Brown Farm Wetland Restoration Monitoring Report – MY02 Orange and Durham Counties, NC

Basin 03030002 – Contract # D050011-2

Submitted to:

Ecosystem Enhancement PROGRAM

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

December 2008

Monitoring and Design Firm

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EXECUTIVE SUMMARY

The Brown Farm Wetland Restoration Project restored 24.6 acres and enhanced 3.3 acres of riparian wetland. New Hope Creek, which runs adjacent to the site, has a contributing drainage area of 33.3 square miles (21,331 acres) at the downstream limits of the site and is located within USGS 8-digit HUC 03030002 and NCDWQ Sub-basin 03-06-05 of the Cape Fear River Basin. The 46.1 acre project site is located on an active floodplain of New Hope Creek along the Orange-Durham County line. The restoration was completed to achieve the following objectives:

- Restore aquatic/terrestrial habitat
- Improve water quality
- Increase groundwater recharge
- Enhance nutrient cycling
- Restore a native bottomland hardwood community

Project construction occurred in November 2006. Construction involved plugging and filling ditches, installing level spreaders, and creating microtopography. The site was planted with native trees and shrubs common to Piedmont Bottomland Hardwood communities. Following construction and planting, baseline data collection occurred in February 2007. This report describes the second year of monitoring that took place in 2008.

Vegetation was planted at a density of approximately 436 and 100-200 stems per acre in the restored and enhanced wetlands, respectively. Twenty vegetation plots were monitored to assess planted vegetation survivability, growth, and vigor. The second year monitoring counted an average of 346 stems per acre, which exceeds the success criterion of 320 stems/acre. There was, however, increased mortality of planted stems due to drought conditions, deer browse, and competition from tall fescue. An assessment of the site's vegetation found Chinese privet (*Ligustrum sinense*), Japanese honeysuckle (*Lonicera japonica*), and multiflora rose (*Rosa multiflora*) on the outskirts of the site with Chinese lespedeza (*Lespedeza cunteata*) and thistle (*Cirisium* sp.) observed within the site. The thistle was sprayed with herbicide during the 2008 monitoring year. These species will continue to be monitored in the future to determine if other corrective action is necessary. Second year monitoring found the vegetation component of the project to be on track to meeting the success criteria.

During the 2008 monitoring year, wetland hydrology was achieved at all seven wells in the restoration area and the well in the reference wetland. The hydrology success criterion states that groundwater must be within 12 inches of the soil surface in excess of 12 consecutive days (5% of the growing season) at each well.

The daily rainfall data depicted on the gauge data graphs were obtained from the on-site precipitation gauge. The precipitation gauge was installed in 2006 prior to project implementation. Daily rainfall data were obtained from the State Climate Office of North Carolina for Durham, North Carolina to confirm on-site precipitation data. The combined precipitation data show that Durham experienced normal precipitation during the growing season in 2008.

Site photographs were taken from permanent photo points established throughout the site. Photo documentation facilitates the qualitative evaluation of wetland conditions. The photo point locations were selected in order to document representative site conditions.

The results of the 2008 monitoring of the Brown Farm Wetland Restoration Project indicate that the site is on track to meeting the project's success criteria.

1.0 PROJECT BACKGROUND

1.1 Project Objectives

- Restore aquatic/terrestrial wildlife habitat
- Improve water quality
- Increase groundwater recharge
- Enhance nutrient cycling
- Restore to native bottomland hardwood communities

1.2 Project Structure, Restoration Type, and Approach

Before restoration, the land use was primarily agricultural for at least the past 50 years. The wetland was restored by plugging and filling drainage ditches throughout the site, removing ditch spoil from wooded areas to restore natural drainage patterns, placing water diversion features to redistribute the surface hydrology, re-creating microtopography across the site to enhance surface water retention and storage, and planting the site with Piedmont Bottomland Hardwood Forest species.

1.3 Location and Setting

The Brown Farm Wetland Restoration Site is located within the 03030002 (Upper Cape Fear 02) Watershed Cataloging Unit (8-digit HUC) and North Carolina Division of Water Quality (NCDWQ) Sub-basin 03-06-05 (Figure 1). New Hope Creek, which runs adjacent to the site, has a contributing drainage area of 33.3 square miles (21,331 acres) at the downstream limits of the project. Jordan Lake is approximately 11 miles downstream of the site. The project watershed is located within the Piedmont physiographic province and is part of the Triassic Basins Level IV Ecoregion.

1.4 Project History and Background

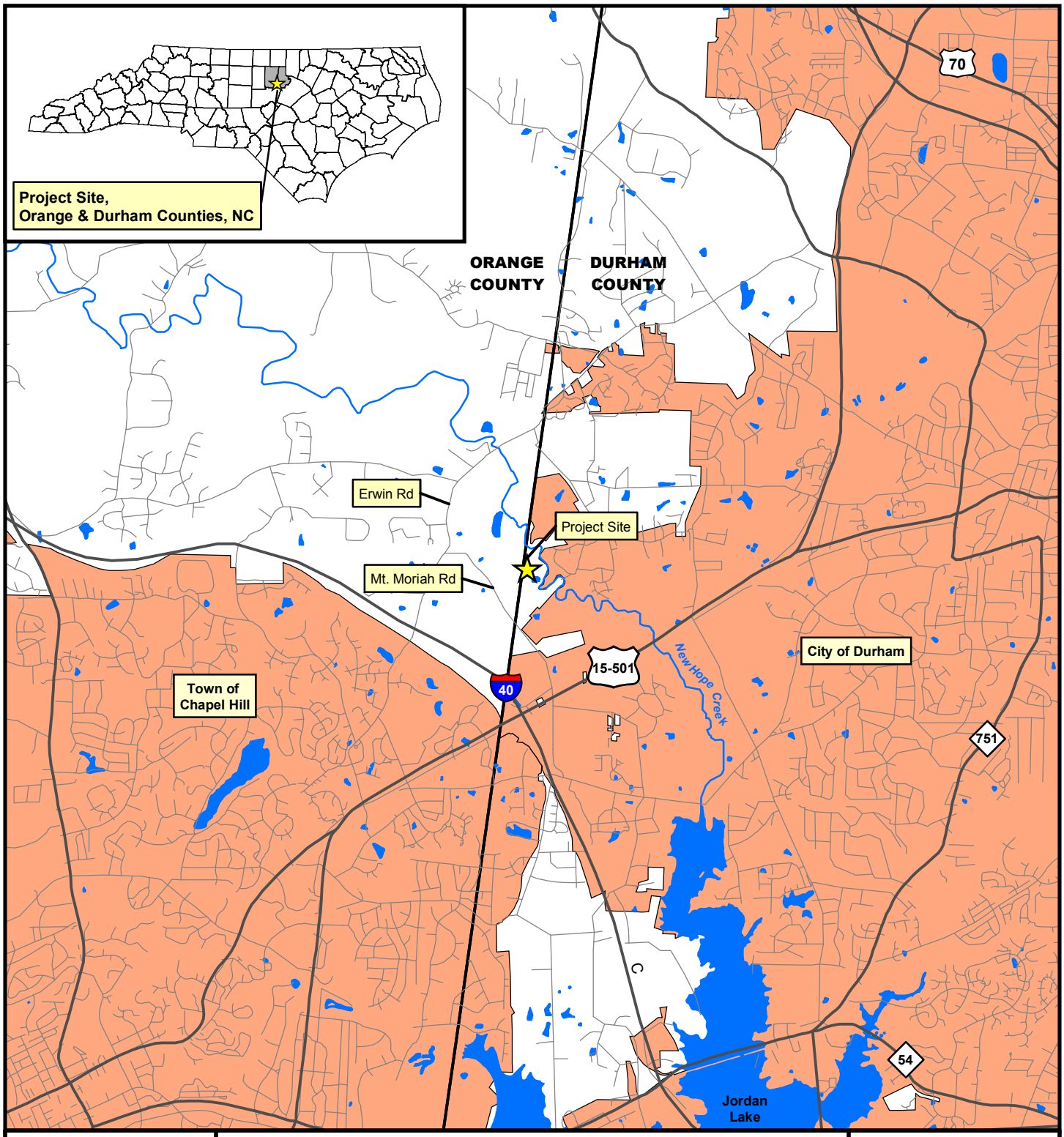
Table 1. Project Restoration Components
Project Name: Brown Farm Wetland Restoration

Segment / Reach ID	Existing Feet/Acres	Type	Approach	Acreage	Mitigation Ratio	Mitigation Units
Brown Farm	24.6	R	-	24.6	1.0	24.6
Brown Farm	3.3	E	-	3.3	0.5	1.7

Mitigation Unit Summations

Stream (lf)	Riparian Wetland (Ac)	Nonriparian Wetland (Ac)	Total Wetland (Ac)	Buffer (Ac)	Comment
	26.3				

R = Restoration E = Enhancement



KCI TECHNOLOGIES

Figure 1. Vicinity Map

- Project Location
- Major Streams and Rivers
- Lakes and Reservoirs
- Municipalities
- Counties
- Major Roads
- Other Roads

1:63,360
1 inch equals 1 miles

1 0.5 0 1 Miles

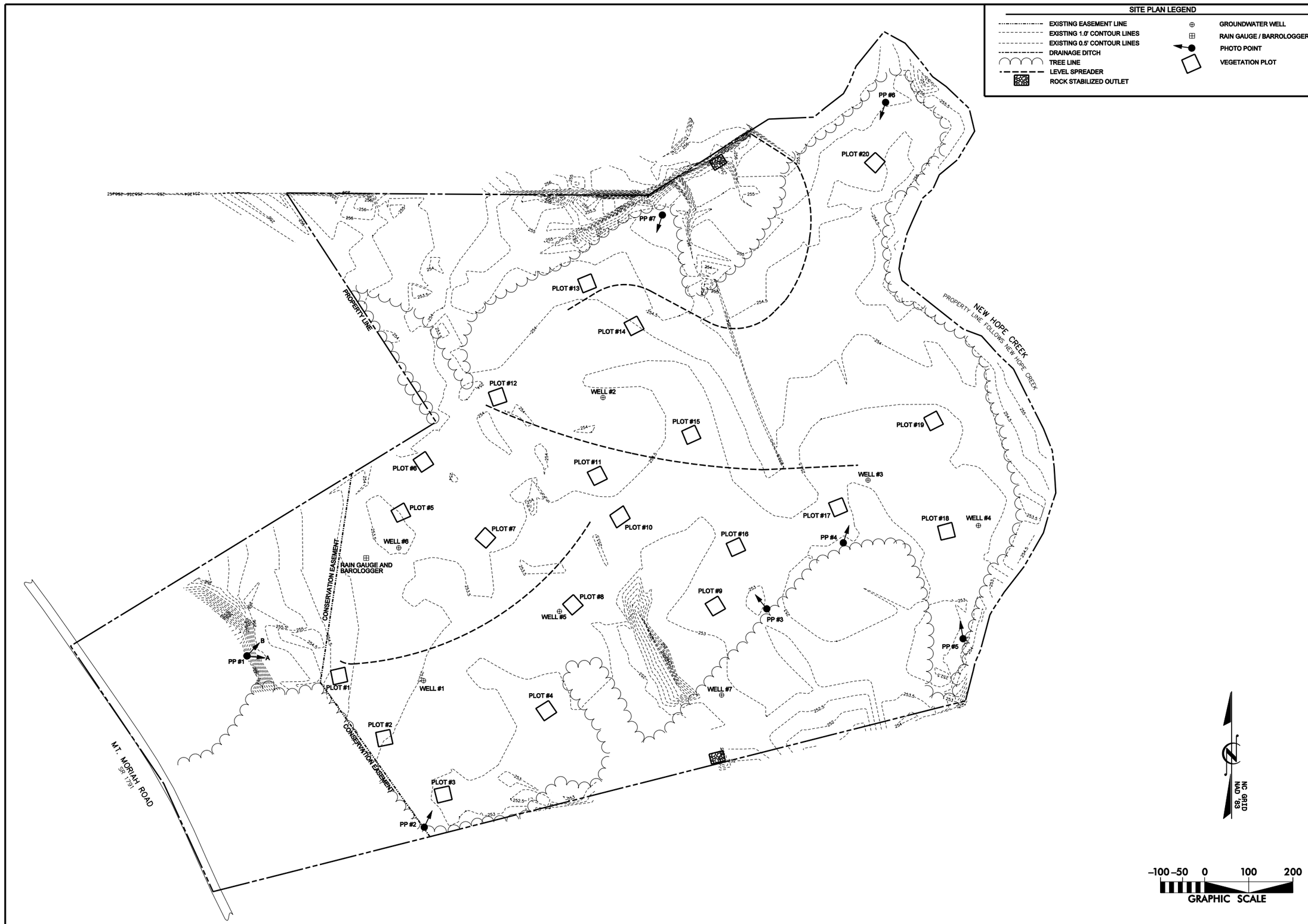
KCI ASSOCIATES OF NC

ENVIRONMENTAL TECHNOLOGIES AND CONSTRUCTION, INC.

Table 2. Project Activity and Reporting History Project Name: Brown Farm Wetland Restoration		
Activity or Report	**Data Collection Complete**	**Actual Completion or Delivery**
Restoration Plan	May 06	Jun 06
Construction	N/A	Nov 06
Mitigation Plan	Feb 07	Mar 07
Year 1 Monitoring	Sep 07	Nov 07
Herbicide Sprayed for Invasive Species Control	N/A	Jun 08
Year 2 Monitoring	Sep 08	Dec 08

Table 3. Project Contact Table Project Name: Brown Farm Wetland Restoration	
Design, Monitoring, and Maintenance Firm	KCI Associates of NC Landmark Center II, Suite 220 4601 Six Forks Rd. Raleigh, NC 27609 Contact: Ms. Kristin Knight-Meng Phone: (919) 783-9214 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. Ryan McDavitt Phone: (919) 783-9214 Fax: (919) 783-9266
Nursery	Cill Ide Native Plant Nursery 621 Starburst Lane Raleigh, North Carolina 27603 Contact: Mr. George T. Swearingen Phone: (919) 302-6900 Fax: (509) 351-5324

Table 4. Project Background Table Project Name: Brown Farm Wetland Restoration	
Project County	Durham and Orange Counties
Project Area	46.1 Acres
Drainage impervious cover	17%
Physiographic Region	Piedmont
Ecoregion	Triassic Basin
Dominant soil types	Wehadkee
USGS HUC for project and reference	03030002
NCDWQ Sub-basin for project and reference	03-06-05
% of project easement fenced	65%



REVISIONS

SYM.	DESCRIPTION	DATE	APPROVED

KCI TECHNOLOGIES
ENGINEERS•PLANNERS•ECOLOGISTS
SUITE 220 LANDMARK CENTER II
4601 SIX FORKS RD., RALEIGH, NC

BROWN FARM - NEW HOPE CREEK WETLAND RESTORATION PROJECT

ORANGE / DURHAM COUNTY, NORTH CAROLINA

DATE: NOV 2007

SCALE: 1"=100'

MONITORING PLAN VIEW

SHEET 1 OF 1

2.0 PROJECT CONDITIONS AND MONITORING RESULTS

2.1 Vegetation Assessment

See vegetation data and assessment in Appendix A.

2.2 Wetland Criteria Attainment Tables

Table 5. Hydrologic Monitoring Results
Project Name: Brown Farm Wetland Restoration

Well #	Hydroperiod					Dates Meeting Success
	<5%	5% - 8%	8% - 12.5%	>12.5%	Max. No. of Consecutive Days	
1				X	29	8/27/08-9/25/08
2				X	77	3/24/08-9/8/08
3				X	71	3/24/08-6/2/08
4				X	33	9/6/08-10/8/08
5				X	76	3/24/08-6/8/08
6				X	68	3/24/08-5/31/08
7				X	67	3/24/08-5/29/08
Ref. Wetland				X	44	3/25/08-5/8/08

Table 6. Hydroperiod History
Project Name: Brown Farm Wetland Restoration

Well #	Pre-Restoration	Year 1	Year 2	Year 3	Year 4	Year 5
1	<5%	>12.5%	>12.5%			
2	<5%	>12.5%	>12.5%			
3	<5%	5% - 8%	>12.5%			
4	<5%	5% - 8%	>12.5%			
5	<5%	8%-12.5%	>12.5%			
6	<5%	5% - 8%	>12.5%			
7	<5%	8%-12.5%	>12.5%			
Ref. Well	<5%	5% - 8%	>12.5%			

The wetland wells used to monitor site hydrology were installed in early 2007. The maximum number of consecutive days that the groundwater was within 12 inches of the surface was determined for each groundwater gauge. This number was converted into a percentage of the 223-day growing season. Wetland hydrology was achieved at all of the wells on the site (Table 5). Based on these data, the site has exceeded the minimum duration of 12 consecutive days with the water table within 12 inches of the soil surface for the 2008 growing season (Appendix B). Table 5 presents the hydrological monitoring results for 2008. Climatic data for the 2008 growing season were analyzed in comparison to historical data to determine whether 2008 was a normal year in terms of climatic conditions as a precursor to validating the results of the wetland monitoring. The historical data were collected from the NRCS, Water and Climate Center, "Climate Analysis for Wetlands by County" website. This evaluation concluded that 2008 was a normal year for rainfall during the growing season. Rainfall was within the 30th to 70th percentiles for the months of February, April and June. Rainfall was less than the 30th percentile threshold in January, May, and October and was greater than the 70th percentile threshold in March, July, August, September, and November (Appendix B).

To illustrate that the site is a riverine system, a stream gauge was installed on New Hope Creek to document overbank flooding. This gauge was installed in February 2008. Since installation, the gauge has recorded 15 overbank flooding events (over 253.8' elevation). Of these events, all of them exceeded 254 feet in elevation, which would inundate approximately 75% of the site. One event was over 256 feet in elevation, which inundated the entire site (Appendix B).

