Daniels Farm #2
Wetland Restoration Site
Franklin County, North Carolina

Tar-Pam 03020101
Contract # D05025

Monitoring Report
Year 2

Submitted to:

North Carolina
Department of Environment and
Natural Resources
Ecosystem Enhancement Program

Submitted by:

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November 2007

ENVIRONMENTAL TECHNOLOGIES AND CONSTRUCTION, INC.

EXECUTIVE SUMMARY

The Daniels Farm #2 Wetland Restoration Project has restored, enhanced, and preserved a Piedmont Bottomland Hardwood wetland community along the Tar River in central Franklin County. This project hopes to improve water quality and protect aquatic habitat in a predominantly agricultural area with the restoration and enhancement of 19.7 acres of wetland and the preservation of 10.4 acres of wetland. The restoration site had undergone severe degradation from unrestricted agricultural activities and human-induced disturbances.

This monitoring report presents the data and findings from the second growing season following construction. Included in this report are analyses of both hydrologic and vegetation monitoring results as well as local climatic conditions throughout the growing season. Monitoring activities included sampling vegetation survivability at eleven locations, monitoring groundwater elevations at five locations and documenting general site conditions at seven permanent photograph points within the wetland restoration area. In addition, daily precipitation was recorded. These data were evaluated and verified using the climatic data for Louisburg, North Carolina. Field investigations were conducted in June and November 2007. Supporting data and site photographs are included in the report appendices.

The 14.4 acres of wetland restoration were initially planted at a density of 680 trees per acre and the 5.2 acres of wetland enhancement were planted at a density ranging from 100 to 200 trees per acre. There were eleven vegetation monitoring plots established throughout the restoration area and one monitoring plot in the enhancement area. The 2007 vegetation monitoring of the restoration areas revealed an average density of 484 trees per acre, which is above the minimum requirement of 320 trees per acre needed to meet the success criteria at the end of the five-year monitoring period.

During the 2007 monitoring year, wetland hydrology was achieved at all four wells in the restoration area, the well in the preservation area, and the well in the reference wetland. Groundwater was within 12 inches of the soil surface in excess of 12 consecutive days (5% of the growing season) at each well, with all but one of the gauges exceeding the hydrological success criteria for more than 12.5% of the growing season.

The daily rainfall data depicted on the gauge data graphs were obtained from the on-site precipitation gauge. The precipitation gauge was installed on the site in 2003 prior to project implementation. The daily rainfall data obtained for Louisburg, North Carolina shows that Louisburg experienced an extreme drought during the growing season in 2007 and correlated to the precipitation data recorded on-site.

Soils in the restoration portion of the site have been determined to be predominately Roanoke. Since this soil is already considered hydric, no success criteria or monitoring is required.

Site photographs were taken from seven permanent photo documentation points established along the property boundary. Photo documentation facilitates the qualitative evaluation of the conditions or changes in the restored wetland. The photo point locations were selected in order to document representative site conditions.

The results of the 2007 monitoring of the Daniels Farm #2 Wetland Restoration Project indicate that the site has met the success criteria for the second year of monitoring.

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1.0 SUMMARY

1.1 Vegetation

The 14.4 acres of wetland restoration were planted at a density of 680 trees per acre and the 5.2 acres of wetland enhancement were planted at a density ranging from 100 to 200 trees per acre. Eleven vegetation plots were established in order to encompass 2% of the restored wetland acreage. The 2007 vegetation monitoring of the planted areas revealed an average density of 484 trees per acre, which is well above the minimum requirement of 320 trees per acre (Appendix A). A total of eight trees per vegetation monitoring plot are needed to meet the 320 trees per acre minimum requirement.

Table 1: Vegetation Monitoring Results

Plot Number	Willow Oak	Swamp Chestnut Oak	Laurel Oak	Yellow Poplar	Bald Cypress	Overcup Oak	Green Ash	Cherrybark Oak	Unknown	Total - Year 2	Density - Year 2 (Trees/Acres)
1	3	7				1		2		13	520
2					4		11			15	600
3		2				2	1	1	2	8	320
4	2	1		1	1		1	2	2	10	400
5		1			2		4		1	8	320
6		3	1		1	3	4	1		13	520
7	1	7						3	1	13	520
8		5				3	3			11	440
9		1			4	2	7		1	15	600
10		4	1			2	2	5		14	560
11		1			1	4	3		1	10	520
									Total Average Density		484

Table 2: Vegetation History (Trees/Acre)

Plot #	Year 1	Year 2	Year 3	Year 4	Year 5
1	680	520			
2	680	600			
3	400	320			
4	600	400			
5	360	320			
6	640	520			
7	600	520			
8	680	440			
9	600	600			
10	720	560			
11	520	520			

Vegetative monitoring also took place in the enhancement vegetation plot. The plot evaluated the tree layer (greater than or equal to 3 inches DBH) and sapling/shrub layer. There were no changes in species dominance in the enhancement plot as compared to the baseline conditions prior to the restoration project.

1.2 Hydrology

The wetland wells used to monitor site hydrology were installed in early May 2006. Wetland hydrology was achieved at all of the wells on the site; groundwater was within 12 inches of the soil surface in excess of 12 consecutive days (5% of the growing season) at each well (Table 2). Based on these data, the site has exceeded the minimum duration of near surface saturation for the 2007 growing season, from March 20th to November 11th (Appendix B). 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 235-day growing season. Table 3 presents the hydrological monitoring results for 2007. Climatic data for the 2007 growing season were analyzed in comparison to historical data to determine whether 2007 was a normal year in terms of climatic conditions; this is 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 2007 was a below average year for rainfall during the growing season. Rainfall was within the 30th to 70th percentiles for the months of March, April, June, and October. Rainfall was less than the 30th percentile threshold in May, July, August, September, and November and none of the months had rainfall greater than the 70th percentile threshold (Appendix B). The piedmont of North Carolina experienced an exceptional drought during the 2007 growing season. This is reflected in the shorter hydroperiod for the site when compared to previous monitoring data. The fact that the project site maintained wetland hydrology during this drought illustrates how strong the groundwater influence is.

A stream gauge was installed on the unnamed tributary to the Tar River (UTTR) in order to evaluate the influence of flooding on the site. There were no flood events recorded in 2007.

Table 3: 2007 Hydrologic Monitoring Results

	Hydroperiod					
Well #	**<5%**	**5% - 8%**	**8% - 12.5%**	**>12.5%**	**Maximum Number of Consecutive Days**	**Dates Meeting Success**
1				X	59	March 20 – May 17
2			X		21	March 20 – April 9
3				X	69	March 20 – May 27
4				X	56	March 20 – May 14
Preservation Wetland				X	235	March 20 – November 11
Ref. Wetland				X	44	March 20 – May 2

Table 4. Hydroperiod History

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

2.0 DATA ANALYSIS

2.1 Vegetation

During the first monitoring year, the initial stress of planting caused some of the trees to drop their leaves early in the growing season and several trees had their tops die back. The condition of the trees made identifying the tree species difficult during first year monitoring; those species were re-identified during the current monitoring year and appropriate changes have been made.

2.2 Hydrology

Wetland restoration on the site focused on the removal of hydrologic alterations, which included filling the primary ditches, plugging the lateral ditches, removing ditch spoil to restore natural drainage, installing water diversion features to redistribute the surface hydrology, placing restrictive berms to reduce runoff and enhance infiltration, and recreating microtopography across the site to enhance surface water retention and storage. Based on the hydrological results, this site has met and exceeded the criteria outlined in the wetland restoration plan. Plugging and filling ditches combined with the other hydrogical restoration methods have resulted in increased short-term surface and subsurface water storage and subsequent increase in the duration and elevation of the seasonally high water table.

2.3 Soils

Soils in the restoration portion of the site have been determined to be predominantly Roanoke, with small inclusions of Altavista, and Wahee. Roanoke is listed as a hydric soil on the state and federal hydric soils lists. As this soil is already considered hydric, no success criteria or monitoring are required.

3.0 MAINTENANCE/MANAGEMENT ACTIONS

There were no Maintenance/Management Actions taken during 2007.

4.0 CONCLUSIONS

Findings from this monitoring year indicate that the site is meeting the success criteria developed for the project. The success criteria for vegetation states that there must be 320 stems/acre of planted vegetation at the end of five years of monitoring and that non-target species must not constitute more than 20% of the woody vegetation based on permanent plots. The 2007 vegetation monitoring of the planted areas revealed an average density of 484 trees per acre, which is above the minimum requirement of 320 trees per acre. Non-target species did not constitute more than 20 percent of the woody vegetation based on permanent vegetation monitoring plots.

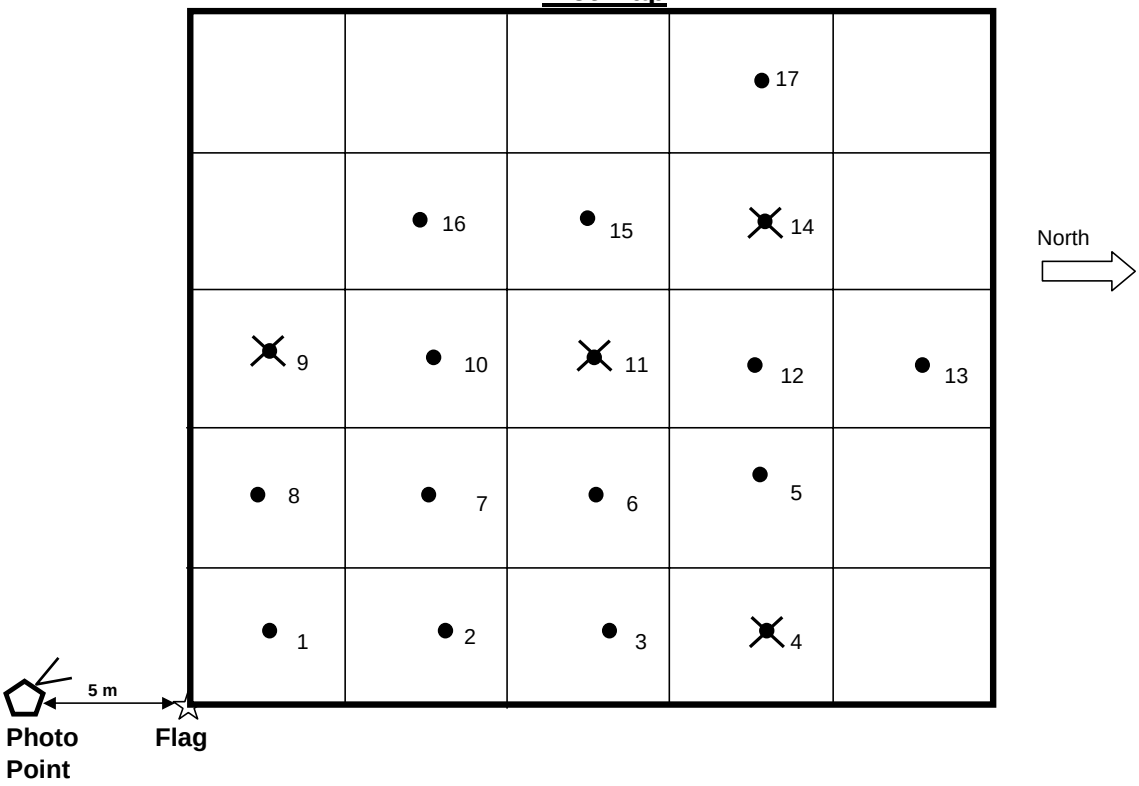
For the 2007 monitoring year, the site's gauges showed that the project is meeting the hydrologic success criteria of saturation within 12 inches of the surface continuously for at least 5% of the growing season. All but one of the gauges exceeded the hydrological success criteria for more than 12.5% of the growing season.

