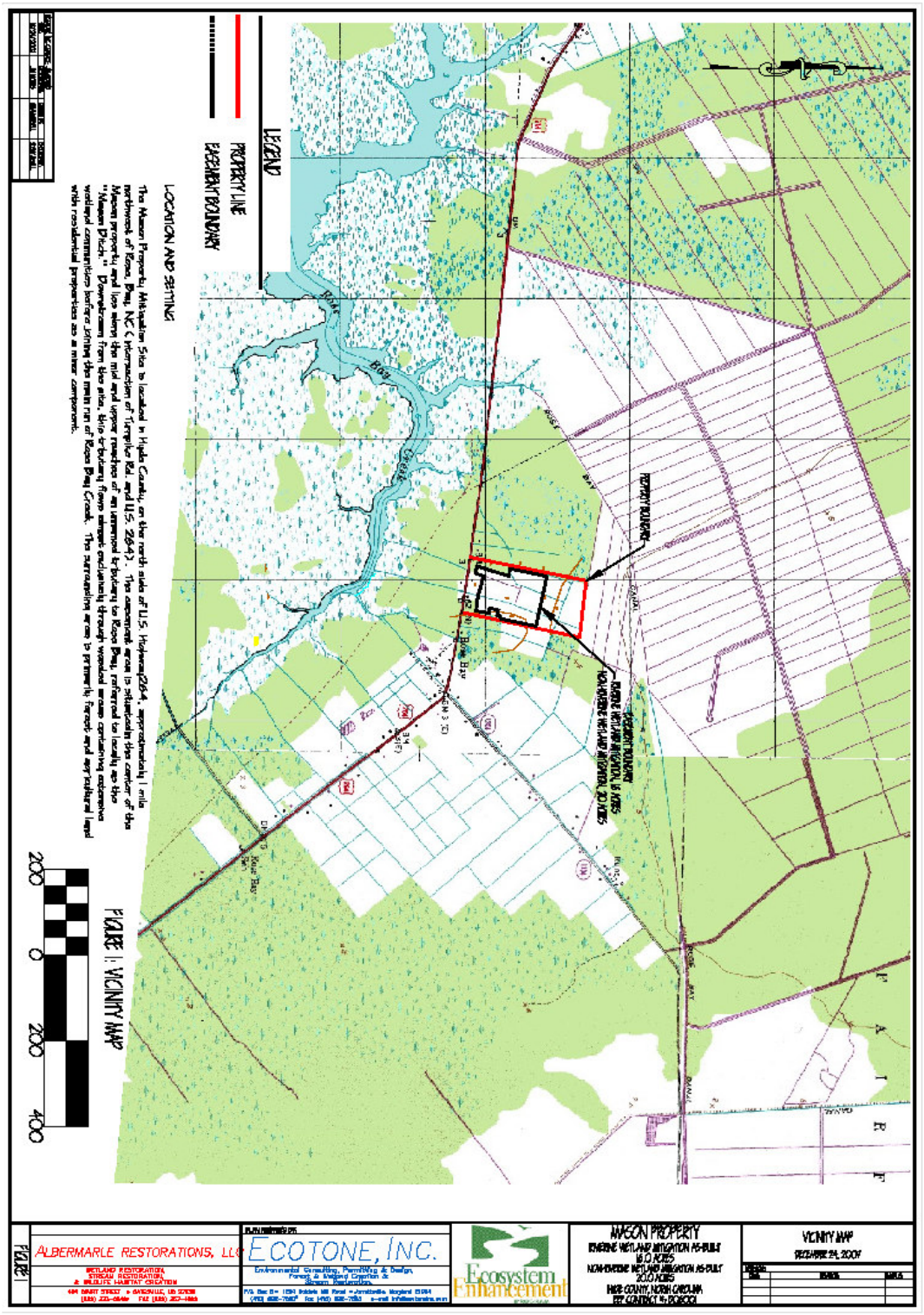
Table I lists the estimated wetland acreage by community type to be restored on the Mason Property. The mitigation plan provides for the restoration of 16.0 acres of riverine wetlands and 20.0 acres of non-riverine wetlands. The 36.0 acre easement area is located within the boundaries of the larger Mason farm which has been used for row crop production. The project area was bisected by a deep drainage ditch that acted as a stream that ran from north to south through the property. Degradation to the channel and surrounding areas by past agricultural activities, including channel straightening and planting of row crops up to the channel edges had eliminated any significant natural habitat on the site and allowed excessive nutrient and sediment accumulation in the channel. Construction, in accordance with the approved restoration plan, began in March of 2007 and was completed in May of 2007. The resulting features and topography allow for frequent over bank flooding of the newly created swamp run, which in turn allows for adjacent areas that are lower in elevation to retain water even after stream flow returns to normal.

Table I. Project Restoration Components Mason Property Wetland Mitigation Site/EEP #D06001				
Community Type	**Pre-Existing Acreage**	**Post Construction Acreage**	**Credit Ratio (Restoration WMU)**	**Mitigation Units**
Riverine Wetland	0.0	16.0	1:1	16.0
Non-Riverine Wetland	0.0	20.0	1:1	20.0
			Total	36.0

3.0 Location and Setting

The Mason Property Mitigation Site is located in Hyde County, on the north side of U.S. Highway 264, approximately 1 mile northwest of Rose Bay, NC (intersection of Turnpike Rd. and U.S. 264). The easement area is situated in the center of the Mason property and lies along the mid and upper reaches of an unnamed tributary to Rose Bay, referred to locally as the "Mason Ditch." Downstream from this site, the tributary flows almost exclusively through wooded areas containing extensive wetland communities before joining the main run of Rose Bay Creek. 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 area. Directions to the site are as follows: travel west from Rose Bay on U.S. Hwy. 264 approximately 1 mile and turn right (north) onto the property. Access to the site is via a farm path.


LEGEND
PROPERTY LINE
EASEMENT BOUNDARY
LOCATION AND SETTING
FIGURE 1: VICINITY MAP
ALBEMARLE RESTORATIONS, LLC
ECOTONE, INC.
Ecosystem Enhancement
MASON PROPERTY
VICINITY MAP

4.0 Project History and Background

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

Table II. Project Activity and Reporting History Mason Property Wetland Mitigation Project/EEP #D06001		
Activity or Report	**Data Collection Complete**	**Actual Completion or Delivery**
Restoration Plan	June 2006	Novermber 2006
Final Design -90%	June 2006	Novermber 2006
Construction	N/A	May 2007
Temporary S & E mix applied to entire project area	N/A	May 2007
Permanent seed mix applied to entire project area	N/A	May 2007
Containerized and Bare Root Planting	N/A	May 2007
Mitigation Plan/As-built (Year 1 monitoring - baseline)	Oct. 07/Sept. 08	December 2008
Year 2 monitoring		
Year 3 monitoring		
Year 4 monitoring		
Year 5 monitoring		

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

Table III. Project Contacts Mason Property Wetland Mitigation Site/EEP #D06001	
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 Mason Property Wetland Mitigation Site/EEP #D06001	
Project County	Hyde County
Drainage Area	36.0 acres within easement boundary
Drainage impervious cover estimate (%)	0
Physiographic Reion	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	Stockade sand loam, Hydeland silt loam, Brookman loam
Reference site ID	Rose Bay, Hyde county, NC
USGS HUC for Project and Reference	03020105
NCDWQ Sub-basin for Project and Reference	03-03-08
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?	Yes, Pamlico River
Reasons for 303d listing or stressor?	Ag, Urban Runoff, Septic
% of project easement fenced	None

5. Monitoring Plan View

In May of 2007, six water level monitoring gauges were installed at key locations across the property in order to assess the groundwater levels throughout the year at various elevations and topographies. These gauges are suspended in two-inch pvc pipe that is set approximately four feet vertically into the ground. Two reference gauges are also installed offsite to provide a means of comparison to naturally functioning wetlands. In addition, a rain gauge was installed to capture and record on-site precipitation.

Vegetation monitoring was accomplished by the installation of four permanent sampling plots. Each plot is referenced by one of four monitoring gauges which serve 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, soils, contours and plant communities.