Appendix A
Vegetation Data

Appendix A - Vegetation Data Tables

Table A1. Stem counts for each species arranged by plot
Project Name: Brown Farm Wetland Restoration

Species	Plots										Initial Totals	Year 2 Totals	Survival %
	1*	2	3	4	5	6	7	8	9	10			
Trees													
Diospyros virginiana		1									1	1	100%
Fraxinus pennsylvanica	6	4			5	3	1		3	2	23	24	104%
Liriodendron tulipifera				1							6	1	17%
Quercus laurifolia							2		1	2	7	5	71%
Quercus lyrata	1	4	2	1	2						9	10	111%
Quercus michauxii	1	5	6	1		1	4				23	18	78%
Quercus pagoda	1	1	3	3	2		3		3	2	23	18	78%
Quercus phellos			2				2			2	9	6	67%
Unknown								2			44	2	5%

*Plot 1 was moved in MY02

Species	Plots										Initial Totals	Year 2 Totals	Survival %
	11	12	13	14	15	16	17	18	19	20			
Trees													
Fraxinus pennsylvanica	1	2	1			1	8	1	2	6	25	22	88%
Liriodendron tulipifera										1	5	1	20%
Nyssa sylvatica											1	0	0%
Quercus laurifolia	1					1	3		1		7	6	86%
Quercus lyrata	6	2	4	8	3		1			4	28	28	100%
Quercus michauxii	1		2			1		2		1	8	7	88%
Quercus pagoda	3	1	5	2	1	1	1	1	2	1	22	18	82%
Quercus phellos						4			1		8	5	63%
Unknown					1						30	1	3%

Table A2. Stem Density By Plot
Project Name: Brown Farm Wetland Restoration
Date : 6/10/08 and 6/13/08
Crew : B. Roberts, K. Vaughan

Plot #	Persimmon *Diospyros virginiana*	Green Ash *Fraxinus pennsylvanica*	Tulip Poplar *Liriodendron tulipifera*	Water Tupelo *Nyssa sylvatica*	Laurel Oak *Quercus laurifolia*	Overcup Oak *Quercus lyrata*	Swamp Chestnut Oak *Quercus michauxii*	Cherrybark Oak *Quercus pagoda*	Willow Oak *Quercus phellos*	Unknown	Total	Density
1		6				1	1	1			9	360
2	1	4				4	5	1			15	600
3						2	6	3	2		13	520
4			1			1	1	3			6	240
5		5				2		2			9	360
6		3					1				4	160
7		1			2		4	3	2		12	480
8										2	2	80
9		3			1			3			7	280
10		2			2			2	2		8	320
11		1			1	6	1	3			12	480
12		2				2		1			5	200
13		1				4	2	5			12	480
14						8		2			10	400
15						3		1		1	5	200
16		1			1		1	1	4		8	320
17		8			3	1		1			13	520
18		1					2	1			4	160
19		2		1	1			2	1		7	280
20		6	1			4	1	1			13	520
										Total Average Density		348

Table A3. Vegetation History Stems/Acre Project Name: Brown Farm Wetland Restoration						
Plot #	**Year 0**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
1*	640	560	360			
2	760	720	600			
3	680	560	520			
4	520	240	240			
5	640	520	360			
6	400	320	160			
7	680	680	480			
8	560	280	80			
9	440	360	280			
10	480	480	320			
11	640	520	480			
12	520	240	200			
13	640	560	480			
14	720	480	400			
15	320	320	200			
16	480	440	320			
17	600	560	520			
18	320	280	160			
19	480	480	260			
20	640	600	520			

* Plot 1 was moved in MY02.

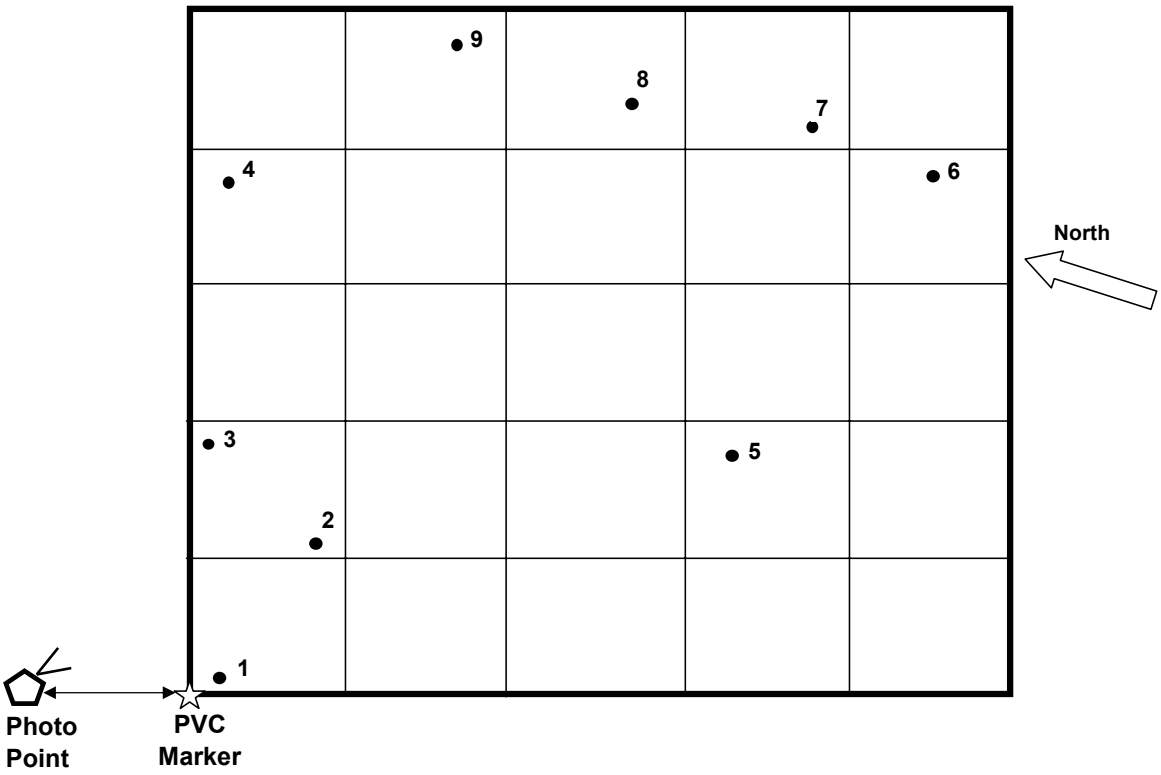
Plot 1 was repositioned during the second monitoring year when it became apparent that the monitoring plot was on top of the line that separated the upland from the restored wetland.

There was a decrease in average stems/acre during the second monitoring year. Extreme drought conditions from the previous year, deer browse, and competition from dense herbaceous vegetation are the likely causes of the planted vegetation mortality. While some mortality occurred in the monitored plots, site visits have documented extensive volunteer populations of green ash and buttonbush (*Cephalanthus occidentalis*), which are both desirable wetland species. The survivability of planted stems will be monitored closely to determine if supplemental planting is required in the future. The number of trees per acre is on track to meeting the vegetative success criterion of 320 stems/acre.

Vegetation Monitoring Worksheet

Site: Brown **Plot:** 1 **Date:** 6/10/2008

Plot Map



ID	Species	Height (m)	Vigor	Comment
1	Overcup Oak (*Quercus lyrata*)	0.53	3	Resprout
2	Green Ash (*Fraxinus pennsylvanica*)	0.67	3	Browsed
3	Green Ash (*Fraxinus pennsylvanica*)	0.53	3	Browsed
4	Swamp Chestnut Oak (*Quercus michauxii*)	1.20	3	
5	Southern Red Oak (*Quercus falcata*)	0.54	2	Insect damage
6	Green Ash (*Fraxinus pennsylvanica*)	0.69	3	Browsed
7	Green Ash (*Fraxinus pennsylvanica*)	0.35	2	Insect damage
8	Green Ash (*Fraxinus pennsylvanica*)	0.60	3	Browsed
9	Green Ash (*Fraxinus pennsylvanica*)	0.56	3	Browsed

*Plot was moved in MY02

Vigor: 4=excellent, 3=good, 2=weak, 1=unlikely to survive year

Species	Percent of Total
Green Ash (*Fraxinus pennsylvanica*)	66.7%
Overcup Oak (*Quercus lyrata*)	11.1%
Southern Red Oak (*Quercus falcata*)	11.1%
Swamp Chestnut Oak (*Quercus michauxii*)	11.1%

Density:

Total Number of Trees **9** / **0.025 acres** = **360** **trees / acre**

Survivability:

Total Number of Trees **9** / **9 trees** x **100** = **100** **% survivability**

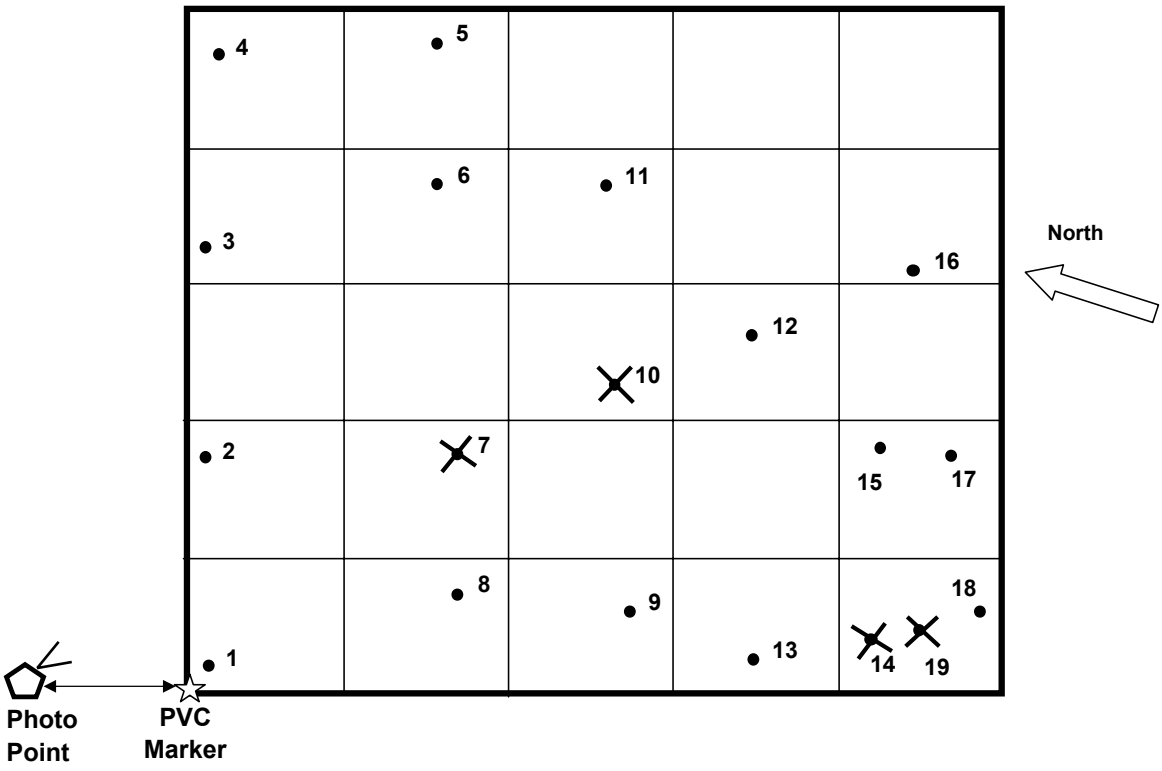
1st Year Monitoring

2nd Year Monitoring

Vegetation Monitoring Worksheet

Site: Brown **Plot:** 2 **Date:** 6/10/2008

Plot Map



ID	Species	Height (m)	Vigor	Comment
1	Green Ash (*Fraxinus pennsylvanica*)	0.58	4	
2	Swamp Chestnut Oak (*Quercus michauxii*)	0.55	3	
3	Swamp Chestnut Oak (*Quercus michauxii*)	0.72	3	Moderately Browsed
4	Overcup Oak (*Quercus lyrata*)	0.73	3	Moderately Browsed
5	Overcup Oak (*Quercus lyrata*)	0.47	3	Moderately Browsed
6	Swamp Chestnut Oak (*Quercus michauxii*)	0.29	2	Resprout
7	Swamp Chestnut Oak (*Quercus michauxii*)			Dead (Browsing)
8	Green Ash (*Fraxinus pennsylvanica*)	0.46	3	Browsed
9	Swamp Chestnut Oak (*Quercus michauxii*)	1.43	4	Moderately Browsed
10	Unknown			Dead
11	Green Ash (*Fraxinus pennsylvanica*)	0.61	3	Browsed
12	Swamp Chestnut Oak (*Quercus michauxii*)	0.57	3	
13	Overcup Oak (*Quercus lyrata*)	0.43	3	
14	Unknown			Dead
15	Green Ash (*Fraxinus pennsylvanica*)	0.63	3	Browsed
16	Cherrybark Oak (*Quercus pagoda*)	0.47	3	Moderately Browsed
17	Persimmon (*Diospyros virginiana*)	0.74	4	
18	Overcup Oak (*Quercus lyrata*)	0.34	2	
19	Unknown			Dead (Browsing)

Vigor: 4=excellent, 3=good, 2=weak, 1=unlikely to survive year

Species	Percent of Total
Green Ash (*Fraxinus pennsylvanica*)	26.7%
Overcup Oak (*Quercus lyrata*)	26.7%
Swamp Chestnut Oak (*Quercus michauxii*)	33.3%
Persimmon (*Diospyros virginiana*)	6.7%
Cherrybark Oak (*Quercus pagoda*)	6.7%

Density:

Total Number of Trees **15** / **0.025 acres** = **600** **trees / acre**

Survivability:

Total Number of Trees **15** / **19 trees** x **100** = **79** **% survivability**

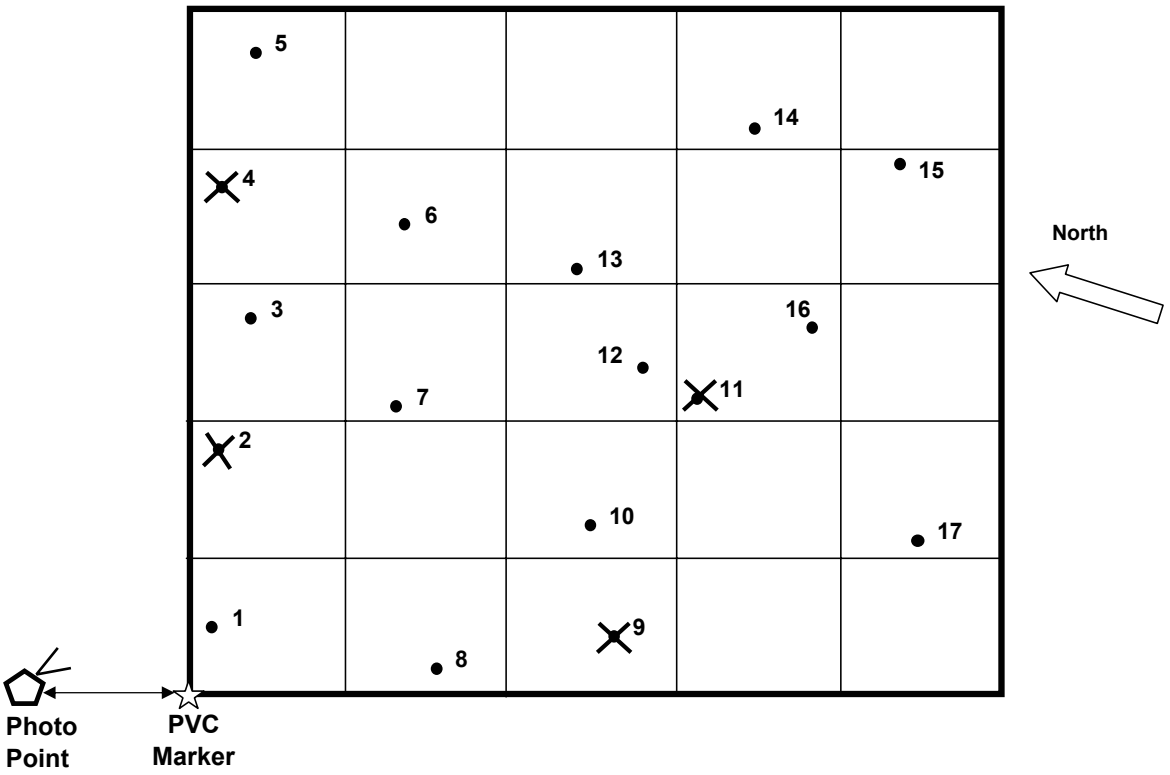
1st Year Monitoring

2nd Year Monitoring

Vegetation Monitoring Worksheet

Site: Brown **Plot:** 3 **Date:** 6/10/2008

Plot Map



ID	Species	Height (m)	Vigor	Comment
1	Cherrybark Oak (*Quercus pagoda*)	0.73	2	Insect damage
2	Unknown			Dead
3	Overcup Oak (*Quercus lyrata*)	0.64	3	Browsed
4	Unknown			Dead
5	Willow Oak (*Quercus phellos*)	0.58	3	Resprout
6	Swamp Chestnut Oak (*Quercus michauxii*)	0.33	2	Resprout (sprayed)
7	Cherrybark Oak (*Quercus pagoda*)	0.62	3	
8	Swamp Chestnut Oak (*Quercus michauxii*)	0.56	3	Top died back
9	Unknown			Dead
10	Overcup Oak (*Quercus lyrata*)	0.57	3	Browsed
11	Unknown			Dead
12	Willow Oak (*Quercus phellos*)	0.77	3	
13	Swamp Chestnut Oak (*Quercus michauxii*)			Missing
14	Swamp Chestnut Oak (*Quercus michauxii*)	0.71	3	Browsed
15	Swamp Chestnut Oak (*Quercus michauxii*)	0.35	2	Resprout
16	Swamp Chestnut Oak (*Quercus michauxii*)	0.39	2	Resprout
17	Cherrybark Oak (*Quercus pagoda*)	0.77	3	Insect damage

Vigor: 4=excellent, 3=good, 2=weak, 1=unlikely to survive year

Species	Percent of Total
Willow Oak (*Quercus phellos*)	15.4%
Swamp Chestnut Oak (*Quercus michauxii*)	46.2%
Cherrybark Oak (*Quercus pagoda*)	23.1%
Overcup Oak (*Quercus lyrata*)	15.4%

Density:

Total Number of Trees **13** / **0.025 acres** = **520** **trees / acre**

Survivability:

Total Number of Trees **13** / **17 trees** x **100** = **76** **% survivability**

