Buffalo Flats Restoration Site
Monitoring Report MY01
EEP Project # 94647
EEP Contract # 003273

Submitted to:

Ecosystem Enhancement PROGRAM

NCEEP, 1652 Mail Service Center, Raleigh, NC 27699-1652

Construction Completed: October 2011
Data Collection: October 2012
Submitted: January 2013

Monitoring and Design Firm

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Project No: 20100798

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1.0 EXECUTIVE SUMMARY / PROJECT ABSTRACT

The Buffalo Flats Restoration Site (BFRS) is a full-delivery project that was developed for the North Carolina Ecosystem Enhancement Program (EEP). Construction was completed in October 2011. The site is within the 03040105 Watershed Cataloging Unit (8-digit HUC) and the Local Watershed Unit (14-digit HUC) 03040105020050. In the North Carolina Ecosystem Enhancement Program's (EEP) most recent publication of excluded and Targeted Local Watersheds/Hydrologic Units, the 03040105020050 14-digit HUC has been identified as a Targeted Local Watershed.

The project goals and objectives are listed below.

Project Goals

- Create diverse bottomland hardwood and low elevation seep communities that are integrated into the Dutch Buffalo Creek Corridor.
- Buffer nutrient and sediment impacts to Dutch Buffalo Creek from adjacent grazing practices.

Project Objectives

- Fill field ditches and ponds to slow the removal of hydrology from the site.
- Redevelop wetland microtopography to capture surface hydrology and slow subsurface drainage.
- Plant the mitigation area with species native to bottomland riparian forest and low elevation seep communities.
- Install livestock exclusion fencing.

The project site, which is protected by a 20.2-acre permanent conservation easement held by the State of North Carolina, is situated in Cabarrus County in the Southern Outer Piedmont ecoregion of the Piedmont physiographic province. The site is located on a single parcel located off of Gold Hill Road approximately six miles northeast of Concord, North Carolina.

The BFRS provided mitigation for wetland impacts within Hydrologic Unit 03040105 by restoring, preserving, and creating 20.2 acres of wetland, generating 11.6 riparian wetland mitigation units (WMU's) and 3.4 non-riparian WMU's.

The BFRS will be monitored to determine if the project is on-track to meeting jurisdictional wetland status. In the restoration areas, the wetland site will be deemed successful once hydrology is established and vegetation success criteria are met. In the creation area, success will be achieved if wetland hydrology and vegetation are present along with indicators of hydric soils.

1.1 Vegetation Success Criteria

The wetland mitigation is comprised of four areas that combine preservation, creation, and restoration. The site will be monitored for at least seven years or until the success criteria are achieved. The success criteria for the planted species in mitigation areas will be based on survival and growth. The site will demonstrate the re-establishment of targeted vegetative communities based on survival and growth of planted species and volunteer colonization, with an average stem density of 320 stems/acre after three years, 288 stems/acre after four years, 260 stems/acre after five years, and 210 stems/acre after 7 years. To determine the success of the planted mitigation area, thirteen permanent vegetation monitoring plots (10 by 10 meters) have been established in the wetland restoration and creation areas at a density that statistically represents the total mitigation acreage. Three of these plots are located in Wetland Area 1, nine of these plots are located in Wetland Area 2, and one plot is located in Wetland Area 3. The average

density of these plots will determine whether the site meets the success criterion. Non-target species must not constitute more than 20% of the woody vegetation based on permanent monitoring plots.

The first-year vegetation monitoring was based on the Level 2 CVS-EEP vegetation monitoring protocol. The site's average density for this monitoring period was 473 planted stems/acre. Ten of the thirteen plots had greater than 320 planted stems/acre. Including volunteers, the site averaged 719 total stems/acre.

1.2 Hydrology Success Criteria

Due to the inherent variability in the sites features and its geomorphic position, it is unlikely that the project will homogeneously exhibit common hydrologic conditions across the site, making a single hydrologic performance criterion unrepresentative of the sites performance. As such, the gauge data will be evaluated as a spatial average with each gauge representing the area half the distance to adjacent gauges or wetland type boundaries. The spatial average by wetland type will be the calculated value for comparison with the performance standard for credit validation. Gauges not achieving a minimum of 5% saturation will be considered non-attaining even if the spatial average exceeds the credit validation performance standard (5% for non-riparian and 10% for riparian).

The water table of the restored wetlands must be within 12" of the soils surface continuously for at least 5% (12 days) in the non-riparian wetland area (3.4 acres) and 10% (23 days) in the riparian wetland area (11.6 acres), (50% probability of reoccurrence) of the growing season during normal weather conditions. A "normal" year is based on NRCS climatological data for Cabarrus County, and using the 30th to 70th percentile thresholds as the range of normal, as documented in the USACE Technical Report "Accessing and Using Meteorological Data to Evaluate Wetland Hydrology" (Sprecher, 2000). The growing season for Cabarrus County extends from March 23 to November 11 for a total of 233 days (NRCS 1995). Beginning in Monitoring Year 2, KCI will also monitor soil temperature with an automatic recording gauge to determine if the 233 day growing season is accurate for the site.

The daily rainfall data was obtained from a local weather station in Kannapolis, NC; provided by the NC State Climate Office. For the 2012-year, the month of May experienced an above average rainfall, while July and August experienced average rainfall. The months of January, February, March, April, July, September, October, and November recorded below average rainfall for the site. Overall, the area experienced a below average rainfall during the 2012 growing season. The particularly low rainfall in the first four months of the year has a significant effect on wetland hydrology. During typical years, it is the normal rainfall during this part of the year that provides the wetland hydrology for these wetlands during the early spring.

During the site's first growing season, four of the seven wells in the riparian areas met the success criterion of having saturated soil conditions occurring within 12 inches of the ground surface for a minimum continuous period of 10% (23 days) of the 233 day growing season (March 10 to November 28) during average climatic conditions. One of the three wells in the non-riparian areas met the success criterion of 5% (12 days) of the growing season. Overall, wetland hydrology was achieved at five of the ten groundwater monitoring gauges in the riparian and non-riparian restoration areas.

1.3 Soil Success Criteria

Beginning in Monitoring Year 2, the 1.2 acre wetland creation area will be monitored to document the development of redoximorphic features in the soil by evidence of two or more indicators i.e. changes in chroma, organic matter content, oxidized root channels, concretions, mottles and other indications that the soil is subject to low oxygen conditions etc. within the seven-year monitoring period. Two permanent monitoring plots will be established and soil profiles will be monitored yearly for development of

redoximorphic conditions by a licensed soil scientist. Profiles will be compared from year to year and changes will be documented in the yearly monitoring reports.

Summary information/data related to the occurrence of items such as beaver or encroachment and statistics related to performance of various project and monitoring elements can be found in the tables and figures in the report appendices. Narrative background and supporting information formerly found in these reports can be found in the Baseline Monitoring Report and in the Mitigation Plan (formerly the Restoration Plan) documents available on the EEPs website. All raw data supporting the tables and figures in the appendices are available from EEP upon request.

2.0 METHODOLOGY

The CVS-EEP protocol, Level 2 (http://cvs.bio.unc.edu/methods.htm) was used to collect vegetation data from the site. The vegetation monitoring was completed on October 10, 2012.

3.0 REFERENCES

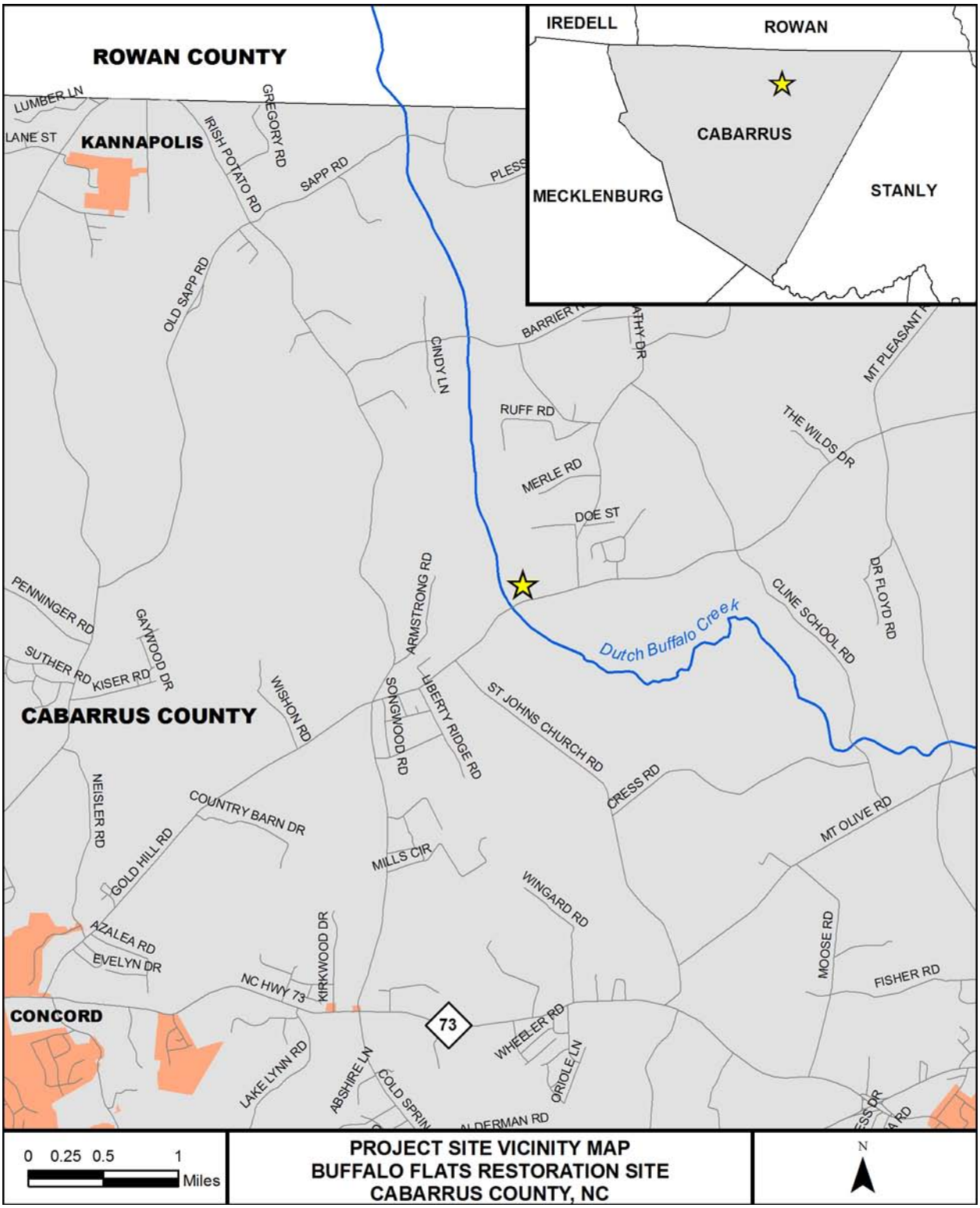
Lee, M.T., R.K. Peet, S.D. Roberts, and T.R. Wentworth. 2006. CVS-EEP Protocol for Recording Vegetation, Version 4.0 (http://cvs.bio.unc.edu/methods.htm)

USACE. 2003. Stream Mitigation Guidelines. USACE, NCDENR-DWQ, USEPA, NCWRC.

Sprecher, S. W. and Warne, A. G. 2000. "Accessing and Using Meteorological Data to Evaluate Wetland Hydrology," ERDC/EL TR-WRAP-00-01, U.S. Army Engineer Research and Development Center, Vicksburg, MS.