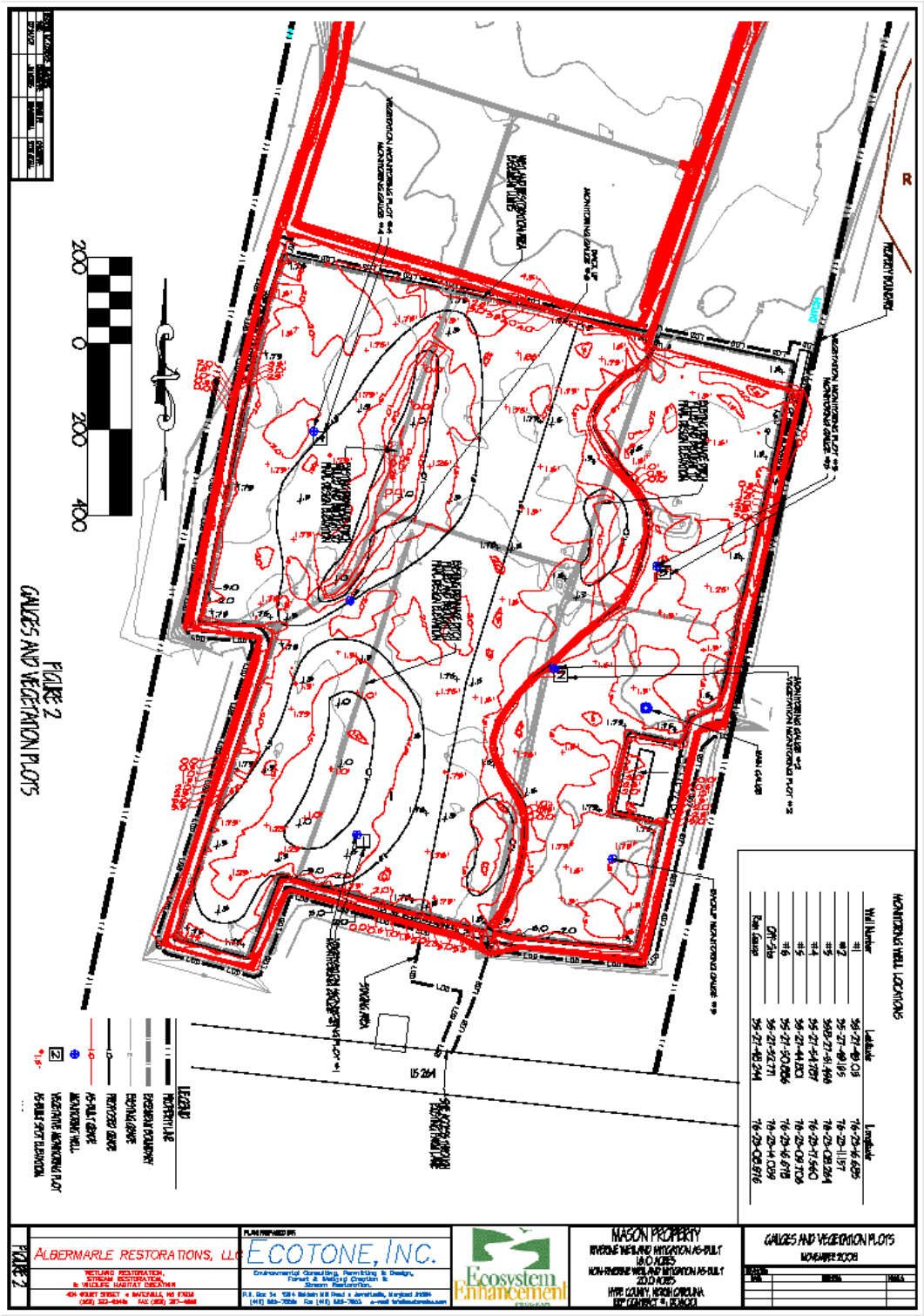


FIGURE 2
GAUGES AND VEGETATION PLOTS
200 0 200 400
LEGEND
MONITORING WELL LOCATIONS
Well Number
Latitude
Longitude
Rain Gauge
ALBEMARLE RESTORATIONS, LLC
ECOTONE, INC.
Ecosystem Enhancement
MASON PROPERTY
GAUGES AND VEGETATION PLOTS
NOVEMBER 2008

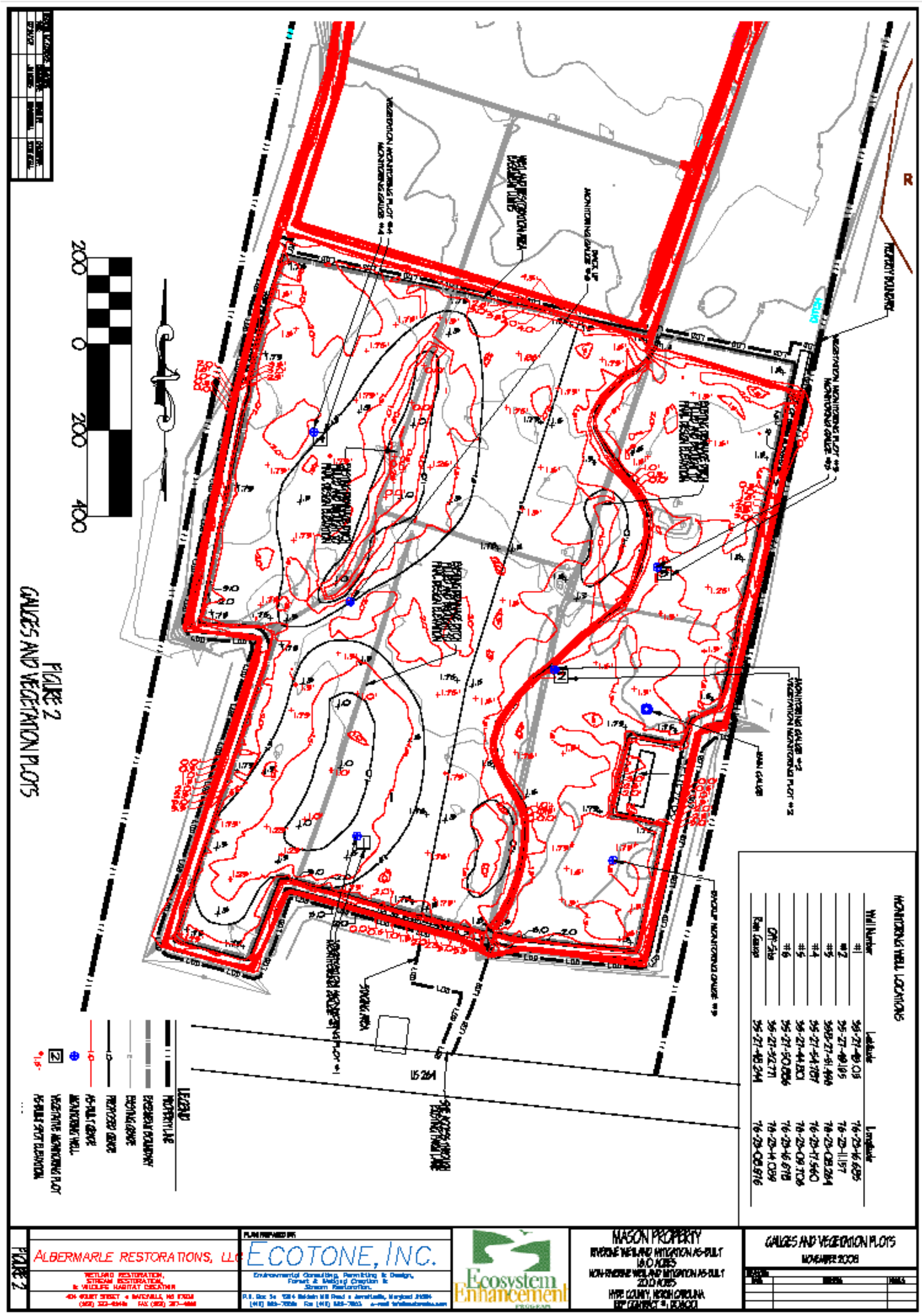


FIGURE 2
GAUGES AND VEGETATION PLOTS
MASON PROPERTY
ALBEMARLE RESTORATIONS, LLC
ECOTONE, INC.
Ecosystem Enhancement
MONITORING WELL LOCATIONS
LEGEND

II. Project Condition and Monitoring Results

1.0 Vegetation Assessment

The vegetation success criterion was developed in accordance with the CVS-EEP protocol. The Mason project was planned to include various topographies and a contiguous plant community consistent with those found naturally occurring along swamp runs and associated broad hardwood flats. The species mix was based on the vegetation noted at the reference site and all species are classified from FAC to OBL (Table V). The site was planted at a rate of 275 stems per acre in May of 2007. In February of 2008, an additional 175 stems per acre were installed bringing the total stocking at the start of the 2008 growing season to 450 stems per acre.