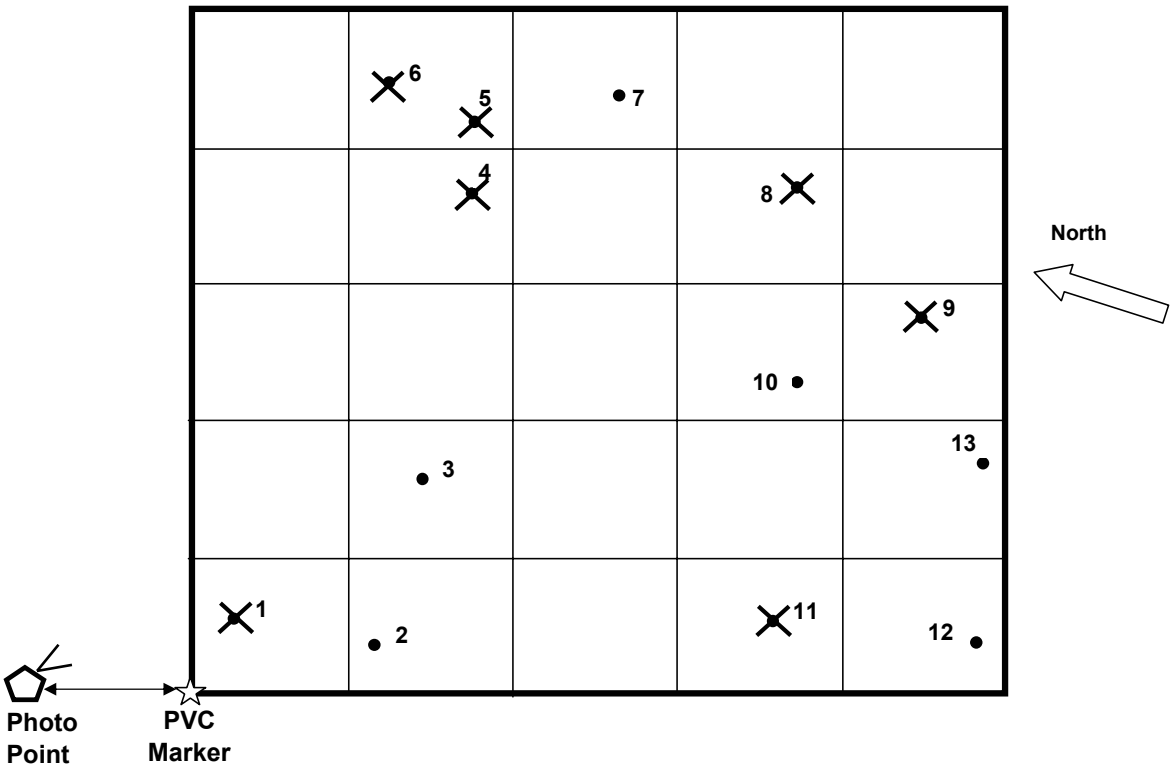
1st Year Monitoring

2nd Year Monitoring

Vegetation Monitoring Worksheet

Site: Brown **Plot:** 4 **Date:** 6/10/2008

Plot Map



ID	Species	Height (m)	Vigor	Comment
1	Unknown			Dead
2	Cherrybark Oak (*Quercus pagoda*)	0.62	3	
3	Overcup Oak (*Quercus lyrata*)	0.54	3	
4	Unknown			Dead
5	Unknown			Dead
6	Unknown			Dead
7	Tulip Poplar (*Liriodendron tulipifera*)	0.42	2	Resprout
8	Unknown			Dead
9	Unknown			Dead
10	Swamp Chestnut Oak (*Quercus michauxii*)	0.80	3	
11	Unknown			Dead
12	Cherrybark Oak (*Quercus pagoda*)	0.57	3	
13	Cherrybark Oak (*Quercus pagoda*)	0.58	3	

Vigor: 4=excellent, 3=good, 2=weak, 1=unlikely to survive year

Species	Percent of Total
Cherrybark Oak (*Quercus pagoda*)	50.0%
Tulip Poplar (*Liriodendron tulipifera*)	16.7%
Swamp Chestnut Oak (*Quercus michauxii*)	16.7%
Overcup Oak (*Quercus lyrata*)	16.7%

Density:

Total Number of Trees **6** / **0.025 acres** = **240** **trees / acre**

Survivability:

Total Number of Trees **6** / **13 trees** x **100** = **46** **% survivability**

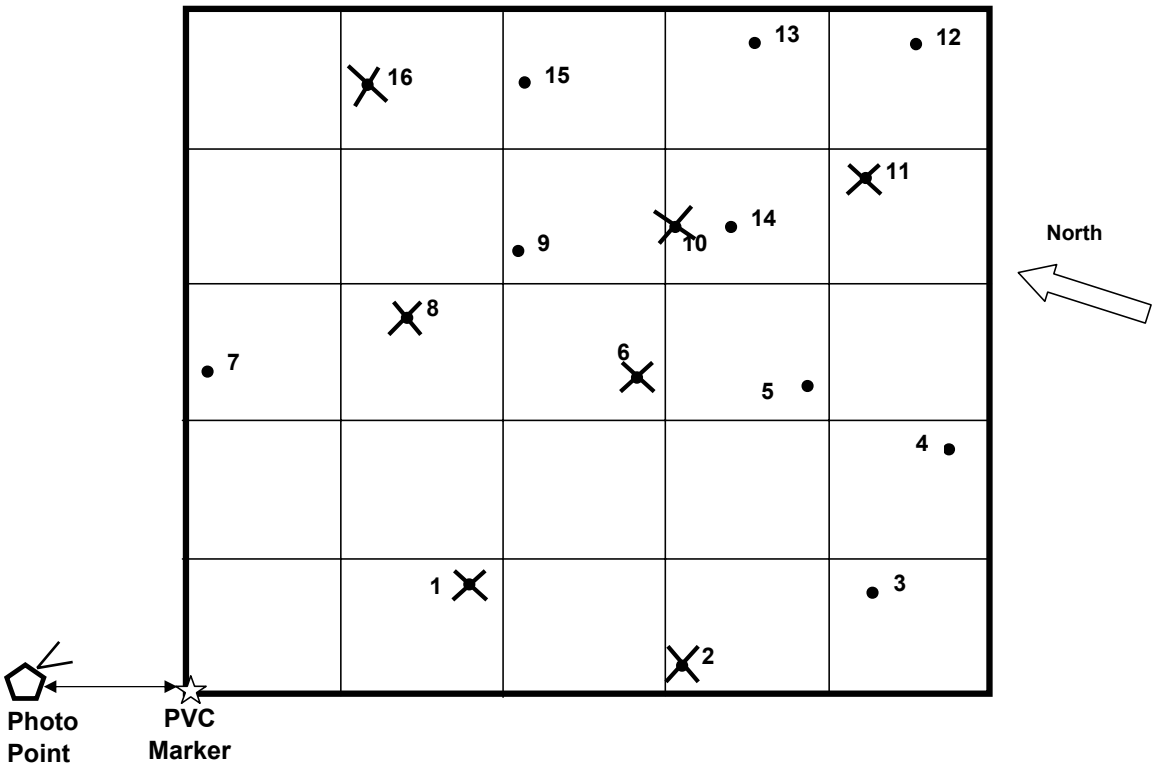
1st Year Monitoring

2nd Year Monitoring

Vegetation Monitoring Worksheet

Site: Brown **Plot:** 5 **Date:** 6/10/2008

Plot Map



ID	Species	Height (m)	Vigor	Comment
1	Unknown			Dead
2	Overcup Oak (*Quercus lyrata*)			Dead
3	Green Ash (*Fraxinus pennsylvanica*)	0.51	2	No leaves (Browsed)
4	Green Ash (*Fraxinus pennsylvanica*)	0.39	2	Browsed
5	Green Ash (*Fraxinus pennsylvanica*)	0.52	3	Browsed
6	Unknown			Dead
7	Overcup Oak (*Quercus lyrata*)	0.35	3	
8	Unknown			Dead
9	Overcup Oak (*Quercus lyrata*)	0.45	3	
10	Unknown			Dead
11	Willow Oak (*Quercus phellos*)			Dead
12	Cherrybark Oak (*Quercus pagoda*)	0.60	4	
13	Green Ash (*Fraxinus pennsylvanica*)	0.51	2	Browsed
14	Green Ash (*Fraxinus pennsylvanica*)	0.55	2	Browsed
15	Cherrybark Oak (*Quercus pagoda*)	0.49	3	
16	Swamp Chestnut Oak (*Quercus michauxii*)			Dead

Vigor: 4=excellent, 3=good, 2=weak, 1=unlikely to survive year

Species	Percent of Total
Overcup Oak (*Quercus lyrata*)	22.2%
Green Ash (*Fraxinus pennsylvanica*)	55.6%
Cherrybark Oak (*Quercus pagoda*)	22.2%

Density:

Total Number of Trees **9** / **0.025 acres** = **360** **trees / acre**

Survivability:

Total Number of Trees **9** / **16 trees** x **100** = **56** **% survivability**

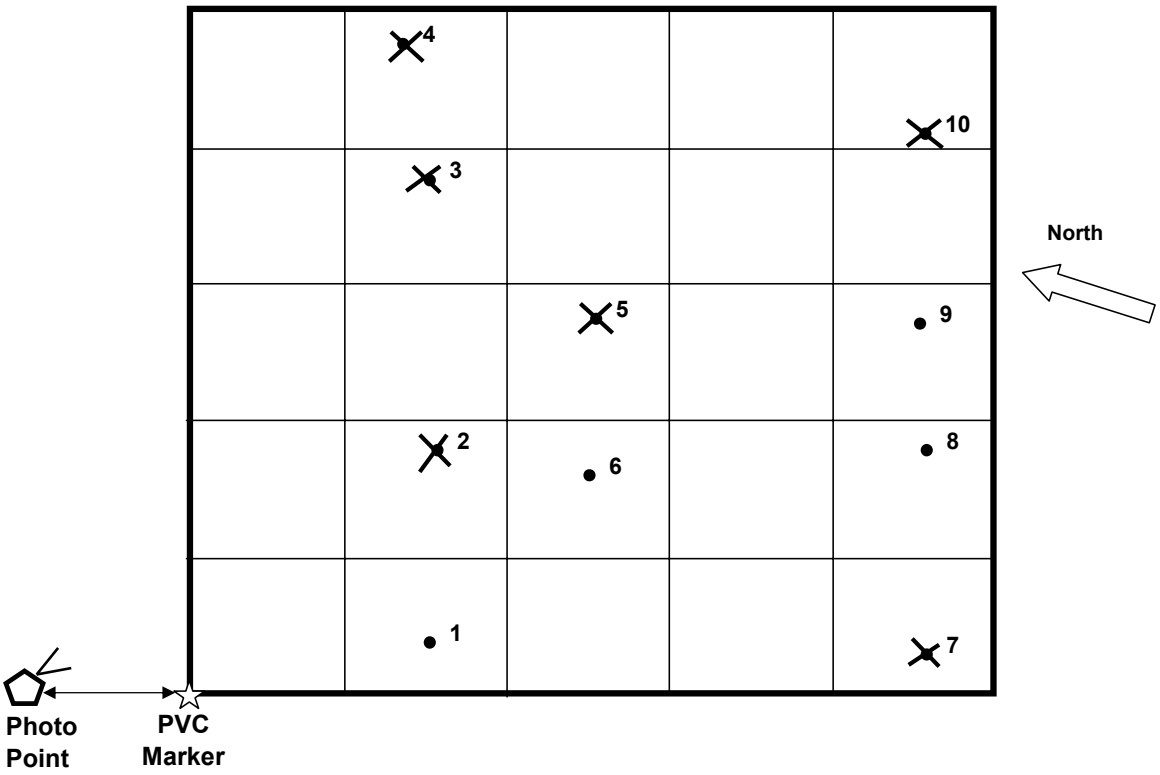
1st Year Monitoring

2nd Year Monitoring

Vegetation Monitoring Worksheet

Site: Brown **Plot:** 6 **Date:** 6/10/2008

Plot Map



ID	Species	Height (m)	Vigor	Comment
1	Green Ash (*Fraxinus pennsylvanica*)	0.79	3	Browsed
2	Cherrybark Oak (*Quercus pagoda*)			Missing
3	Tulip Poplar (*Liriodendron tulipifera*)			Dead
4	Unknown			Dead
5	Unknown			Dead
6	Green Ash (*Fraxinus pennsylvanica*)	0.72	3	Browsed
7	Swamp Chestnut Oak (*Quercus michauxii*)			Dead
8	Green Ash (*Fraxinus pennsylvanica*)	0.60	3	Top has died back, insect damage
9	Swamp Chestnut Oak (*Quercus michauxii*)	0.71	3	Browsed
10	Swamp Chestnut Oak (*Quercus michauxii*)			Missing

Vigor: 4=excellent, 3=good, 2=weak, 1=unlikely to survive year

Species	Percent of Total
Green Ash (*Fraxinus pennsylvanica*)	75.0%
Swamp Chestnut Oak (*Quercus michauxii*)	25.0%

Density:

Total Number of Trees **4** / **0.025 acres** = **160** **trees / acre**

Survivability:

Total Number of Trees **4** / **10 trees** x **100** = **40** **% survivability**

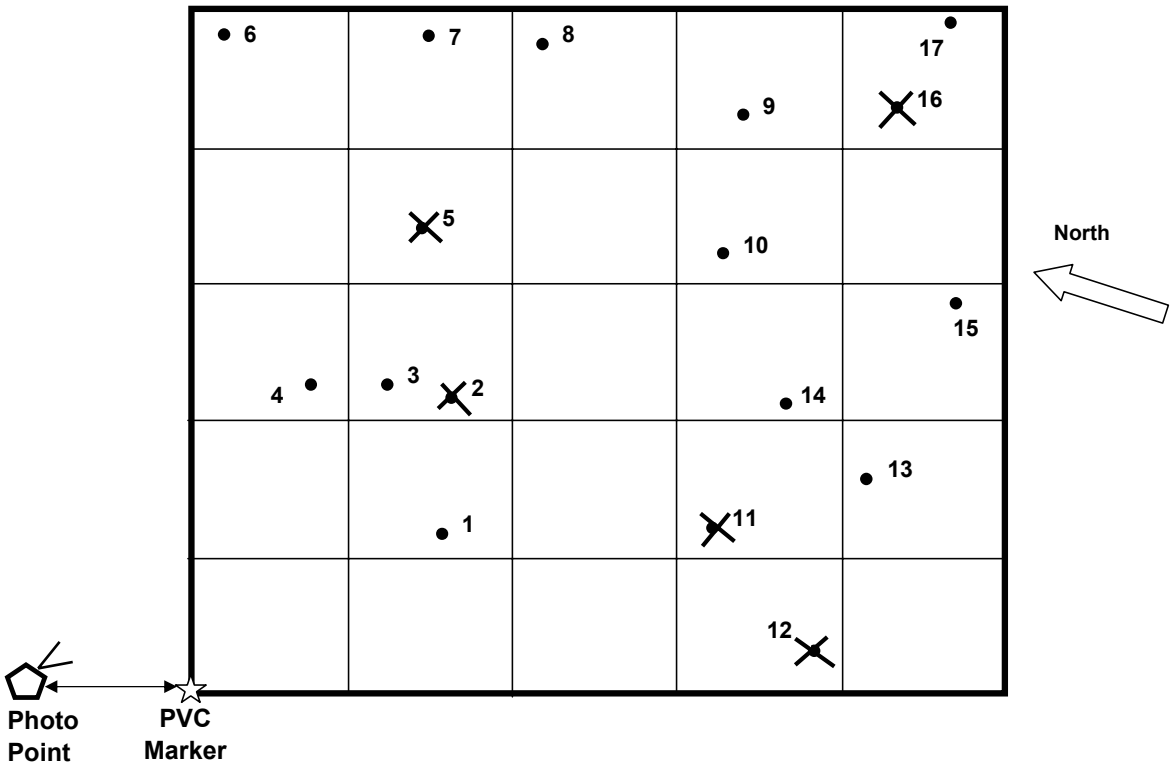
1st Year Monitoring

2nd Year Monitoring

Vegetation Monitoring Worksheet

Site: Brown **Plot:** 7 **Date:** 6/10/2008

Plot Map



ID	Species	Height (m)	Vigor	Comment
1	Cherrybark Oak (*Quercus pagoda*)	0.37	3	Top died back
2	Willow Oak (*Quercus phellos*)			Dead
3	Swamp Chestnut Oak (*Quercus michauxii*)	0.31	3	Resprout
4	Laurel Oak (*Quercus laurifolia*)	0.47	2	Browsed
5	Swamp Chestnut Oak (*Quercus michauxii*)			Dead
6	Swamp Chestnut Oak (*Quercus michauxii*)	0.71	3	Insect damage
7	Willow Oak (*Quercus phellos*)	0.54	3	Top died back
8	Laurel Oak (*Quercus laurifolia*)	0.72	3	
9	Willow Oak (*Quercus phellos*)	0.54	3	Top died back
10	Swamp Chestnut Oak (*Quercus michauxii*)	0.45	3	Resprout
11	Unknown			Dead
12	Green Ash (*Fraxinus pennsylvanica*)			Dead
13	Swamp Chestnut Oak (*Quercus michauxii*)	0.43	2	
14	Cherrybark Oak (*Quercus pagoda*)	0.76	2	Accidently sprayed
15	Cherrybark Oak (*Quercus pagoda*)	0.37	3	
16	Unknown			Dead
17	Green Ash (*Fraxinus pennsylvanica*)	0.64	3	

Vigor: 4=excellent, 3=good, 2=weak, 1=unlikely to survive year

Species	Percent of Total
Willow Oak (*Quercus phellos*)	16.7%
Green Ash (*Fraxinus pennsylvanica*)	8.3%
Cherrybark Oak (*Quercus pagoda*)	25.0%
Swamp Chestnut Oak (*Quercus michauxii*)	33.3%
Laurel Oak (*Quercus laurifolia*)	16.7%

Density:

Total Number of Trees **12** / **0.025 acres** = **480** **trees / acre**

Survivability:

Total Number of Trees **12** / **17 trees** x **100** = **71** **% survivability**

