DANIEL'S FARM PHASE II
WETLAND RESTORATION
MONITORING YEAR 1 REPORT
JANUARY 2007

FULL DELIVERY PROJECT

CONSULTANT: KCI

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 will improve water quality and protect aquatic habitat in a predominantly agricultural area by restoring and enhancing 19.7 acres of wetland and preserving 10.4 acres of wetland. The restoration sites have undergone severe degradation from unrestricted agricultural activities and human-induced disturbances.

This first year monitoring report presents the data and findings from the first 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 ground water elevations at five locations and documenting general site conditions at seven permanent photo documentation points within the wetland restoration area. In addition, project site daily precipitation was recorded. These data were evaluated and verified using the North Carolina climatic data for Louisburg, North Carolina. Field investigations were conducted in October 2006. 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. Vegetation survival rates at the site are above the minimum success criteria. The 2006 vegetation monitoring of the restoration areas revealed an average density of 589 trees per acre, which is well above the minimum requirement of 320 trees per acre needed to meet the success criteria at the end of the five-year monitoring period. Many of the trees were stressed from highly variable hydrologic conditions during the first year of monitoring. The planted trees dropped their leaves early and the tops of some trees died back, which made tree species hard to identify. The second year vegetation monitoring should clear up any discrepancies in species identification.

During the 2006 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; ground water was within 12 inches of the soil surface in excess of 12 days (5 % of the growing season) at each well.

The daily rainfall data depicted on the gauge data graphs was 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 from the NC climatic data for Louisburg, North Carolina shows that Louisburg experienced average rainfall during the growing season in 2006.

Soils in the restoration portion of the site have been determined to be Roanoke, Altavista, and Wahee. Since these soils are 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 is intended to facilitate 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 2006 monitoring of the Daniels Farm #2 Wetland Restoration Project indicates that the site has met the success criteria for the first year of monitoring post construction.

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1.0 SUMMARY

1.1 Vegetation

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. Supplemental planting occurred during the winter of 2006-2007, which will be reflected in the second year monitoring report. Eleven vegetation plots were established in order to encompass 2% of the restored wetland acreage. The 2006 vegetation monitoring of the planted areas revealed an average density of 589 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. The initial stress of planting caused some of the trees to drop their leaves early in the growing season; the tops of some of the trees died back as well. These conditions made identifying the tree species difficult during monitoring. Some of the trees species were unidentifiable and have been labeled unknown in Table 1.

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 1)	Density-Year 1 (Trees/Acres)
1	2	9				3			3	17	680
2					6		11			17	680
3		1				4	1		4	10	400
4	2	1		1	1	2	1		7	15	600
5		1			2		4		2	9	360
6		3			1	4	4	2	2	16	640
7		6				3			6	15	600
8		5				1	3	2	6	17	680
9		1			4		7	2	1	15	600
10		3	1			7	1	2	4	18	720
11					1	4	5		3	13	520
									Total Average Density		589

Table 2: Vegetation History (Trees/Acre)

Plot #	Year 1	Year 2	Year 3	Year 4	Year 5
1	680				
2	680				
3	400				
4	600				
5	360				
6	640				
7	600				
8	680				
9	600				
10	720				
11	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. Tree girdling took place in the enhancement area to reduce the dominance of red maple (*Acer rubrum*), American elm (*Ulmus Americana*), and sweetgum (*Liquidambar styraciflua*) and to provide more light for understory seedlings. Subsequent monitoring will track any changes in the enhancement area and supplemental plantings will take place as necessary.

1.2 Hydrology

The wetland wells used to monitor site hydrology were installed in early May 2006 after all of the ditches were filled. 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 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 of 12 days with the water table within 12 inches of the soil surface for the 2006 growing season (Appendix B). The results show that the water table was within 12 inches of the soil surface for greater than 12.5 percent of the growing season. 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 2006. Climatic data for the 2006 growing season was analyzed in comparison with historical data to determine whether 2006 was a normal year in terms of climate 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 2006 was a normal year for rainfall during the growing season. Rainfall was within the 30th to 70th percentiles for the months of May, July, and October. Rainfall was less than the 30th percentile threshold in February, March, and August and was greater than the 70th percentile threshold in April, June, September, and November (Appendix B).