Table V. Species by Vegetation Type		
Mason Property Wetland Mitigation Project/EEP #D06001		
Trees		
Common Name	**Scientific Name**	**Wetland Indicator Status**
Bald Cypress	Taxodium distichum	OBL
Red Maple	Acer rubrum var. Trilobum	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
Shrubs		
Common Name	**Scientific Name**	**Wetland Indicator Status**
High Tide Bush	Baccharis halimifolia	FAC
Swamp Cyrilla	Cyrilla racemiflora	FACW
Sweet Pepperbush	Clethra alnifolia	FACW
Virginia Sweetspire	Itea virginica	FACW+
Button Bush	Cephalanthus occidentalis	OBL
Tag Alder	Alnus serrulata	FACW
Wax Myrtle	Myrica cerifera	FAC+
Sweetbay	Magnolia virginiana	FACW+

1.1 Vegetation Discussion and Problem Areas

Two of the four monitoring plots met the Year 3 success criterion of a minimum of 320 stems per acre after the first growing season. Over the entire project, the survival rate averaged 243 live stems per acre, a survival rate of 54%. Those stems that were planted in 2007 and did not survive were replaced in 2008. In addition, the stocking level was raised to 450 stems per acre across the entire site, but due to almost constant inundation, survival was poor. Water oak (Q. phellos) and Bald Cypress (T. distichum) proved to be the hardiest species. Replacement and supplemental planting is planned for the winter of 2009. Dead stems will be replaced and the overall stocking level will be increased to approximately 600 stems per acre. There are few options for site maintenance beyond herbaceous competition control to improve tree survival and herbaceous competition is thought to be a secondary problem. Selecting the most hydric species

for replanting appears to be the best approach to achieving the required stocking levels, because although there is a cumulative rainfall deficit for the year, the site has remained inundated for all but approximately 2 of the 8 months in the 2008 growing season. The site was under an average of 6 inches of water when planting was done in 2008. Water levels on site began to recede in June, which allowed the herbaceous cover to expand and cause some competition. If it is possible and if deemed necessary, maintenance of herbaceous competition will take place during the 2009 growing season

1.2 Vegetation Monitoring Plan View (Integrated)

Figure 4 in Appendix D illustrates the general inadequate survival of planted stock due to standing water during the planting and growing season.

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 11 to November 27, a period of 261 days (WETS Table for Belhaven, Beaufort 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.

Six continuous monitoring gauges were deployed across the site and two more were installed in reference areas. All six gauges met the success criteria for the site in 2008 as did the two reference gauges. The onsite gauges averaged 198 days where the water table was at -12" or higher as compared to the two reference gauges which averaged 202 days during the growing season. The hydrologic charts in Appendix C also show that the water level on site remained above the ground (the zero level on the charts) for extended periods both early and late in the growing season. The swamp run held water for most of the season as well, as evidenced by the photos in Appendix A.

2.1 Wetland Discussion and Problem Areas

Drainage from the project area can only occur during times when water levels onsite are high enough to overcome the level of the retaining structure at the outfall end of the project *and* the level of the water beyond the outfall end is low enough to accommodate additional flow which is dependant on daily tidal fluctuations. This combination causes the site to retain water for long periods and apparently even during seasons when rainfall is less than average.

The project site was moderately dry for approximately two months during the summer until Tropical Storm Hannah brought enough rain to inundate the site. It remained either inundated or saturated for the remainder of the growing season despite low rainfall.

2.2 Wetland Monitoring Plan View (Integrated)

As illustrated in figure 4, Appendix D, the site remained very wet for almost the entire growing season. While this is important for successful hydrology, it creates problems in establishing woody vegetation. There were no micro-scale problems.

Table VI. Hydrology and Vegetation Criteria Success by Plot
Mason Property Wetland Mitigation Project/EEP #D06001

Well	Hydrology Success Met	Hydrology Mean	Vegetation Plot	Vegetation Success Met	Vegetation Mean
1	Y	100%	1	Y	50%
2	Y		2	Y	
3	Y		3	N	
4	Y		4	N	
5	Y		N/A	N/A	
6	Y		N/A	N/A	
7	Y (Ref)		Reference Well	Reference Well	
8	Y (Ref)		Reference Well	Reference Well	

3.0 Project Success Discussion

Construction and planting on the Mason project was completed early enough in 2007 so that the project was monitored in that year but due to insufficient planting an official report was not submitted to EEP. The rainfall data from 2007 indicated moderate to severe drought conditions which, along with heavy herbaceous cover, caused some tree and shrub mortality. Although drought conditions continued in 2008 (see Figure P-1 in Appendix D), the Mason site was not as severely affected. The monitoring gauges and visual inspections throughout the year confirm that wetland hydrology has been restored. The site was totally inundated for all but approximately two months of the growing season in 2008.

The result of this constant inundation, however, has created a problem with seedling mortality. Replacement and supplemental planting was done in winter of 2008 under conditions of constant standing water. The site remained generally inundated until late spring which did not allow the planting stock the proper conditions for root establishment and development. Consequently, additional replacement and supplemental planting is planned for the winter of 2009. Barring invasive, extensive mechanical site preparation to create elevated root zones, little can be done to enhance tree survival beyond replanting and herbaceous control if conditions warrant and allow.

III. Methodology Section

Year 1 (baseline) monitoring for the Mason project occurred in 2008. Monitoring and vegetation sampling procedures were established in the mitigation plan for this project and no deviations were made.

Appendix A

Vegetation Data Tables

Vegetation Photos

1. Vegetation Data Tables

Table 1. Project Summary	
Report Prepared By	Ashby Brown
Date Prepared	10/6/2008 14:07
DESCRIPTION OF WORKSHEETS IN THIS DOCUMENT----------	
Metadata	This worksheet, which is a summary of the project and the project data.
Proj, planted	Each project is listed with its PLANTED stems, for each year. This excludes live stakes and lists stems per acre.
Proj, total stems	Each project is listed with its TOTAL stems, for each year. This includes live stakes, all planted stems, and all natural/volunteer stems. Listed in stems per acre.
Plots	List of plots surveyed.
Vigor	Frequency distribution of vigor classes.
Vigor by Spp	Frequency distribution of vigor classes listed by species.
Damage	List of most frequent damage classes with number of occurrences and percent of total stems impacted by each.
Damage by Spp	Damage values tallied by type for each species.
Damage by Plot	Damage values tallied by type for each plot.
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	D06001
project Name	Mason Riverine
Description	Mason Riverine wetland project in Hyde county, NC
River Basin	Tar-Pamlico
length(ft)	
stream-to-edge width (ft)	
area (sq m)	
Required Plots (calculated)	
Sampled Plots	4

Table 2. Vigor by Species							
	Species	**4**	**3**	**2**	**1**	**0**	**Missing**
	Cephalanthus occidentalis	1	1	1			
	Itea virginica			2			
	Quercus bicolor			1			
	Quercus phellos			1			
	Taxodium distichum	2	2	2			
	Unknown			8			
	Myrica cerifera	1		2			
TOT:	**7**	**4**	**3**	**17**			

Table 3. Damage by Species				
	Species	**All Damage Categories**	**(no damage)**	**Site Too Wet**
	Cephalanthus occidentalis	3	3	
	Itea virginica	2	2	
	Myrica cerifera	3	3	
	Quercus bicolor	1		1
	Quercus phellos	1	1	
	Taxodium distichum	6	6	
	Unknown	8	1	7
TOT:	**7**	**24**	**16**	**8**

Table 4. Damage by Plot				
	plot	**All Damage Categories**	**(no damage)**	**Site Too Wet**
	D06001-ABET-0001	9	6	3
	D06001-ABET-0002	8	5	3
	D06001-ABET-0003	1	1	
	D06001-ABET-0004	6	4	2
TOT:	**4**	**24**	**16**	**8**

Table 5. Stems by Plot and Species								
	Species	**Total Planted Stems**	**# plots**	**avg# stems**	**plot D06001-ABET-0001**	**plot D06001-ABET-0002**	**plot D06001-ABET-0003**	**plot D06001-ABET-0004**
	Cephalanthus occidentalis	3	2	1.5			1	2
	Itea virginica	2	1	2	2			
	Myrica cerifera	3	2	1.5	1	2		
	Quercus bicolor	1	1	1		1		
	Quercus phellos	1	1	1		1		
	Taxodium distichum	6	3	2	3	2		1
	Unknown	8	3	2.67	3	2		3
TOT:	**7**	**24**	**7**		**9**	**8**	**1**	**6**
	Stems per acre				364	324	243	40