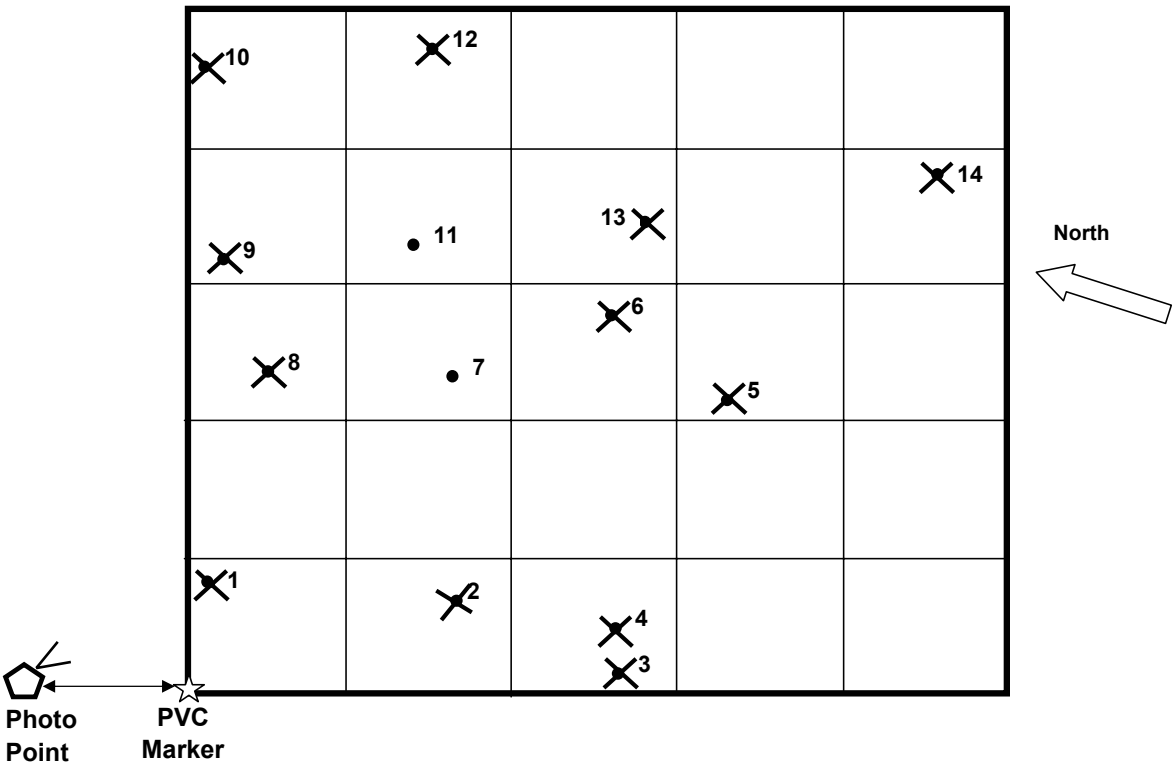
1st Year Monitoring

2nd Year Monitoring

Vegetation Monitoring Worksheet

Site: Brown **Plot:** 8 **Date:** 6/10/2008

Plot Map



ID	Species	Height (m)	Vigor	Comment
1	Unknown			Dead
2	Unknown			Dead
3	Unknown			Dead
4	Unknown			Dead
5	Unknown			Dead
6	Unknown			Dead
7	Unknown	0.83	1	No leaves
8	Unknown			Dead
9	Laurel Oak (*Quercus laurifolia*)			Dead
10	Unknown			Dead
11	Unknown	0.55	1	No leaves
12	Unknown			Dead
13	Unknown			Dead
14	Swamp Chestnut Oak (*Quercus michauxii*)			Missing

Vigor: 4=excellent, 3=good, 2=weak, 1=unlikely to survive year

Species	Percent of Total
Unknown	100.0%

Density:

Total Number of Trees **2** / **0.025 acres** = **80** **trees / acre**

Survivability:

Total Number of Trees **2** / **14 trees** x **100** = **14** **% survivability**

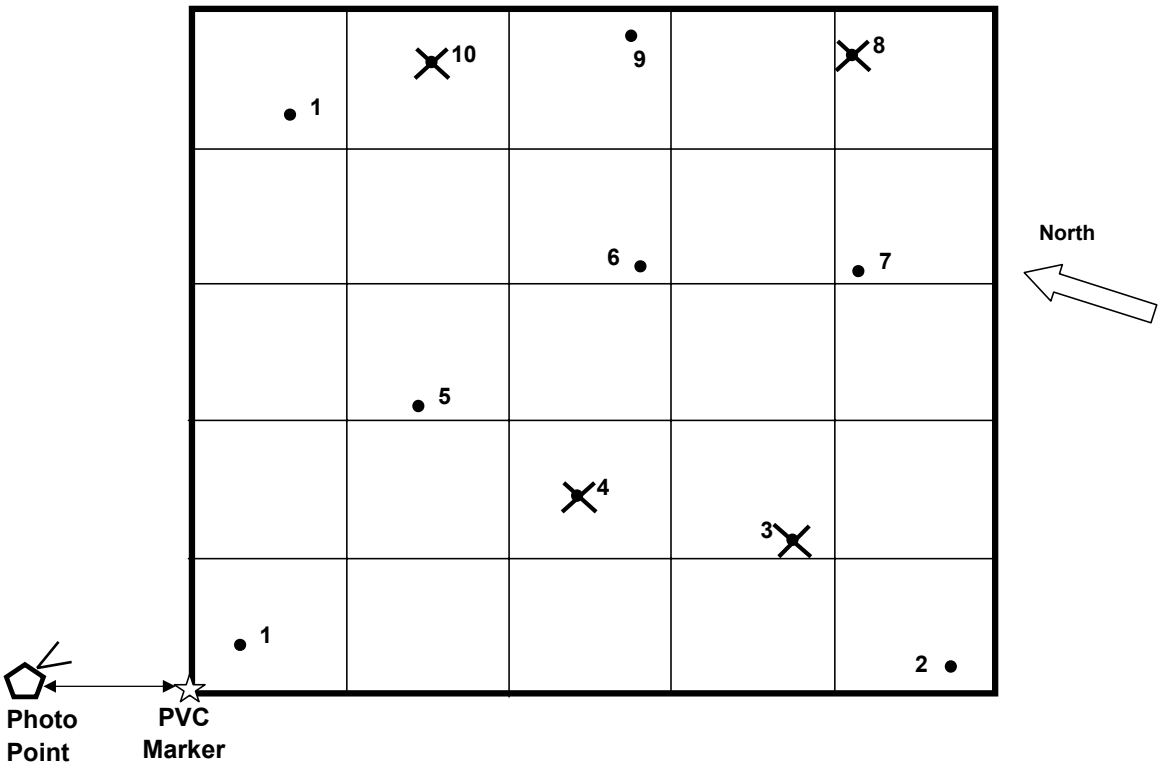
1st Year Monitoring

2nd Year Monitoring

Vegetation Monitoring Worksheet

Site: Brown **Plot:** 9 **Date:** 6/10/2008

Plot Map



ID	Species	Height (m)	Vigor	Comment
1	Green Ash (*Fraxinus pennsylvanica*)	0.85	2	Browsed
2	Cherrybark Oak (*Quercus pagoda*)	0.68	2	
3	Unknown			Dead
4	Unknown			Dead
5	Green Ash (*Fraxinus pennsylvanica*)	0.63	2	Resprout from base
6	Cherrybark Oak (*Quercus pagoda*)	0.49	3	
7	Green Ash (*Fraxinus pennsylvanica*)	0.48	2	Resprout
8	Unknown			Dead
9	Laurel Oak (*Quercus laurifolia*)	0.36	2	Top died back, resprout from base
10	Unknown			Dead
11	Cherrybark Oak (*Quercus pagoda*)	0.73	3	Some insect damage

Vigor: 4=excellent, 3=good, 2=weak, 1=unlikely to survive year

Species	Percent of Total
Green Ash (*Fraxinus pennsylvanica*)	42.9%
Laurel Oak (*Quercus laurifolia*)	14.3%
Cherrybark Oak (*Quercus pagoda*)	42.9%

Density:

Total Number of Trees **7** / **0.025 acres** = **280** **trees / acre**

Survivability:

Total Number of Trees **7** / **11 trees** x **100** = **64** **% survivability**

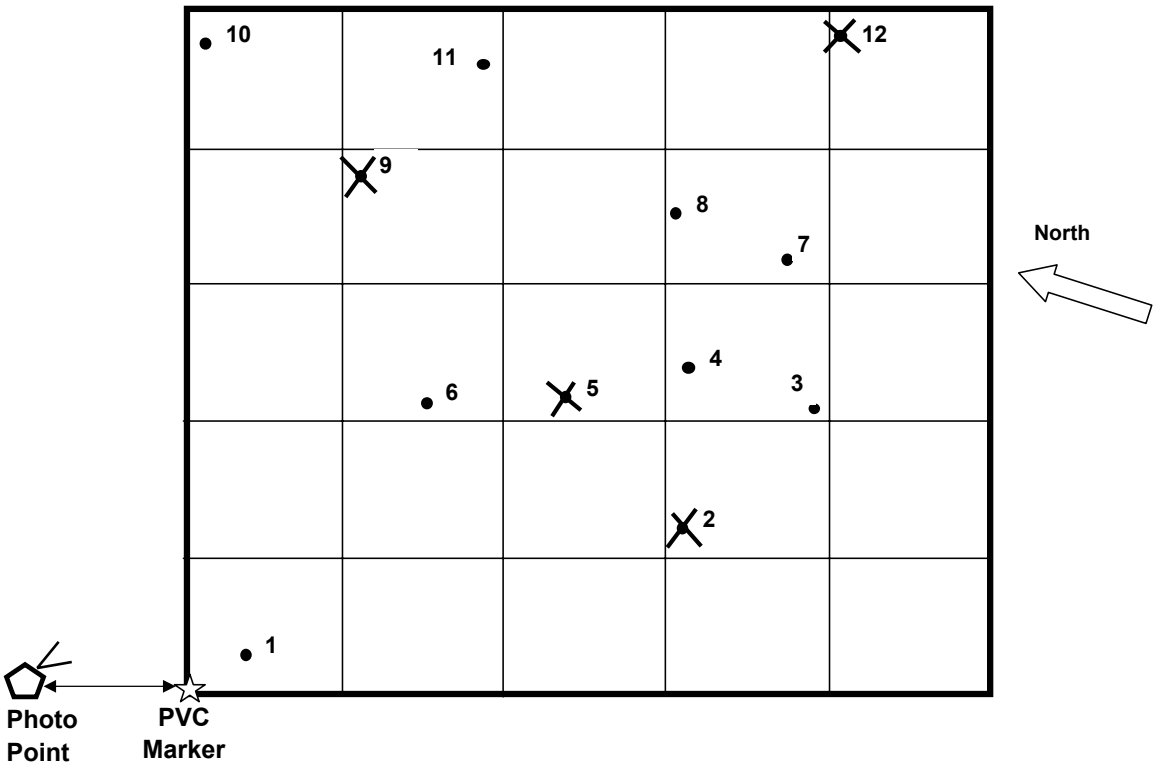
1st Year Monitoring

2nd Year Monitoring

Vegetation Monitoring Worksheet

Site: Brown **Plot:** 10 **Date:** 6/10/2008

Plot Map



ID	Species	Height (m)	Vigor	Comment
1	Laurel Oak (*Quercus laurifolia*)	0.62	2	
2	Unknown			Dead
3	Cherrybark Oak (*Quercus pagoda*)	0.80	3	
4	Willow Oak (*Quercus phellos*)	0.37	2	Main stem has died back
5	Unknown			Dead
6	Willow Oak (*Quercus phellos*)	0.98	3	
7	Cherrybark Oak (*Quercus pagoda*)	0.60	3	
8	Green Ash (*Fraxinus pennsylvanica*)	0.72	2	
9	Willow Oak (*Quercus phellos*)			Dead
10	Laurel Oak (*Quercus laurifolia*)	0.80	2	
11	Green Ash (*Fraxinus pennsylvanica*)	0.76	3	
12	Unknown			Dead

Vigor: 4=excellent, 3=good, 2=weak, 1=unlikely to survive year

Species	Percent of Total
Willow Oak (*Quercus phellos*)	25.0%
Green Ash (*Fraxinus pennsylvanica*)	25.0%
Cherrybark Oak (*Quercus pagoda*)	25.0%
Laurel Oak (*Quercus laurifolia*)	25.0%

Density:

Total Number of Trees **8** / **0.025 acres** = **320** **trees / acre**

Survivability:

Total Number of Trees **8** / **12 trees** x **100** = **67** **% survivability**

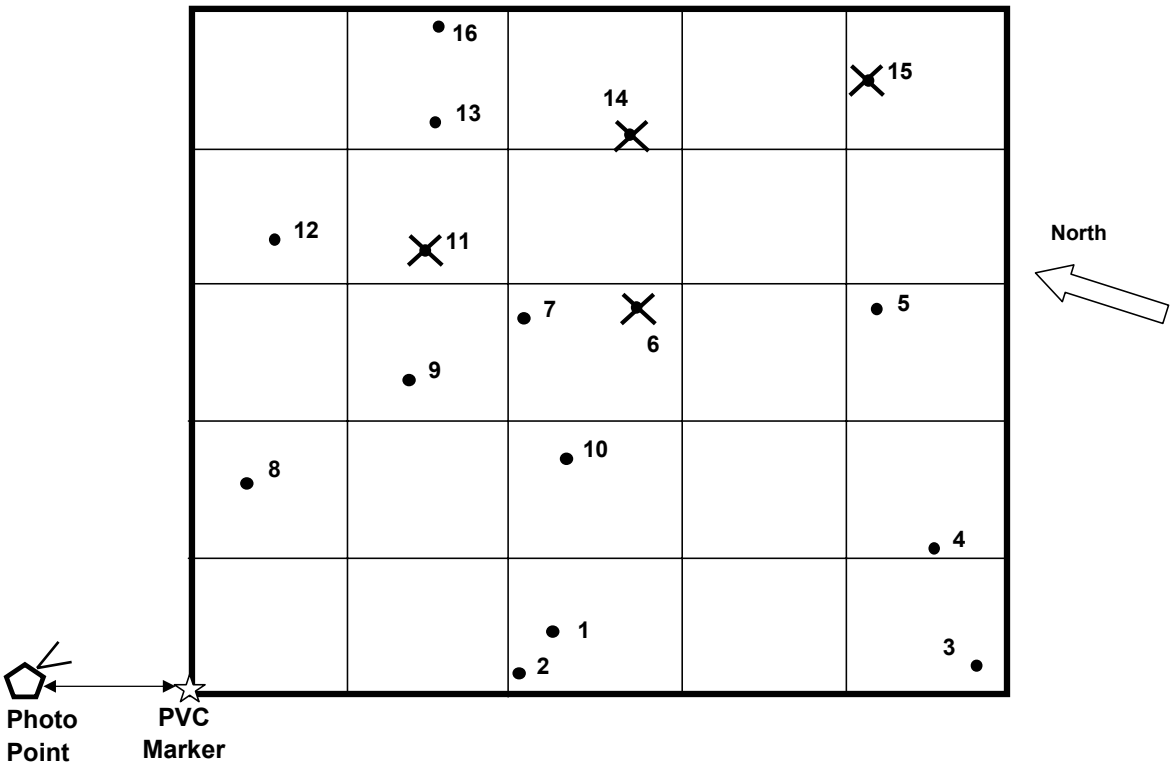
1st Year Monitoring

2nd Year Monitoring

Vegetation Monitoring Worksheet

Site: Brown **Plot:** 11 **Date:** 6/10/2008

Plot Map



ID	Species	Height (m)	Vigor	Comment
1	Cherrybark Oak (*Quercus pagoda*)	0.75	2	
2	Swamp Chestnut Oak (*Quercus michauxii*)	0.73	3	
3	Cherrybark Oak (*Quercus pagoda*)	0.63	3	
4	Overcup Oak (*Quercus lyrata*)	1.10	4	
5	Cherrybark Oak (*Quercus pagoda*)	0.47	3	Top has died back
6	Unknown			Dead
7	Overcup Oak (*Quercus lyrata*)	0.47	3	Some insect damage
8	Overcup Oak (*Quercus lyrata*)	0.69	3	Top has died back
9	Green Ash (*Fraxinus pennsylvanica*)	0.71	3	
10	Laurel Oak (*Quercus laurifolia*)	0.64	2	Browsed
11	Unknown			Dead
12	Overcup Oak (*Quercus lyrata*)	0.57	3	
13	Overcup Oak (*Quercus lyrata*)	0.72	3	
14	Unknown			Dead
15	Unknown			Dead
16	Overcup Oak (*Quercus lyrata*)	0.70	3	

Vigor: 4=excellent, 3=good, 2=weak, 1=unlikely to survive year

Species	Percent of Total
Overcup Oak (*Quercus lyrata*)	50.0%
Green Ash (*Fraxinus pennsylvanica*)	8.3%
Laurel Oak (*Quercus laurifolia*)	8.3%
Cherrybark Oak (*Quercus pagoda*)	25.0%
Swamp Chestnut Oak (*Quercus michauxii*)	8.3%

Density:

Total Number of Trees **12** / **0.025 acres** = **480** **trees / acre**

Survivability:

Total Number of Trees **12** / **16 trees** x **100** = **75** **% survivability**

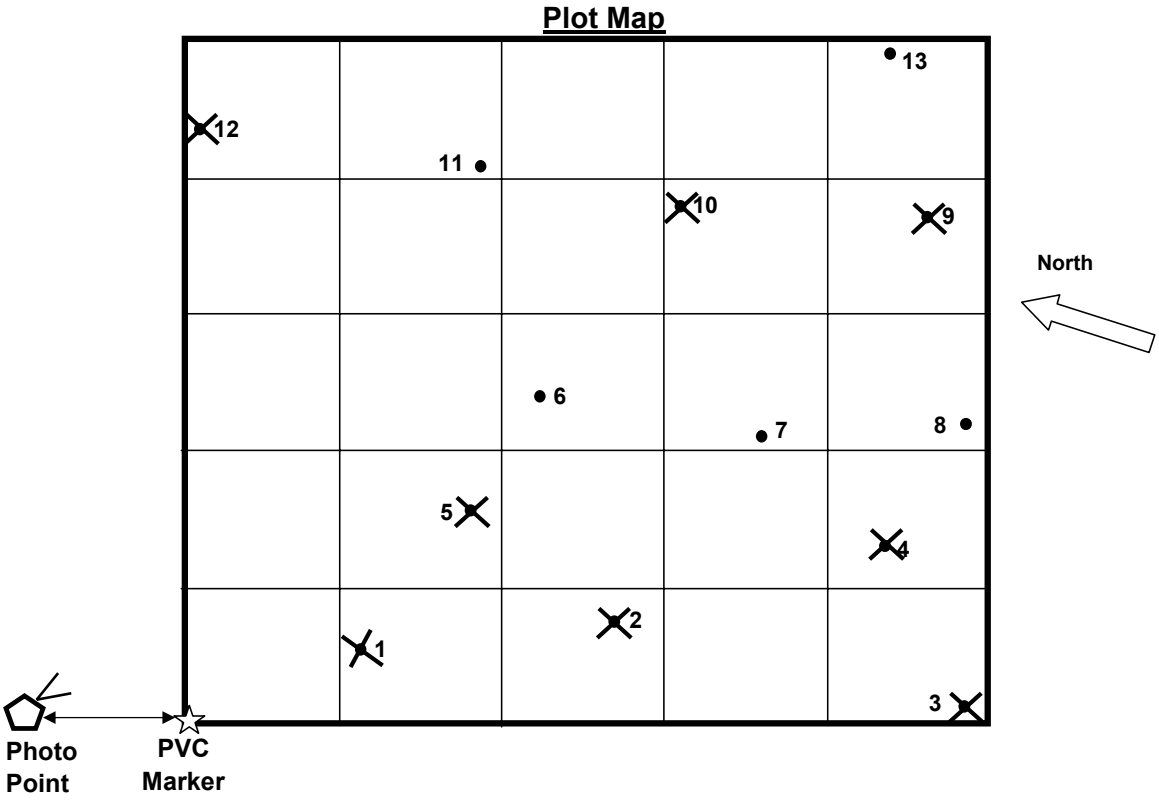
1st Year Monitoring

2nd Year Monitoring

Vegetation Monitoring Worksheet

Site: Brown **Plot:** 12 **Date:** 6/10/2008

Plot Map



ID	Species	Height (m)	Vigor	Comment
1	Tulip Poplar (*Liriodendron tulipifera*)			Dead
2	Unknown			Dead
3	Unknown			Dead
4	Unknown			Dead
5	Unknown			Dead
6	Green Ash (*Fraxinus pennsylvanica*)	0.75	3	Browsed
7	Cherrybark Oak (*Quercus pagoda*)	0.67	3	Browsed
8	Overcup Oak (*Quercus lyrata*)	0.72	3	Browsed
9	Unknown			Dead
10	Unknown			Dead
11	Overcup Oak (*Quercus lyrata*)	0.65	3	Browsed
12	Unknown			Dead
13	Green Ash (*Fraxinus pennsylvanica*)	0.60	3	Browsed