Table 3: 2006 Hydrologic Monitoring Results

	Hydroperiod					
Well #	**<5%**	**5% - 8%**	**8% -12.5%**	**>12.5%**	**Number of Consecutive Days**	**Dates Meeting Success**
1				X	74	August 30 – November 11
2				X	26	October 17 – November 11
3				X	74	August 30 – November 11
4				X	73	August 31 – November 11
Preservation Wetland				X	237	March 20 – November 11
Ref. Wetland				X	72	September 1 –November 11

Table 4. Hydroperiod History

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

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. This gauge showed that the site experienced several major flooding events. The largest event occurred on June 15, 2006 with a stage elevation of approximately 186.2 feet, which almost reached the estimated 5-year flood elevation of 186.6 feet. Due to backwatering from this event, many of the wetland gauges showed peaks that were over the 5-year flood elevation, followed by an extended period of jurisdictional hydrology.

2.0 DATA ANALYSIS

2.1 Vegetation

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 monitoring. Some of the trees species were unidentifiable and have been labeled unknown in Table 1. It is anticipated that supplemental planting during the winter of 2006-2007 will increase the number of trees in the plots.

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 wetlands 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 Roanoke, Altavista, and Wahee, all hydric soils on the state and federal hydric soils lists. NRCS verified the limits of hydric soils and confirmed their status as Prior Converted wetland. As soils are already considered hydric, no success criteria or monitoring are required.

3.0 MAINTENANCE/MANAGEMENT ACTIONS

Maintenance actions conducted during the 2006 growing season focused on the application of herbicide around the base of many of the planted trees. This action resulted in decreased herbaceous competition with the trees and improved their opportunity for growth. Thinning of dominant trees in the enhancement wetland was also conducted in 2006. Thinning was accomplished through girdling and herbicide application. Maintenance planting was conducted during the winter of 2006/2007, which consisted of adding trees to areas of the site that exhibited high rates of seedling mortality. The trees that were planted were from the same list of species that was planted during the original planting.

4.0 CONCLUSIONS

Findings from this monitoring year indicate that the site is a meeting the success criteria developed for the project. The success criteria for the survival of the planted species must be 320 stems/acre at the end of five years of monitoring. The 2006 vegetation monitoring of the planted areas revealed an average density of 589 trees per acre, which is well 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. The long-term success of the wetland restoration project was improved by supplemental vegetation planting, which will be reflected in the second year monitoring report.