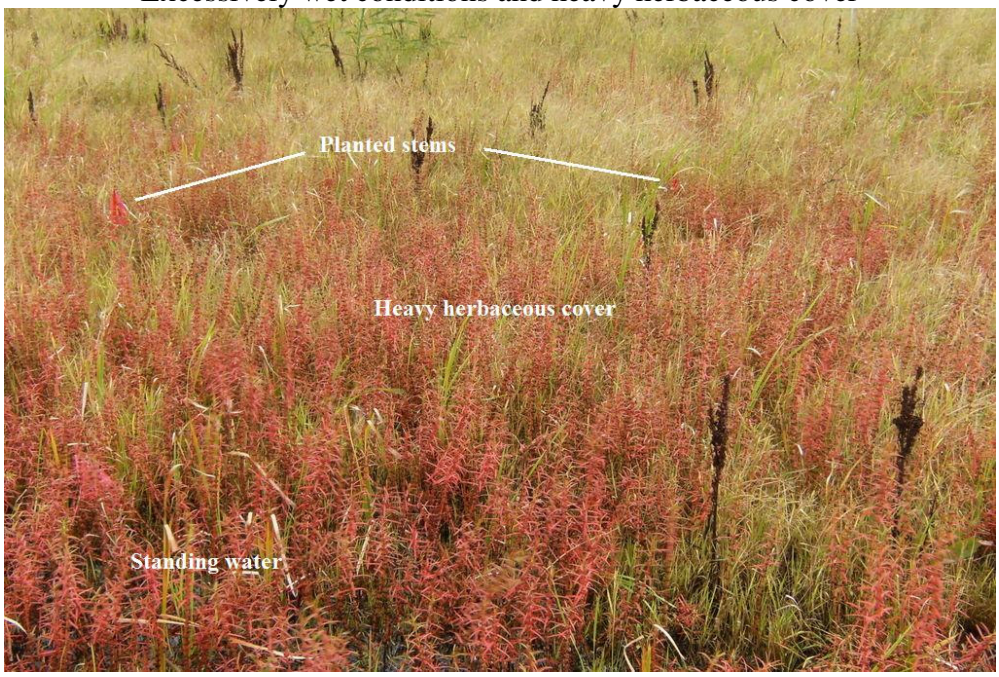
Table 6. Vegetation Problem Areas			
Feature/Issue	Plot	Probable Cause	Photo #
Poor Survival	3, 4	Excessivley Wet	VPA 1
Poor Health and Growth	All	Excessively Wet	VPA 2, VPA 3

VPA 1
Excessively wet conditions
Sept. 08

VPA 2
Excessively wet conditions during planting
March 08

VPA 3
Excessively wet conditions during planting
March 08

VPA 4
Excessively wet conditions and heavy herbaceous cover



Swamp Run at driest time of year, July 08

Swamp Run 2 months later in Sept. 08

Plot 1

Plot 2

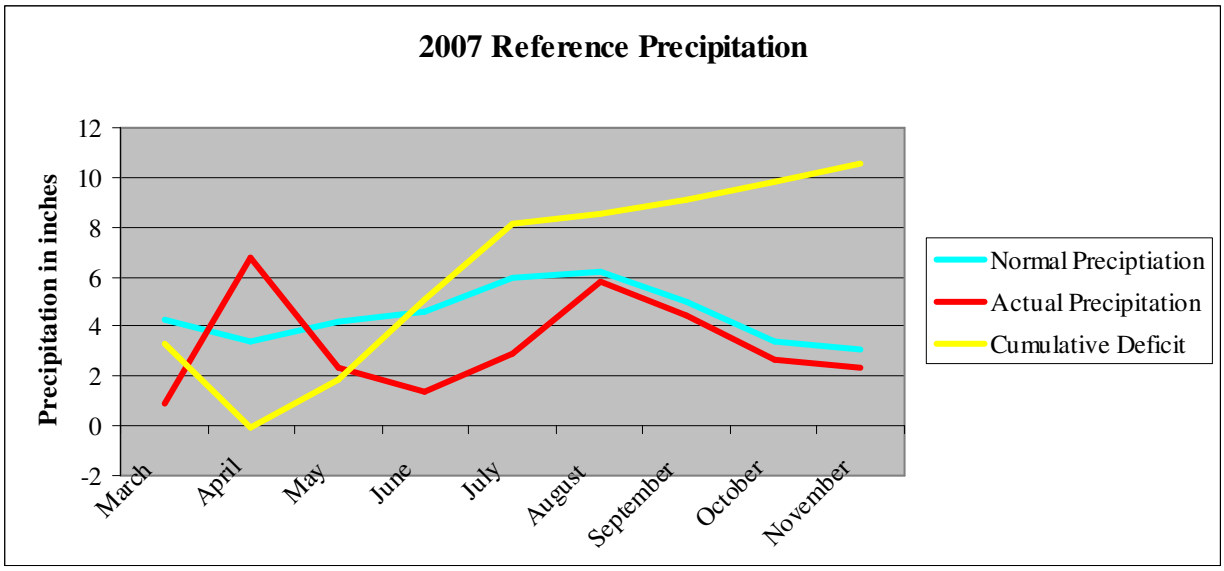
Plot 3

Plot 4

Table C-1. Hydrologic Monitoring Results			
Gauge	# days within 12" (% of growing season)	# days within 12" (during growing season)	Hydrologic Success
1	80%	210	Yes
2	71%	186	Yes
3	79%	206	Yes
4	70%	184	Yes
5	76%	198	Yes
6	77%	201	Yes
7 Ref. Gauge	92%	241	Yes
8 Ref. Gauge	62%	162	Yes

Average for wells 1-6 198 days (76%)

Average for wells 7 & 8 202 days (77%)