Vigor: 4=excellent, 3=good, 2=weak, 1=unlikely to survive year

Species	Percent of Total
Green Ash (*Fraxinus pennsylvanica*)	40.0%
Overcup Oak (*Quercus lyrata*)	40.0%
Cherrybark Oak (*Quercus pagoda*)	20.0%

Density:

Total Number of Trees **5** / **0.025 acres** = **200** **trees / acre**

Survivability:

Total Number of Trees **5** / **13** **x 100** = **38** **% survivability**

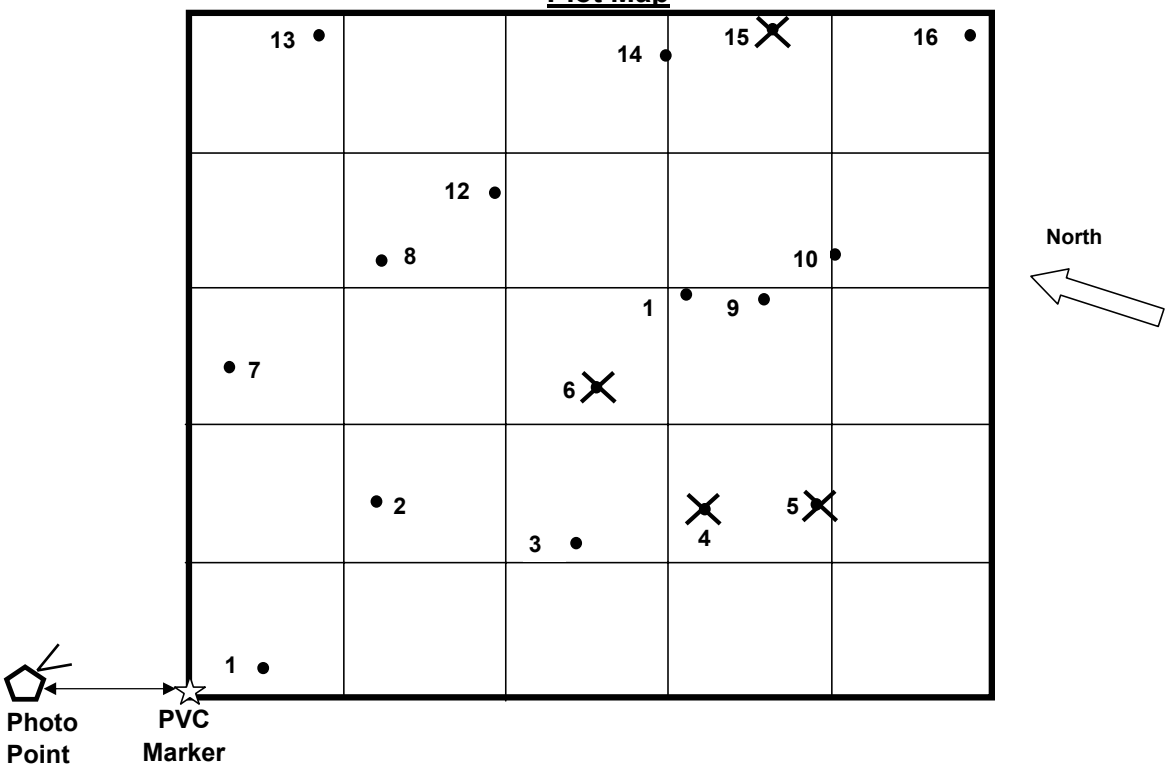
1st Year Monitoring

2nd Year Monitoring

Vegetation Monitoring Worksheet

Site: Brown **Plot:** 13 **Date:** 6/10/2008

Plot Map



ID	Species	Height (m)	Vigor	Comment
1	Overcup Oak (*Quercus lyrata*)	0.28	1	Resprout
2	Cherrybark Oak (*Quercus pagoda*)	0.72	3	
3	Overcup Oak (*Quercus lyrata*)	0.78	3	Browsed
4	Unknown			Dead
5	Tulip Poplar (*Liriodendron tulipifera*)			Dead
6	Unknown			Dead
7	Cherrybark Oak (*Quercus pagoda*)	0.67	3	Moderately browsed
8	Swamp Chestnut Oak (*Quercus michauxii*)	0.79	3	Browsed
9	Overcup Oak (*Quercus lyrata*)	0.46	3	Browsed
10	Green Ash (*Fraxinus pennsylvanica*)	0.58	2	Heavily browsed
11	Cherrybark Oak (*Quercus pagoda*)	0.81	3	Top broke off, resprout at break
12	Cherrybark Oak (*Quercus pagoda*)	0.92	4	Browsed
13	Swamp Chestnut Oak (*Quercus michauxii*)	0.44	2	Browsed
14	Overcup Oak (*Quercus lyrata*)	0.55	3	Browsed
15	Unknown			Dead
16	Cherrybark Oak (*Quercus pagoda*)	0.81	3	Browsed

Vigor: 4=excellent, 3=good, 2=weak, 1=unlikely to survive year

Species	Percent of Total
Green Ash (*Fraxinus pennsylvanica*)	8.3%
Overcup Oak (*Quercus lyrata*)	33.3%
Cherrybark Oak (*Quercus pagoda*)	41.7%
Swamp Chestnut Oak (*Quercus michauxii*)	16.7%

Density:

Total Number of Trees **12** / **0.025 acres** = **480** **trees / acre**

Survivability:

Total Number of Trees **12** / **16** x **100** = **75** **% survivability**

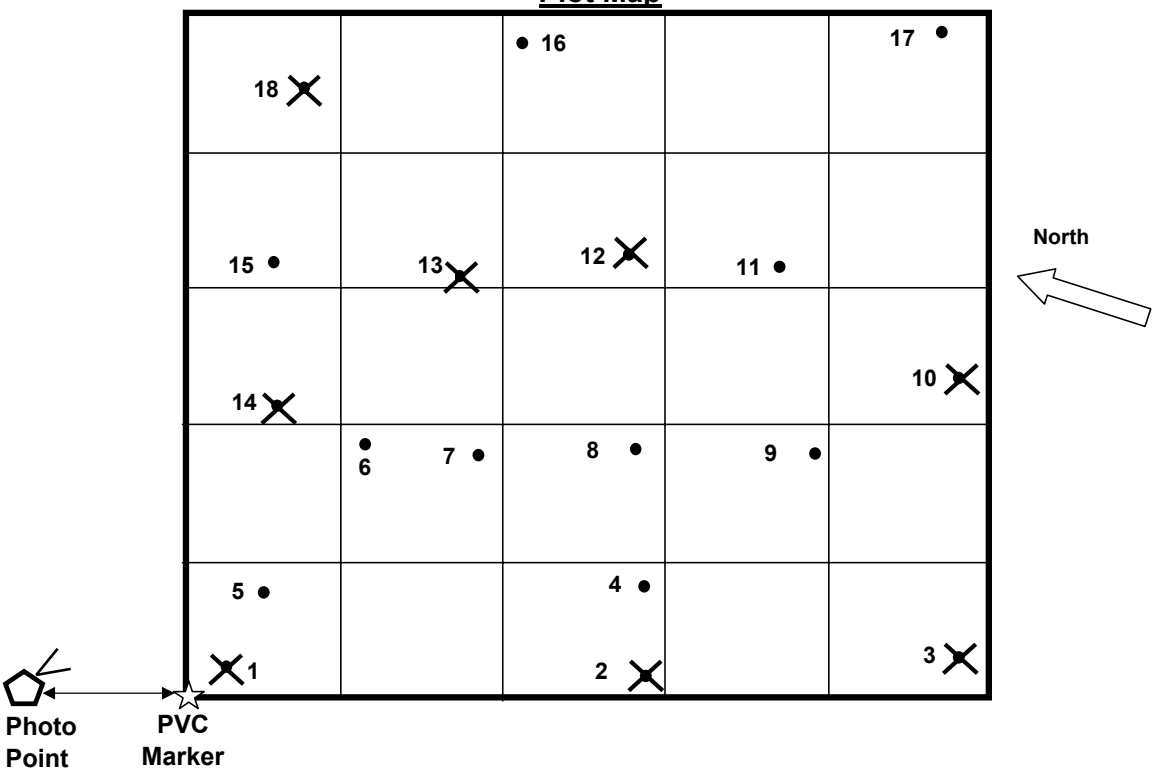
1st Year Monitoring

2nd Year Monitoring

Vegetation Monitoring Worksheet

Site: Brown **Plot:** 14 **Date:** 6/10/2008

Plot Map



ID	Species	Height (m)	Vigor	Comment
1	Cherrybark Oak (*Quercus pagoda)*			Dead
2	Unknown			Dead
3	Unknown			Dead
4	Overcup Oak (*Quercus lyrata*)	0.63	3	
5	Overcup Oak (*Quercus lyrata*)	0.60	3	
6	Cherrybark Oak (*Quercus pagoda)*	0.58	3	
7	Cherrybark Oak (*Quercus pagoda)*	0.75	4	
8	Overcup Oak (*Quercus lyrata*)	0.56	4	
9	Overcup Oak (*Quercus lyrata*)	0.25	2	Resprout
10	Unknown			Dead
11	Overcup Oak (*Quercus lyrata*)	0.50	3	Top has died back
12	Unknown			Dead
13	Unknown			Dead
14	Unknown			Dead
15	Overcup Oak (*Quercus lyrata*)	0.25	2	Resprout
16	Overcup Oak (*Quercus lyrata*)	0.57	3	Browsed
17	Overcup Oak (*Quercus lyrata*)	0.50	3	Browsed
18	Cherrybark Oak (*Quercus pagoda)*			Dead

Vigor: 4=excellent, 3=good, 2=weak, 1=unlikely to survive year

Species	Percent of Total
Cherrybark Oak (*Quercus pagoda*)	20.0%
Overcup Oak (*Quercus lyrata*)	80.0%

Density:

Total Number of Trees **10** / **0.025 acres** = **400** **trees / acre**

Survivability:

Total Number of Trees **10** / **18** x **100** = **56** **% survivability**

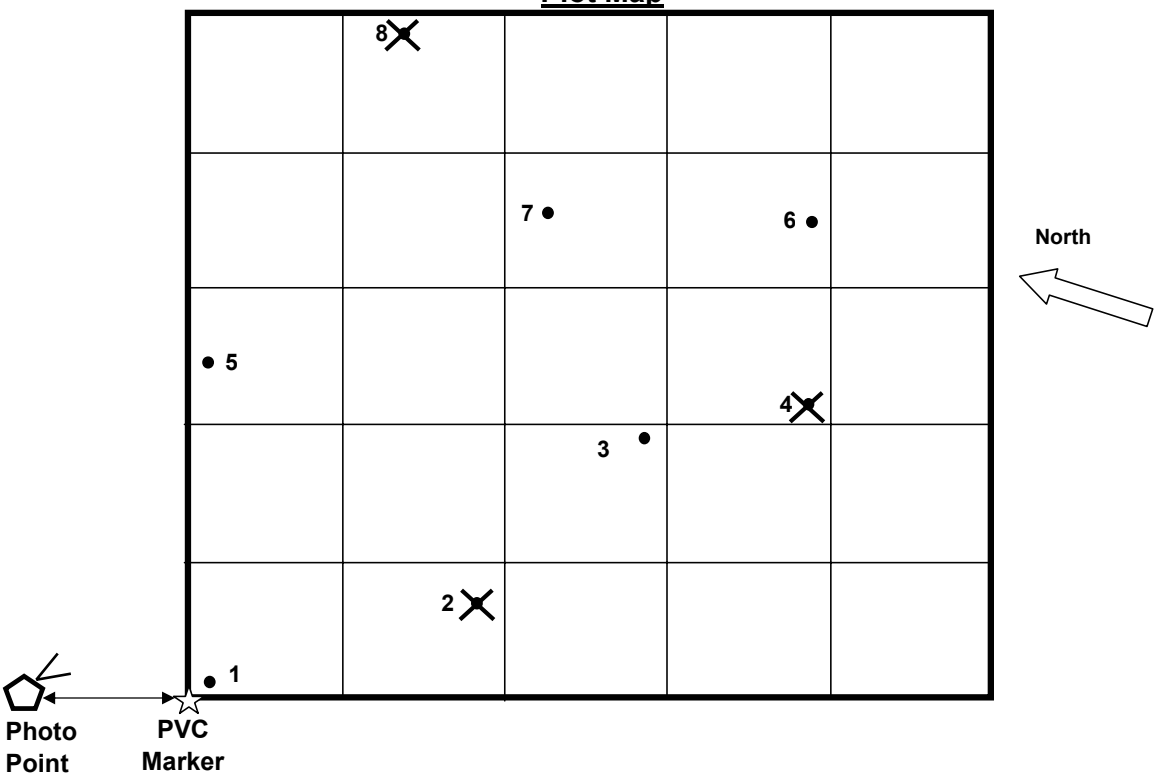
1st Year Monitoring

2nd Year Monitoring

Vegetation Monitoring Worksheet

Site: Brown **Plot:** 15 **Date:** 6/10/2008

Plot Map



ID	Species	Height (m)	Vigor	Comment
1	Overcup Oak (*Quercus lyrata*)	0.47	3	
2	Unknown			Dead
3	Overcup Oak (*Quercus lyrata*)	0.54	3	Top has died back
4	Laurel Oak (*Quercus laurifolia)*			Dead
5	Cherrybark Oak (*Quercus pagoda*)	0.30	3	
6	Unknown	0.35	3	
7	Overcup Oak (*Quercus lyrata*)	0.65	3	
8	Unknown			Dead

Vigor: 4=excellent, 3=good, 2=weak, 1=unlikely to survive year

Species	Percent of Total
Overcup Oak (*Quercus lyrata*)	60.0%
Cherrybark Oak (*Quercus pagoda*)	20.0%
Unknown	20.0%

Density:

Total Number of Trees **5** / **0.025 acres** = **200** **trees / acre**

Survivability:

Total Number of Trees **5** / **8** x **100** = **63** **% survivability**

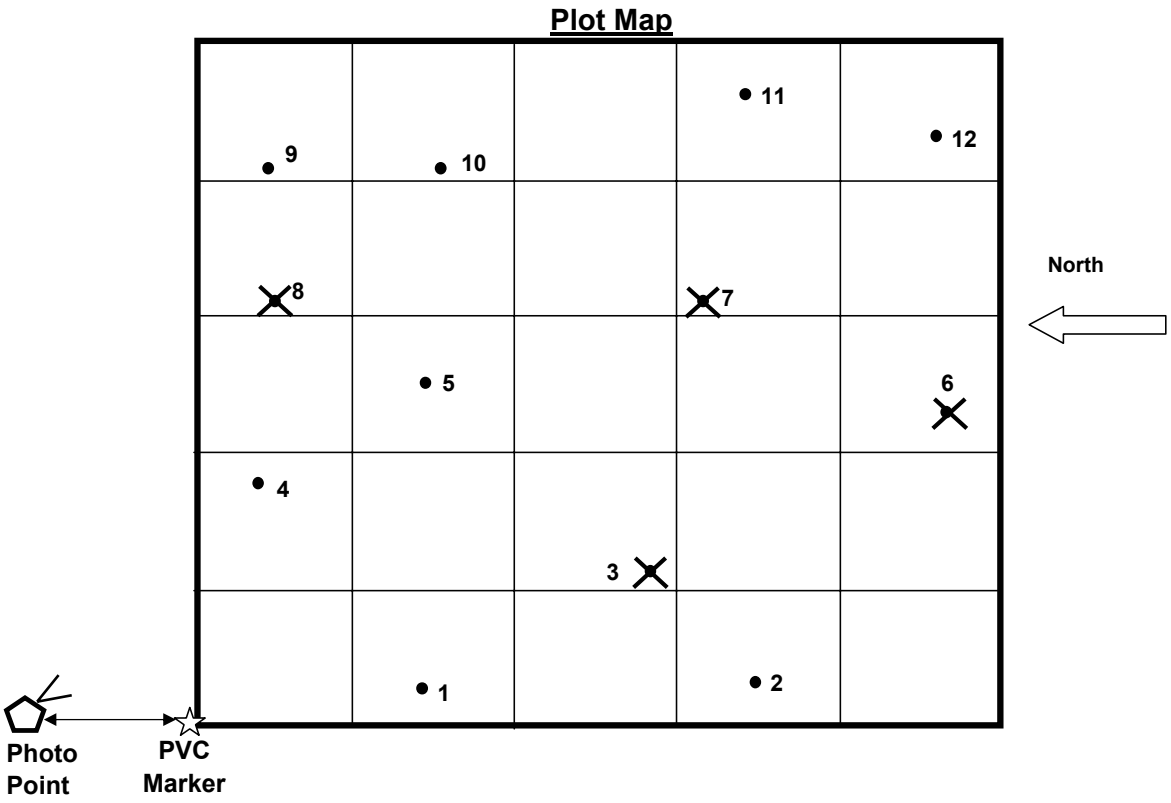
1st Year Monitoring

2nd Year Monitoring

Vegetation Monitoring Worksheet

Site: Brown **Plot:** 16 **Date:** 6/13/2008

Plot Map



ID	Species	Height (m)	Vigor	Comment
1	Willow Oak (*Quercus phellos)*	0.82	2	Top has died back
2	Cherrybark Oak (*Quercus pagoda*)	0.68	3	
3	Willow Oak (*Quercus phellos)*			Dead
4	Laurel Oak (*Quercus laurifolia*)	0.73	2	
5	Swamp Chestnut Oak (*Quercus michauxii*)	0.28	1	Resprout from base
6	Unknown			Dead
7	Unknown			Dead
8	Unknown			Dead
9	Willow Oak (*Quercus phellos)*	0.77	3	
10	Willow Oak (*Quercus phellos)*	0.75	3	
11	Green Ash (*Fraxinus pennsylvanica*)	0.57	3	
12	Willow Oak (*Quercus phellos)*	0.49	3	