Appendix A

Project Vicinity Map and Background Tables


ROWAN COUNTY
IREDELL
ROWAN
CABARRUS
MECKLENBURG
STANLY
KANNAPOLIS
CONCORD
CABARRUS COUNTY
Dutch Buffalo Creek
LUMBER LN
LANE ST
IRISH POTATO RD
GREGORY RD
SAPP RD
OLD SAPP RD
CINDY LN
RUFF RD
MERLE RD
DOE ST
THE WILDS DR
MT PLEASANT
CLINE SCHOOL RD
DR FLOYD RD
ARMSTRONG RD
PENNINGER RD
GAYWOOD DR
SUTHER RD
KISER RD
WISHON RD
SONGWOOD RD
LIBERTY RIDGE RD
ST JOHNS CHURCH RD
CRESS RD
MT OLIVE RD
NEISLER RD
COUNTRY BARN DR
GOLD HILL RD
MILLS CIR
WINGARD RD
AZALEA RD
EVELYN DR
KIRKWOOD DR
NC HWY 73
MOOSE RD
FISHER RD
WHEELER RD
ORIOLE LN
LAKE LYNN RD
ABSHIRE LN
ALDERMAN RD
73
0 0.25 0.5 1
Miles
N
PROJECT SITE VICINITY MAP
BUFFALO FLATS RESTORATION SITE
CABARRUS COUNTY, NC

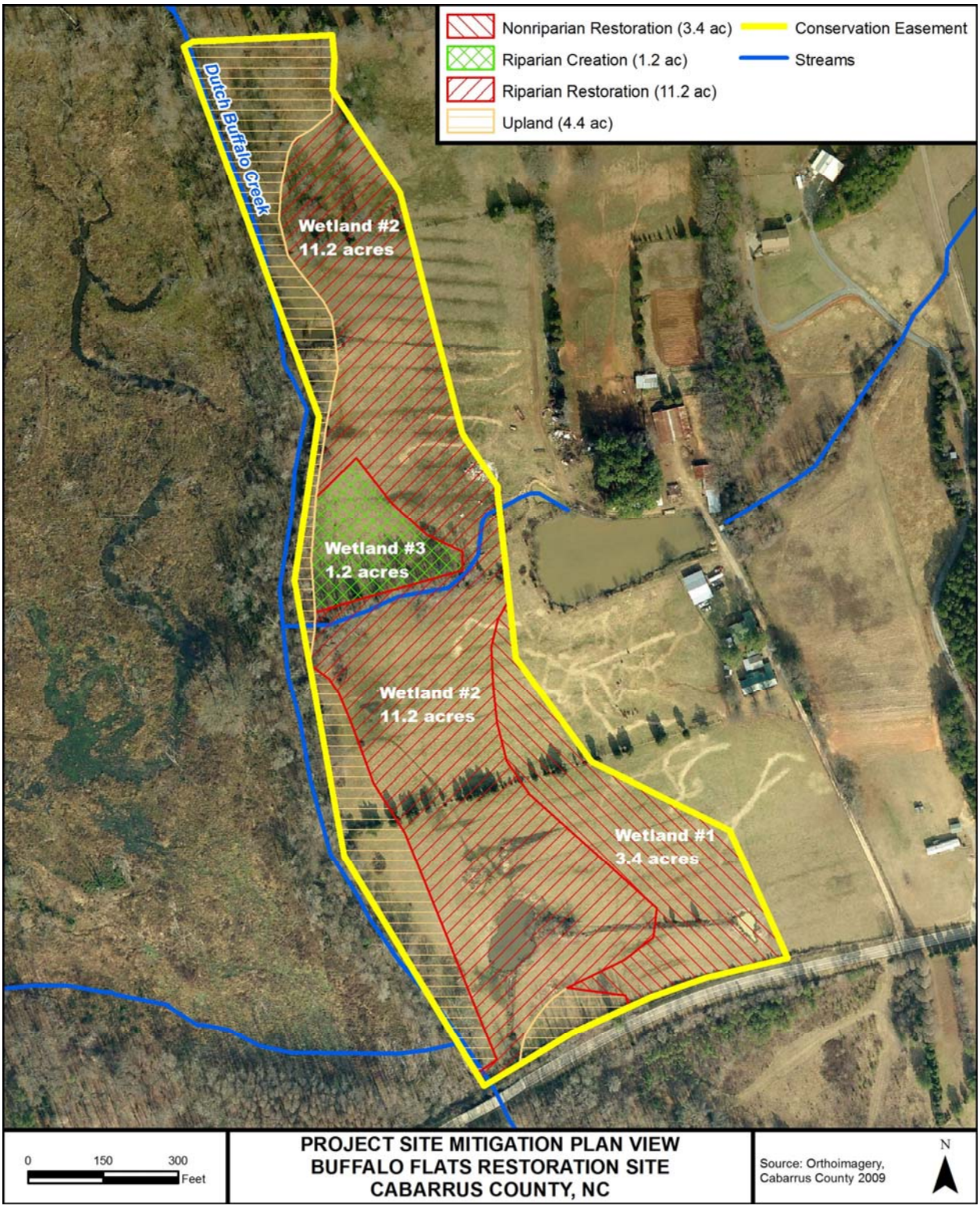

Nonriparian Restoration (3.4 ac)
Riparian Creation (1.2 ac)
Riparian Restoration (11.2 ac)
Upland (4.4 ac)
Conservation Easement
Streams
Dutch Buffalo Creek
Wetland #2
11.2 acres
Wetland #3
1.2 acres
Wetland #2
11.2 acres
Wetland #1
3.4 acres
0
150
300
Feet
PROJECT SITE MITIGATION PLAN VIEW
BUFFALO FLATS RESTORATION SITE
CABARRUS COUNTY, NC
Source: Orthoimagery,
Cabarrus County 2009
N

Table 1. Project Components
Project Number and Name: 94647 - Buffalo Flats Restoration Site

Mitigation Credits									
	Stream		**Riparian Wetland**		**Non-riparian Wetland**		**Buffer**	**Nitrogen Nutrient Offset**	**Phosphorous Nutrient Offset**
Type	R	RE	R	RE	R	RE			
Acres	-	-	11.2	1.2	3.4	-			
Credits	-	-	11.2	0.4	3.4	-	-	-	-
TOTAL CREDITS			11.6		3.4				

Project Components						
Project Component -or- Reach ID	**Stationing/ Location**	**Existing Footage/ Acreage**	**Approach (PI, PII etc.)**	**Restoration -or- Restoration Equivalent**	**Restoration Footage or Acreage**	**Mitigation Ratio**
Wetland Area 1	Southeastern corner of project	3.4 acres	-	Restoration	3.4 acres	1:1
Wetland Area 2	North to south throughout the center of project	11.2 acres	-	Restoration	11.2 acres	1:1
Wetland Area 3	West-central portion of the project	1.2 acres	-	Creation	1.2 acres	3:1

Component Summation						
Restoration Level	**Stream (linear feet)**	**Riparian Wetland (acres)**		**Non-riparian Wetland (acres)**	**Buffer (square feet)**	**Upland (acres)**
		Riverine	Non-Riverine			
Restoration	-	11.2 acres	-	3.4 acres	-	-
Enhancement		-	-		-	-
Enhancement I	-					
Enhancement II	-					
Creation		1.2 acres	-	-		-
Preservation	-	-	-	-		4.4 acres
High Quality Preservation	-	-	-	-		-
TOTAL		12.4 acres	-	3.4 acres		4.4 acres

Table 2. Project Activity & Reporting History Project Number and Name: 94647 - Buffalo Flats Restoration Site		
Elapsed Time Since Grading Complete: 1 yr 2 months **Elapsed Time Since Planting Complete: 10 months** **Number of Reporting Years: 1**		
Activity or Report	**Data Collection Complete**	**Actual Completion or Delivery**
Mitigation Plan		Dec 10
Final Design - Construction Plans		Dec 10
Construction		Oct 11
Planting		Feb 12
Baseline Monitoring/Report	Feb/March 12	July 12
Year 1 Monitoring	Oct 12	Dec12

Table 3. Project Contacts Project Number and Name: 94647 - Buffalo Flats Restoration Site	
Design Firm	KCI Associates of North Carolina, PC Landmark Center II, Suite 220 4601 Six Forks Rd. Raleigh, NC 27609 Contact: Mr. Tim Morris Phone: (919) 278-2512 Fax: (919) 783-9266
Construction Contractor	KCI Environmental Technologies and Construction, Inc. Landmark Center II, Suite 220 4601 Six Forks Rd. Raleigh, NC 27609 Contact: Mr. Tim Morris Phone: (919) 278-2512 Fax: (919) 783-9266
Planting Contractor	Bruton Nurseries and Landscapes PO Box 1197 Freemont, NC 27830 Contact: Mr. Charlie Bruton Phone: (919) 242-6555
Monitoring Performers	
MY00-MY01	KCI Associates of North Carolina, PC Landmark Center II, Suite 220 4601 Six Forks Rd. Raleigh, NC 27609 Contact: Mr. Adam Spiller Phone: (919) 278-2514 Fax: (919) 783-9266

Table 4. Project Attribute Table **Project Number and Name: 94647 – Buffalo Flats Restoration Site**			
County	Cabarrus County		
Project Area (acres)	20.20 acres		
Project Coordinates (lat. and long.)	35.456988 N , -80.496325 W		
Project Watershed Summary Information			
Physiographic Province	Piedmont		
River Basin	Yadkin-Pee Dee		
USGS Hydrologic Unit 8-digit	03040105	**USGS Hydrologic Unit 14-digit**	03040105020050
DWQ Sub-basin	03-07-12		
Project Drainage Area (acres)	106 acres		
Project Drainage Area Percentage of Impervious Area	1%		
CGIA Land Use Classification	3.6% Cultivated, 54.1% Managed Herbaceous Cover, 32.5% Mixed Upland Hardwoods, 5.2% Southern Yellow Pine, and 4.6% Water Bodies		
Wetland Summary Information			
Parameters	**Wetland Area 1**	**Wetland Area 2**	**Wetland Area 3**
Size of Wetland (acres)	3.4 acres	11.2 acres	1.2 acres
Wetland Type (non-riparian, riparian riverine or riparian non-riverine)	Non-riparian	Riparian non-riverine	Riparian non-riverine
Mapped Soil Series	Chewacla (Wehadkee and Armenia by detailed soil investigation)	Chewacla (Wehadkee and Armenia by detailed soil investigation)	Chewacla
Drainage class	Poorly drained	Poorly drained	Somewhat poorly drained
Soil Hydric Status	Drained Hydric	Drained Hydric	Non hydric
Source of Hydrology	Hillside seepage	Surface/Overbank Flow	Surface/Overbank Flow
Hydrologic Impairment	Ditching and Pasture	Ditching and Pasture	Ditching and Pasture
Native vegetation community	Pasture	Pasture	Pasture

Appendix B

Visual Assessment Data

LEGEND:

- VEG PLOT ACHIEVING DENSITY CRITERION
- VEG PLOT BELOW DENSITY CRITERION
- VEG PLOT TOTAL / PLANTED STEM DENSITY 890/423
- WETLAND GAUGE ACHIEVING HYDROLOGIC CRITERION
- WETLAND GAUGE BELOW HYDROLOGIC CRITERION
- PHOTO POINT

IMAGE SOURCE: NC 2010 ORTHOIMAGERY

NC GRID NAD '83

–80 –40 0 80 160

GRAPHIC SCALE

DUTCH BUFFALO CREEK

CONSERVATION EASEMENT BOUNDARY

CONSERVATION EASEMENT

REFERENCE GAUGE

UPLAND PRESERVATION

PP11

VEG PLOT #13 1174/445

GAUGE#9

GAUGE#6

WETLAND AREA 3 RIPARIAN CREATION

VEG PLOT #11 607/486

VEG PLOT #12 1255/486

WETLAND AREA 2 RIPARIAN RESTORATION

PP9

PP10

PP8

VEG PLOT #7 648/283

GAUGE#5

VEG PLOT #9 850/607

GAUGE#7

VEG PLOT #8 648/607

GAUGE#8

VEG PLOT #10 567/567

WETLAND AREA 2 RIPARIAN RESTORATION

VEG PLOT #5 768/526

VEG PLOT #3 931/324

GAUGE#3

VEG PLOT #6 283/283

GAUGE#4

PP6

PP7

UPL. PRES.