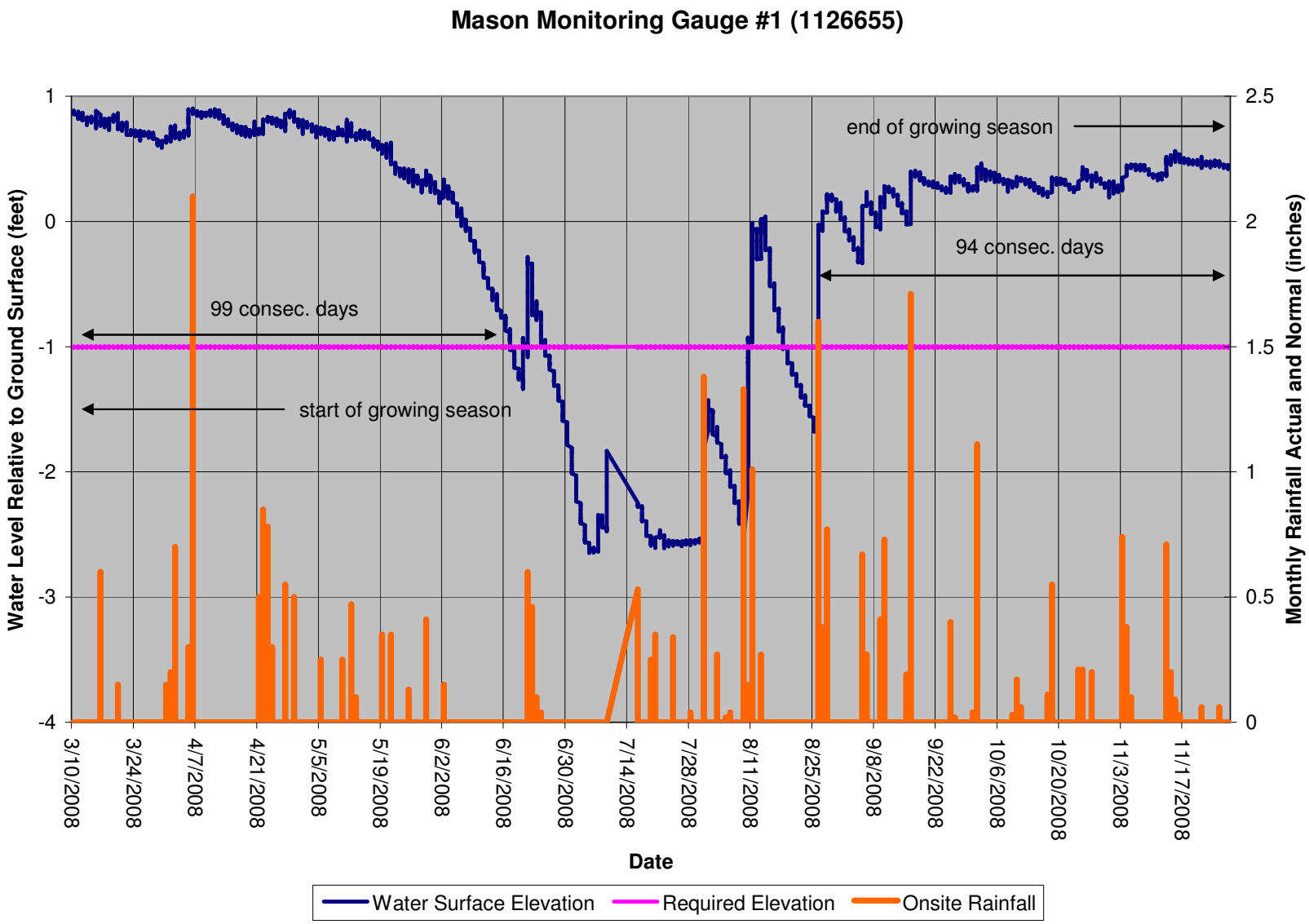
Appendix B

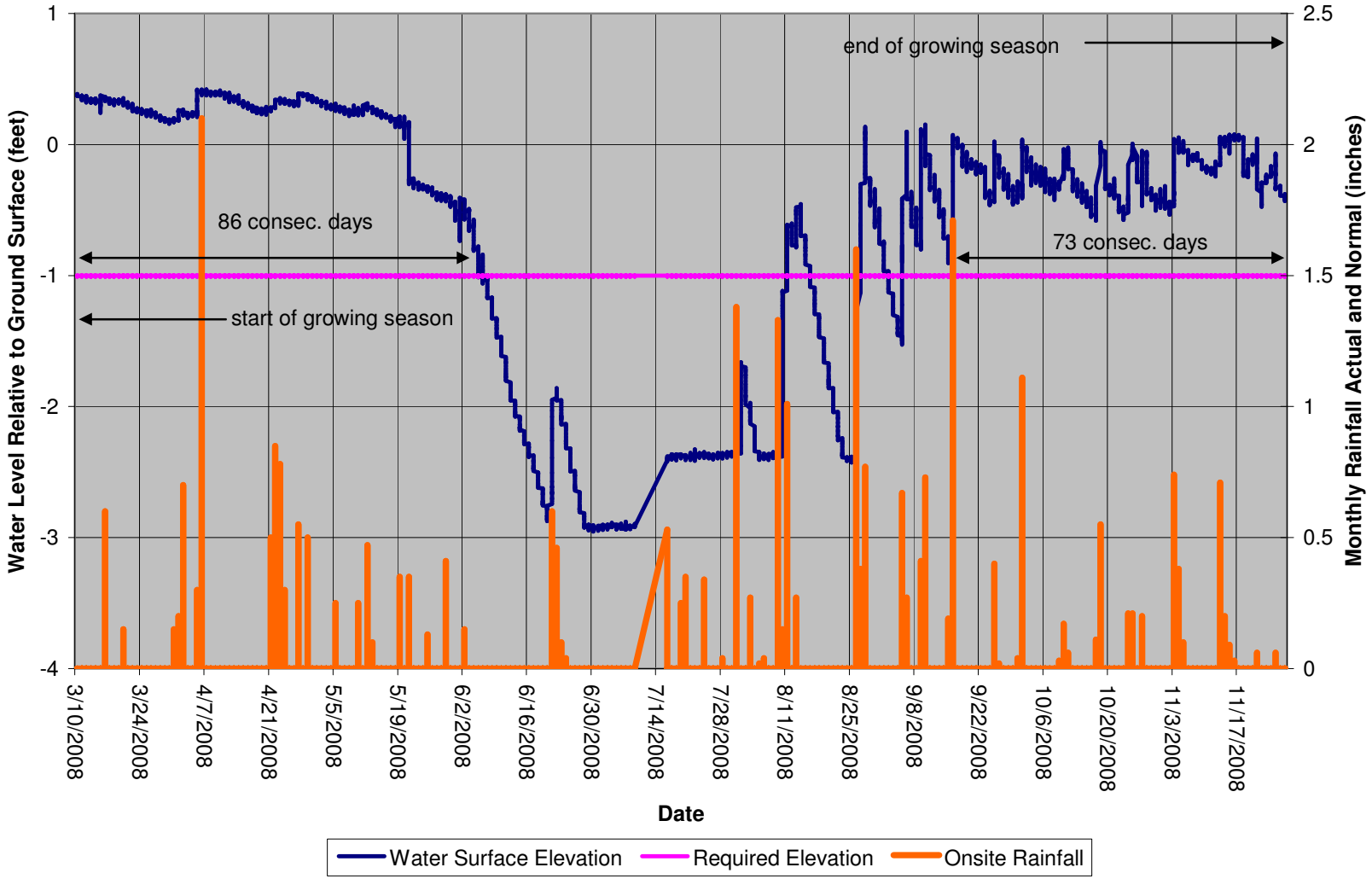
Geomorphologic Raw Data

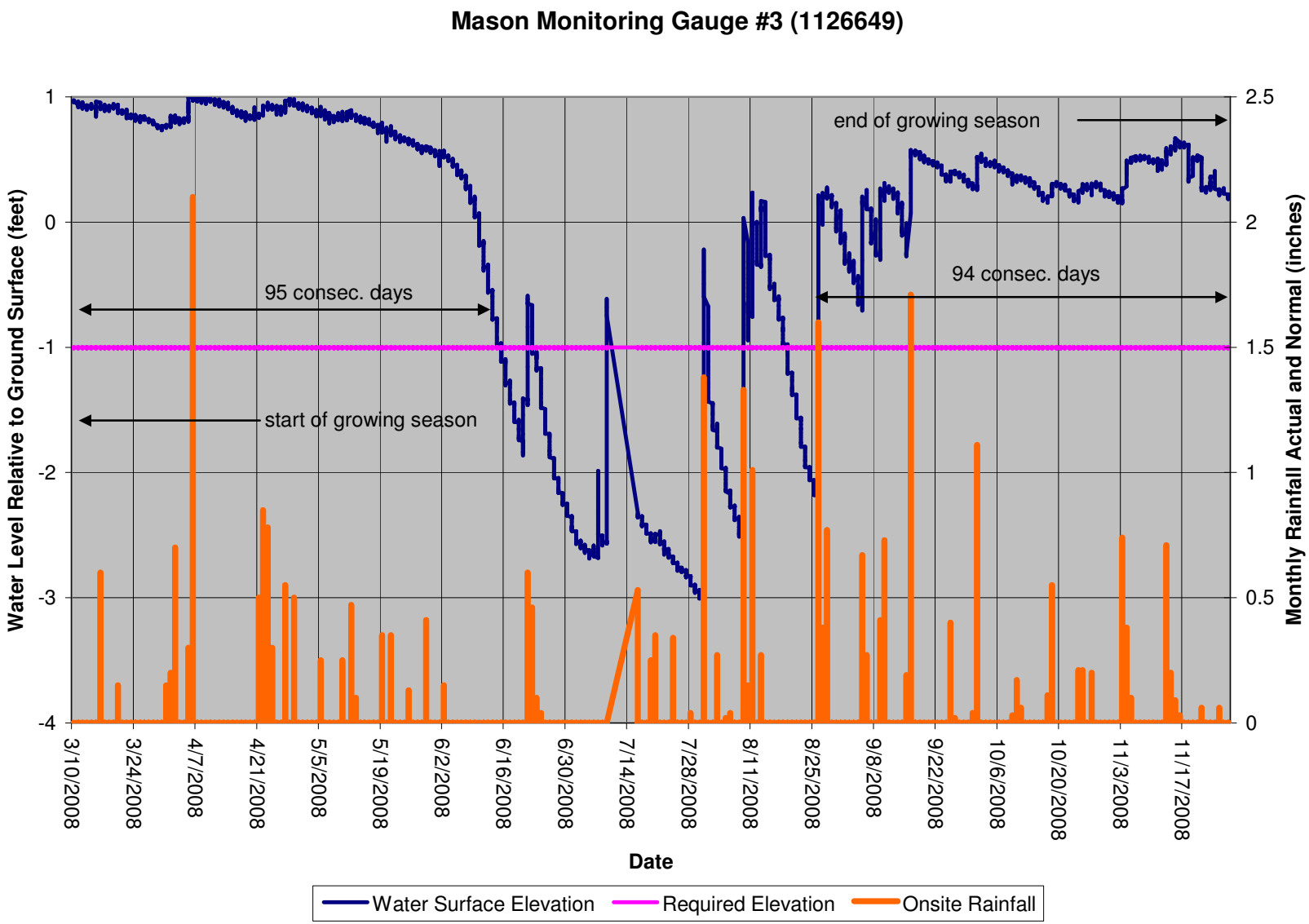
Not used in this report

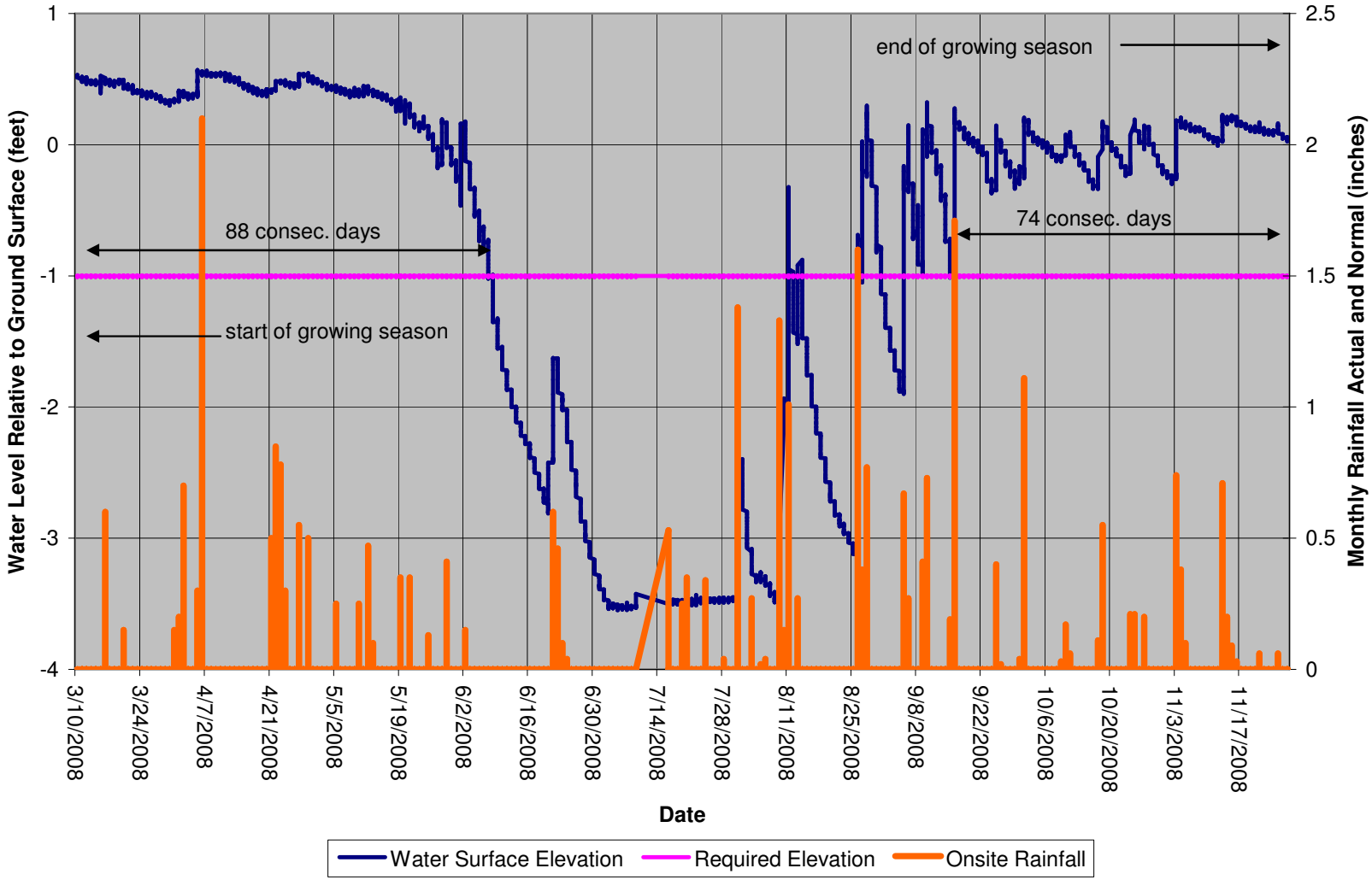
Appendix C

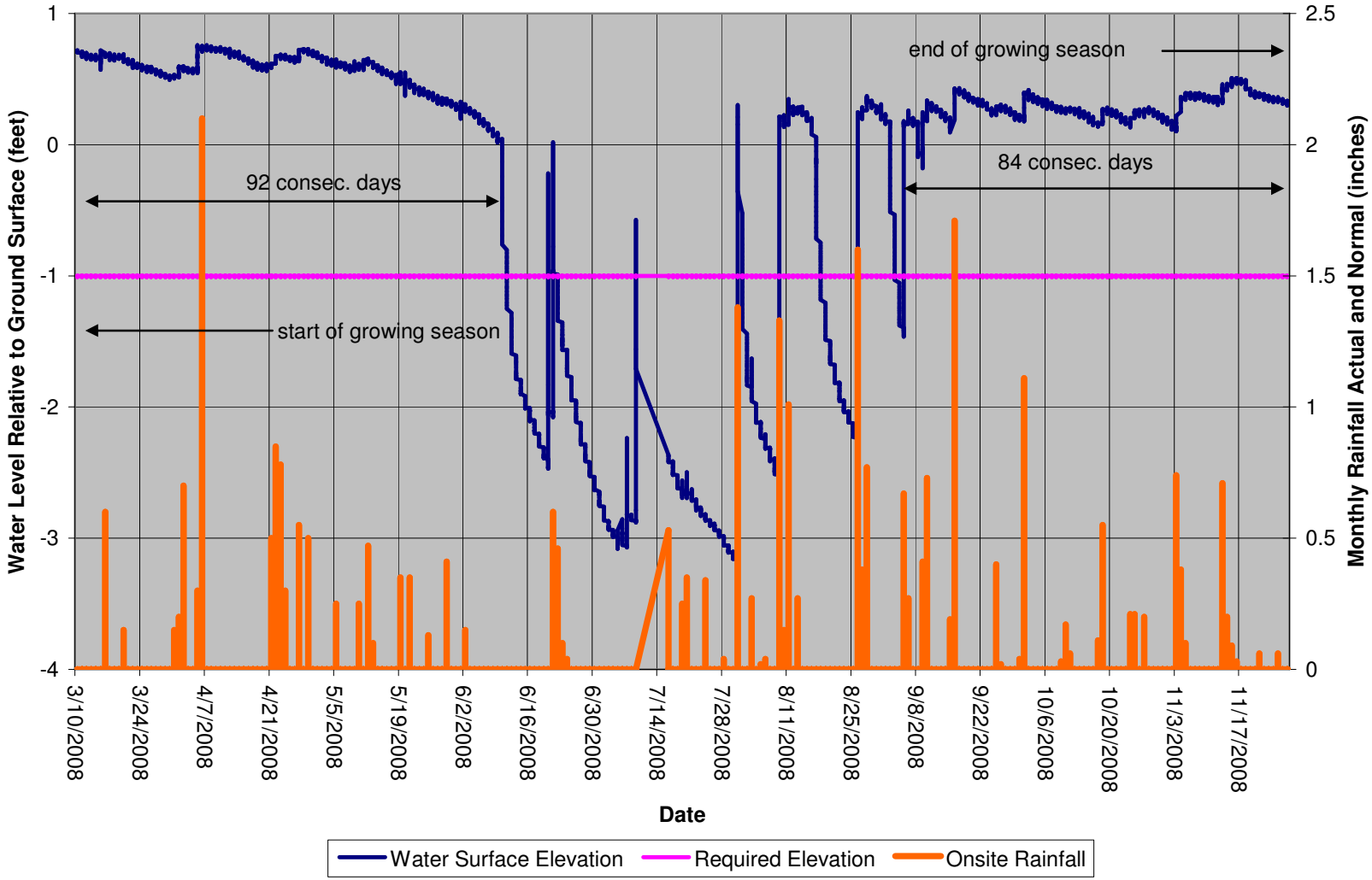
Hydrologic Data Tables

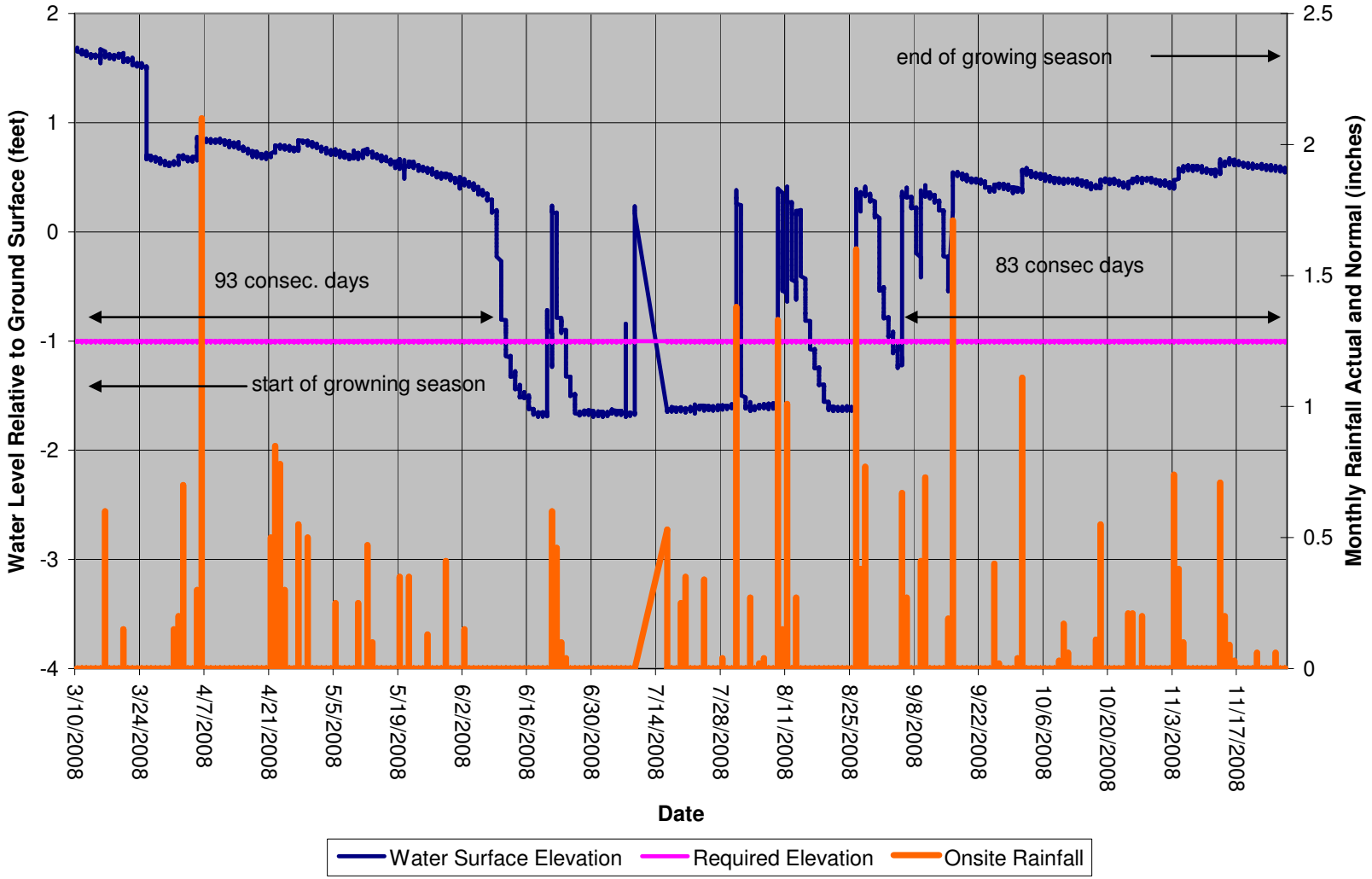

Mason Monitoring Gauge #1 (1126655)
Water Level Relative to Ground Surface (feet)
Monthly Rainfall Actual and Normal (inches)