Vigor: 4=excellent, 3=good, 2=weak, 1=unlikely to survive year

Species	Percent of Total
Willow Oak (*Quercus phellos*)	50.0%
Green Ash (*Fraxinus pennsylvanica*)	12.5%
Swamp Chestnut Oak (*Quercus michauxii*)	12.5%
Laurel Oak (*Quercus laurifolia*)	12.5%
Cherrybark Oak (*Quercus pagoda*)	12.5%

Density:

Total Number of Trees **8** / **0.025 acres** = **320** **trees / acre**

Survivability:

Total Number of Trees **8** / **12** x **100** = **67** **% survivability**

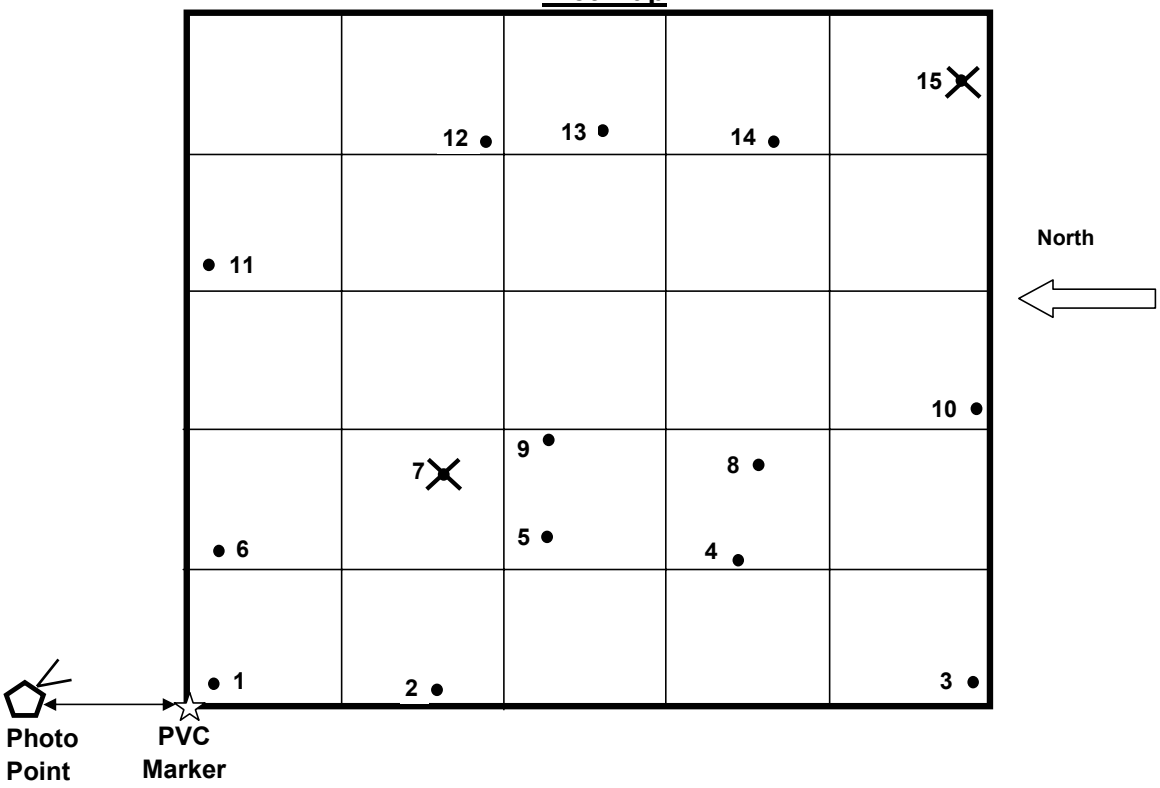
1st Year Monitoring

2nd Year Monitoring

Vegetation Monitoring Worksheet

Site: Brown **Plot:** 17 **Date:** 6/13/2008

Plot Map



ID	Species	Height (m)	Vigor	Comment
1	Green Ash (*Fraxinus pennsylvanica*)	0.84	2	Browsed
2	Overcup Oak (*Quercus lyrata*)	0.85	2	Heavily browsed
3	Green Ash (*Fraxinus pennsylvanica*)	0.56	2	Browsed
4	Green Ash (*Fraxinus pennsylvanica*)	0.62	2	Browsed
5	Laurel Oak (*Quercus laurifolia*)	0.82	3	Browsed
6	Laurel Oak (*Quercus laurifolia*)	0.67	1	Very few leaves
7	Unknown			Dead
8	Green Ash (*Fraxinus pennsylvanica*)	0.73	1	Very few leaves
9	Green Ash (*Fraxinus pennsylvanica*)	0.52	2	Browsed
10	Laurel Oak (*Quercus laurifolia*)	0.57	3	
11	Green Ash (*Fraxinus pennsylvanica*)	0.65	2	Browsed
12	Cherrybark Oak (*Quercus pagoda*)	0.72	3	
13	Green Ash (*Fraxinus pennsylvanica*)	0.84	2	Browsed
14	Green Ash (*Fraxinus pennsylvanica*)	0.67	2	Browsed
15	Green Ash (*Fraxinus pennsylvanica*)			Dead

Vigor: 4=excellent, 3=good, 2=weak, 1=unlikely to survive year

Species	Percent of Total
Green Ash (*Fraxinus pennsylvanica*)	61.5%
Cherrybark Oak (*Quercus pagoda*)	7.7%
Laurel Oak (*Quercus laurifolia*)	23.1%
Overcup Oak (*Quercus lyrata*)	7.7%

Density:

Total Number of Trees **13** / **0.025 acres** = **520** **trees / acre**

Survivability:

Total Number of Trees **13** / **15** x **100** = **87** **% survivability**

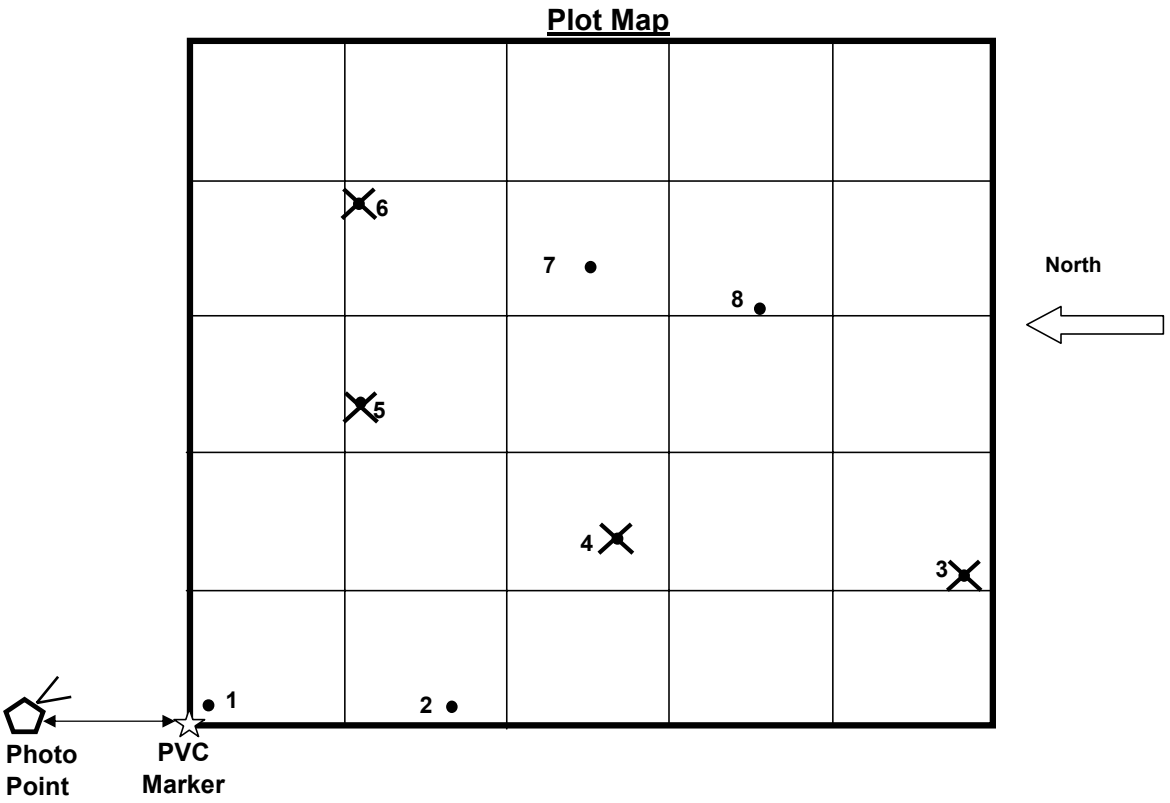
1st Year Monitoring

2nd Year Monitoring

Vegetation Monitoring Worksheet

Site: Brown **Plot:** 18 **Date:** 6/13/2008

Plot Map



ID	Species	Height (m)	Vigor	Comment
1	Swamp Chestnut Oak (*Quercus michauxii*)	,52	2	Top has died back
2	Cherrybark Oak (*Quercus pagoda*)	0.79	3	Some insect damage
3	Unknown			Dead
4	Tulip Poplar (*Liriodendron tulipifera*)			Missing
5	Green Ash (*Fraxinus pennsylvanica*)			Missing
6	Swamp Chestnut Oak (*Quercus michauxii*)			Missing
7	Swamp Chestnut Oak (*Quercus michauxii*)	0.26	2	Resprout
8	Green Ash (*Fraxinus pennsylvanica*)	0.63	2	Top has died back

Vigor: 4=excellent, 3=good, 2=weak, 1=unlikely to survive year

Species	Percent of Total
Green Ash (*Fraxinus pennsylvanica*)	25.0%
Swamp Chestnut Oak (*Quercus michauxii*)	50.0%
Cherrybark Oak (*Quercus pagoda*)	25.0%

Density:

Total Number of Trees **4** / **0.025 acres** = **160** **trees / acre**

Survivability:

Total Number of Trees **4** / **8** x **100** = **50** **% survivability**

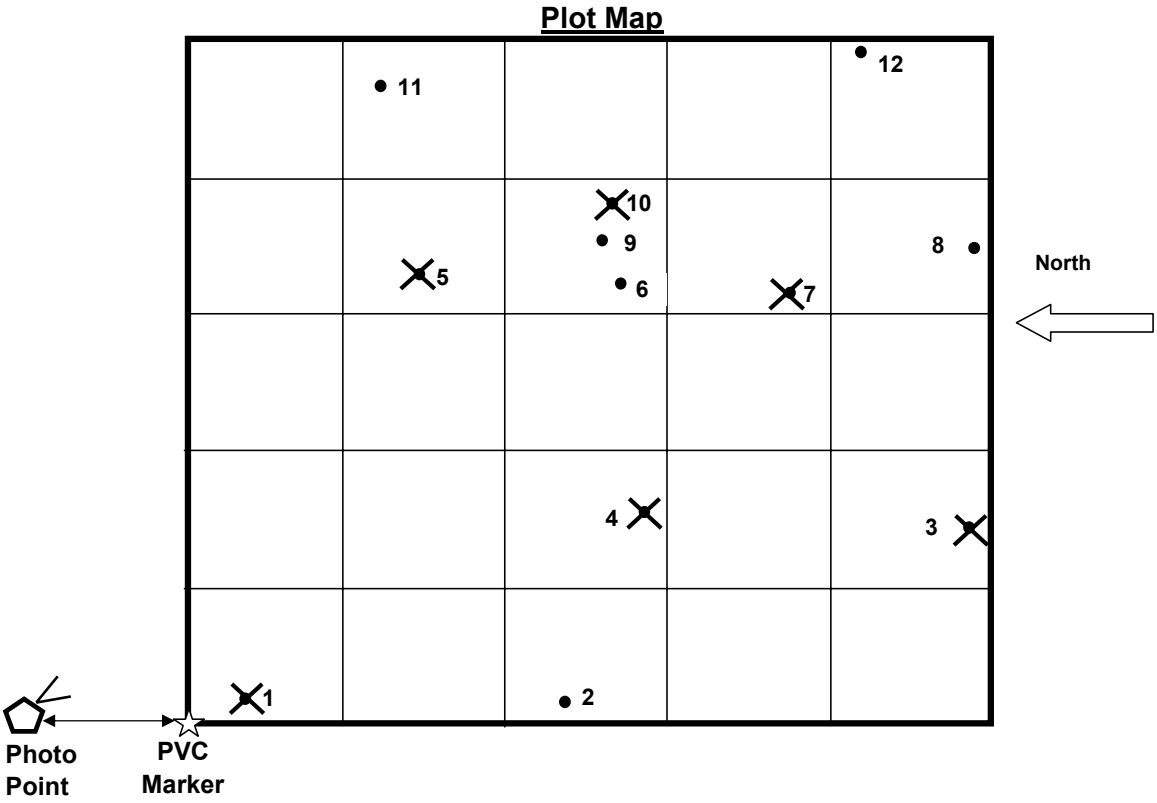
1st Year Monitoring

2nd Year Monitoring

Vegetation Monitoring Worksheet

Site: Brown **Plot:** 19 **Date:** 6/13/2008

Plot Map



ID	Species	Height (m)	Vigor	Comment
1	Willow Oak (*Quercus phellos)*			Dead
2	Green Ash (*Fraxinus pennsylvanica*)	0.70	2	Browsed
3	Unknown			Dead
4	Willow Oak (*Quercus phellos)*			Dead
5	Willow Oak (*Quercus phellos)*			Dead
6	Cherrybark Oak (*Quercus pagoda*)	0.83	3	Some insect damage
7	Green Ash (*Fraxinus pennsylvanica*)			Dead
8	Overcup Oak (*Quercus lyrata)*	0.56	2	Top has died back
9	Green Ash (*Fraxinus pennsylvanica*)	0.94	1	Heavily browsed
10	Water Tupelo (*Nyssa aquatica)*			Dead
11	Cherrybark Oak (*Quercus pagoda*)	0.80	3	Some insect damage
12	Laurel Oak (*Quercus laurifolia*)	0.57	2	Browsed

Vigor: 4=excellent, 3=good, 2=weak, 1=unlikely to survive year

Species	Percent of Total
Green Ash (*Fraxinus pennsylvanica*)	33.3%
Willow Oak (*Quercus phellos*)	16.7%
Cherrybark Oak (*Quercus pagoda*)	33.3%
Laurel Oak (*Quercus laurifolia*)	16.7%

Density:

Total Number of Trees **6** / **0.025 acres** = **240** **trees / acre**

Survivability:

Total Number of Trees **6** / **12** x **100** = **50** **% survivability**

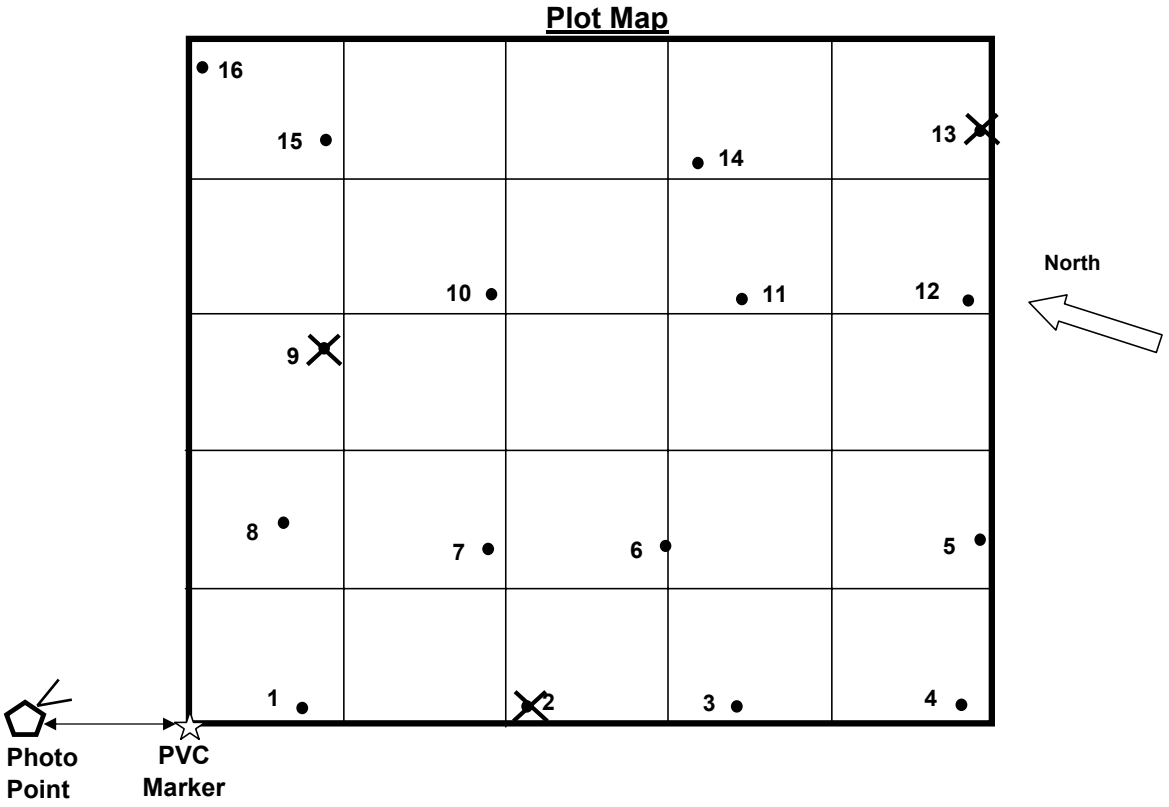
1st Year Monitoring

2nd Year Monitoring

Vegetation Monitoring Worksheet

Site: Brown **Plot:** 20 **Date:** 6/13/2008

Plot Map



ID	Species	Height (m)	Vigor	Comment
1	Swamp Chestnut Oak (*Quercus michauxii*)	0.50	2	Main stem has died back
2	Tulip Poplar (*Liriodendron tulipifera*)			Dead
3	Tulip Poplar (*Liriodendron tulipifera*)	0.46	2	Main stem has died back
4	Cherrybark Oak (*Quercus pagoda*)	0.24	1	Main stem has died back
5	Green Ash (*Fraxinus pennsylvanica*)	0.58	2	Heavily browsed
6	Green Ash (*Fraxinus pennsylvanica*)	0.60	2	Browsed
7	Overcup Oak (*Quercus lyrata*)	0.82	3	
8	Green Ash (*Fraxinus pennsylvanica*)	0.59	2	
9	Unknown			Dead
10	Green Ash (*Fraxinus pennsylvanica*)	0.62	2	Browsed
11	Green Ash (*Fraxinus pennsylvanica*)	0.67	3	
12	Overcup Oak (*Quercus lyrata*)	0.84	4	
13	Cherrybark Oak (*Quercus pagoda*)			Missing
14	Overcup Oak (*Quercus lyrata*)	1.07	4	
15	Overcup Oak (*Quercus lyrata*)	0.83	3	
16	Green Ash (*Fraxinus pennsylvanica*)	0.52	2	Browsed