Appendix A
Vegetation Monitoring Plot Data Sheets

Vegetation Monitoring Worksheet

Site: Daniels II **Plot:** 1 **Date:** 6/4/2007

Plot Map



ID	Species	Height (m)	Vigor	Comment
1	Swamp chestnut oak (*Quercus michauxii*)	0.81	3	
2	Cherrybark oak (*Quercus pagoda*)	0.86	3	
3	Swamp chestnut oak (*Quercus michauxii*)	0.95	4	
4	Swamp chestnut oak (*Quercus michauxii*)			Dead
5	Willow oak (*Quercus phellos*)	0.15	2	Resprout from base
6	Cherrybark oak (*Quercus pagoda*)	0.36	3	
7	Willow oak (*Quercus phellos*)	0.23	3	Resprout from base
8	Swamp chestnut oak (*Quercus michauxii*)	0.95	4	
9	Swamp chestnut oak (*Quercus michauxii*)			Dead
10	Willow oak (*Quercus phellos*)	0.18	2	
11	Unknown species			Dead
12	Swamp chestnut oak (*Quercus michauxii*)	0.94	3	
13	Swamp chestnut oak (*Quercus michauxii*)	0.94	4	
14	Unknown species			Dead
15	Swamp chestnut oak (*Quercus michauxii*)	0.63	3	
16	Swamp chestnut oak (*Quercus michauxii*)	0.94	3	
17	Overcup oak (*Quercus lyrata*)	0.80	1	

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

Species	Percent of Total
Overcup oak (*Quercus lyrata*)	7.7%
Swamp chestnut oak (*Quercus michauxii*)	53.8%
Willow oak (*Quercus phellos*)	23.1%
Cherrybark Oak (*Quercus pagoda*)	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**

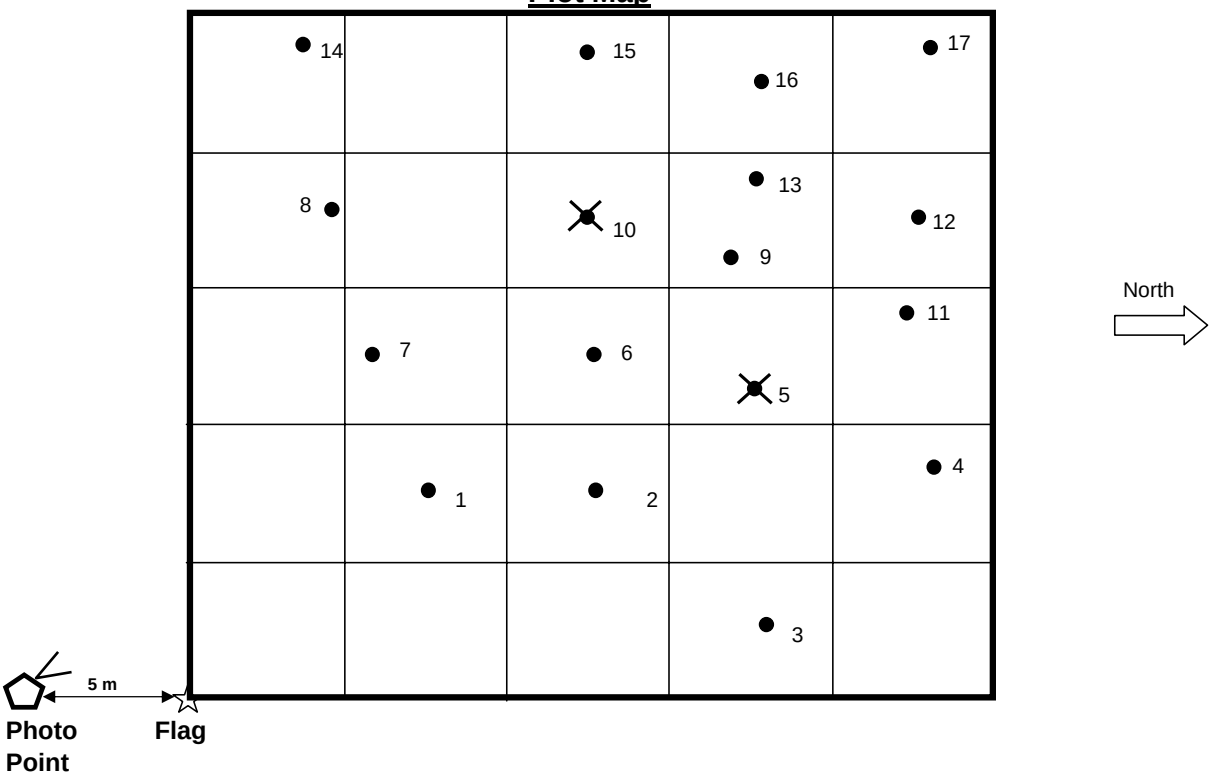
Previous

Current

Vegetation Monitoring Worksheet

Site: Daniels II **Plot:** 2 **Date:** 6/4/2007

Plot Map



ID	Species	Height (m)	Vigor	Comment
1	Bald cypress (*Taxodium distichum*)	0.80	4	
2	Green ash (*Fraxinus pennsylvanica*)	0.78	4	
3	Green ash (*Fraxinus pennsylvanica*)	0.73	2	
4	Green ash (*Fraxinus pennsylvanica*)	0.79	2	
5	Bald cypress (*Taxodium distichum*)			Dead
6	Green ash (*Fraxinus pennsylvanica*)	1.80	4	
7	Green ash (*Fraxinus pennsylvanica*)	0.96	3	
8	Green ash (*Fraxinus pennsylvanica*)	0.49	2	
9	Green ash (*Fraxinus pennsylvanica*)	1.16	3	
10	Bald cypress (*Taxodium distichum*)			Dead
11	Bald cypress (*Taxodium distichum*)	1.00	4	
12	Green ash (*Fraxinus pennsylvanica*)	0.98	3	Browsed at top
13	Bald cypress (*Taxodium distichum*)	0.24	2	Resprout from base
14	Green ash (*Fraxinus pennsylvanica*)	1.10	3	
15	Green ash (*Fraxinus pennsylvanica*)	1.02	3	
16	Green ash (*Fraxinus pennsylvanica*)	1.16	3	
17	Bald cypress (*Taxodium distichum*)	0.75	4	

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

Species	Percent of Total
Green ash (*Fraxinus pennsylvanica*)	73.3%
Bald cypress (*Taxodium distichum*)	26.7%

Density:

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

Survivability:

Total Number of Trees **15** / **17 trees** x **100** = **88** **% survivability**

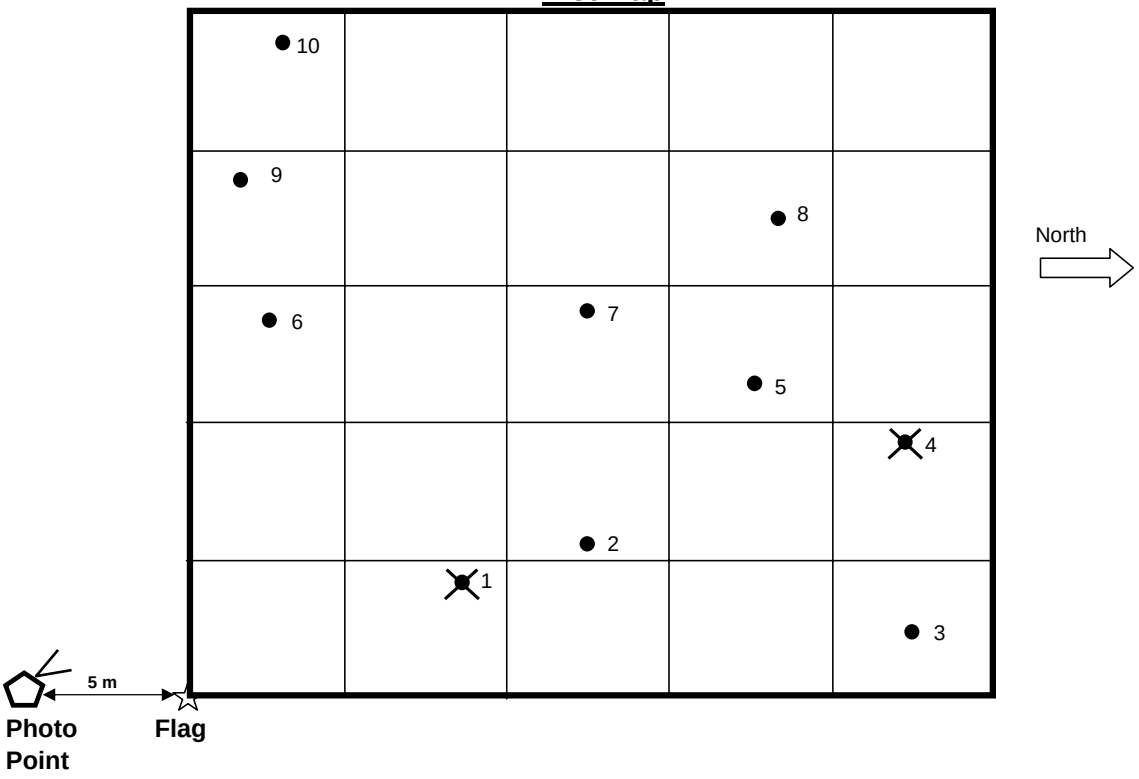
Previous

Current

Vegetation Monitoring Worksheet

Site: Daniels II **Plot:** 3 **Date:** 6/4/2007

Plot Map



ID	Species	Height (m)	Vigor	Comment
1	Unknown species			Dead
2	Overcup oak (*Quercus lyrata*)	0.76	1	
3	Unknown species	0.85	1	
4	Unknown species			Dead
5	Cherrybark oak (*Quercus pagoda*)	0.64	3	
6	Overcup oak (*Quercus lyrata*)	0.35	3	
7	Swamp chestnut oak (*Quercus michauxii*)	0.56	2	
8	Swamp chestnut oak (*Quercus michauxii*)	0.75	2	
9	Green ash (*Fraxinus pennsylvanica*)	0.85	2	
10	Unknown species	0.85	1	

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

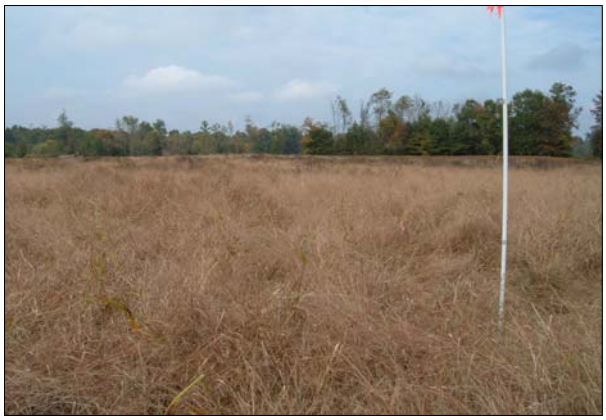
Species	Percent of Total
Green ash (*Fraxinus pennsylvanica*)	12.5%
Overcup oak (*Quercus lyrata*)	25.0%
Swamp chestnut oak (*Quercus michauxii*)	25.0%
Cherrybark oak (*Quercus pagoda*)	12.5%
Unknown species	25.0%

Density:

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

Survivability:

Total Number of Trees **8** / **10 trees** x **100** = **80** **% survivability**