1
0
-1
-2
-3
-4
2.5
2
1.5
1
0.5
0
end of growing season
94 consec. days
99 consec. days
start of growing season
3/10/2008
3/24/2008
4/7/2008
4/21/2008
5/5/2008
5/19/2008
6/2/2008
6/16/2008
6/30/2008
7/14/2008
7/28/2008
8/11/2008
8/25/2008
9/8/2008
9/22/2008
10/6/2008
10/20/2008
11/3/2008
11/17/2008
Date
Water Surface Elevation
Required Elevation
Onsite Rainfall

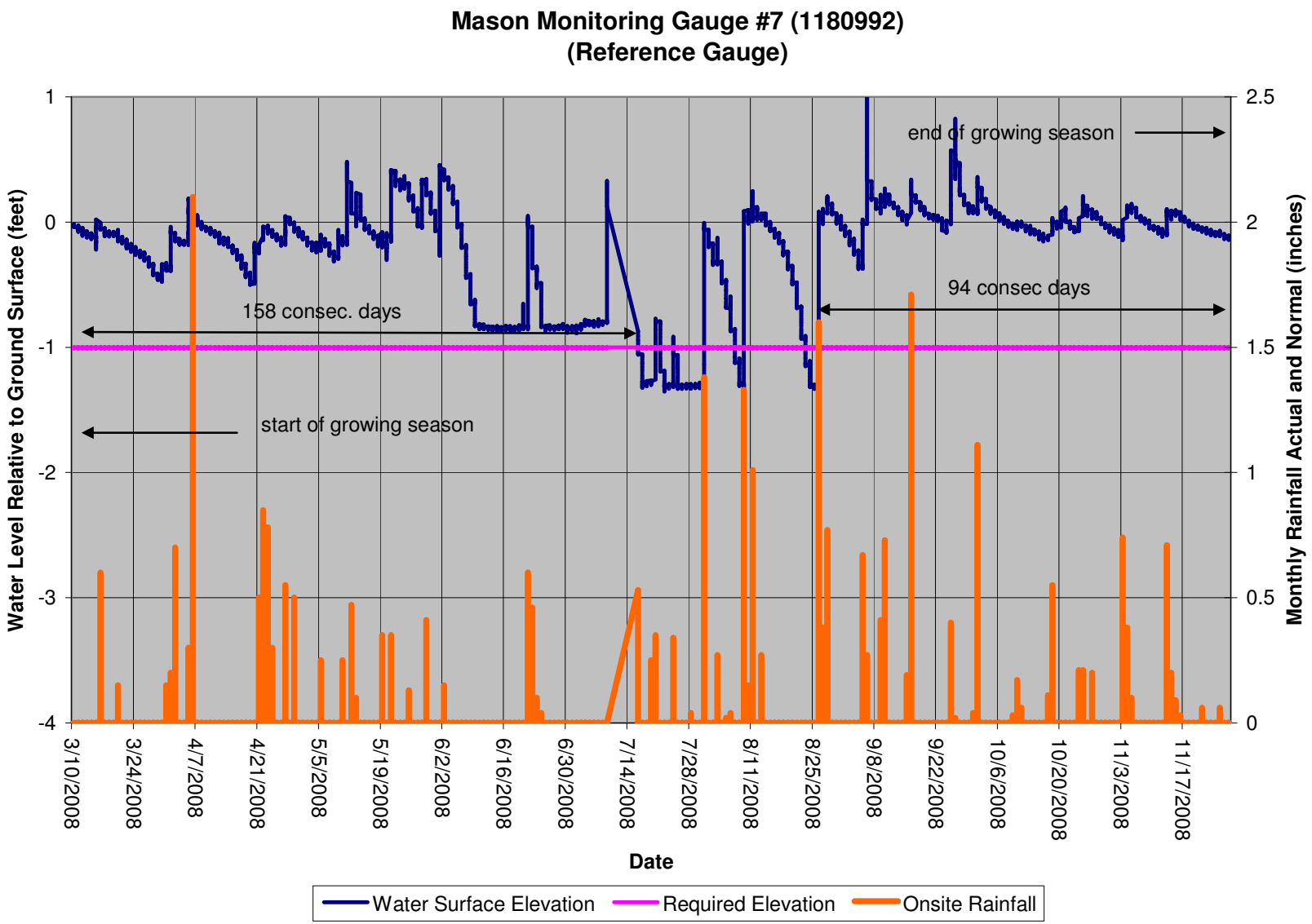

Mason Monitoring Gauge #2 (1126648)
Water Level Relative to Ground Surface (feet)
Monthly Rainfall Actual and Normal (inches)
1
0
-1
-2
-3
-4
2.5
2
1.5
1
0.5
0
end of growing season
86 consec. days
73 consec. days
start of growing season
3/10/2008
3/24/2008
4/7/2008
4/21/2008
5/5/2008
5/19/2008
6/2/2008
6/16/2008
6/30/2008
7/14/2008
7/28/2008
8/11/2008
8/25/2008
9/8/2008
9/22/2008
10/6/2008
10/20/2008
11/3/2008
11/17/2008
Date
Water Surface Elevation
Required Elevation
Onsite Rainfall