Vigor: 4=excellent, 3=good, 2=weak, 1=unlikely to survive year

Species	Percent of Total
Swamp Chestnut Oak (*Quercus michauxii*)	7.7%
Tulip Poplar (*Liriodendron tulipifera*)	7.7%
Cherrybark Oak (*Quercus pagoda*)	7.7%
Green Ash (*Fraxinus pennsylvanica*)	46.2%
Overcup Oak (*Quercus lyrata*)	30.8%

Density:

Total Number of Trees **13** / **0.025 acres** = **520** **trees / acre**

Survivability:

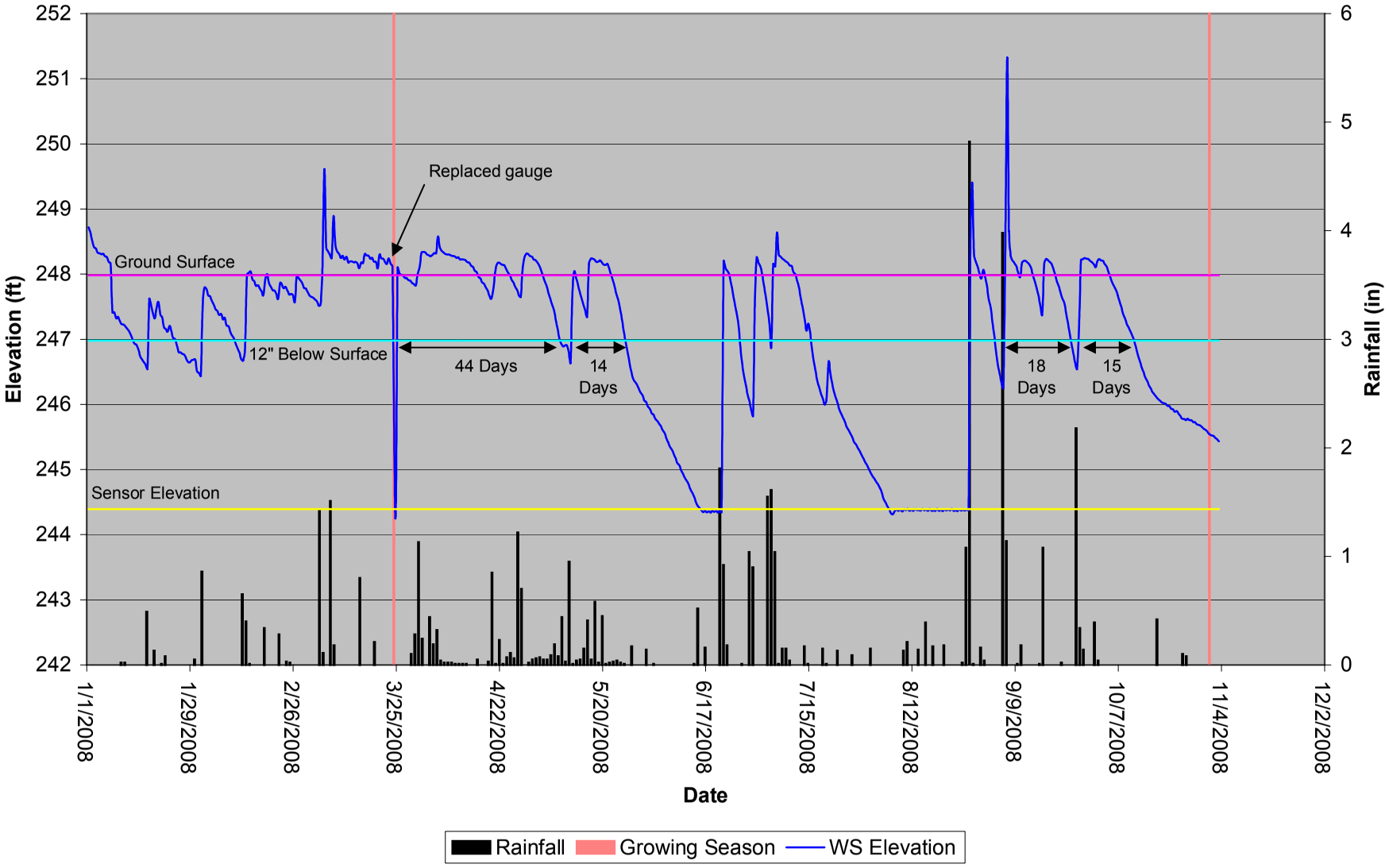
Total Number of Trees **13** / **16** x **100** = **81** **% survivability**

1st Year Monitoring

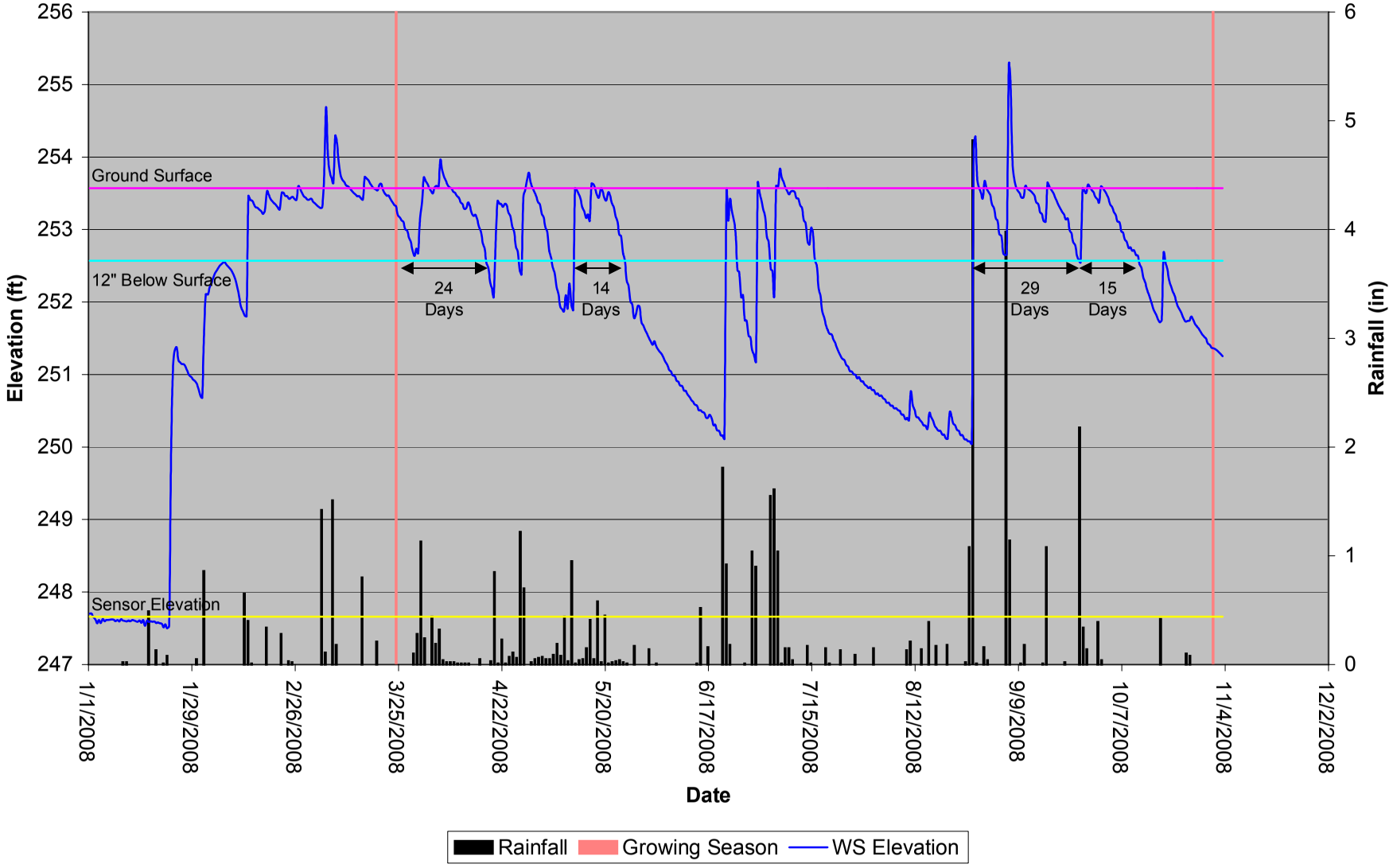
2nd Year Monitoring

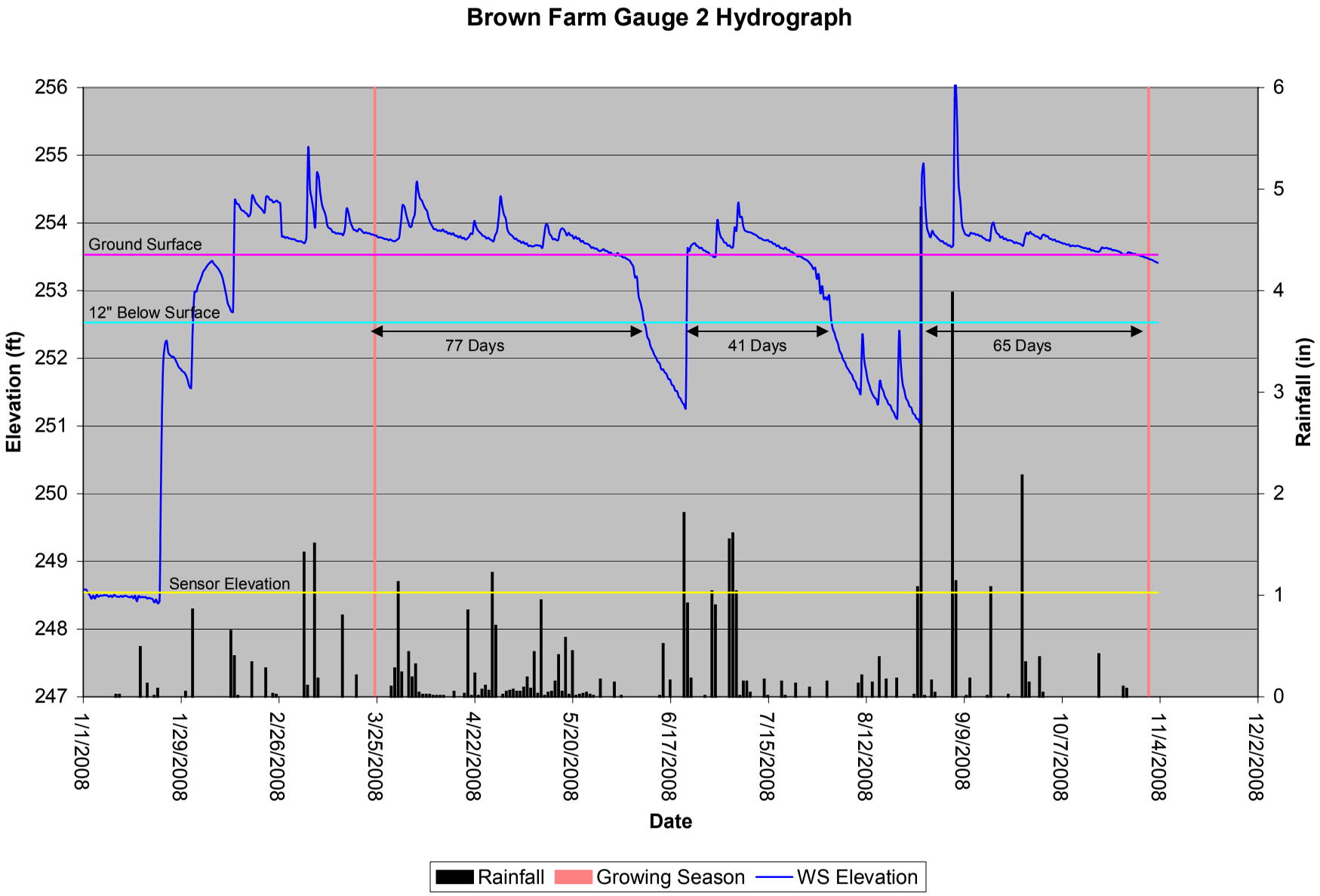
Appendix B
Hydrologic Monitoring and Hydroperiod

Brown Farm Reference Gauge Hydrograph

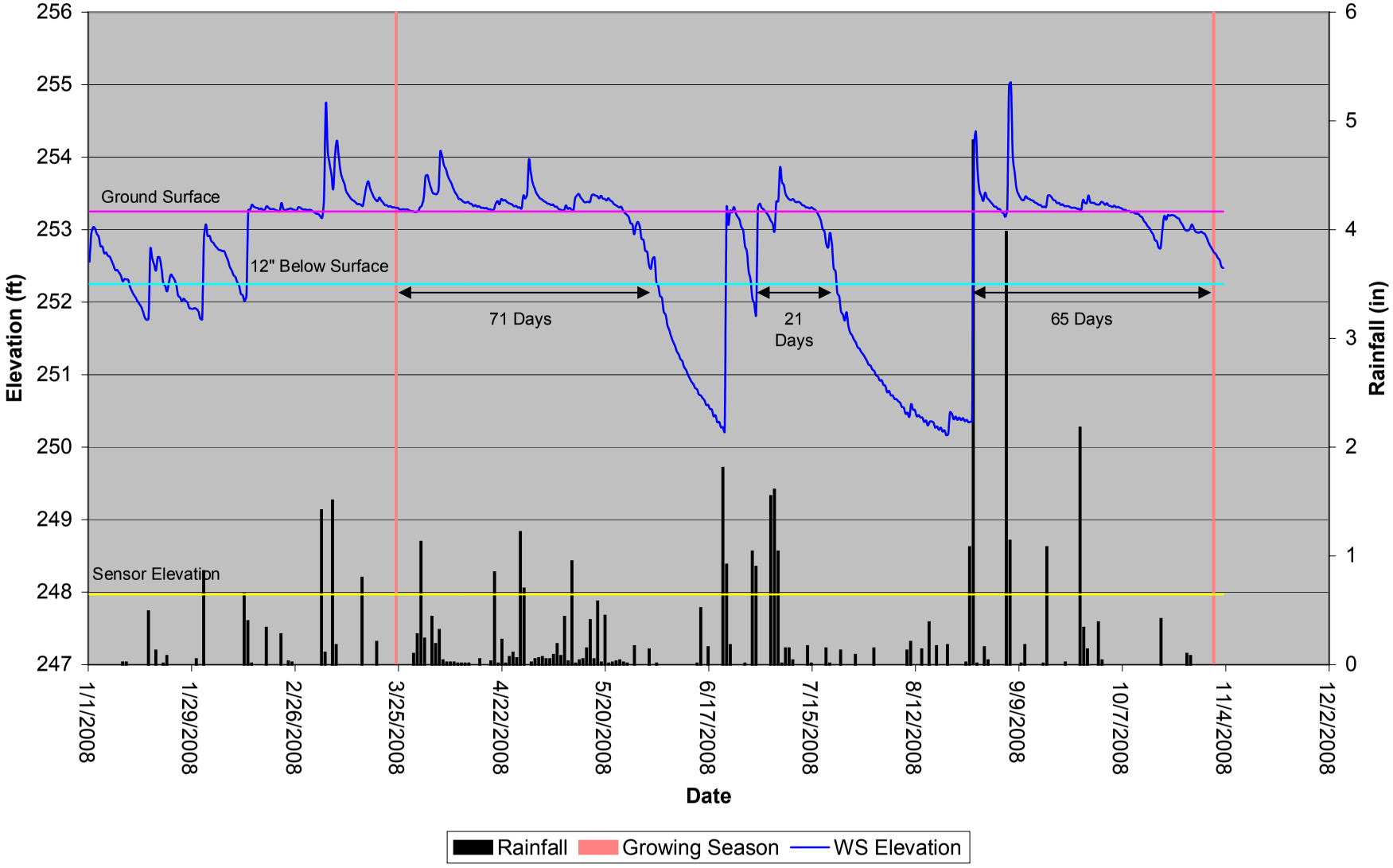


Brown Farm Gauge 1 Hydrograph

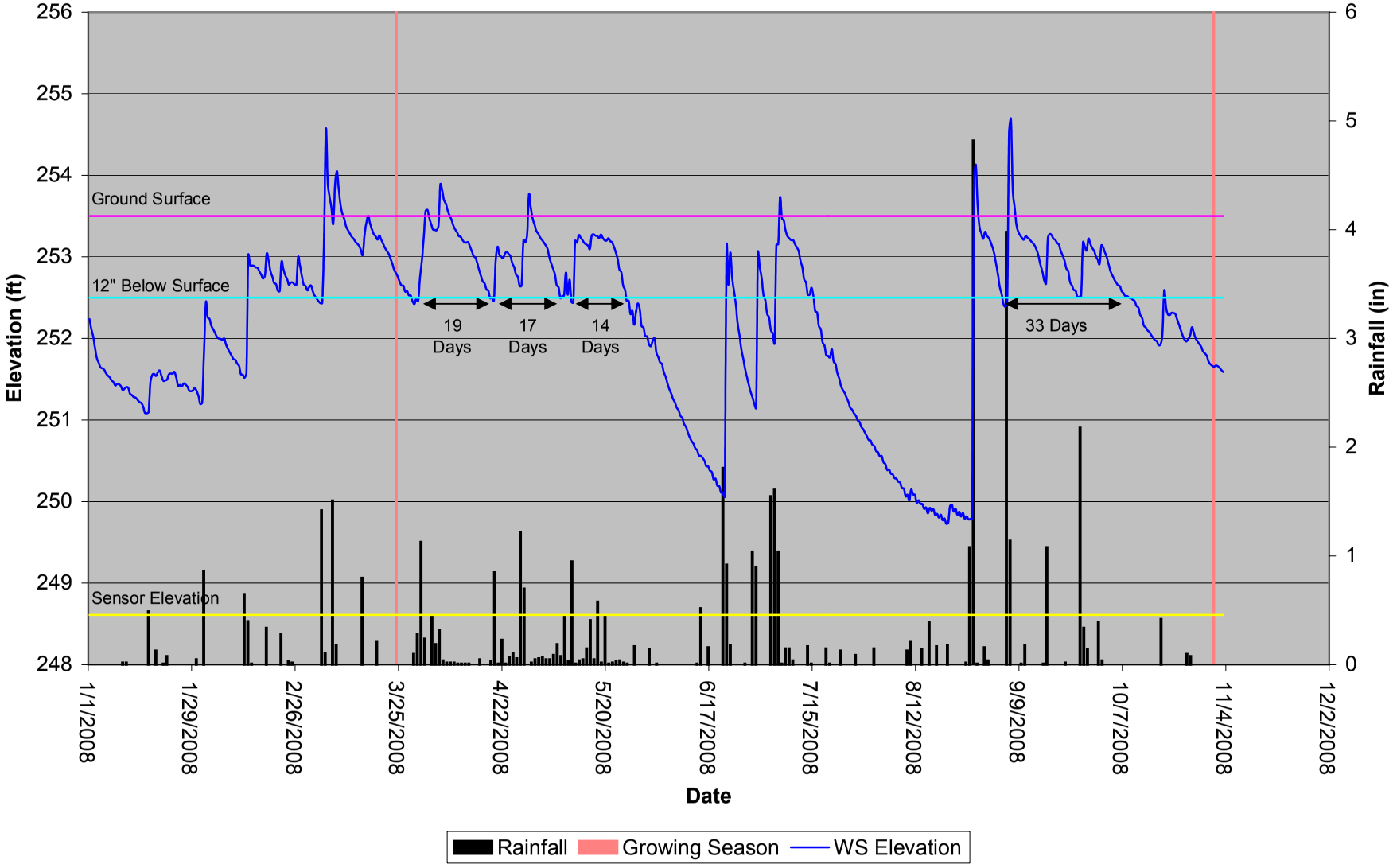



Brown Farm Gauge 2 Hydrograph
Elevation (ft)
Rainfall (in)
Date
Ground Surface
12" Below Surface
Sensor Elevation
77 Days
41 Days
65 Days
256
255
254
253
252
251
250
249
248
247
6
5
4
3
2
1
0
1/1/2008
1/29/2008
2/26/2008
3/25/2008
4/22/2008
5/20/2008
6/17/2008
7/15/2008
8/12/2008
9/9/2008
10/7/2008
11/4/2008
12/2/2008
Rainfall
Growing Season
WS Elevation