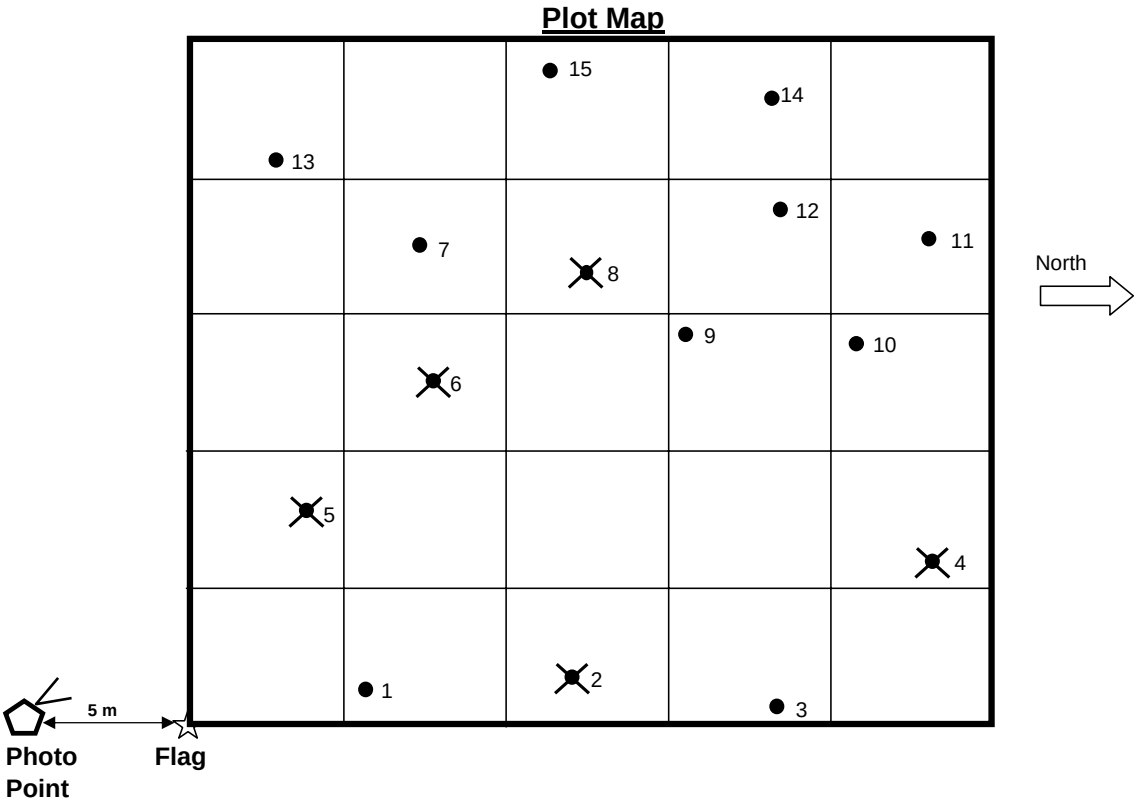
Previous

Current

Vegetation Monitoring Worksheet

Site: Daniels II **Plot:** 4 **Date:** 6/4/2007

Plot Map



ID	Species	Height (m)	Vigor	Comment
1	Unknown species	0.73	1	
2	Unknown species			Dead
3	Willow oak (*Quercus phellos*)	0.10	2	Resprout from base
4	Unknown species			Dead
5	Unknown species			Dead
6	Unknown species			Dead
7	Green ash (*Fraxinus pennsylvanica*)	1.30	3	
8	Unknown species			Dead
9	Tulip poplar (*Liriodendron tulipfera*)	0.37	4	
10	Willow oak (*Quercus phellos*)	0.27	3	Resprout from base
11	Swamp chestnut oak (*Quercus michauxii*)	0.30	3	Resprout from base
12	Cherrybark oak (*Quercus pagoda*)	0.32	4	
13	Bald cypress (*Taxodium distichum*)	0.79	1	Sprouting at base only
14	Cherrybark oak (*Quercus pagoda*)	0.22	3	Resprout from base
15	Unknown species	0.49	1	

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

Species	Percent of Total
Green ash (*Fraxinus pennsylvanica*)	10.0%
Tulip poplar (*Liriodendron tulipfera*)	10.0%
Swamp chestnut oak (*Quercus michauxii*)	10.0%
Willow oak (*Quercus phellos*)	20.0%
Bald cypress (*Taxodium distichum*)	10.0%
Cherrybark oak (*Quercus pagoda*)	20.0%
Unknown species	20.0%

Density:

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

Survivability:

Total Number of Trees **10** / **15 trees** x **100** = **67** **% survivability**

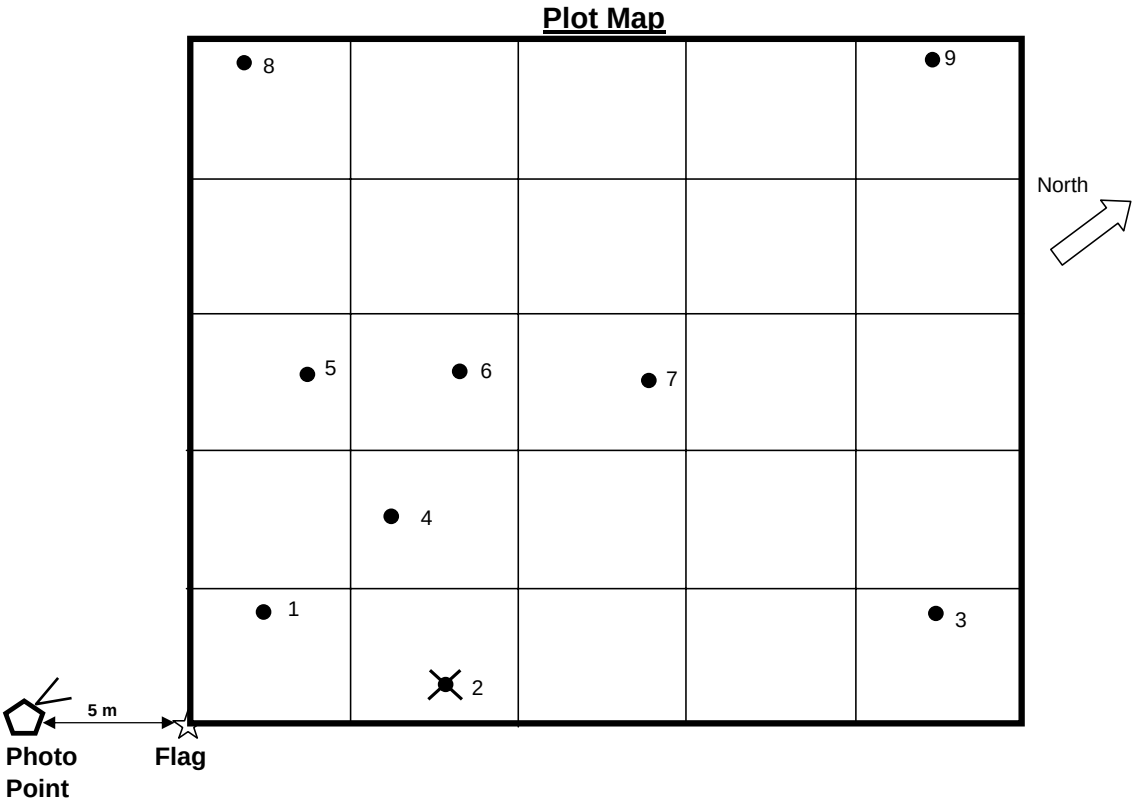
Previous

Current

Vegetation Monitoring Worksheet

Site: Daniels II **Plot:** 5 **Date:** 6/4/2007

Plot Map



ID	Species	Height (m)	Vigor	Comment
1	Bald cypress (*Taxodium distichum*)	0.83	4	
2	Unknown species			Dead
3	Green ash (*Fraxinus pennsylvanica*)	0.85	3	Top browsed
4	Green ash (*Fraxinus pennsylvanica*)	1.30	4	
5	Unknown species	1.01	1	
6	Bald cypress (*Taxodium distichum*)	1.20	4	
7	Green ash (*Fraxinus pennsylvanica*)	0.94	3	
8	Green ash (*Fraxinus pennsylvanica*)	1.15	2	Fungal growth
9	Swamp chestnut oak (*Quercus michauxii*)	0.82	3	Top browsed

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

Species	Percent of Total
Green ash (*Fraxinus pennsylvanica*)	50.0%
Swamp chestnut oak (*Quercus michauxii*)	12.5%
Bald cypress (*Taxodium distichum*)	25.0%
Unknown species	12.5%

Density:

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

Survivability:

Total Number of Trees **8** / **9 trees** x **100** = **89** **% survivability**

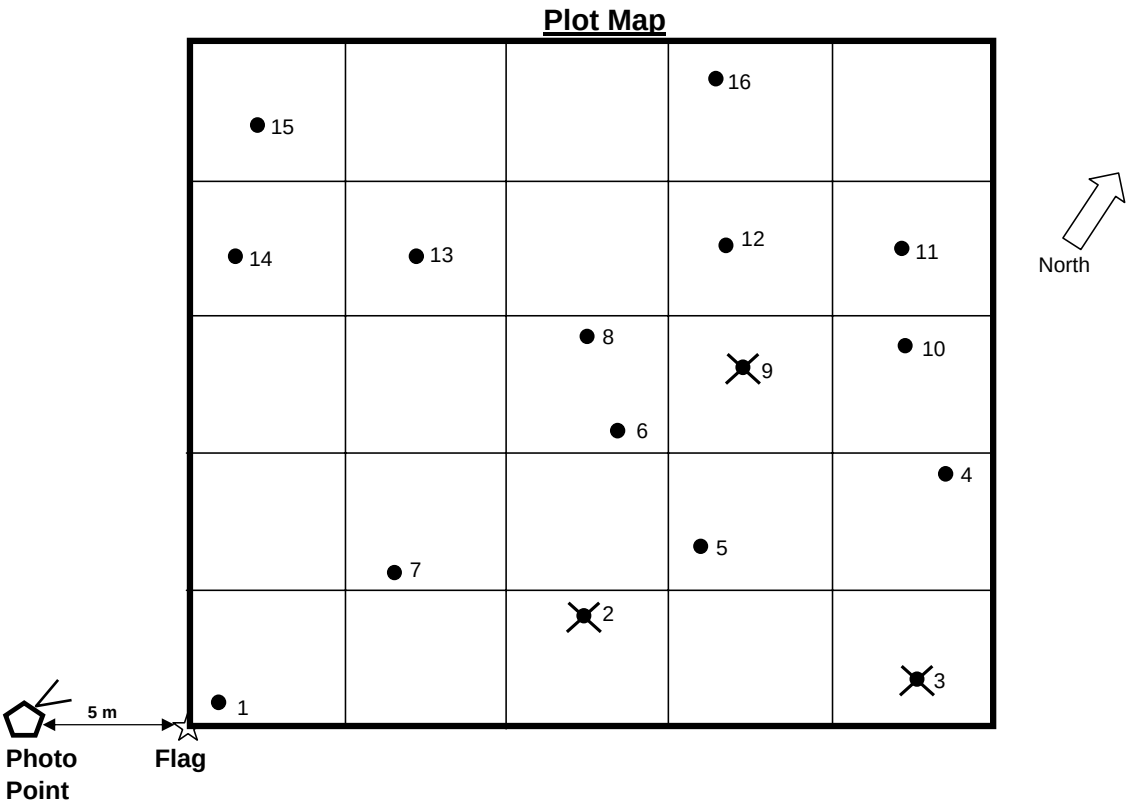
Previous

Current

Vegetation Monitoring Worksheet

Site: Daniels II **Plot:** 6 **Date:** 6/4/2007

Plot Map



ID	Species	Height (m)	Vigor	Comment
1	Bald cypress (*Taxodium distichum*)	1.05	4	
2	Cherrybark oak (*Quercus pagoda*)			Dead
3	Unknown species			Dead
4	Overcup oak (*Quercus lyrata*)	0.79	4	Browsed on top
5	Overcup oak (*Quercus lyrata*)	0.39	3	Resprout from base
6	Green ash (*Fraxinus pennsylvanica*)	0.80	3	
7	Swamp chestnut oak (*Quercus michauxii*)	0.20	3	Resprout from base
8	Green ash (*Fraxinus pennsylvanica*)	0.84	3	
9	Overcup oak (*Quercus lyrata*)			Dead
10	Green ash (*Fraxinus pennsylvanica*)	1.41	4	
11	Green ash (*Fraxinus pennsylvanica*)	0.71	3	Browsed on top
12	Cherrybark oak (*Quercus pagoda*)	0.34	3	Resprout from base
13	Laurel oak (*Quercus laurifolia)*	0.23	3	Resprout from base
14	Swamp chestnut oak (*Quercus michauxii*)	0.42	3	
15	Swamp chestnut oak (*Quercus michauxii*)	0.25	3	
16	Overcup oak (*Quercus lyrata*)	0.30	2	Resprout from base