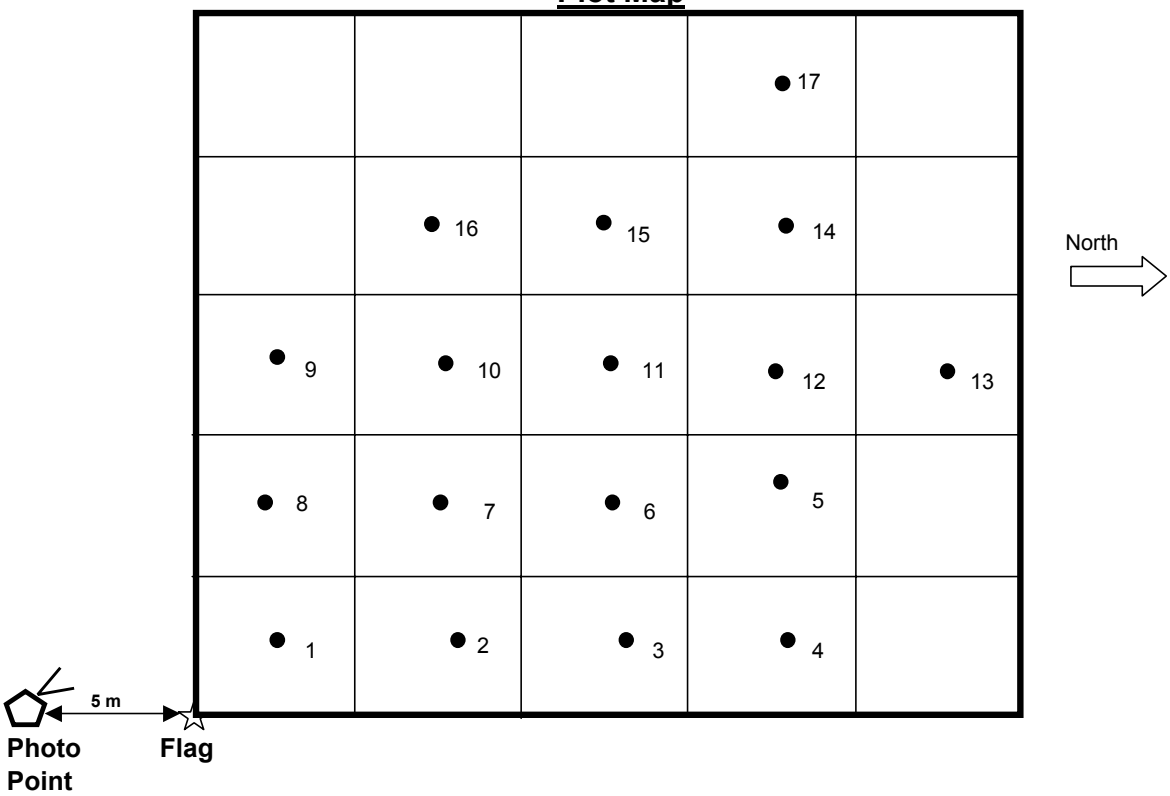
For the 2006 monitoring year, all of the site's gauges met the hydrologic success criteria of the water table being within 12 inches of the surface for at least 5% of the growing season. Additionally, all of the gauges exceeded the hydrological success criteria for more than 12.5% of the growing season.

Appendix A
Vegetation Monitoring Plot Data Sheets

Vegetation Monitoring Worksheet

Site: Daniels II **Plot:** 1 **Date:** 10/19/2006

Plot Map



ID	Species	Height (m)	Vigor	Comment
1	Swamp chestnut oak (*Quercus michauxii*)	0.70	3	
2	Overcup oak (*Quercus lyrata*)	0.76	2	
3	Swamp chestnut oak (*Quercus michauxii*)	0.85	4	
4	Swamp chestnut oak (*Quercus michauxii*)	0.58	1	
5	Willow oak (*Quercus phellos*)	0.12	2	Resprout from base