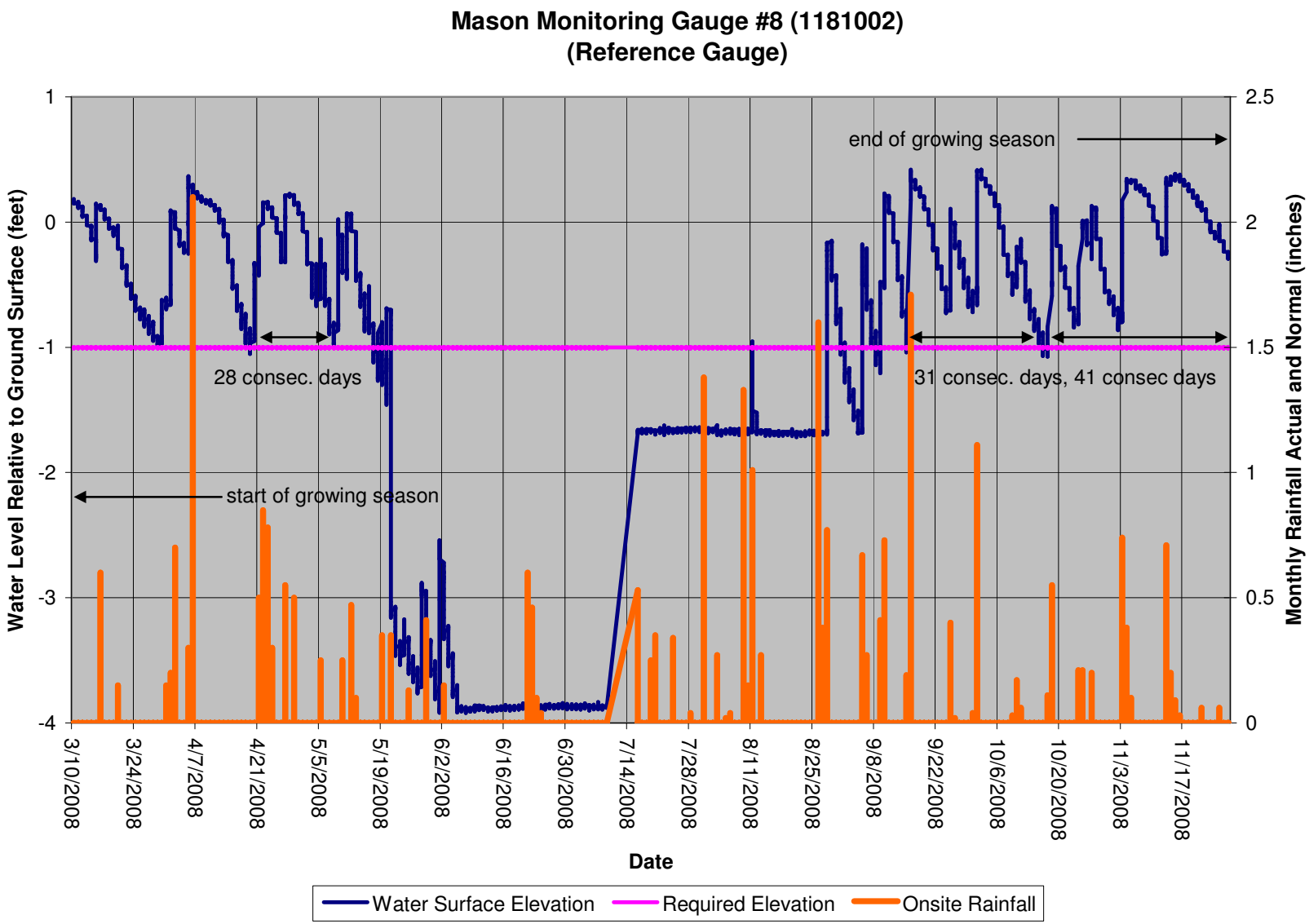

Mason Monitoring Gauge #3 (1126649)
Water Level Relative to Ground Surface (feet)
Monthly Rainfall Actual and Normal (inches)
1
0
-1
-2
-3
-4
2.5
2
1.5
1
0.5
0
end of growing season
94 consec. days
95 consec. days
start of growing season
3/10/2008
3/24/2008
4/7/2008
4/21/2008
5/5/2008
5/19/2008
6/2/2008
6/16/2008
6/30/2008
7/14/2008
7/28/2008
8/11/2008
8/25/2008
9/8/2008
9/22/2008
10/6/2008
10/20/2008
11/3/2008
11/17/2008
Date
Water Surface Elevation
Required Elevation
Onsite Rainfall


Mason Monitoring Gauge #4 (1126652)
Water Level Relative to Ground Surface (feet)
Monthly Rainfall Actual and Normal (inches)
1
0
-1
-2
-3
-4
2.5
2
1.5
1
0.5
0
end of growing season
88 consec. days
74 consec. days
start of growing season
3/10/2008
3/24/2008
4/7/2008
4/21/2008
5/5/2008
5/19/2008
6/2/2008
6/16/2008
6/30/2008
7/14/2008
7/28/2008
8/11/2008
8/25/2008
9/8/2008
9/22/2008
10/6/2008
10/20/2008
11/3/2008
11/17/2008
Date
Water Surface Elevation
Required Elevation
Onsite Rainfall


Mason Monitoring Gauge #5 (1180996)
Water Level Relative to Ground Surface (feet)
Monthly Rainfall Actual and Normal (inches)
1
0
-1
-2
-3
-4
2.5
2
1.5
1
0.5
0
end of growing season
84 consec. days
92 consec. days
start of growing season
3/10/2008
3/24/2008
4/7/2008
4/21/2008
5/5/2008
5/19/2008
6/2/2008
6/16/2008
6/30/2008
7/14/2008
7/28/2008
8/11/2008
8/25/2008
9/8/2008
9/22/2008
10/6/2008
10/20/2008
11/3/2008
11/17/2008
Date
Water Surface Elevation
Required Elevation
Onsite Rainfall


Mason Monitoring Gauge #6 (1181004)
Water Level Relative to Ground Surface (feet)
Monthly Rainfall Actual and Normal (inches)
2
1
0
-1
-2
-3
-4
2.5
2
1.5
1
0.5
0
end of growing season
93 consec. days
83 consec days
start of growning season
3/10/2008
3/24/2008
4/7/2008
4/21/2008
5/5/2008
5/19/2008
6/2/2008
6/16/2008
6/30/2008
7/14/2008
7/28/2008
8/11/2008
8/25/2008
9/8/2008
9/22/2008
10/6/2008
10/20/2008
11/3/2008
11/17/2008
Date
Water Surface Elevation
Required Elevation
Onsite Rainfall


Mason Monitoring Gauge #7 (1180992)
(Reference Gauge)
Water Level Relative to Ground Surface (feet)
Monthly Rainfall Actual and Normal (inches)
Date
end of growing season
158 consec. days
94 consec days
start of growing season
1
0
-1
-2
-3
-4
2.5
2
1.5
1
0.5
0
3/10/2008
3/24/2008
4/7/2008
4/21/2008
5/5/2008
5/19/2008
6/2/2008
6/16/2008
6/30/2008
7/14/2008
7/28/2008
8/11/2008
8/25/2008
9/8/2008
9/22/2008
10/6/2008
10/20/2008
11/3/2008
11/17/2008
Water Surface Elevation
Required Elevation
Onsite Rainfall


Mason Monitoring Gauge #8 (1181002)
(Reference Gauge)
Water Level Relative to Ground Surface (feet)
Monthly Rainfall Actual and Normal (inches)
Date
end of growing season
28 consec. days
31 consec. days, 41 consec days
start of growing season
1
0
-1
-2
-3
-4
2.5
2
1.5
1
0.5
0
3/10/2008
3/24/2008
4/7/2008
4/21/2008
5/5/2008
5/19/2008
6/2/2008
6/16/2008
6/30/2008
7/14/2008
7/28/2008
8/11/2008
8/25/2008
9/8/2008
9/22/2008
10/6/2008
10/20/2008
11/3/2008
11/17/2008
Water Surface Elevation
Required Elevation
Onsite Rainfall

Appendix D

Problem Areas Plan View (Integrated)

Vegetation Plots	Latitude	Longitude
#1 Northwest Corner	35-27-46.08	76-29-16.889
#2 Northwest Corner	35-27-49.195	76-29-11.187
#3 Northeast Corner	35-27-51.496	76-29-08.264
#4 Northwest Corner	35-27-54.787	76-29-17.560

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.

APPENDIX D: INTEGRATED PROBLEM AREAS
MONITORING REPORT YEAR #1

PROBLEM AREAS
NOVEMBER 2008

MASON PROPERTY
RIVERINE WETLAND MITIGATION AS-BUILT
16.0 ACRES
NON-RIVERINE WETLAND MITIGATION AS-BUILT
20.0 ACRES
HYDE COUNTY, NORTH CAROLINA

Ecosystem Enhancement

PLAN PREPARED BY:
ECOTONE, INC.
Environmental Consulting, Permitting & Design, Forest & Wetland Creation & Stream Restoration

ALBERMARLE RESTORATIONS, LLC
WETLAND RESTORATION, STREAM RESTORATION, & WILDLIFE HABITAT CREATION

FIGURE 4