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

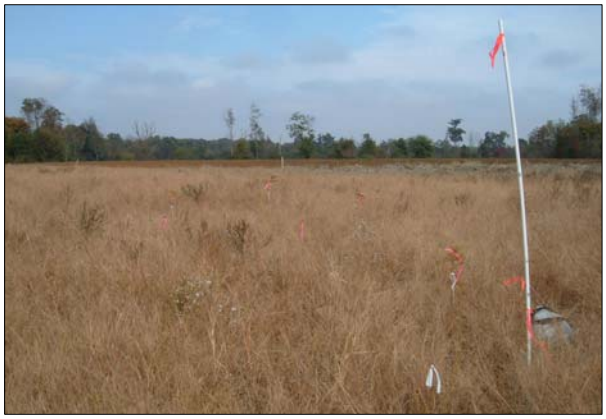
Species	Percent of Total
Green ash (*Fraxinus pennsylvanica*)	30.8%
Overcup oak (*Quercus lyrata*)	23.1%
Swamp chestnut oak (*Quercus michauxii*)	23.1%
Cherrybark oak (*Quercus pagoda*)	7.7%
Bald cypress (*Taxodium distichum*)	7.7%
Laurel oak (*Quercus laurifolia*)	7.7%

Density:

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

Survivability:

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



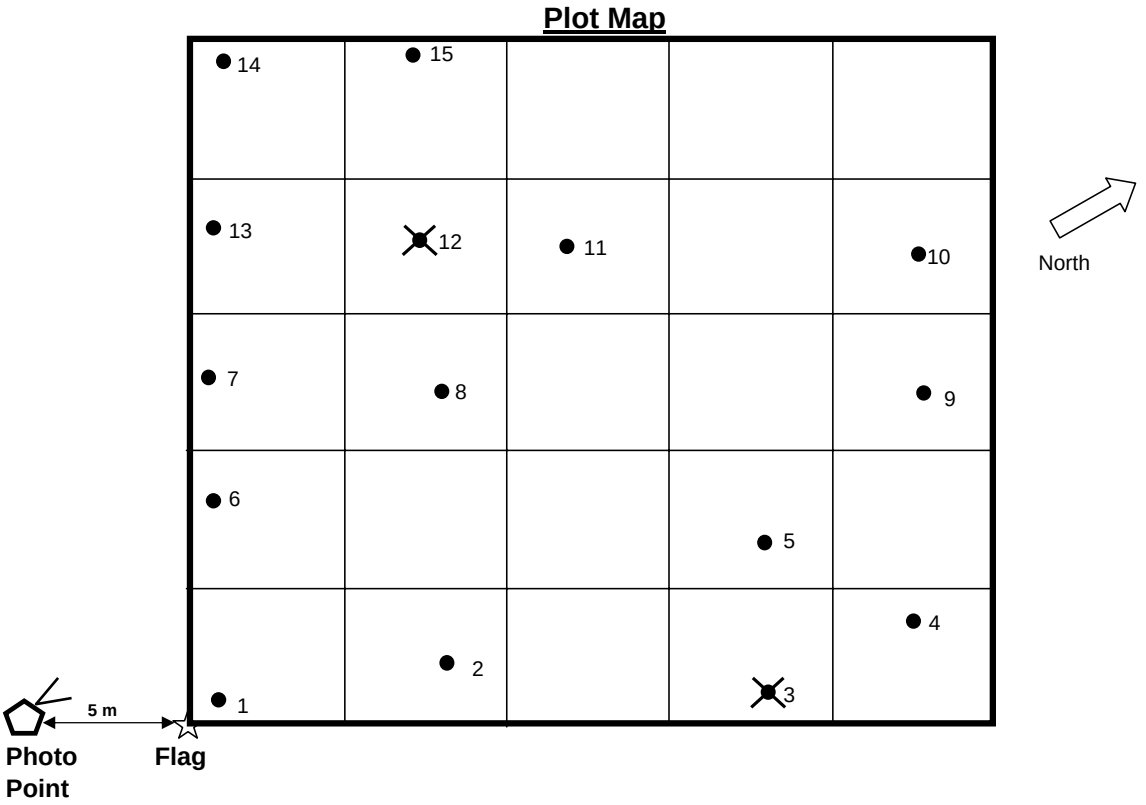
Previous

Current

Vegetation Monitoring Worksheet

Site: Daniels II **Plot:** 7 **Date:** 6/6/2007

Plot Map



ID	Species	Height (m)	Vigor	Comment
1	Swamp chestnut oak (*Quercus michauxii*)	0.52	4	
2	Unknown species	0.70	1	
3	Unknown species			Dead
4	Swamp chestnut oak (*Quercus michauxii*)	0.40	3	
5	Cherrybark oak (*Quercus pagoda*)	0.60	3	
6	Cherrybark oak (*Quercus pagoda*)	0.23	3	Resprout from base
7	Cherrybark oak (*Quercus pagoda*)	0.44	3	
8	Swamp chestnut oak (*Quercus michauxii*)	0.55	2	
9	Swamp chestnut oak (*Quercus michauxii*)	0.30	3	Resprout from base
10	Swamp chestnut oak (*Quercus michauxii*)	0.43	3	
11	Swamp chestnut oak (*Quercus michauxii*)	0.28	3	Resprout from base
12	Unknown species			Dead
13	Willow oak (*Quercus phellos*)	0.10	2	Resprout from base
14	Cherrybark oak (*Quercus pagoda*)	0.75	2	
15	Swamp chestnut oak (*Quercus michauxii*)	0.67	4	

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

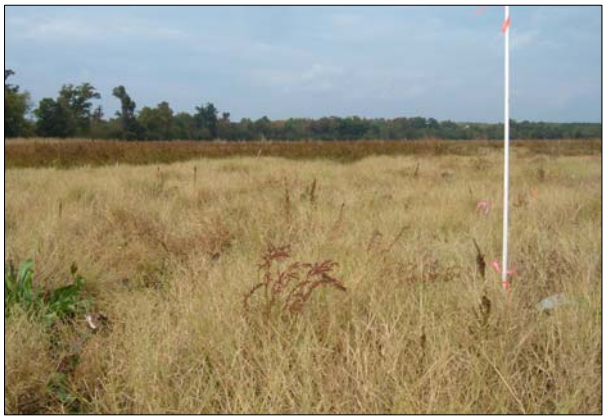
Species	Percent of Total
Swamp chestnut oak (*Quercus michauxii*)	53.8%
Cherrybark oak (*Quercus pagoda*)	30.8%
Willow oak (*Quercus phellos*)	7.7%
Unknown	7.7%

Density:

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

Survivability:

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



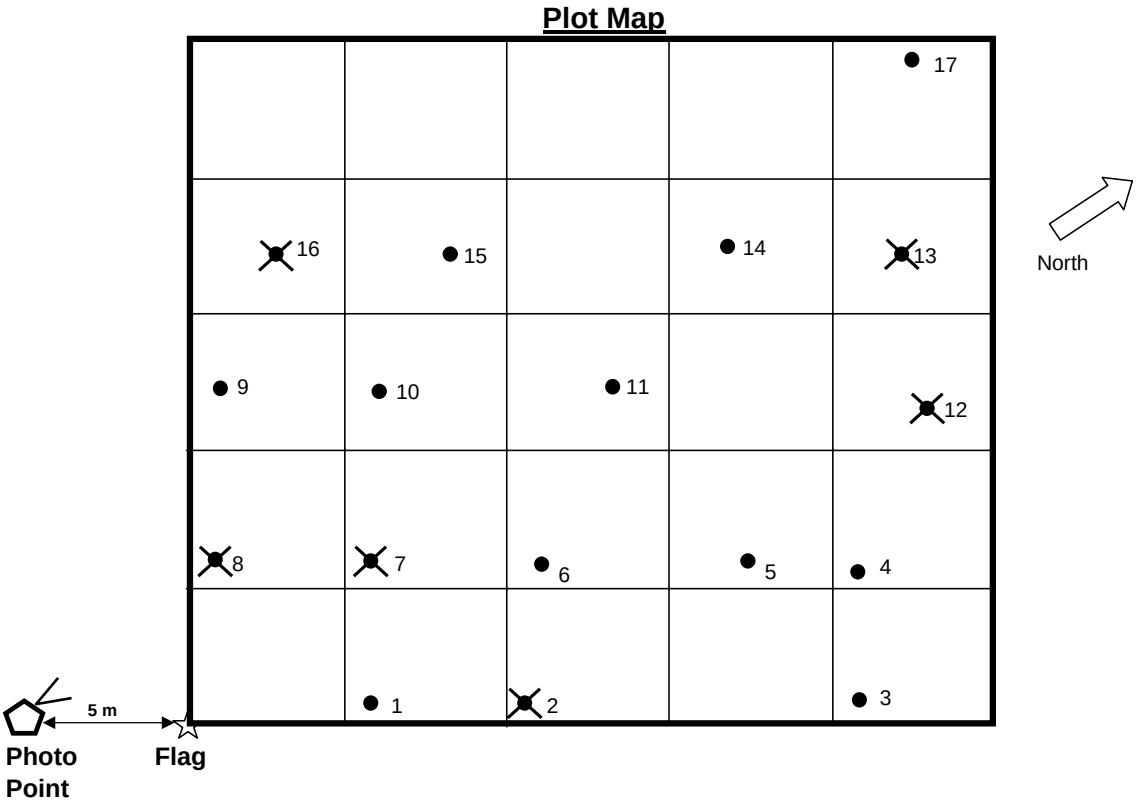
Previous

Current

Vegetation Monitoring Worksheet

Site: Daniels II **Plot:** 8 **Date:** 6/6/2007

Plot Map



ID	Species	Height (m)	Vigor	Comment
1	Swamp chestnut oak (*Quercus michauxii*)	0.72	4	
2	Unknown species			Dead
3	Green ash (*Fraxinus pennsylvanica*)	0.66	3	
4	Green ash (*Fraxinus pennsylvanica*)	0.67	3	
5	Swamp chestnut oak (*Quercus michauxii*)	0.72	3	
6	Green ash (*Fraxinus pennsylvanica*)	0.98	4	
7	Unknown species			Dead
8	Unknown species			Dead
9	Overcup oak (*Quercus lyrata*)	0.35	3	Resprout from base
10	Overcup oak (*Quercus lyrata*)	0.36	3	Resprout from base
11	Swamp chestnut oak (*Quercus michauxii*)	0.10	1	Resprout from base
12	Unknown species			Dead
13	Unknown species			Dead
14	Swamp chestnut oak (*Quercus michauxii*)	0.48	3	
15	Swamp chestnut oak (*Quercus michauxii*)	0.34	3	Resprout from base
16	Unknown species			Dead
17	Overcup oak (*Quercus lyrata*)	0.29	3	Resprout from base

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

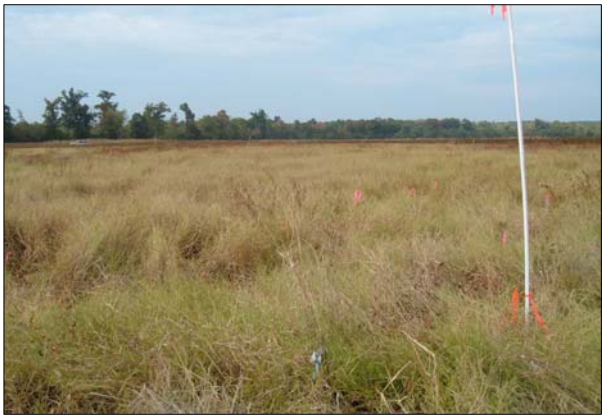
Species	Percent of Total
Green ash (*Fraxinus pennsylvanica*)	27.3%
Overcup oak (*Quercus lyrata*)	27.3%
Swamp chestnut oak (*Quercus michauxii*)	45.5%

Density:

Total Number of Trees **11** / **0.025 acres** = **440** **trees / acre**

Survivability:

Total Number of Trees **11** / **17 trees** x **100** = **65** **% survivability**