GOLD HILL RD

CONSERVATION EASEMENT

PP4

PP5

PP3

GAUGE#2

VEG PLOT #2 283/202

VEG PLOT #4 526/526

GAUGE#1

WETLAND AREA 1 NONRIPARIAN RESTORATION

VEG PLOT #1 809/809

GAUGE#10

PP1

PP2

CONSERVATION EASEMENT BOUNDARY

PROJECT DATA:

WETLAND AREA 1
NONRIPARIAN WETLAND RESTORATION = 3.4 ACRES

WETLAND AREA 2
RIPARIAN WETLAND RESTORATION = 11.2 ACRES

WETLAND AREA 3
RIPARIAN WETLAND CREATION = 1.2 ACRES

PROJECT TOTAL AREA OF DISTURBANCE = 20.2 ACRES

REVISIONS			
SYM.	DESCRIPTION	DATE	APPROVED

Ecosystem Enhancement Program

KCI ASSOCIATES OF NC
ENGINEERS • PLANNERS • SCIENTISTS
4601 SIX FORKS ROAD
RALEIGH, NORTH CAROLINA 27609

BUFFALO FLATS RESTORATION SITE

EEP PROJECT #94647
CABARRUS COUNTY, NORTH CAROLINA
MONITORING YEAR 01

DATE: DEC 2012
SCALE: 1" = 160'

CURRENT CONDITION PLAN VIEW

SHEET 1 OF 1

Table 5. Vegetation Condition Assessment

Project Number and Name: 94647 – Buffalo Flats Restoration Site

Planted Acreage 15.8 **Easement Acreage 20.2**

Vegetation Category	Definitions	Mapping Threshold	CCPV Depiction	Number of Polygons	Combined Acreage	% of Planted Acreage
1. Bare Areas	Very limited cover of both woody and herbaceous material.	0.1 acres	Pattern and Color	0	0.00	0.0%
2. Low Stem Density Areas	Woody stem densities clearly below target levels based on MY3, 4, or 5 stem count criteria.	0.1 acres	Not Depicted, Covers Most of Restoration Area	0	0.00	0.0%
			Total	0	0.00	0.0%
3. Areas of Poor Growth Rates or Vigor	Areas with woody stems of a size class that are obviously small given the monitoring year.	0.25 acres	Pattern and Color	0	0.00	0.0%
			Cumulative Total	0	0.00	0.0%
4. Invasive Areas of Concern	Areas or points (if too small to render as polygons at map scale).	1000 SF	Pattern and Color	0	0.00	0.0%
5. Easement Encroachment Areas	Areas or points (if too small to render as polygons at map scale).	none	Pattern and Color	0	0.00	0.0%

Photo Point Photos

Photo Point 1: View looking west, from the southeastern corner of the project site. 3/1/2012– Baseline

Photo Point 1: View looking west, from the southeastern corner of the project site. 10/10/2012 – MY01

Photo Point 2: View looking north, from the southeastern corner of the project site. 3/1/2012– Baseline

Photo Point 2: View looking north, from the southeastern corner of the project site. 10/10/2012 – MY01

Photo Point 3: View looking south, from the eastern easement boundary. 3/1/2012– Baseline

Photo Point 3: View looking south, from the eastern easement boundary. 10/10/2012 – MY01

Photo Point 4: View looking west, from the eastern easement boundary. 3/1/2012– Baseline

Photo Point 4: View looking west, from the eastern easement boundary. 10/10/2012 – MY01

Photo Point 5: View looking north, from the eastern easement boundary. 3/1/2012– Baseline

Photo Point 5: View looking north, from the eastern easement boundary. 10/10/2012 – MY01

Photo Point 6: View looking southwest, from the eastern easement boundary. 3/1/2012– Baseline

Photo Point 6: View looking southwest, from the eastern easement boundary. 10/10/2012 – MY01

Photo Point 7: View looking northwest, from the eastern easement boundary. 3/1/2012– Baseline

Photo Point 7: View looking northwest, from the eastern easement boundary. 10/10/2012 – MY01

Photo Point 8: View looking southwest, from the eastern easement boundary. 3/1/2012– Baseline

Photo Point 8: View looking southwest, from the eastern easement boundary. 10/10/2012 – MY01

Photo Point 9: View looking west, from the eastern easement boundary. 3/1/2012– Baseline

Photo Point 9: View looking west, from the eastern easement boundary. 10/10/2012 – MY01

Photo Point 10: View looking north, from the eastern easement boundary. 3/1/2012– Baseline

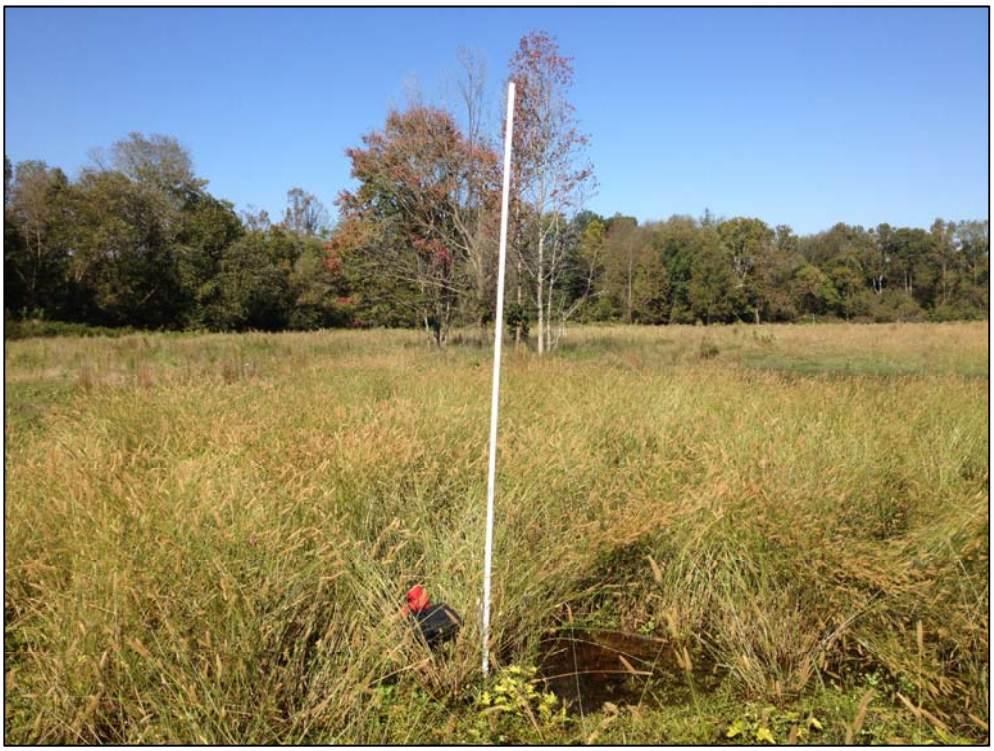
Photo Point 10: View looking north, from the eastern easement boundary. 10/10/2012 – MY01

Photo Point 11: View looking south, from the north eastern corner of the project site. 3/1/2012– Baseline

Photo Point 11: View looking south, from the north eastern corner of the project site. 10/10/2012 – MY01