6	Overcup oak (*Quercus lyrata*)	0.30	3	
7	Willow oak (*Quercus phellos*)	0.18	3	Resprout from base
8	Swamp chestnut oak (*Quercus michauxii*)	0.85	4	
9	Swamp chestnut oak (*Quercus michauxii*)	0.09	3	Resprout from base
10	Unknown species	0.85	1	
11	Unknown species	0.52	1	
12	Swamp chestnut oak (*Quercus michauxii*)	0.85	4	
13	Swamp chestnut oak (*Quercus michauxii*)	0.85	4	
14	Unknown species	0.40	1	
15	Swamp chestnut oak (*Quercus michauxii*)	0.55	3	
16	Swamp chestnut oak (*Quercus michauxii*)	0.79	3	
17	Overcup oak (*Quercus lyrata*)	0.80	1	

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

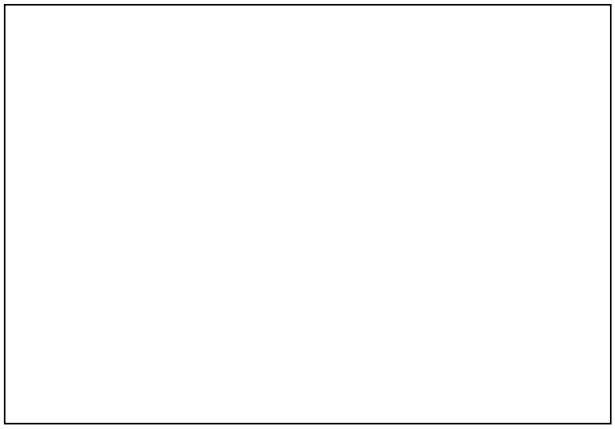
Species	Percent of Total
Overcup oak (*Quercus lyrata*)	17.6%
Swamp chestnut oak (*Quercus michauxii*)	52.9%
Willow oak (*Quercus phellos*)	11.8%
Unknown species	17.6%