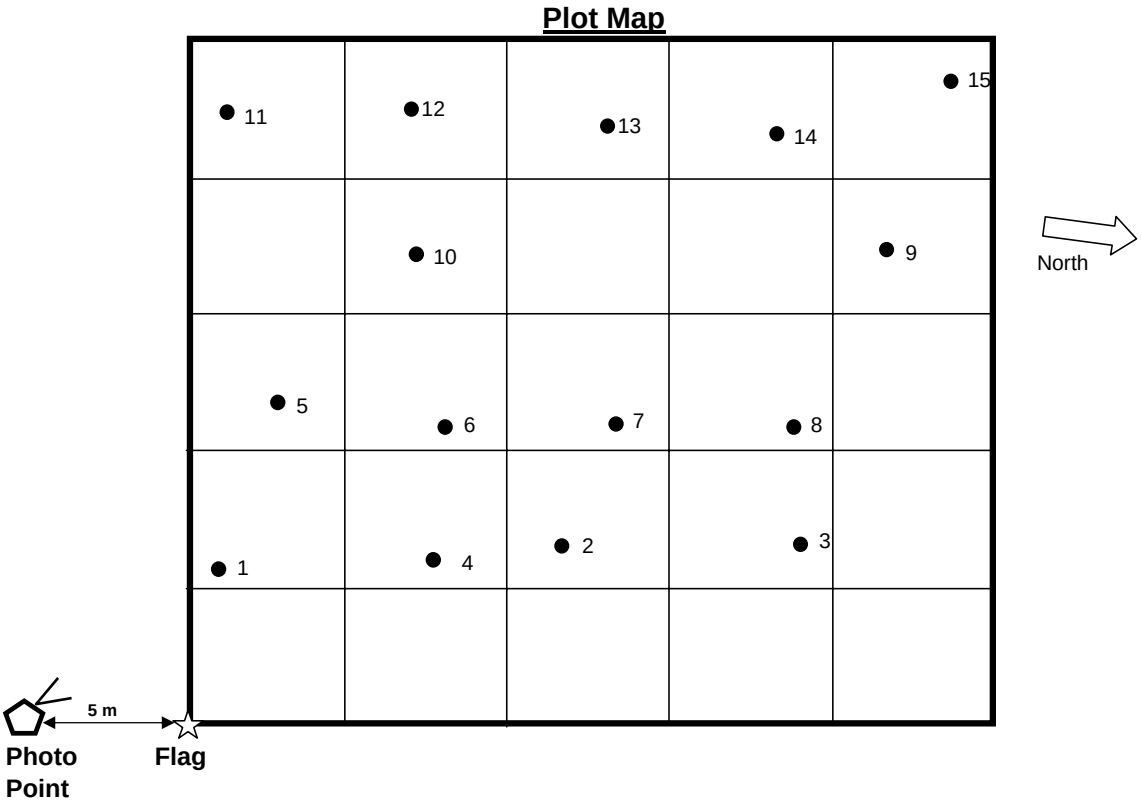
Previous

Current

Vegetation Monitoring Worksheet

Site: Daniels II **Plot:** 9 **Date:** 6/6/2007

Plot Map



ID	Species	Height (m)	Vigor	Comment
1	Green ash (*Fraxinus pennsylvanica*)	0.81	3	
2	Unknown species	0.49	1	
3	Swamp chestnut oak (*Quercus michauxii*)	0.22	2	Resprout from base
4	Bald cypress (*Taxodium distichum*)	0.61	3	
5	Green ash (*Fraxinus pennsylvanica*)	1.23	4	
6	Bald cypress (*Taxodium distichum*)	0.41	3	Resprout from base
7	Green ash (*Fraxinus pennsylvanica*)	0.82	3	
8	Green ash (*Fraxinus pennsylvanica*)	1.20	4	
9	Bald cypress (*Taxodium distichum*)	1.14	4	
10	Green ash (*Fraxinus pennsylvanica*)	0.82	3	
11	Green ash (*Fraxinus pennsylvanica*)	1.12	4	
12	Overcup oak (*Quercus lyrata*)	0.92	3	
13	Overcup oak (*Quercus lyrata*)	1.05	4	
14	Bald cypress (*Taxodium distichum*)	1.09	4	
15	Green ash (*Fraxinus pennsylvanica*)	1.55	4	

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

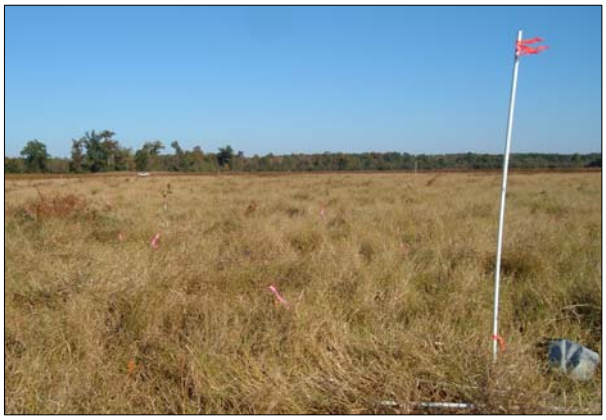
Species	Percent of Total
Green ash (*Fraxinus pennsylvanica*)	46.7%
Swamp chestnut oak (*Quercus michauxii*)	6.7%
Overcup oak (*Quercus lyrata*)	13.3%
Bald cypress (*Taxodium distichum*)	26.7%
Unknown species	6.7%

Density:

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

Survivability:

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



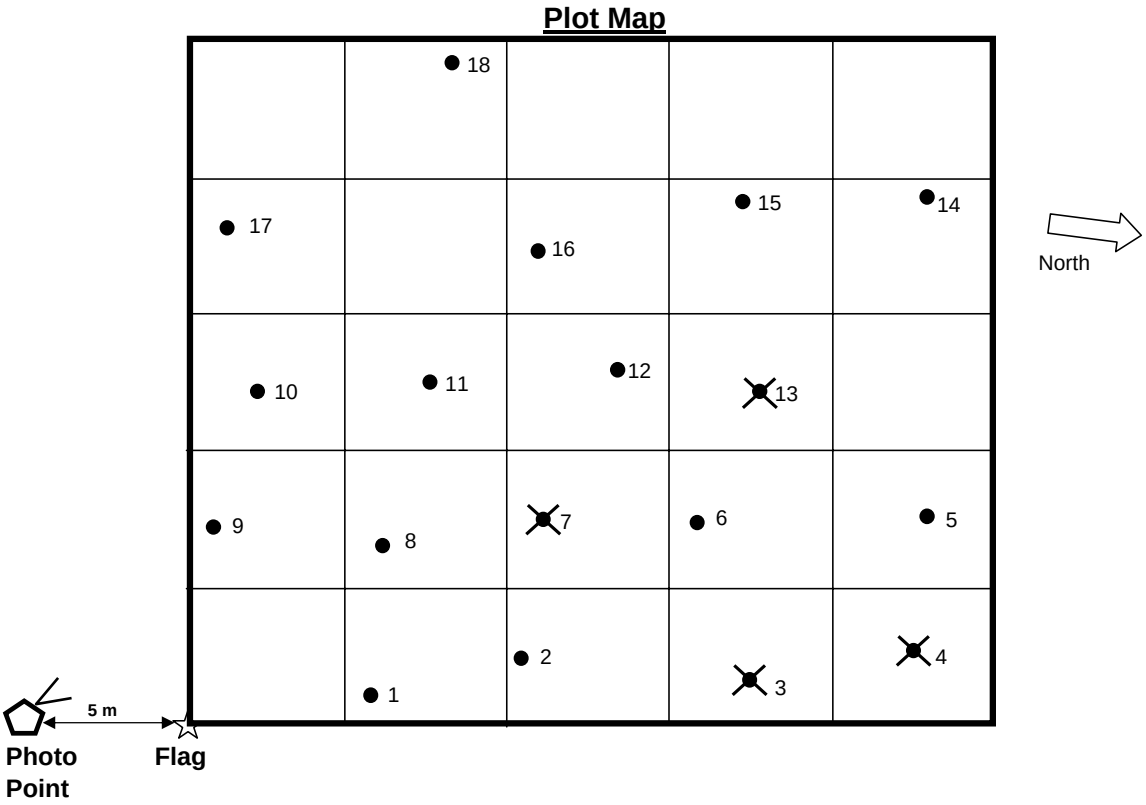
Previous

Current

Vegetation Monitoring Worksheet

Site: Daniels II **Plot:** 10 **Date:** 6/6/2007

Plot Map



ID	Species	Height (m)	Vigor	Comment
1	Cherrybark oak (*Quercus pagoda*)	0.30	3	
2	Laurel oak (*Quercus laurifolia*)	0.40	2	
3	Unknown species			Dead
4	Unknown species			Dead
5	Cherrybark oak (*Quercus pagoda*)	0.21	2	Resprout from base
6	Cherrybark oak (*Quercus pagoda*)	0.61	3	
7	Unknown species			Dead
8	Cherrybark oak (*Quercus pagoda*)	0.68	3	
9	Swamp chestnut oak (*Quercus michauxii*)	0.55	4	
10	Swamp chestnut oak (*Quercus michauxii*)	0.52	2	Top died back
11	Cherrybark oak (*Quercus pagoda*)	0.49	2	Top died back
12	Swamp chestnut oak (*Quercus michauxii*)	0.40	2	Top died back
13	Unknown species			Dead
14	Overcup oak (*Quercus lyrata*)	0.18	2	Resprout from base
15	Green ash (*Fraxinus pennsylvanica*)	1.14	4	
16	Overcup oak (*Quercus lyrata*)	0.37	3	
17	Green ash (*Fraxinus pennsylvanica*)	1.03	4	
18	Swamp chestnut oak (*Quercus michauxii*)	0.30	3	

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

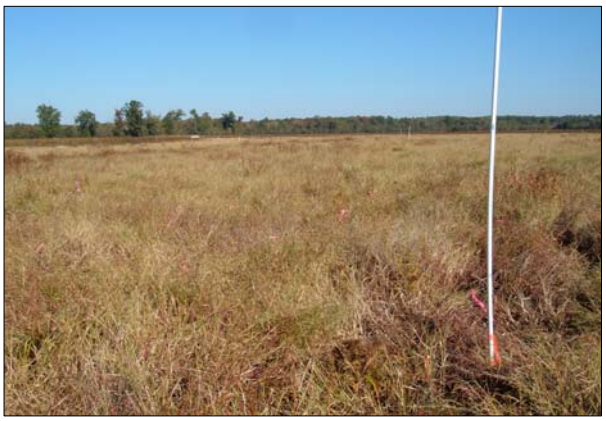
Species	Percent of Total
Green ash (*Fraxinus pennsylvanica*)	14.3%
Laurel oak (*Quercus laurifolia*)	7.1%
Overcup oak (*Quercus lyrata*)	14.3%
Swamp chestnut oak (*Quercus michauxii*)	28.6%
Cherrybark oak (*Quercus pagoda*)	35.7%

Density:

Total Number of Trees **14** / **0.025 acres** = **560** **trees / acre**

Survivability:

Total Number of Trees **14** / **18 trees** x **100** = **78** **% survivability**