Vegetation Plot Photos

Vegetation Plot 1: 10/10/12 – MY-01

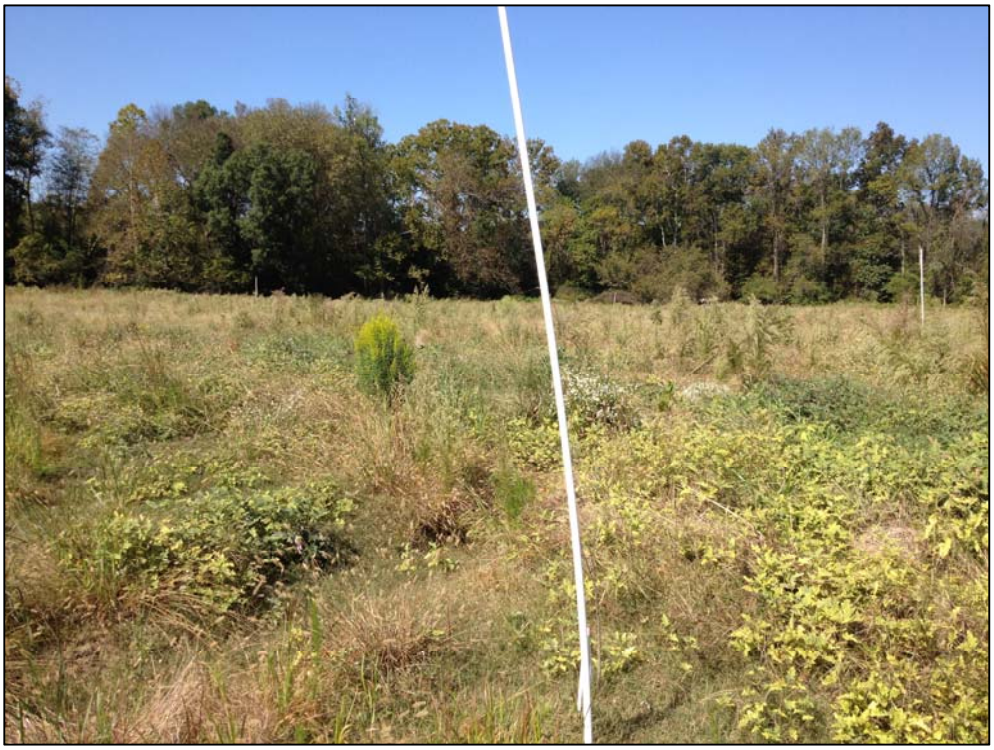


Vegetation Plot 2: 10/10/12 – MY-01

Vegetation Plot 3: 10/10/12 – MY-01

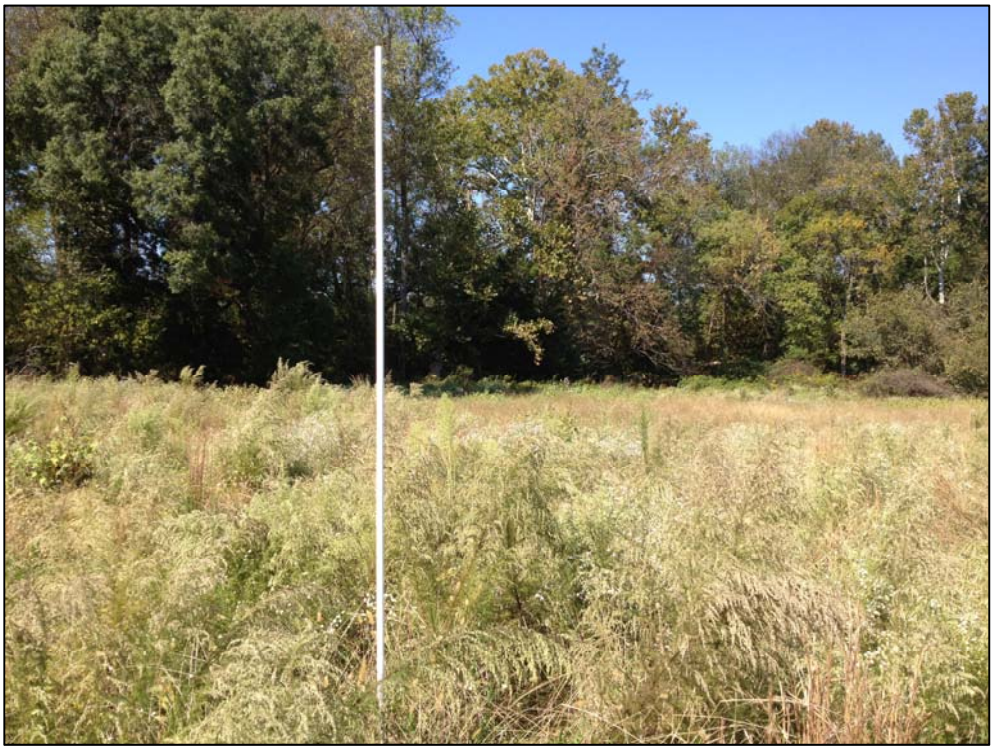
Vegetation Plot 4: 10/10/12 – MY-01

Vegetation Plot 5: 10/10/12 – MY-01

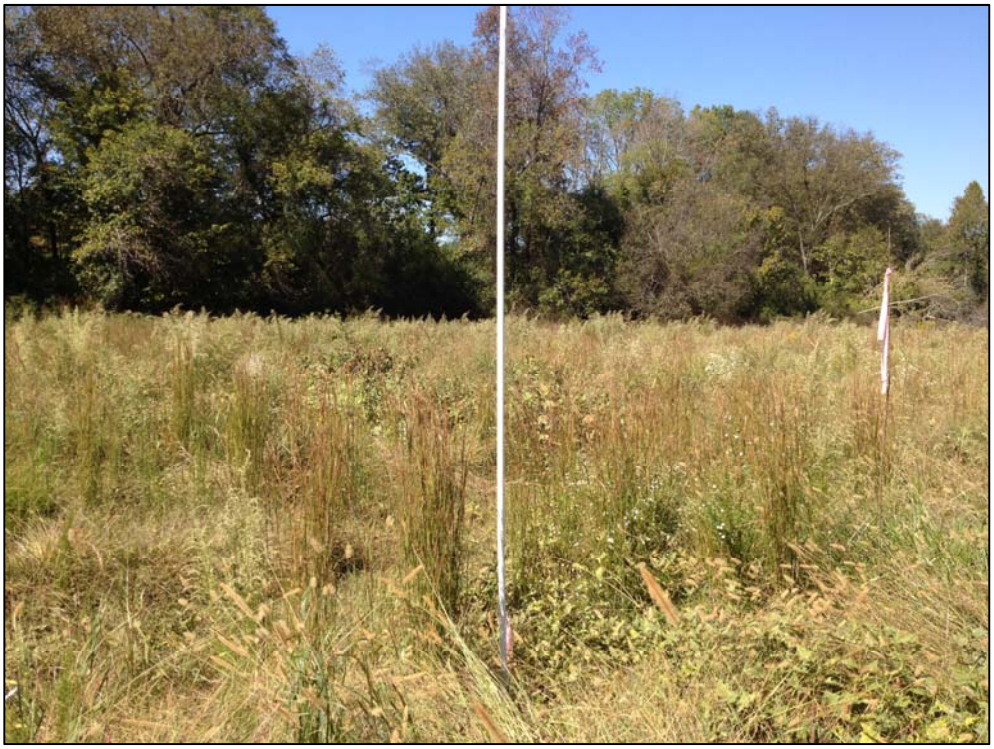


Vegetation Plot 6: 10/10/12 – MY-01

Vegetation Plot 7: 10/10/12 – MY-01



Vegetation Plot 8: 10/10/12 – MY-01



Vegetation Plot 9: 10/10/12 – MY-01

Vegetation Plot 10: 10/10/12 – MY-01

Vegetation Plot 11: 10/10/12 – MY-01

Vegetation Plot 12: 10/10/12 – MY-01

Vegetation Plot 13: 10/10/12 – MY-01

Appendix C

Vegetation Plot Data

Table 6. Vegetation Plot Criteria Attainment

Project Number and Name: 94647 - Buffalo Flats Restoration Site

Vegetation Plot ID	Vegetation Survival Threshold Met? (320 planted stems/acre)	Monitoring Year 01 Planted Stem Density (stems/acre)	Monitoring Year 01 Total Stem Density (stems/acre)
1	Yes	809	809
2	No	202	283
3	Yes	324	931
4	Yes	526	526
5	Yes	526	769
6	No	283	283
7	No	283	647
8	Yes	607	647
9	Yes	607	850
10	Yes	567	567
11	Yes	486	607
12	Yes	486	1,255
13	Yes	445	1,174

Table 7. CVS Vegetation Plot Metadata Project Number and Name: 94647 - Buffalo Flats Restoration Site	
Report Prepared By	April Helms
Date Prepared	11/20/2012 15:49
database name	KCI-2012-A.mdb
database location	M:\2007\12071067_2007 EEP OPEN END\Veg_database
computer name	12-CV76KF1
file size	59768832
DESCRIPTION OF WORKSHEETS IN THIS DOCUMENT----------	
Metadata	Description of database file, the report worksheets, and a summary of project(s) and project data.
Proj, planted	Each project is listed with its PLANTED stems per acre, for each year. This excludes live stakes.
Proj, total stems	Each project is listed with its TOTAL stems per acre, for each year. This includes live stakes, all planted stems, and all natural/volunteer stems.
Plots	List of plots surveyed with location and summary data (live stems, dead stems, missing, etc.).
Vigor	Frequency distribution of vigor classes for stems for all plots.
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.
Planted Stems by Plot and Spp	A matrix of the count of PLANTED living stems of each species for each plot; dead and missing stems are excluded.
ALL Stems by Plot and spp	A matrix of the 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	94647
project Name	Buffalo Flats Restoration Site
Description	Wetland Restoration Site
River Basin	Yadkin River Basin
Sampled Plots	13

Table 8. CVS Stem Count Total and Planted by Plot and Species
Project Number and Name: 94647 - Buffalo Flats Restoration Site

			Current Plot Data (MY1-2012)																					
			E94647-EEP-1			E94647-EEP-2			E94647-EEP-3			E94647-EEP-4			E94647-EEP-5			E94647-EEP-6			E94647-EEP-7			E94647-EEP-8		
Scientific Name	**Common Name**	**Species Type**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**
Acer negundo	boxelder	Tree									2						4						1			1
Acer rubrum	red maple	Tree									1												3			
Betula nigra	river birch	Tree				1	1	1	3	3	3										1	1	1	6	6	6
Diospyros virginiana	common persimmon	Tree															1									
Fraxinus pennsylvanica	green ash	Tree						2																		
Liquidambar styraciflua	sweetgum	Tree									3						1						1			
Liriodendron tulipifera	tuliptree	Tree																			2	2	2			
Nyssa aquatica	water tupelo	Tree													2	2	2				1	1	1			
Platanus occidentalis	American sycamore	Tree	2	2	2						7							1	1	1			4			
Populus deltoides	eastern cottonwood	Tree									2															
Quercus	oak	Tree													1	1	1									
Quercus laurifolia	laurel oak	Tree	7	7	7							1	1	1				2	2	2						
Quercus lyrata	overcup oak	Tree																						1	1	1
Quercus pagoda	cherrybark oak	Tree	7	7	7	3	3	3	3	3	3	1	1	1	4	4	4	3	3	3	2	2	2	4	4	4
Quercus palustris	pin oak	Tree	4	4	4							2	2	2				1	1	1				1	1	1
Quercus phellos	willow oak	Tree				1	1	1	1	1	1	8	8	8	6	6	6				1	1	1	3	3	3
Unknown									1	1	1	1	1	1												
	Stem count		20	20	20	5	5	7	8	8	23	13	13	13	13	13	19	7	7	7	7	7	16	15	15	16
	size (ares)		1			1			1			1			1			1			1			1		
	size (ACRES)		0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02		
	Species count		4	4	4	3	3	4	4	4	9	5	5	5	4	4	7	4	4	4	5	5	9	5	5	6
	Stems per ACRE		809	809	809	202	202	283	324	324	931	526	526	526	526	526	769	283	283	283	283	283	647	607	607	647

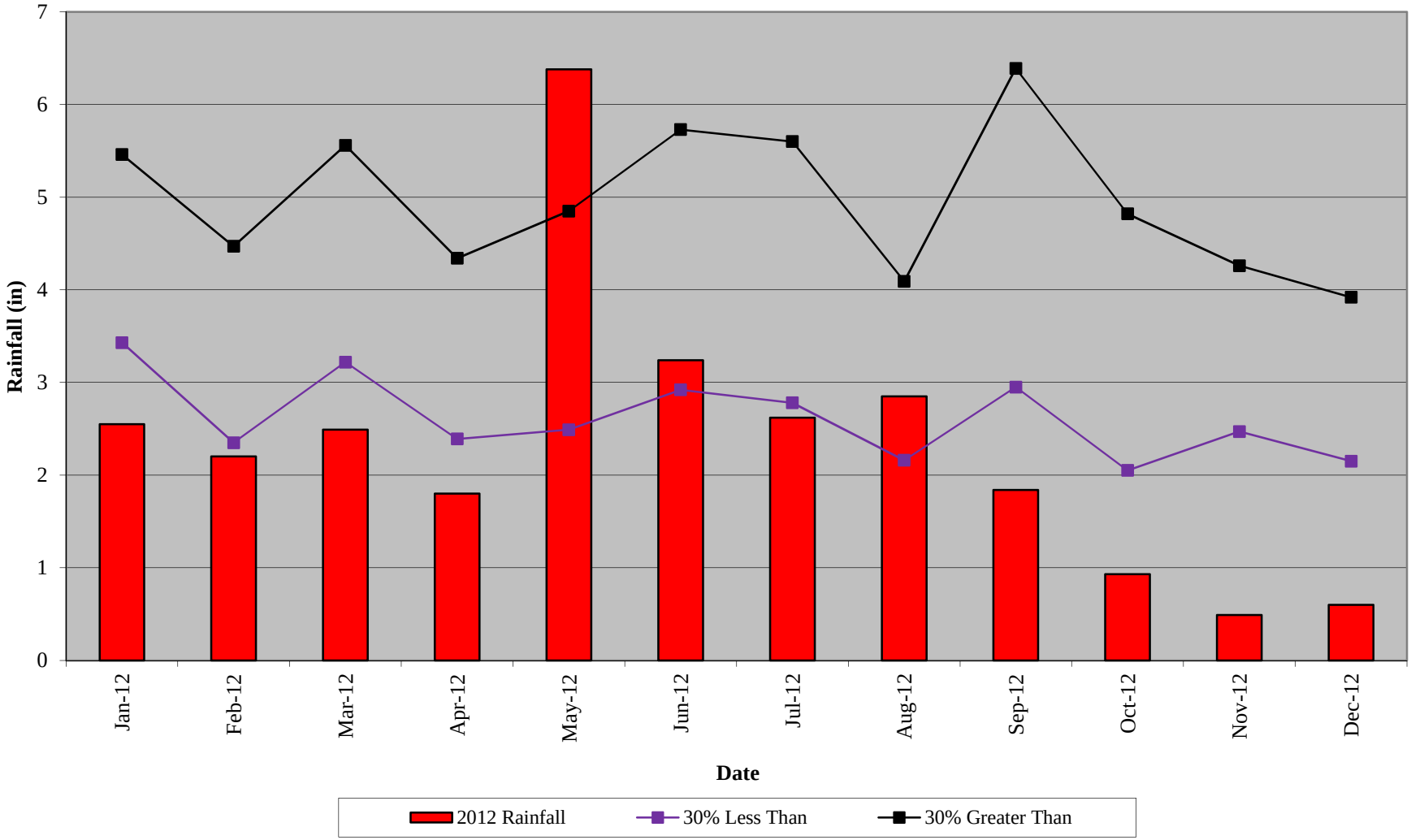
Table 8. CVS Stem Count Total and Planted by Plot and Species Cont.
Project Number and Name: 94647 - Buffalo Flats Restoration Site