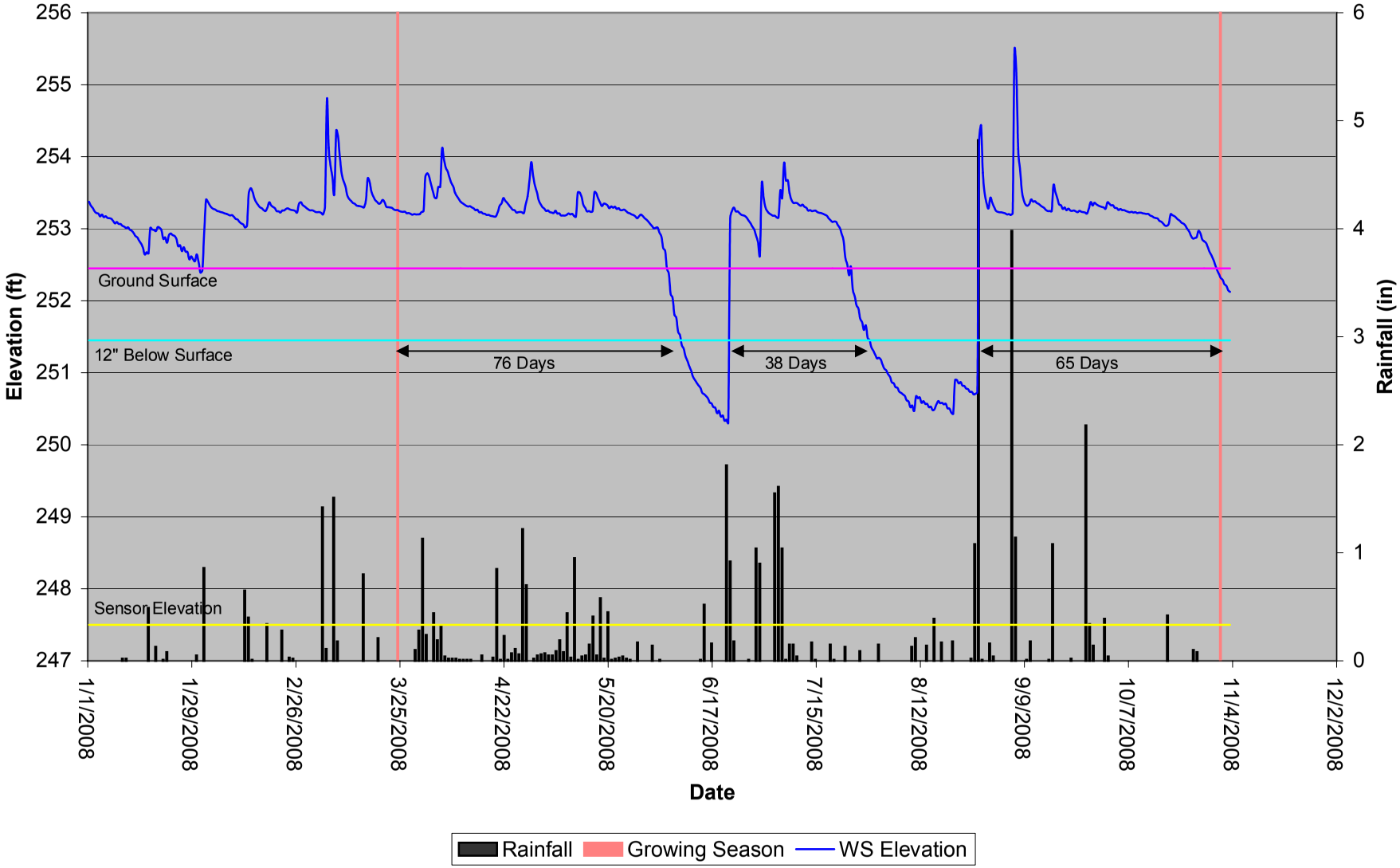
Brown Farm Gauge 3 Hydrograph



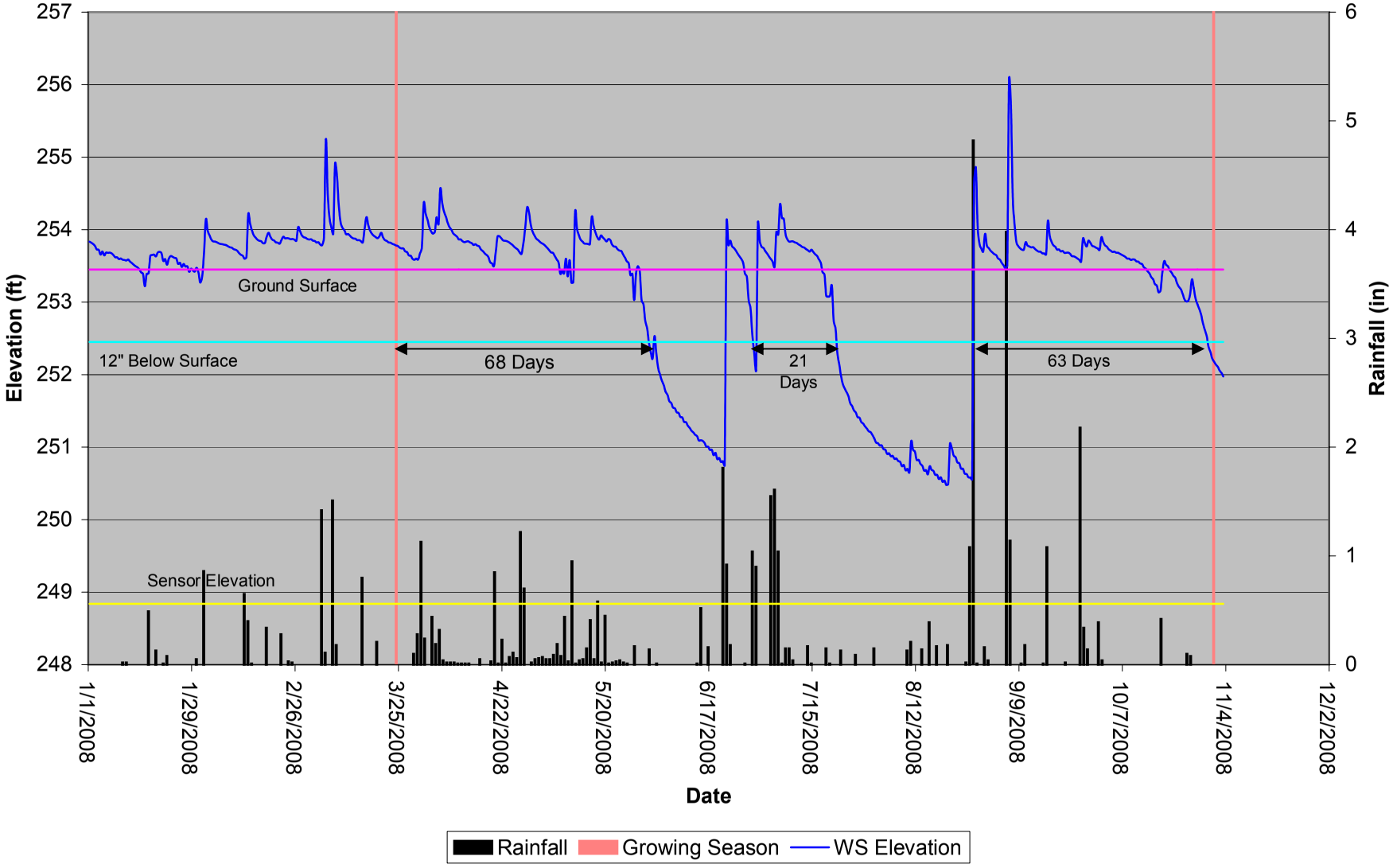
Brown Farm Gauge 4 Hydrograph



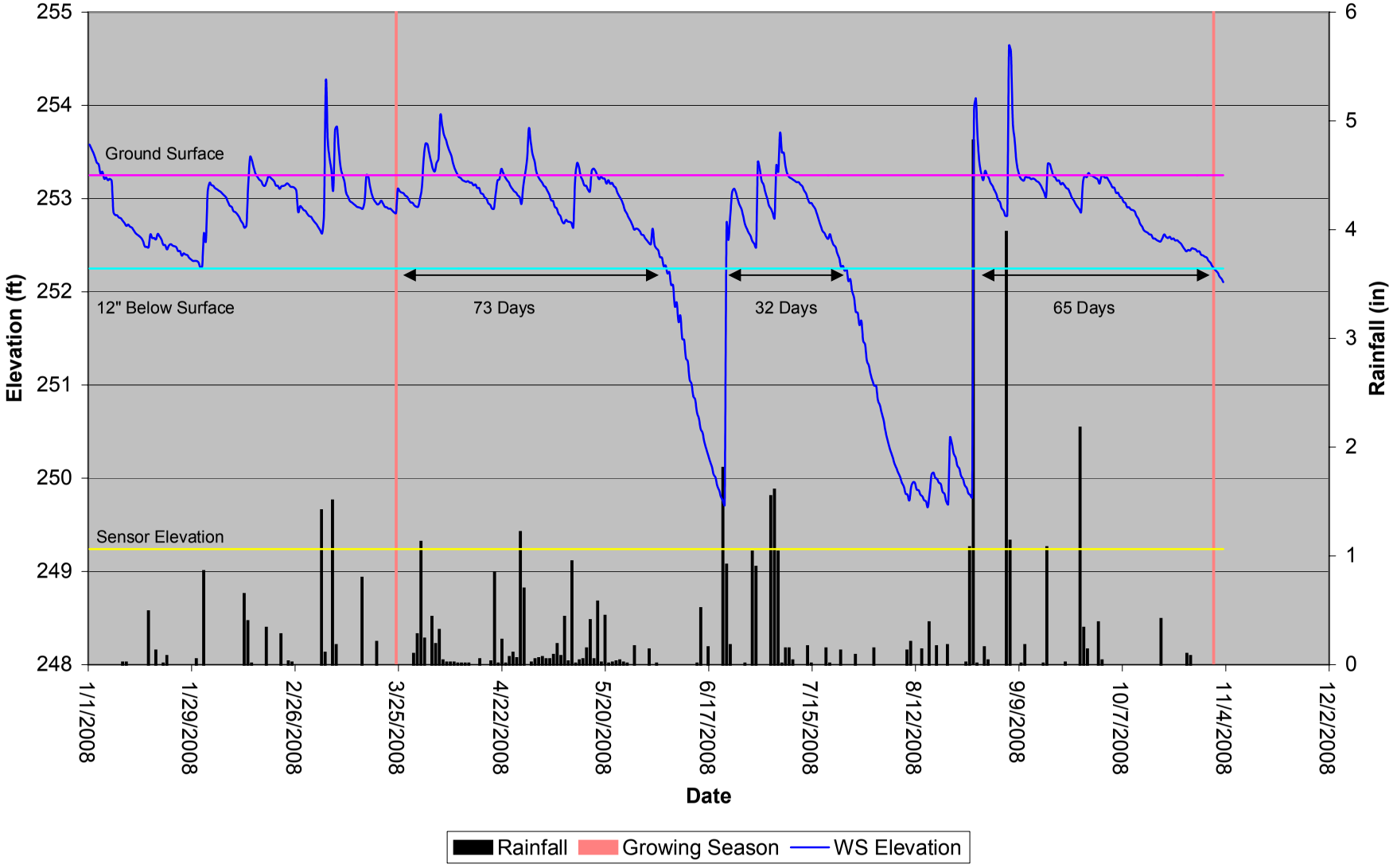
Brown Farm Gauge 5 Hydrograph



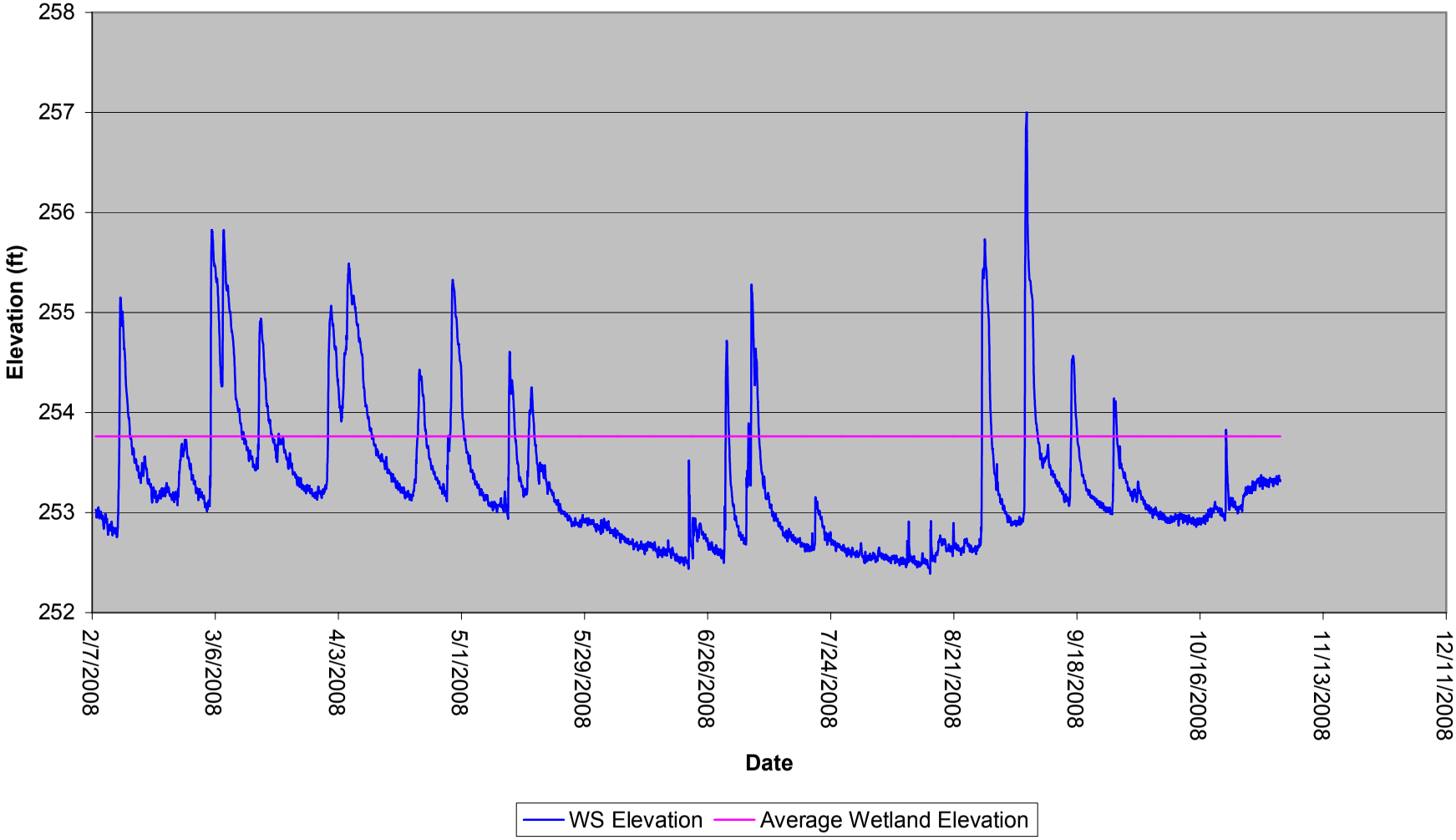
Brown Farm Gauge 6 Hydrograph



Brown Farm Gauge 7 Hydrograph



Brown Farm
New Hope Creek Stream Gauge
Overbank Flooding Hydrographs
02/07/08 to 11/03/08



Appendix C
Photo Log

Photo Point 1A: View looking east towards Vegetation Plot #1. 6/10/08 – MY-02

Photo Point 1B: View looking northeast toward Vegetation Plot #5. 6/10/08 – MY-02

Photo Point 2: View looking north toward Vegetation Plot # 3. 6/10/08 – MY-02

Photo Point 3: View looking north with Vegetation Plot #10 on left. 6/10/08 – MY-02

Photo Point 4: View looking north toward Vegetation Plot #17. 6/13/08 – MY-02

Photo Point 5: View looking north from the far eastern part of the project site. 6/13/08 – MY-02

Photo Point 6: View looking south toward Vegetation Plot #20. 6/13/08 – MY-02

Photo Point 7: View looking south. 6/13/08 – MY-02