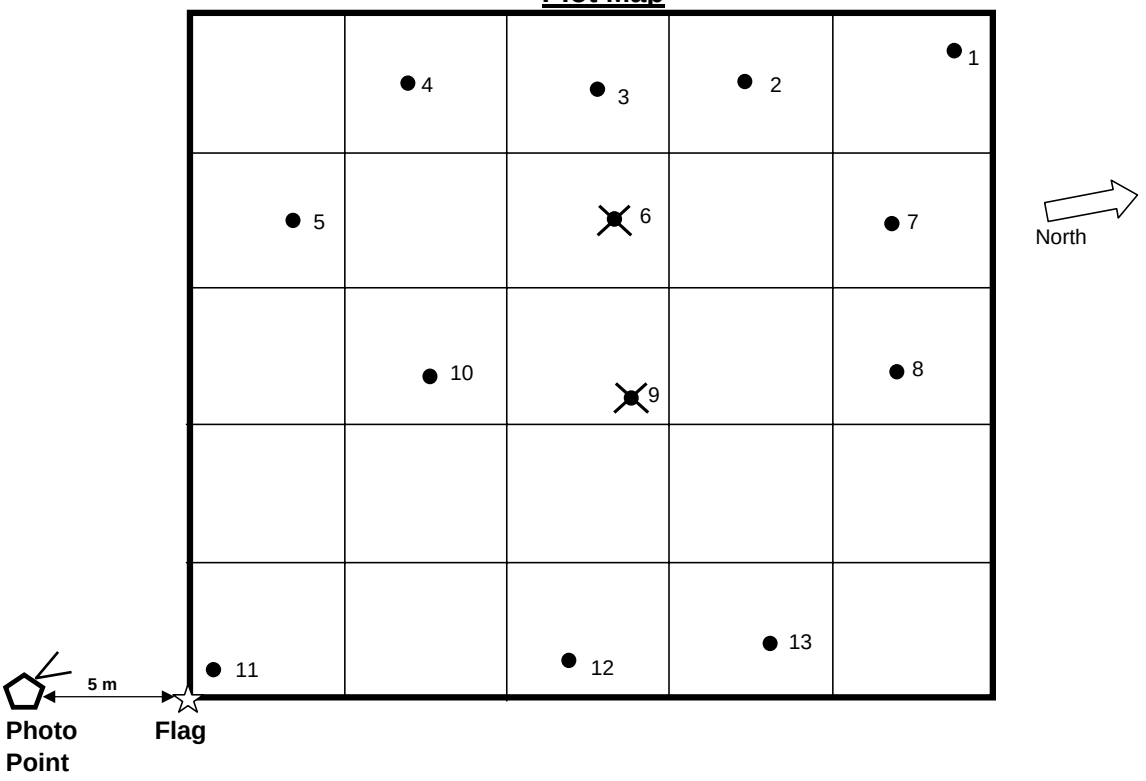
Previous

Current

Vegetation Monitoring Worksheet

Site: Daniels II **Plot:** 11 **Date:** 6/6/2007

Plot Map



ID	Species	Height (m)	Vigor	Comment
1	Overcup oak (*Quercus lyrata*)	0.39	3	
2	Unknown species	0.40	1	
3	Green ash (*Fraxinus pennsylvanica*)	0.70	2	
4	Overcup oak (*Quercus lyrata*)	0.67	3	
5	Green ash (*Fraxinus pennsylvanica*)	0.76	3	
6	Unknown species			Dead
7	Overcup oak (*Quercus lyrata*)	0.91	4	
8	Green ash (*Fraxinus pennsylvanica*)			Dead
9	Unknown species			Dead
10	Overcup oak (*Quercus lyrata*)	0.75	3	Resprout from base
11	Swamp chestnut oak (*Quercus michauxii*)	0.88	3	
12	Green ash (*Fraxinus pennsylvanica*)	1.00	4	
13	Bald cypress (*Taxodium distichum*)	0.80	4	

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

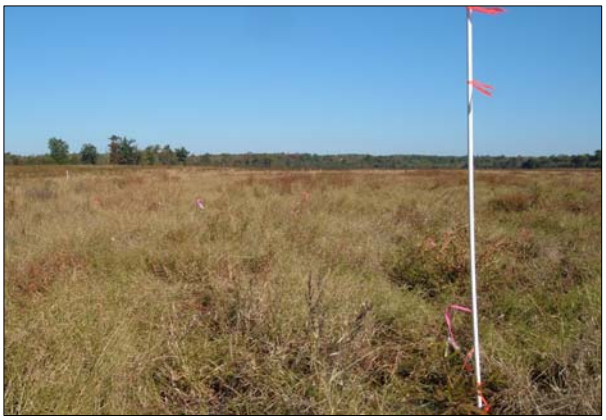
Species	Percent of Total
Green ash (*Fraxinus pennsylvanica*)	30.0%
Overcup oak (*Quercus lyrata*)	40.0%
Bald cypress (*Taxodium distichum*)	10.0%
Swamp chestnut oak (Quercus michauxii)	10.0%
Unknown	10.0%

Density:

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

Survivability:

Total Number of Trees **10** / **13 trees** x **100** = **77** **% survivability**