			Current Plot Data (MY1-2012)																		Annual Means					
			E94647-EEP-8			E94647-EEP-9			E94647-EEP-10			E94647-EEP-11			E94647-EEP-12			E94647-EEP-13			MY1 (2012)			MY0 (2012)		
Scientific Name	Common Name	Species Type	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T
Acer negundo	boxelder	Tree			1									1			4			3			16			
Acer rubrum	red maple	Tree						1															5			
Betula nigra	river birch	Tree	6	6	6				3	3	3	3	3	3	9	9	9	1	1	1	27	27	27	47	47	47
Diospyros virginiana	common persimmon	Tree						1									1			1			4			
Fraxinus pennsylvanica	green ash	Tree						1									1			10			14			
Liquidambar styraciflua	sweetgum	Tree						2															7			
Liriodendron tulipifera	tuliptree	Tree							1	1	1	1	1	1							4	4	4			
Nyssa aquatica	water tupelo	Tree				1	1	1	4	4	4	1	1	1	2	2	2	5	5	5	16	16	16	6	6	6
Platanus occidentalis	American sycamore	Tree						1						2			12			4	3	3	33			
Populus deltoides	eastern cottonwood	Tree																					2			
Quercus	oak	Tree																			1	1	1	3	3	3
Quercus laurifolia	laurel oak	Tree																			10	10	10	19	19	19
Quercus lyrata	overcup oak	Tree	1	1	1																1	1	1			
Quercus pagoda	cherrybark oak	Tree	4	4	4	4	4	4	4	4	4	5	5	5	1	1	2	1	1	1	42	42	43	24	24	24
Quercus palustris	pin oak	Tree	1	1	1																8	8	8			
Quercus phellos	willow oak	Tree	3	3	3	1	1	1	2	2	2	2	2	2				4	4	4	29	29	29	14	14	14
Unknown						9	9	9													11	11	11	124	124	124
Stem count			15	15	16	15	15	21	14	14	14	12	12	15	12	12	31	11	11	29	152	152	231	237	237	237
size (ares)			1			1			1			1			1			1			13			13		
size (ACRES)			0.02			0.02			0.02			0.02			0.02			0.02			0.32			0.32		
Species count			5	5	6	4	4	9	5	5	5	5	5	7	3	3	7	4	4	8	11	11	17	7	7	7
Stems per ACRE			607	607	647	607	607	850	567	567	567	486	486	607	486	486	1255	445	445	1174	473	473	719	738	738	738

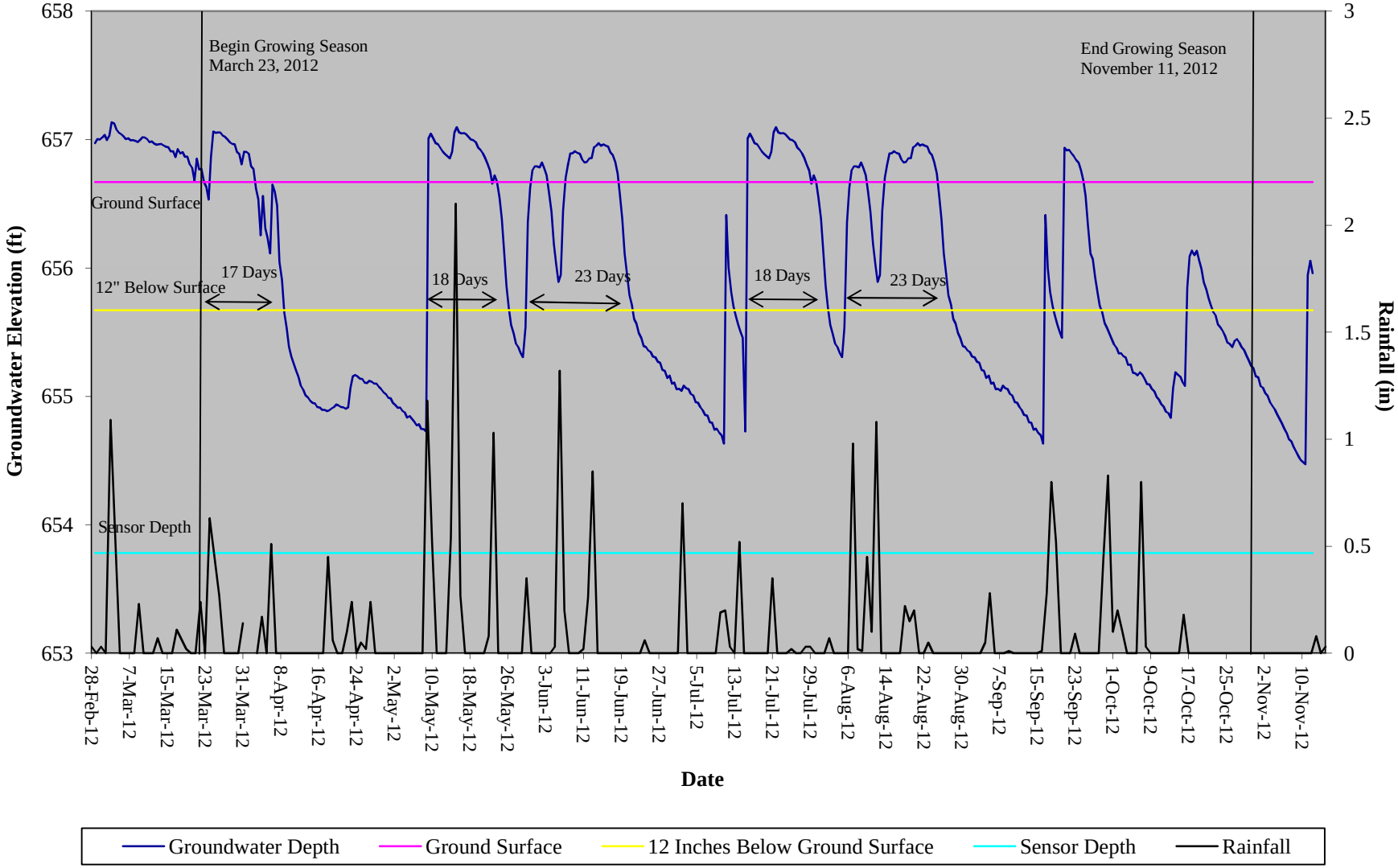
Appendix D

Hydrologic Data

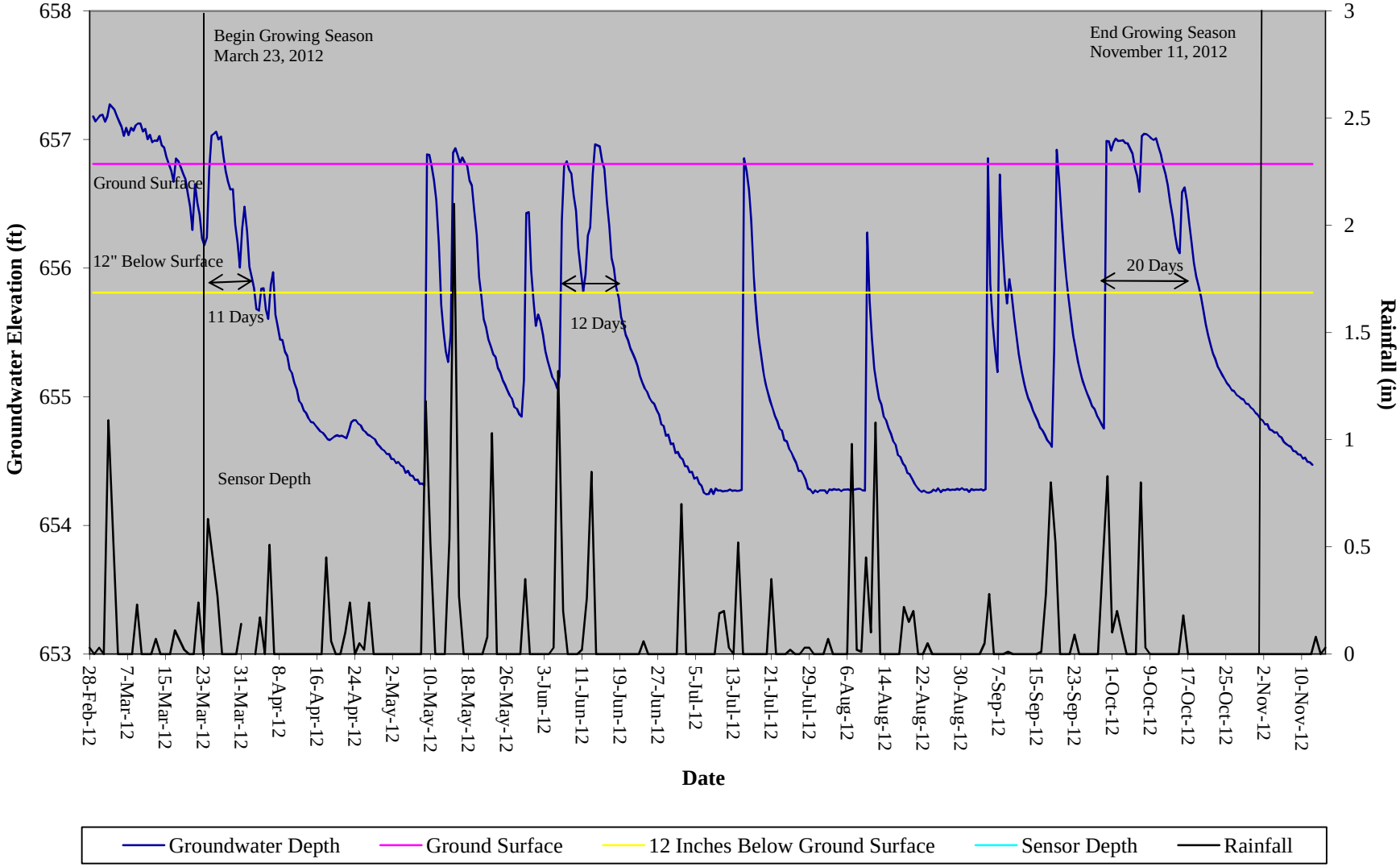
Buffalo Flats Restoration Site
30-70 Percentile Graph
Kannapolis, NC
2012 Monthly Rainfall