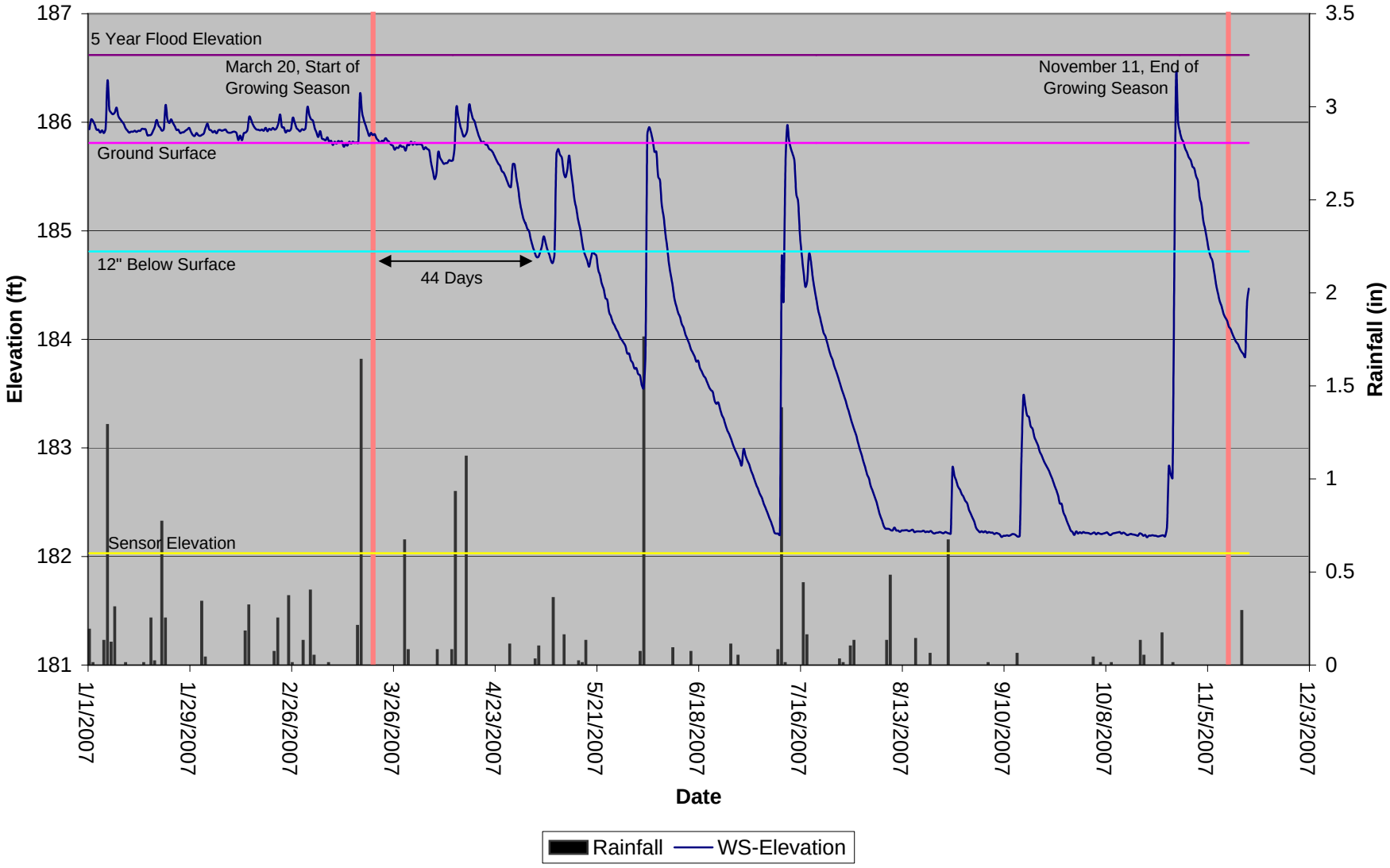


Previous

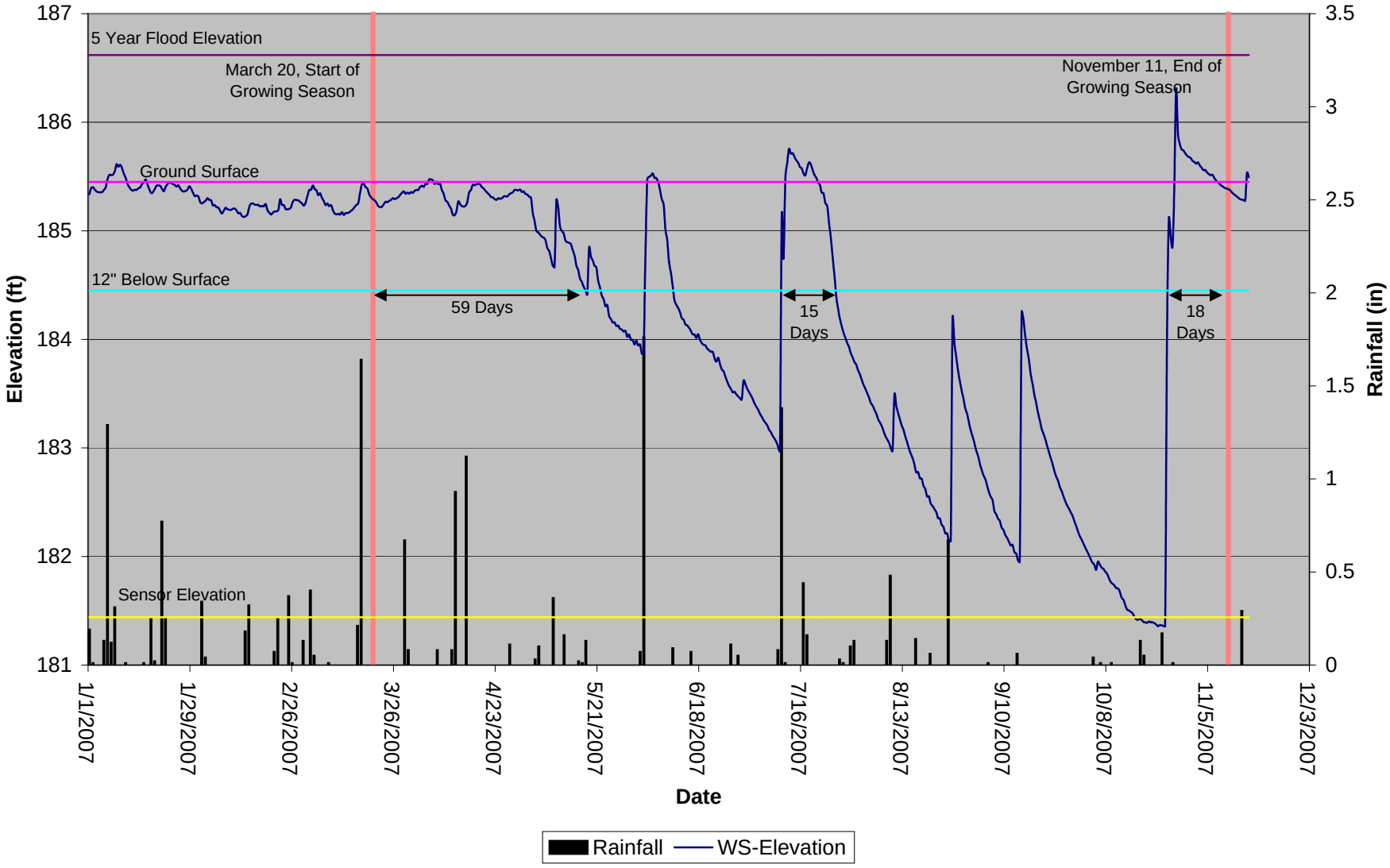
Current

Appendix B
Hydrologic Monitoring and Hydroperiod

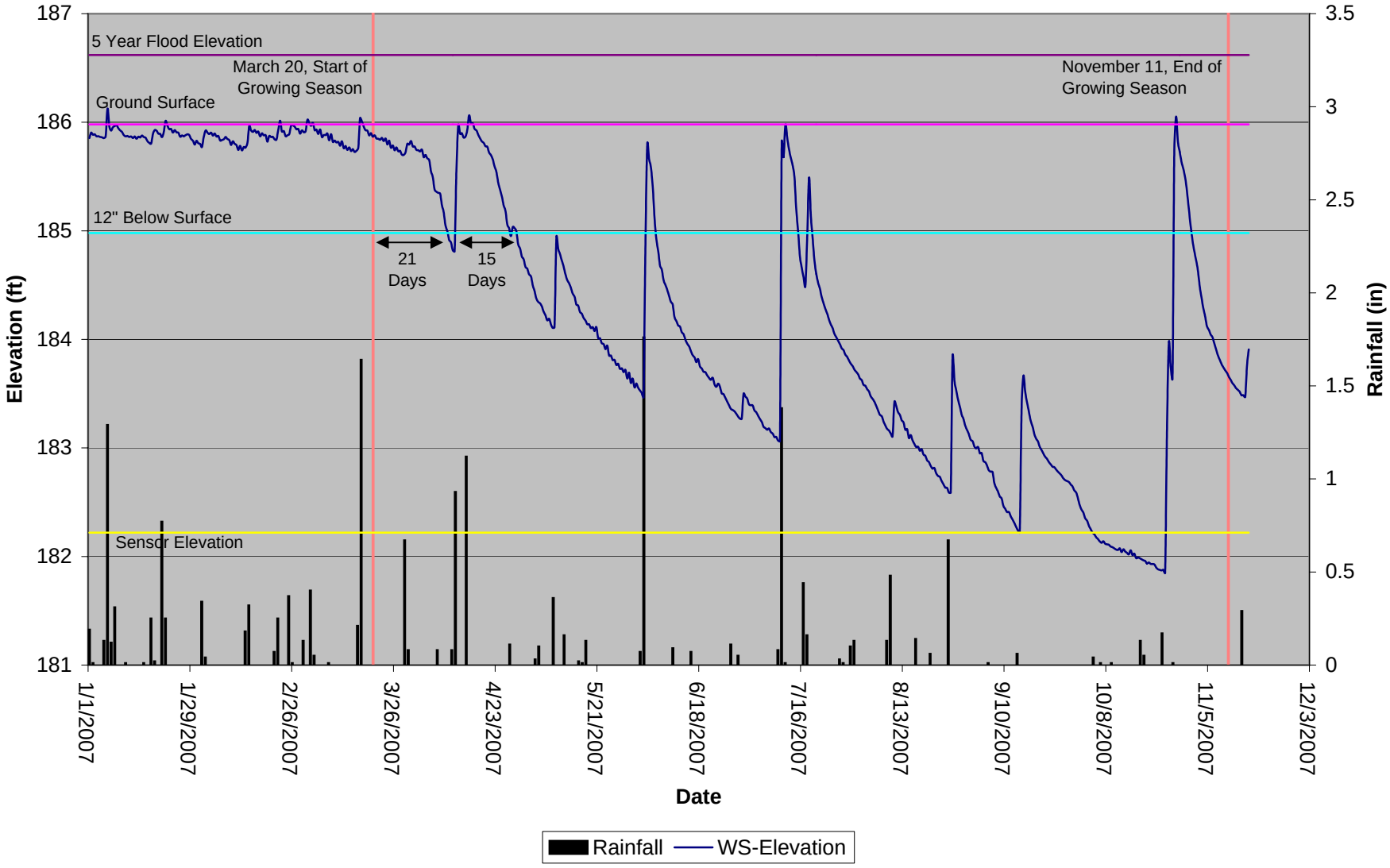
Daniels II Reference Gauge Hydrograph



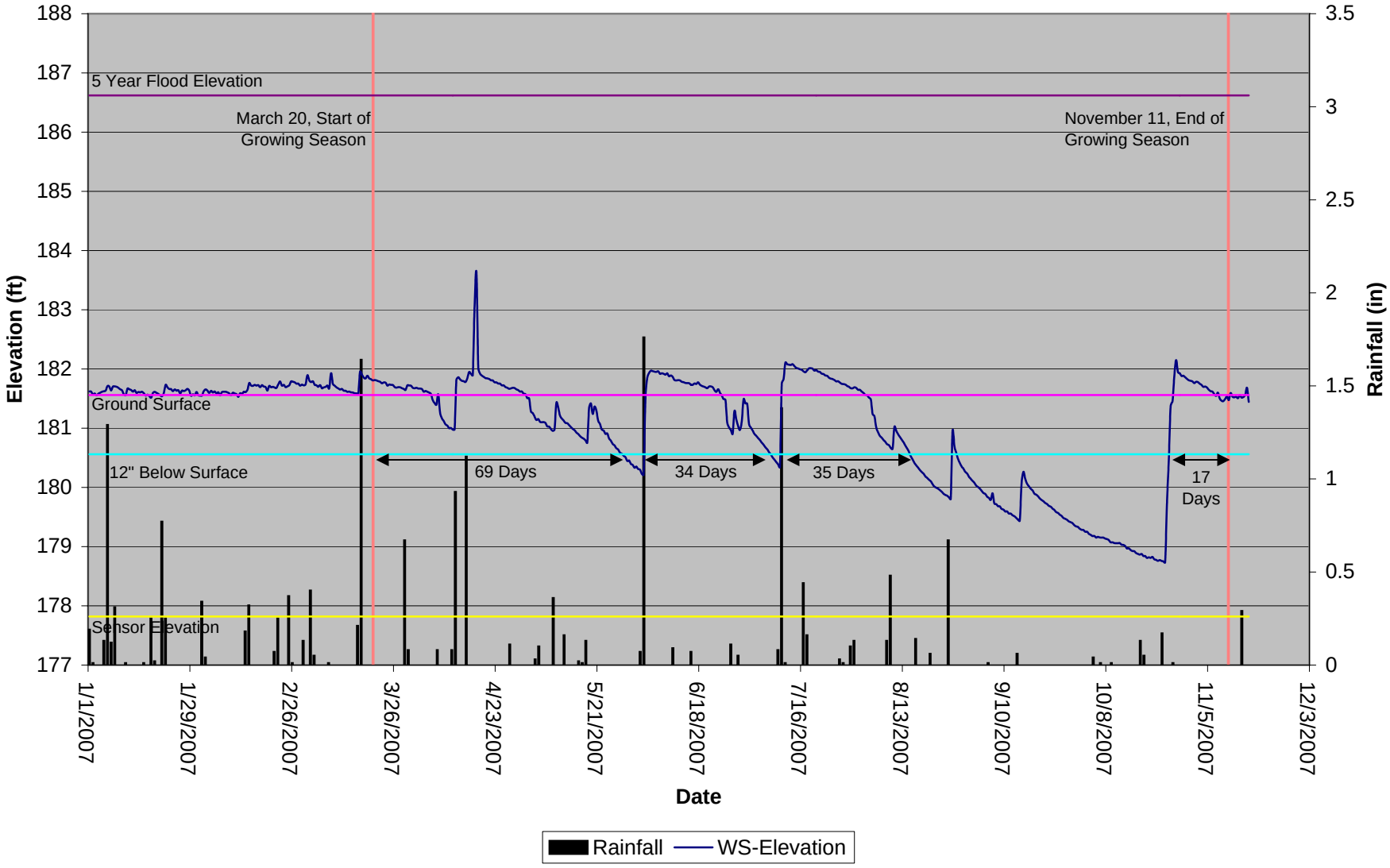
Daniels II Gauge 1 Hydrograph



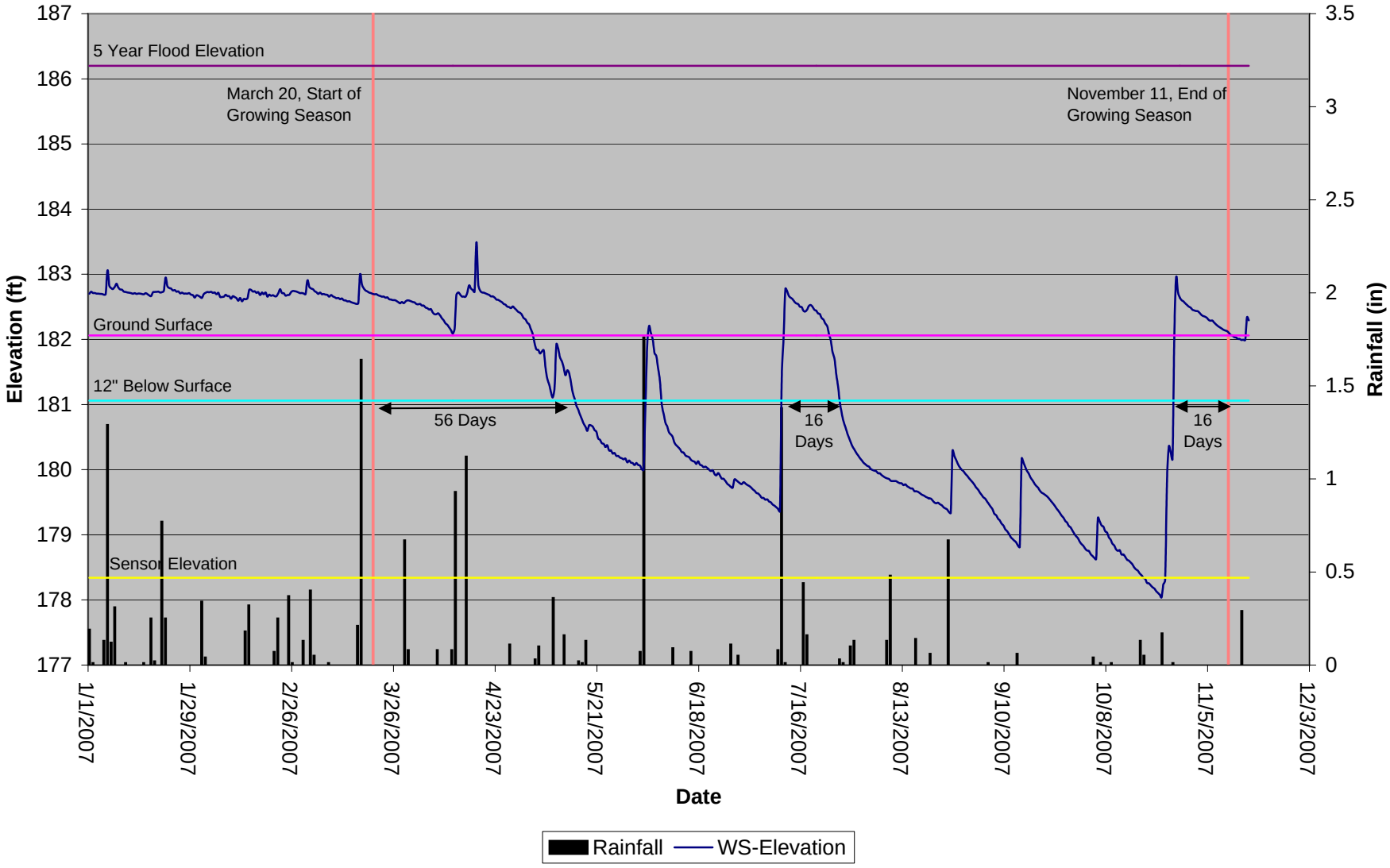
Daniels II Gauge 2 Hydrograph



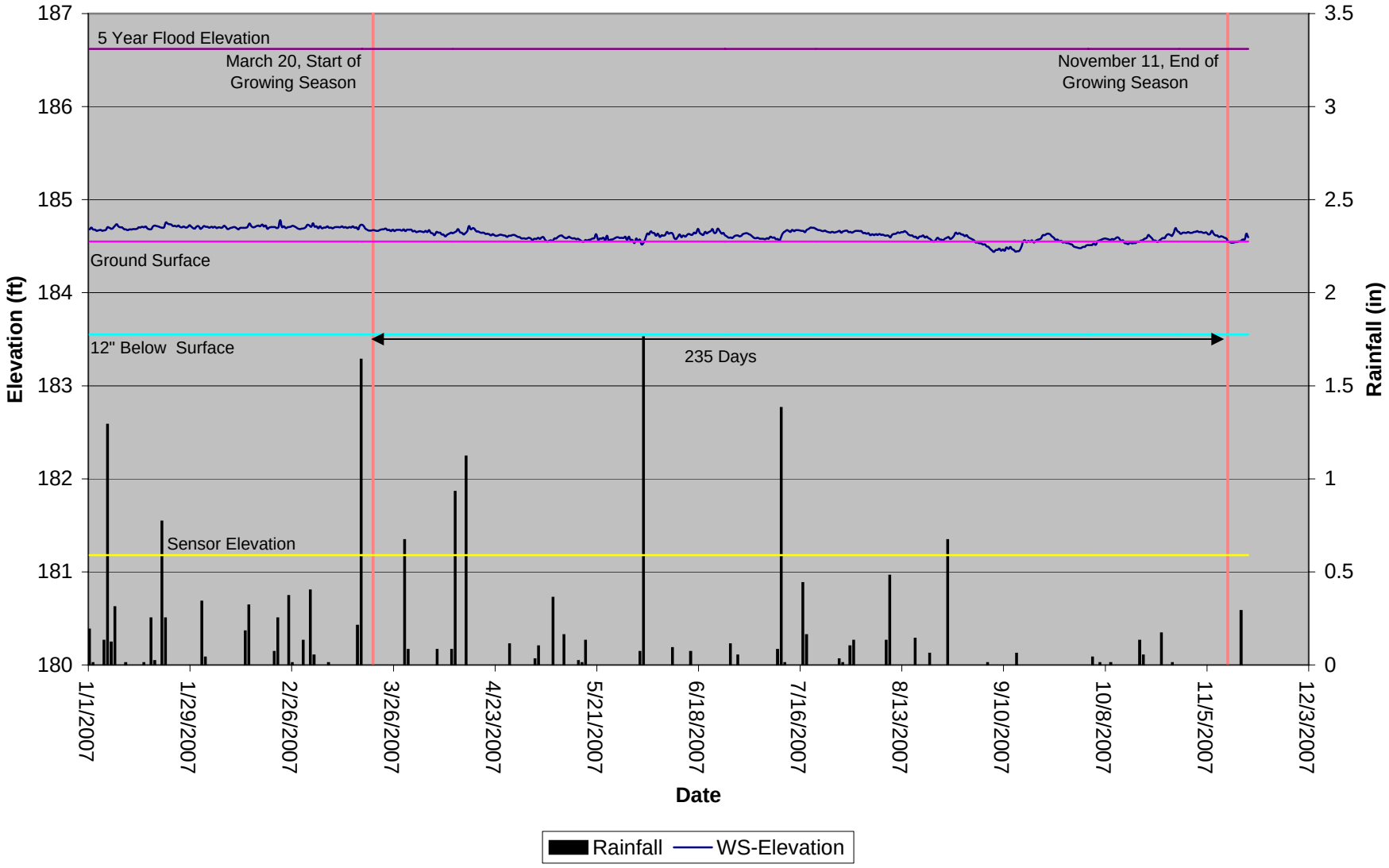
Daniels II Gauge 3 Hydrograph



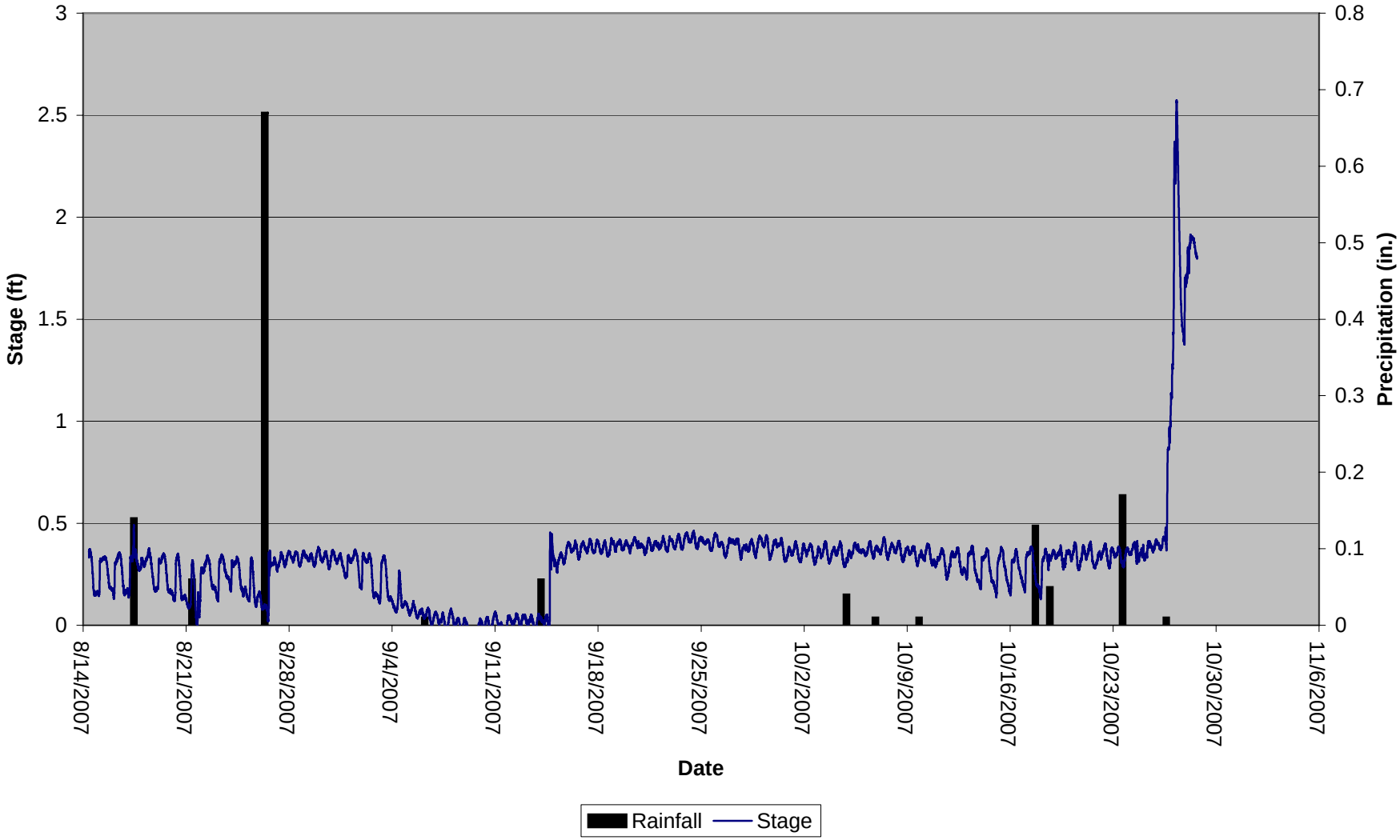
Daniels II Gauge 4 Hydrograph



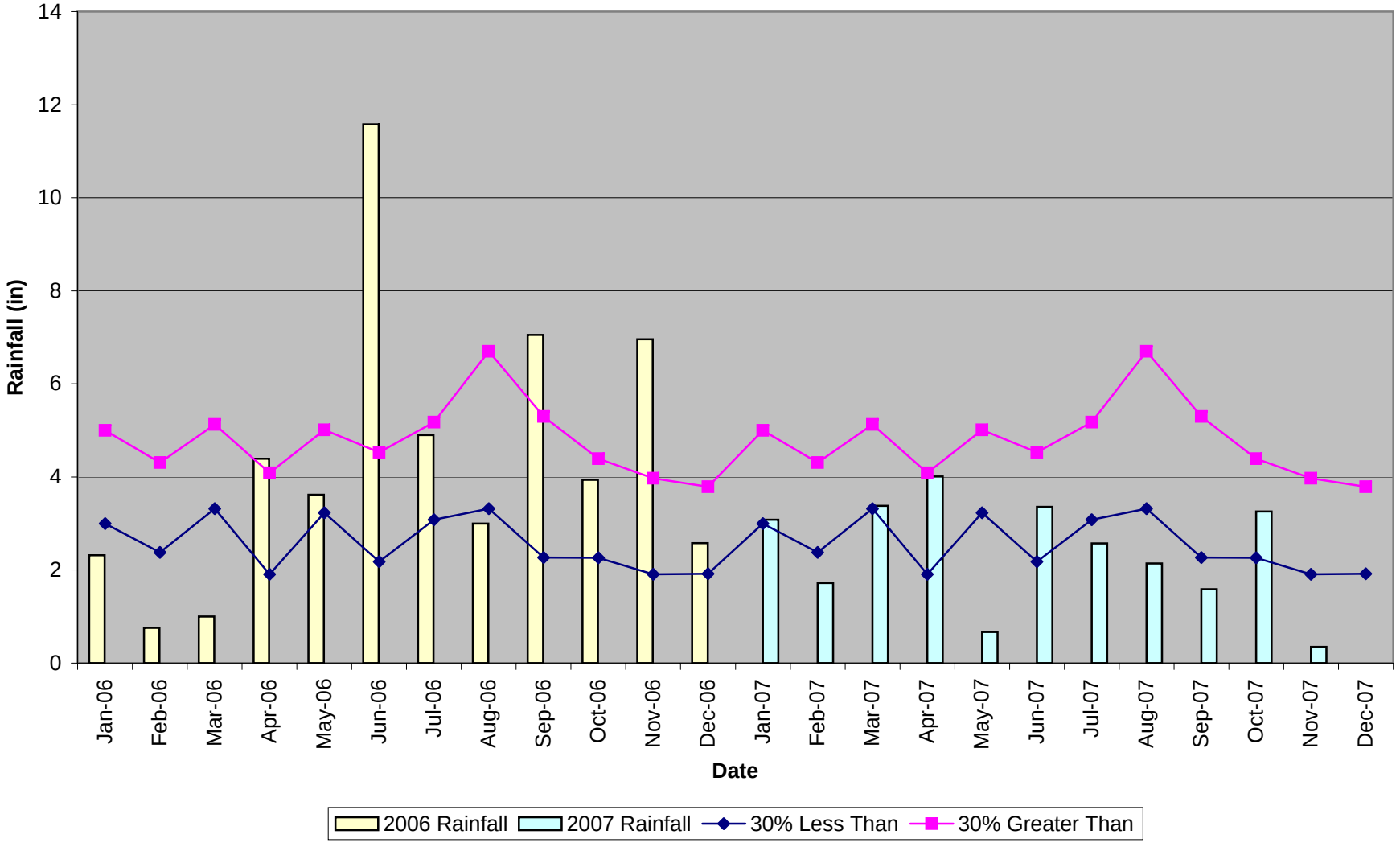
Daniels II Gauge 5 (Preservation) Hydrograph



Daniels II Stage Stream Hydrograph
08/14/07 to 10/28/07



Daniels Property 30-70 Percentile Graph 2006-2007
Louisburg, NC Monthly Rainfall



Appendix C
Permanent Photograph Points

Photo Point 1: View looking west with the enhancement wetland on the left. 6/4/07 – MY02

Photo Point 2: View looking south toward enhancement wetland. 6/4/07 – MY02

Photo Point 3A: View looking east toward vegetation plot # 5. 6/4/07 – MY02

Photo Point 3B: View looking south toward preservation wetland. 6/4/07 – MY02

Photo Point 4A: View looking east with enhancement wetland on the right. 6/4/07 – MY02

Photo Point 4B: View looking west with enhancement wetland on the left. 6/4/07 – MY02

Photo Point 5: View looking south. 6/6/07 – MY02

Photo Point 6A: View looking northwest, toward vegetation plot #6. 6/6/07 – MY02

Photo Point 6B: View looking south. 6/6/07 – MY02

Photo Point 7: View looking north. 6/6/07 – MY02