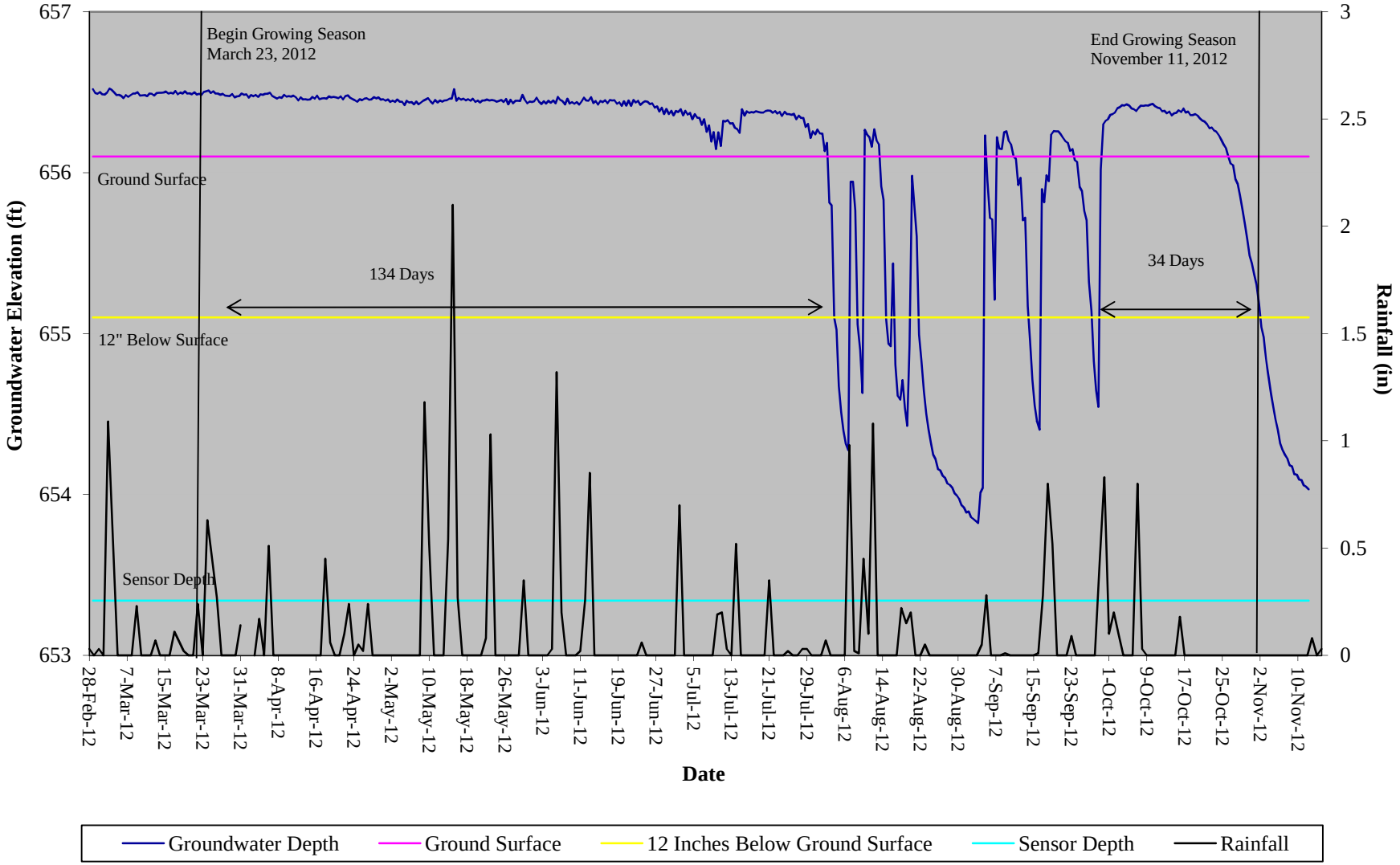
Buffalo Flats Restoration Site
Hydrograph
Wetland Gauge 1 - Nonriparian (12 Days Minimum)



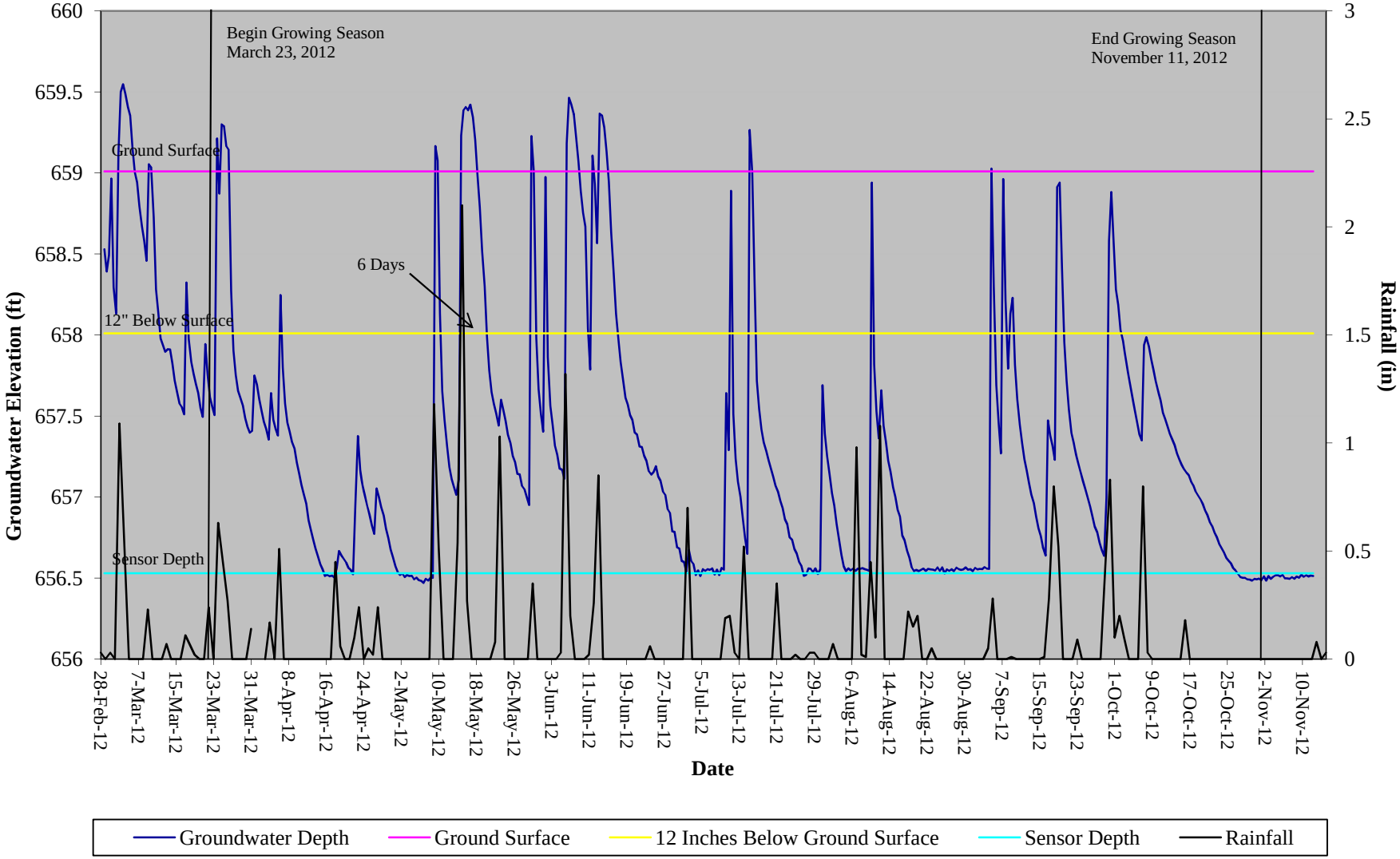
Buffalo Flats Restoration Site
Hydrograph
Wetland Gauge 2 - Riparian (23 Days Minimum)



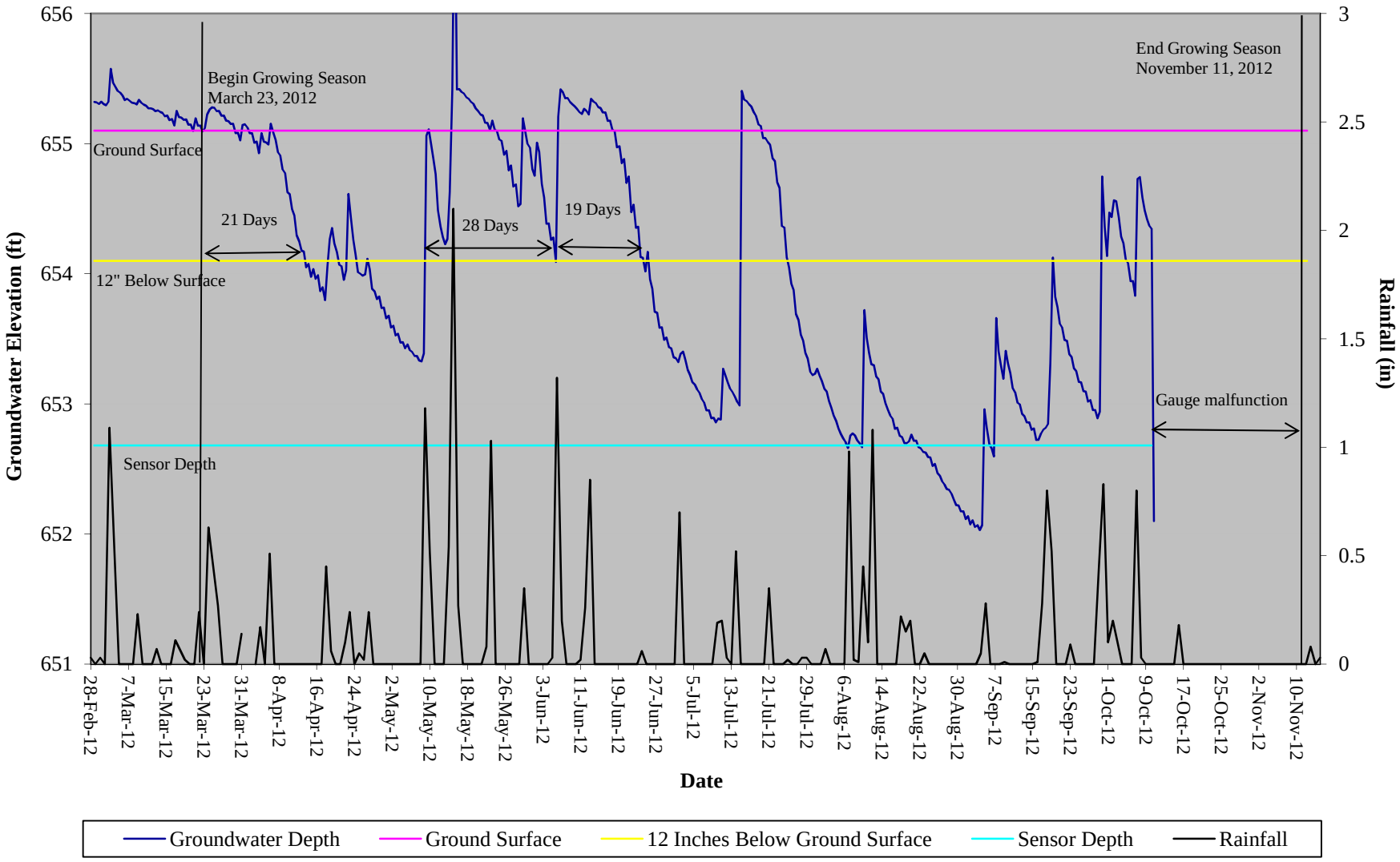
Buffalo Flats Restoration Site
Hydrograph
Wetland Gauge 3 - Riparian (23 Days Minimum)



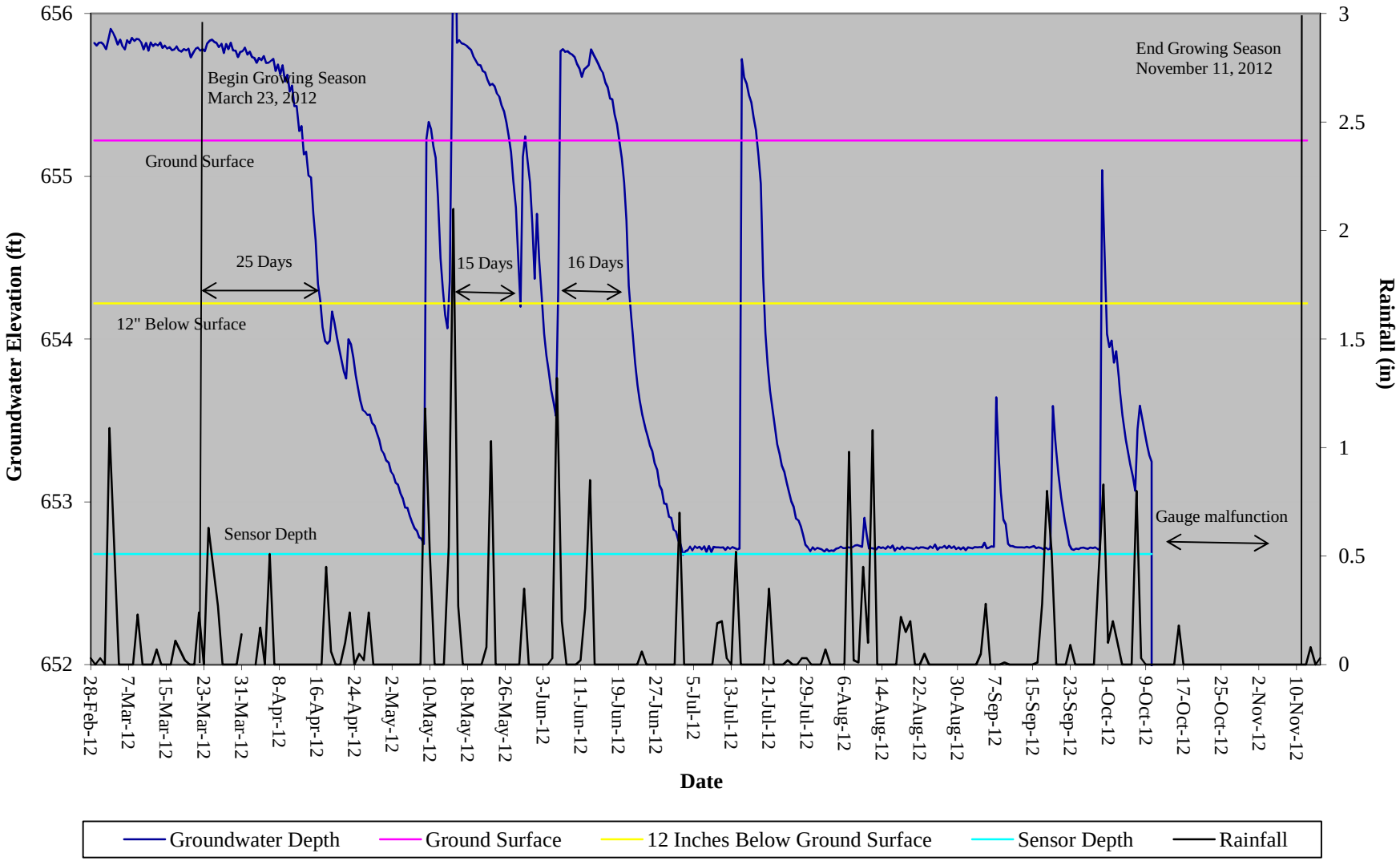
Buffalo Flats Restoration Site
Hydrograph
Wetland Gauge 4 - Nonriparian (12 Days Minimum)



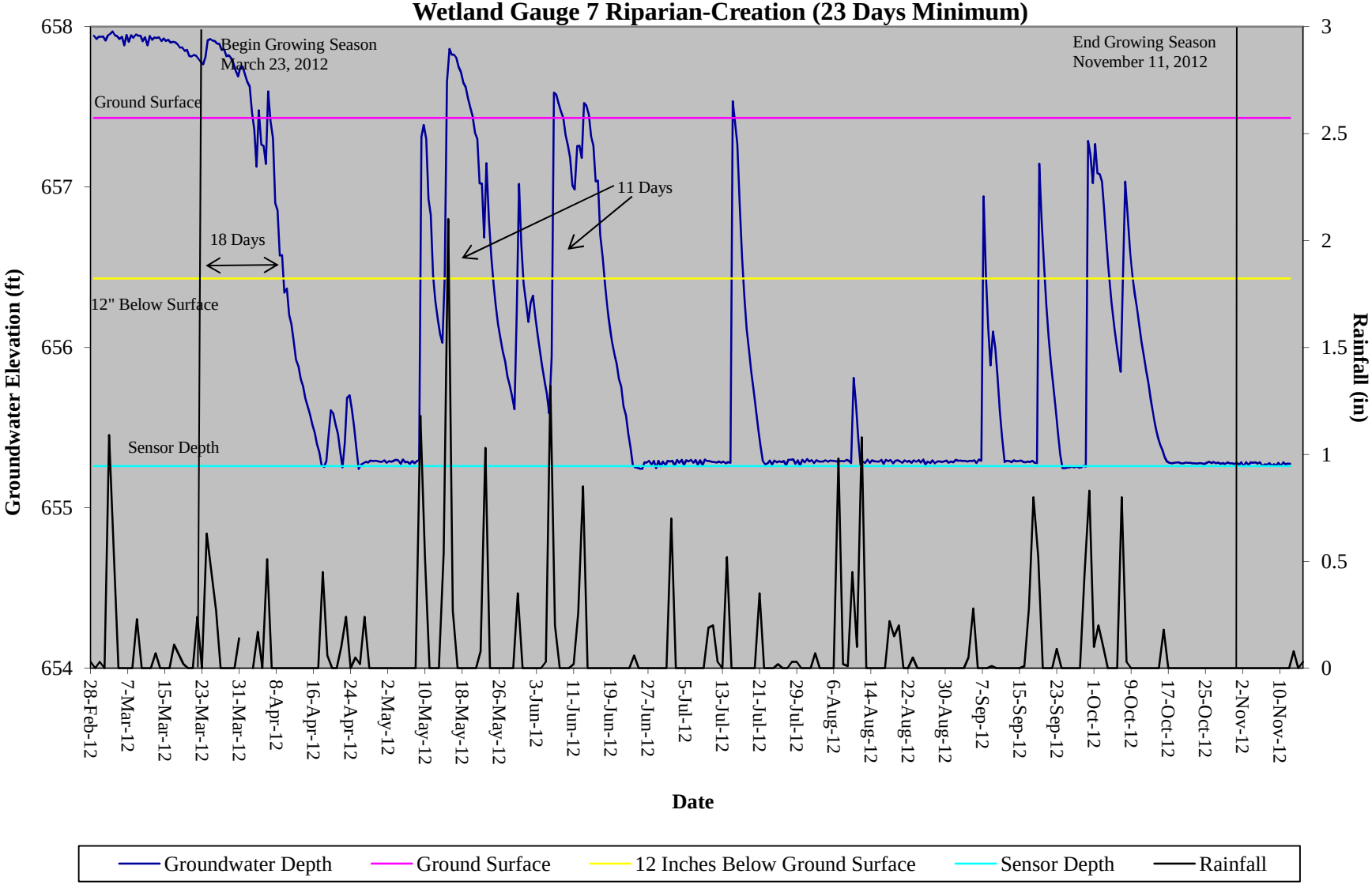
Buffalo Flats Restoration Site
Hydrograph
Wetland Gauge 5 - Riparian (23 Days Minimum)

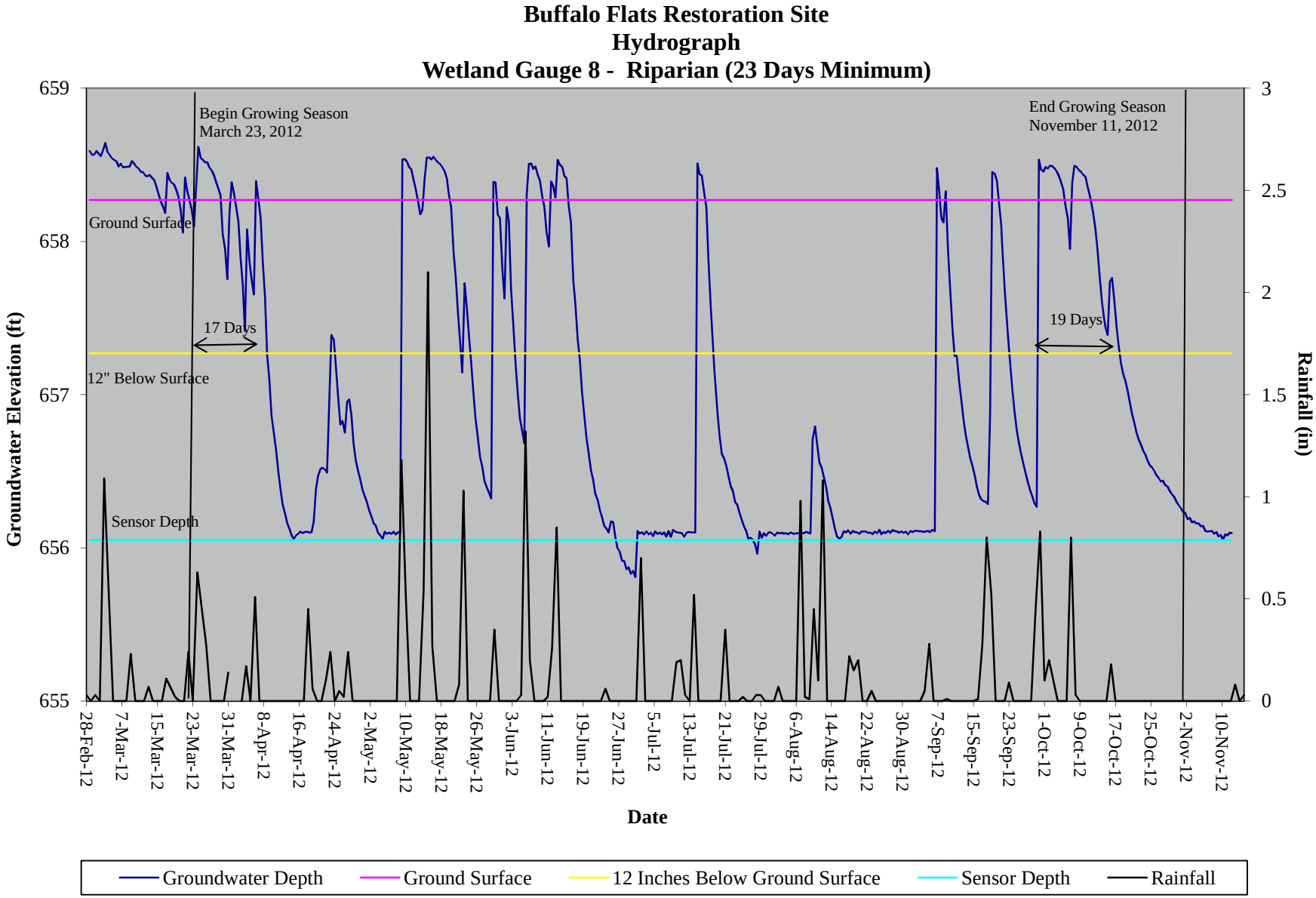


Buffalo Flats Restoration Site
Hydrograph
Wetland Gauge 6 - Riparian-Creation (23 Days Minimum)

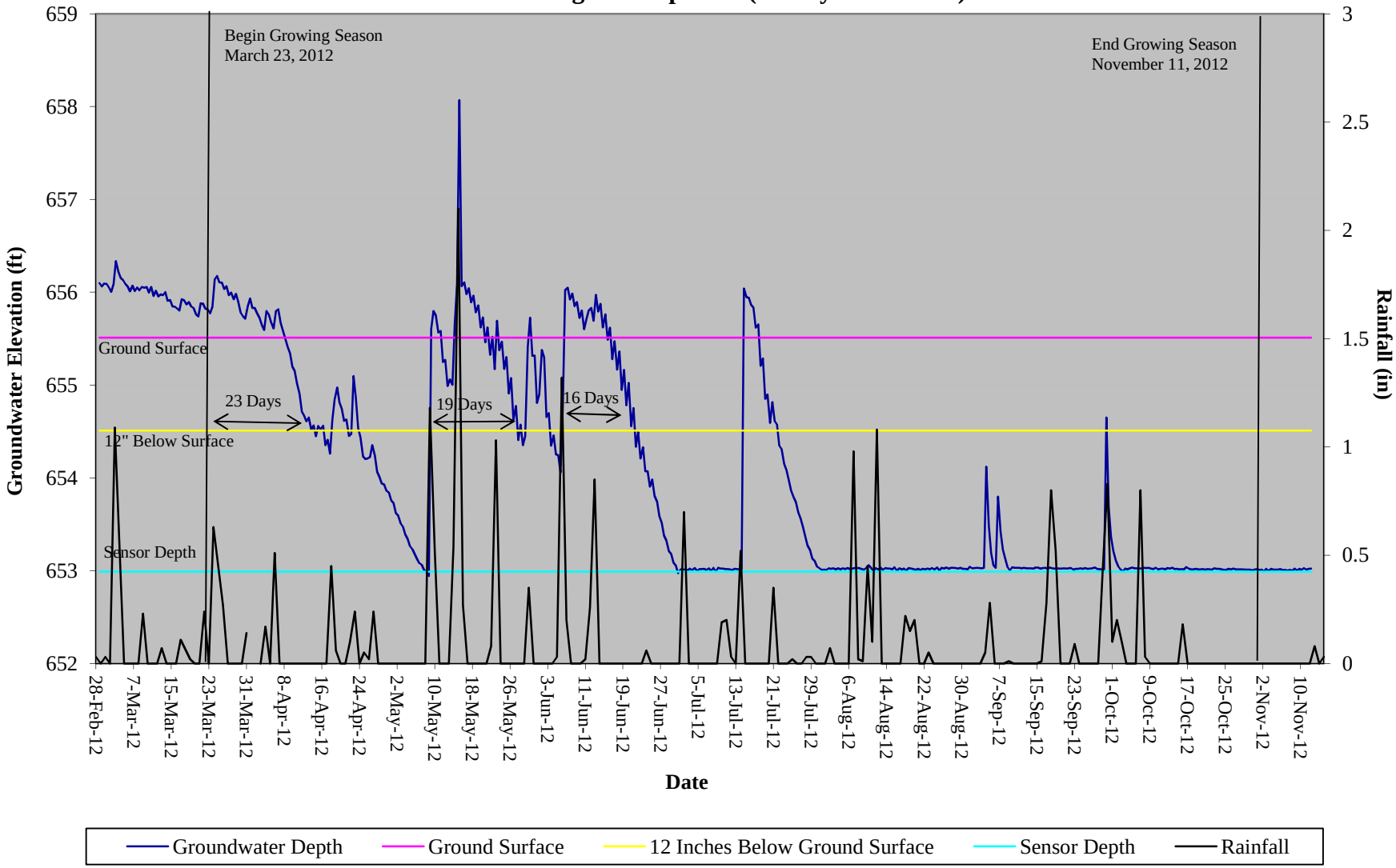


Buffalo Restoration Site
Hydrograph
Wetland Gauge 7 Riparian-Creation (23 Days Minimum)




Buffalo Flats Restoration Site
Hydrograph
Wetland Gauge 8 - Riparian (23 Days Minimum)
Groundwater Elevation (ft)
Rainfall (in)
Date
Begin Growing Season
March 23, 2012
End Growing Season
November 11, 2012
Ground Surface
12" Below Surface
Sensor Depth
17 Days
19 Days
659
658
657
656
655
3
2.5
2
1.5
1
0.5
0
28-Feb-12
7-Mar-12
15-Mar-12
23-Mar-12
31-Mar-12
8-Apr-12
16-Apr-12
24-Apr-12
2-May-12
10-May-12
18-May-12
26-May-12
3-Jun-12
11-Jun-12
19-Jun-12
27-Jun-12
5-Jul-12
13-Jul-12
21-Jul-12
29-Jul-12
6-Aug-12
14-Aug-12
22-Aug-12
30-Aug-12
7-Sep-12
15-Sep-12
23-Sep-12
1-Oct-12
9-Oct-12
17-Oct-12
25-Oct-12
2-Nov-12
10-Nov-12
Groundwater Depth
Ground Surface
12 Inches Below Ground Surface
Sensor Depth
Rainfall

Buffalo Flats Restoration Site
Hydrograph
Wetland Gauge 9 - Riparian (23 Days Minimum)



Buffalo Flats Restoration Site
Hydrograph
Wetland Gauge 10 - Nonriparian (12 Days Minimum)

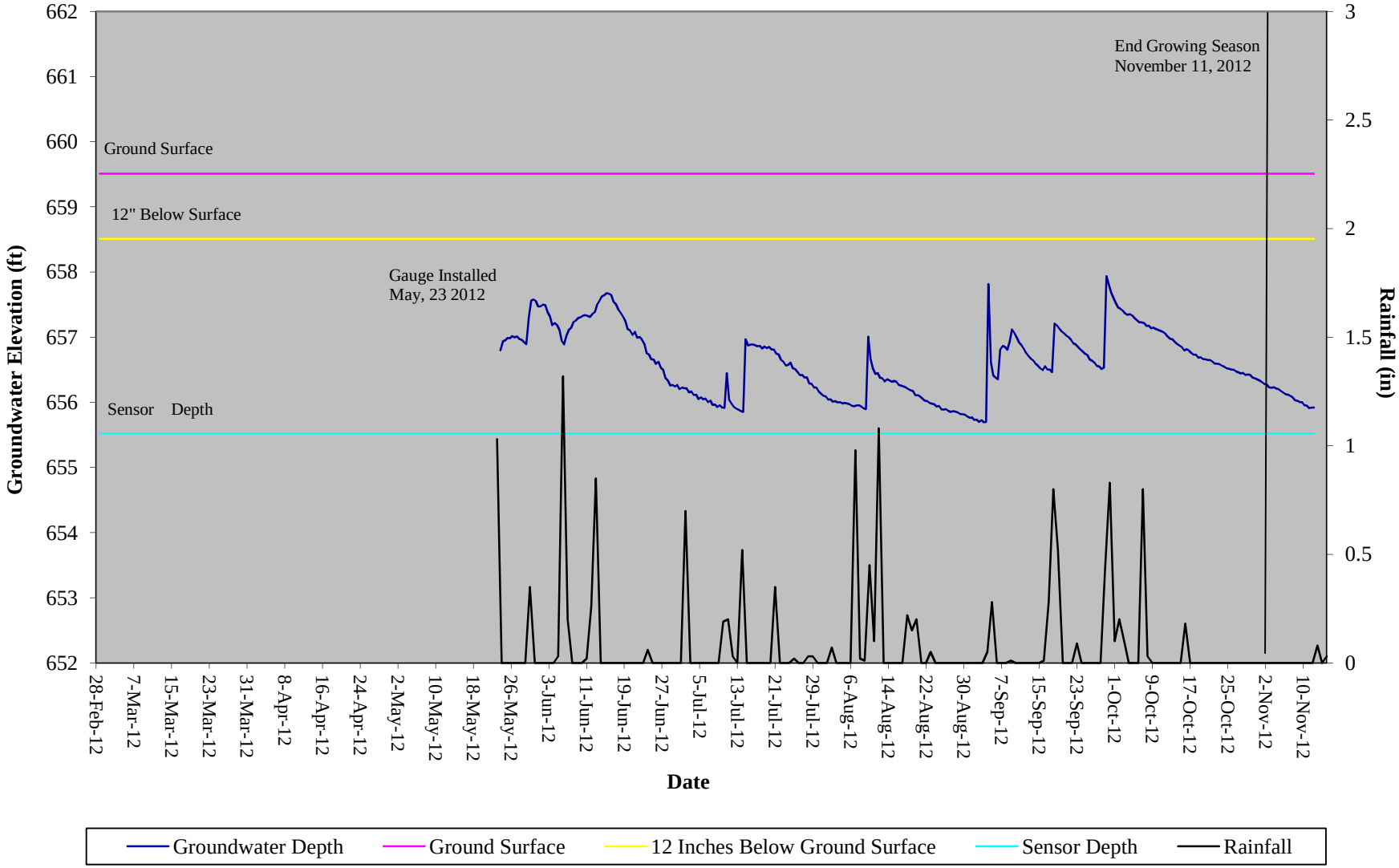


Table 9. Wetland Hydrology Criteria Attainment Table Project Number and Name: 94647 - Buffalo Flats Restoration Site						
	Success Criteria Achieved / Max Consecutive Days During Growing Season (Percentage)					
Wetland Area 1						
Non-Riparian Gauges Success Criteria (12 Days) (5%)	**MY-01 2012**	**MY-02**	**MY-03**	**MY-04**	**MY-05**	
Well 1	Yes/23 (9.7%)					
Well 4	No/6 (2.4%)					
Well 10 (Installed May 23, 2012)	No/0 (0%)					
Wetland Area 2						
Riparian Gauges Success Criteria (23 Days) (10%)	**MY-01 2012**	**MY-02**	**MY-03**	**MY-04**	**MY-05**	
Well 2	No/20 (8.6%)					
Well 3	Yes/134 (57.3%)					
Well 5	Yes/28 (11.8%)					
Well 8	No/19 (7.9%)					
Well 9	Yes/23 (10.0%)					
Wetland Area 3						
Riparian Gauges Success Criteria (23 Days) (10%)	**MY-01 2012**	**MY-02**	**MY-03**	**MY-04**	**MY-05**	
Well 6 (Creation Area)	Yes/25 (10.7%)					
Well 7 (Creation Area)	No/18 (7.5%)					