Density:

Total Number of Trees **17** / **0.025 acres** = **680** **trees / acre**

Survivability:

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



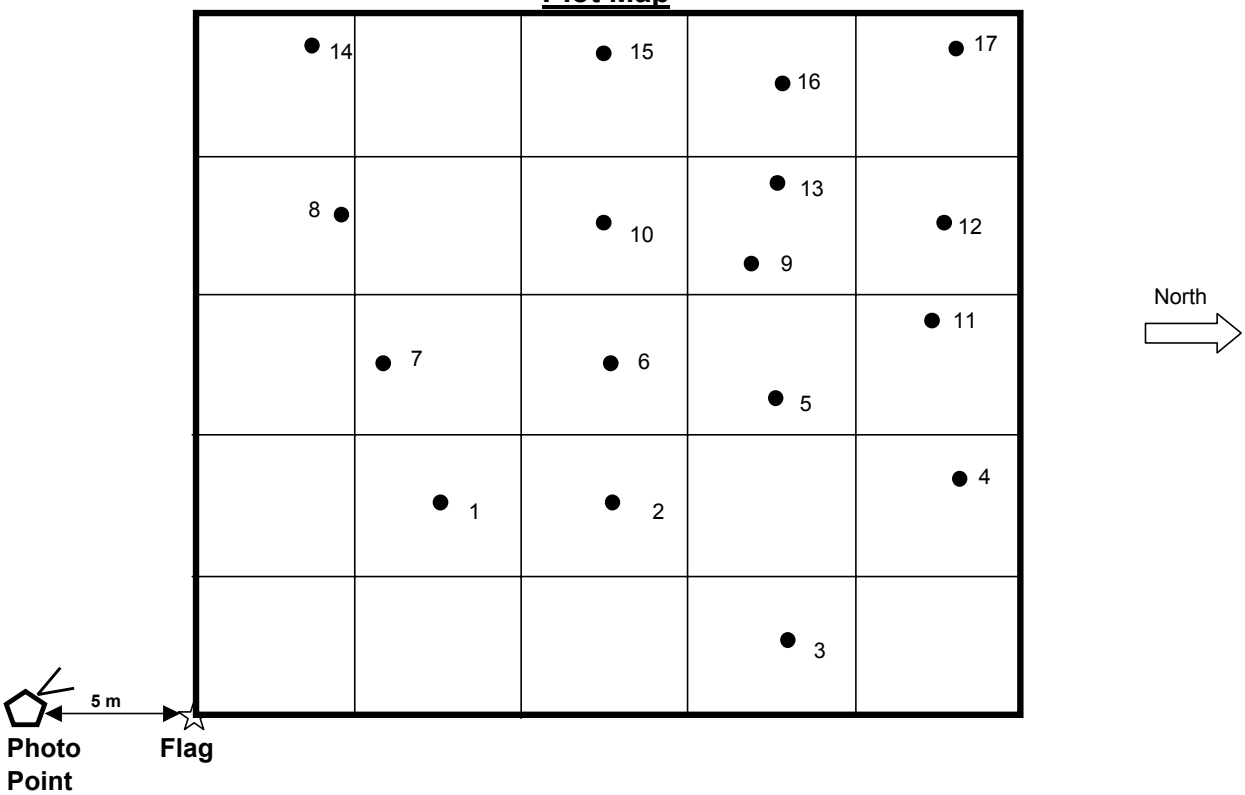
Previous

Current

Vegetation Monitoring Worksheet

Site: Daniels II **Plot:** 2 **Date:** 10/19/2006

Plot Map



ID	Species	Height (m)	Vigor	Comment
1	Bald cypress (*Taxodium distichum*)	0.64	4	
2	Green ash (*Fraxinus pennsylvanica*)	0.58	4	
3	Green ash (*Fraxinus pennsylvanica*)	0.67	2	
4	Green ash (*Fraxinus pennsylvanica*)	0.64	2	
5	Bald cypress (*Taxodium distichum*)	0.61	1	
6	Green ash (*Fraxinus pennsylvanica*)	1.43	4	
7	Green ash (*Fraxinus pennsylvanica*)	0.91	3	
8	Green ash (*Fraxinus pennsylvanica*)	0.49	2	
9	Green ash (*Fraxinus pennsylvanica*)	1.10	3	
10	Bald cypress (*Taxodium distichum*)	0.46	1	
11	Bald cypress (*Taxodium distichum*)	0.82	4	
12	Green ash (*Fraxinus pennsylvanica*)	0.98	3	
13	Bald cypress (*Taxodium distichum*)	0.24	2	Resprout from base
14	Green ash (*Fraxinus pennsylvanica*)	1.04	3	
15	Green ash (*Fraxinus pennsylvanica*)	0.73	3	
16	Green ash (*Fraxinus pennsylvanica*)	0.88	3	
17	Bald cypress (*Taxodium distichum*)	0.64	4	

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

Species	Percent of Total
Green ash (*Fraxinus pennsylvanica*)	64.7%
Bald cypress (*Taxodium distichum*)	35.3%

Density:

Total Number of Trees						
17	/	0.025 acres	=	680	trees / acre

Survivability:

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

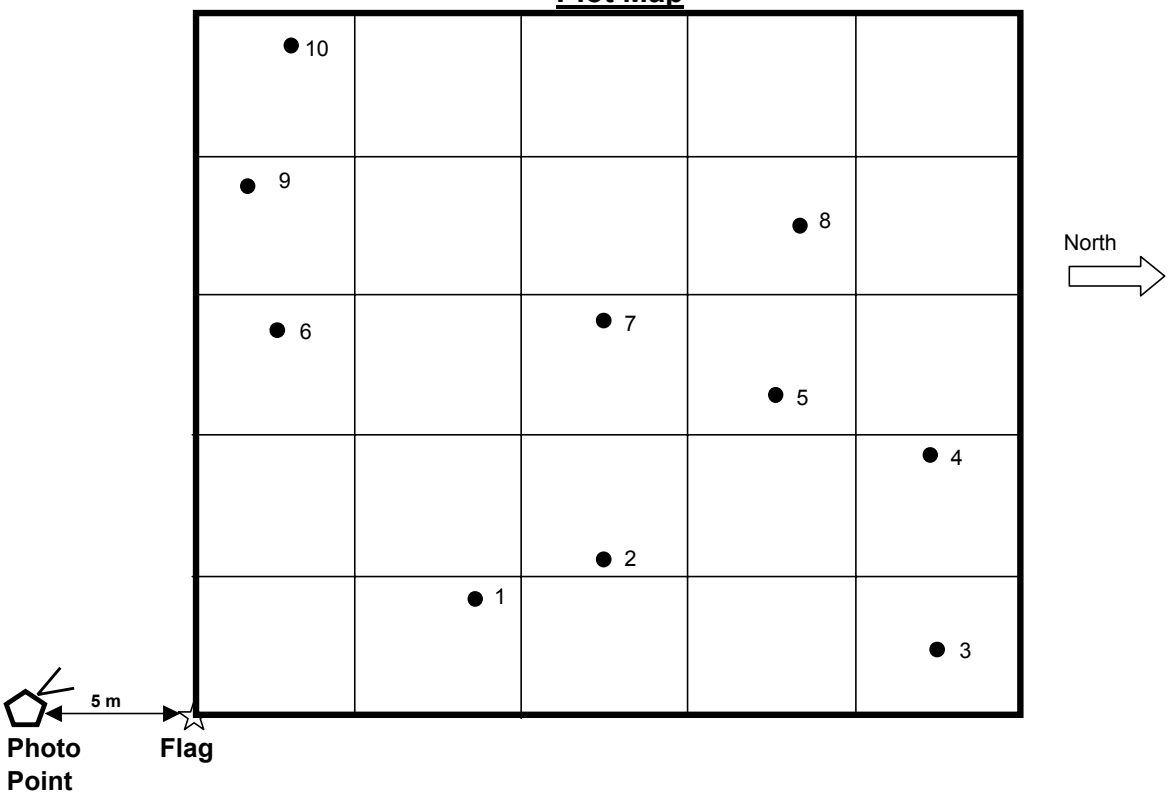
Previous

Current

Vegetation Monitoring Worksheet

Site: Daniels II **Plot:** 3 **Date:** 10/19/2006

Plot Map



ID	Species	Height (m)	Vigor	Comment
1	Unknown species	0.70	1	
2	Overcup oak (*Quercus lyrata*)	0.76	2	
3	Unknown species	0.85	1	
4	Unknown species	0.58	1	
5	Overcup oak (*Quercus lyrata*)	0.12	2	
6	Overcup oak (*Quercus lyrata*)	0.30	3	
7	Swamp chestnut oak (*Quercus michauxii*)	0.18	3	
8	Overcup oak (*Quercus lyrata*)	0.85	2	
9	Green ash (*Fraxinus pennsylvanica*)	0.09	3	
10	Unknown species	0.85	2	

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

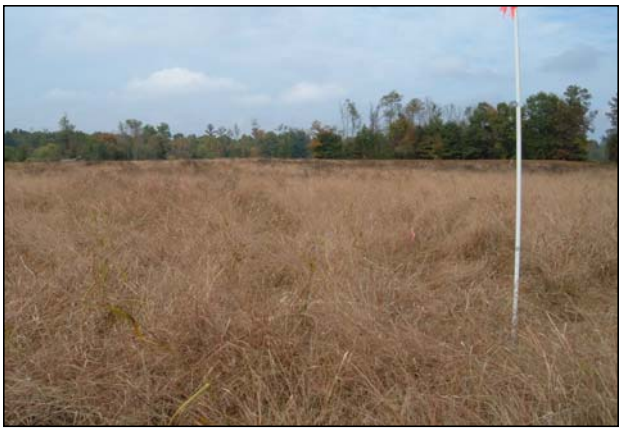
Species	Percent of Total
Green ash (*Fraxinus pennsylvanica*)	10.0%
Overcup oak (*Quercus lyrata*)	40.0%
Swamp chestnut oak (*Quercus michauxii*)	10.0%
Unknown species	40.0%

Density:

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

Survivability:

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



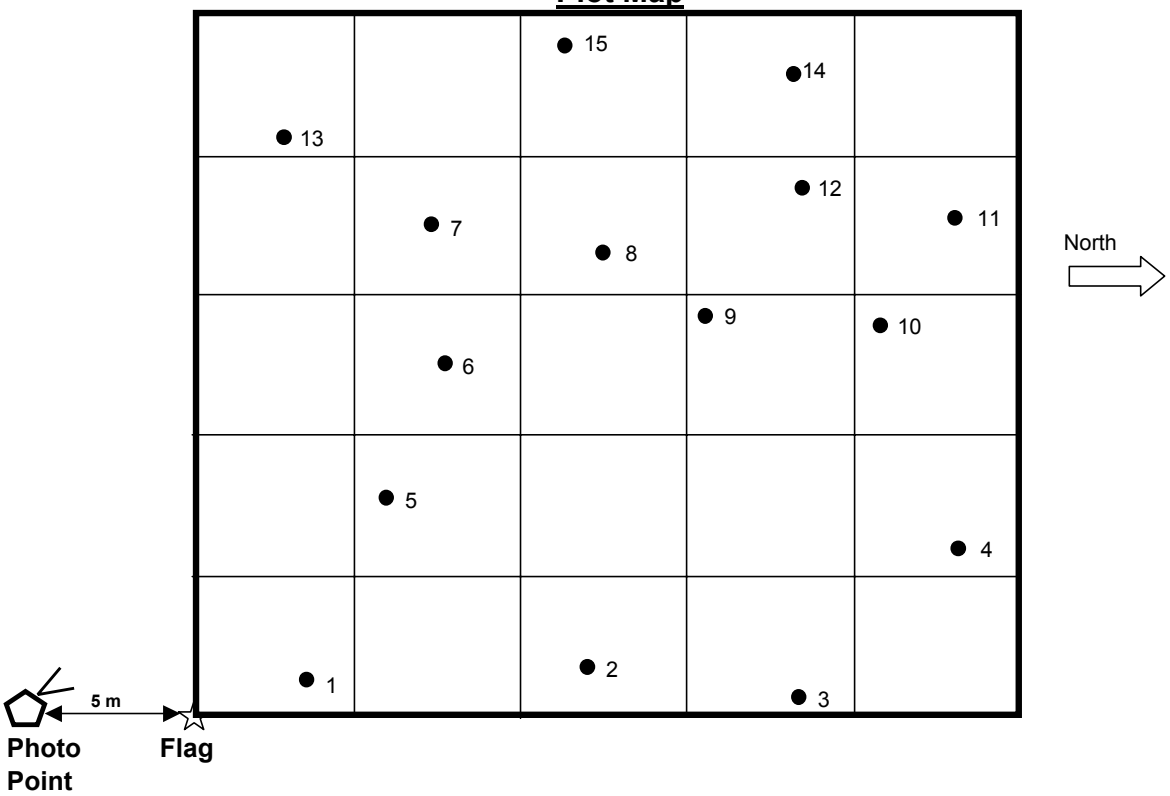
Previous

Current

Vegetation Monitoring Worksheet

Site: Daniels II **Plot:** 4 **Date:** 10/19/2006

Plot Map



ID	Species	Height (m)	Vigor	Comment
1	Unknown species	0.73	1	
2	Unknown species	0.49	1	
3	Willow oak (*Quercus phellos*)	0.06	2	Resprout from base
4	Unknown species	0.61	1	
5	Unknown species	0.61	1	
6	Unknown species	0.64	1	
7	Green ash (*Fraxinus pennsylvanica*)	1.10	3	
8	Unknown species	0.55	1	
9	Tulip poplar (*Liriodendron tulipfera*)	0.34	4	
10	Willow oak (*Quercus phellos*)	0.27	3	Resprout from base
11	Swamp chestnut oak (*Quercus michauxii*)	0.21	3	Resprout from base
12	Overcup oak (*Quercus lyrata*)	0.27	4	
13	Bald cypress (*Taxodium distichum*)	0.79	2	
14	Overcup oak (Quercus lyrata)	0.12	2	Resprout from base
15	Unknown species	0.49	1	

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

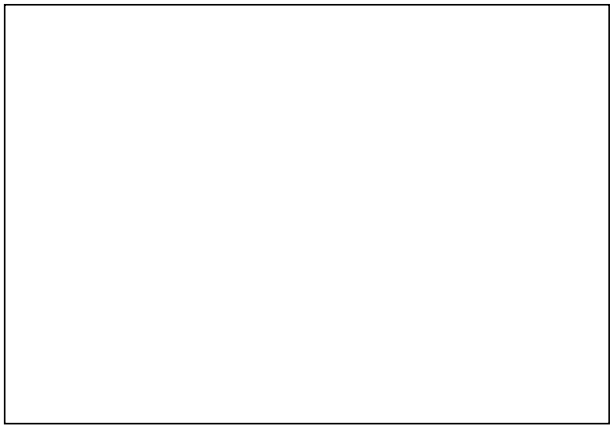
Species	Percent of Total
Green ash (*Fraxinus pennsylvanica*)	6.7%
Tulip poplar (*Liriodendron tulipfera*)	6.7%
Overcup oak (*Quercus lyrata*)	13.3%
Swamp chestnut oak (*Quercus michauxii*)	6.7%
Willow oak (*Quercus phellos*)	13.3%
Bald cypress (*Taxodium distichum*)	6.7%
Unknown species	46.7%

Density:

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

Survivability:

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



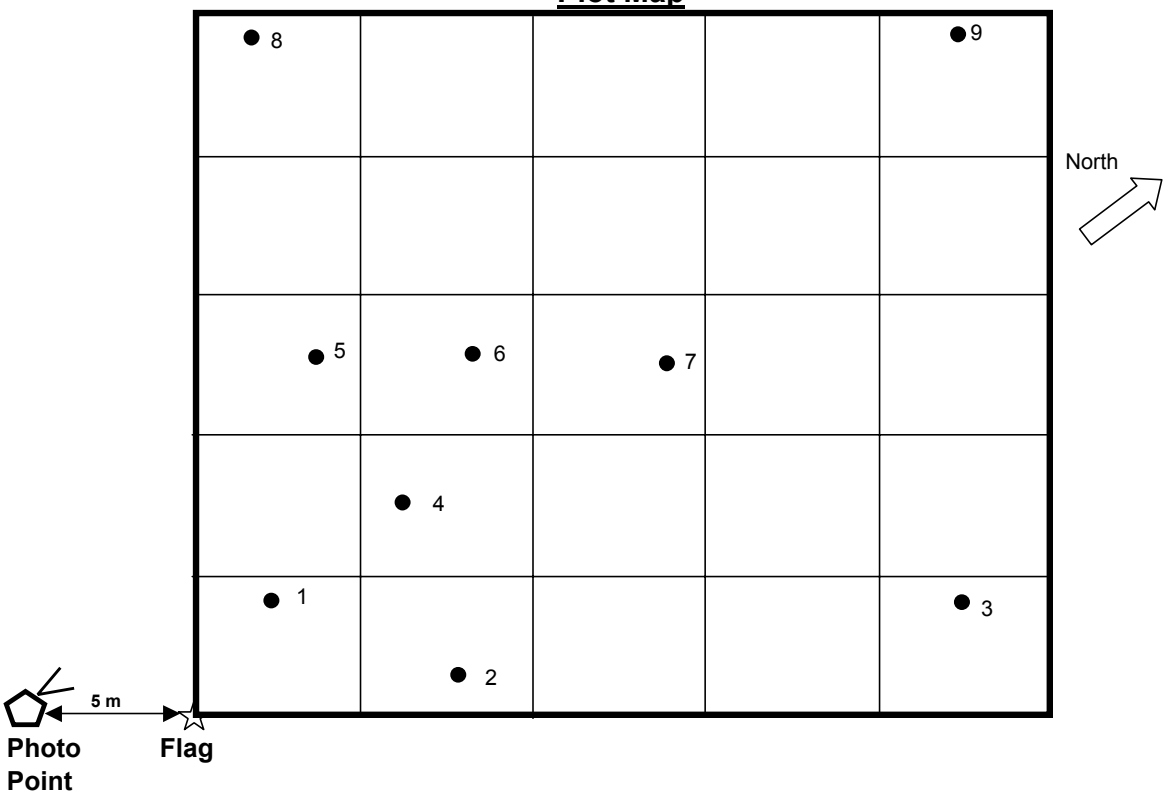
Previous

Current

Vegetation Monitoring Worksheet

Site: Daniels II **Plot:** 5 **Date:** 10/19/2006

Plot Map



ID	Species	Height (m)	Vigor	Comment
1	Bald cypress (*Taxodium distichum*)	0.73	4	
2	Unknown species	0.91	1	
3	Green ash (*Fraxinus pennsylvanica*)	0.85	2	
4	Green ash (*Fraxinus pennsylvanica*)	1.07	2	
5	Unknown species	1.01	1	
6	Bald cypress (*Taxodium distichum*)	1.07	4	
7	Green ash (*Fraxinus pennsylvanica*)	0.79	1	
8	Green ash (*Fraxinus pennsylvanica*)	1.07	2	
9	Swamp chestnut oak (*Quercus michauxii*)	0.76	3	

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

Species	Percent of Total
Green ash (*Fraxinus pennsylvanica*)	44.4%
Swamp chestnut oak (*Quercus michauxii*)	11.1%
Bald cypress (*Taxodium distichum*)	22.2%
Unknown species	22.2%

Density:

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

Survivability:

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

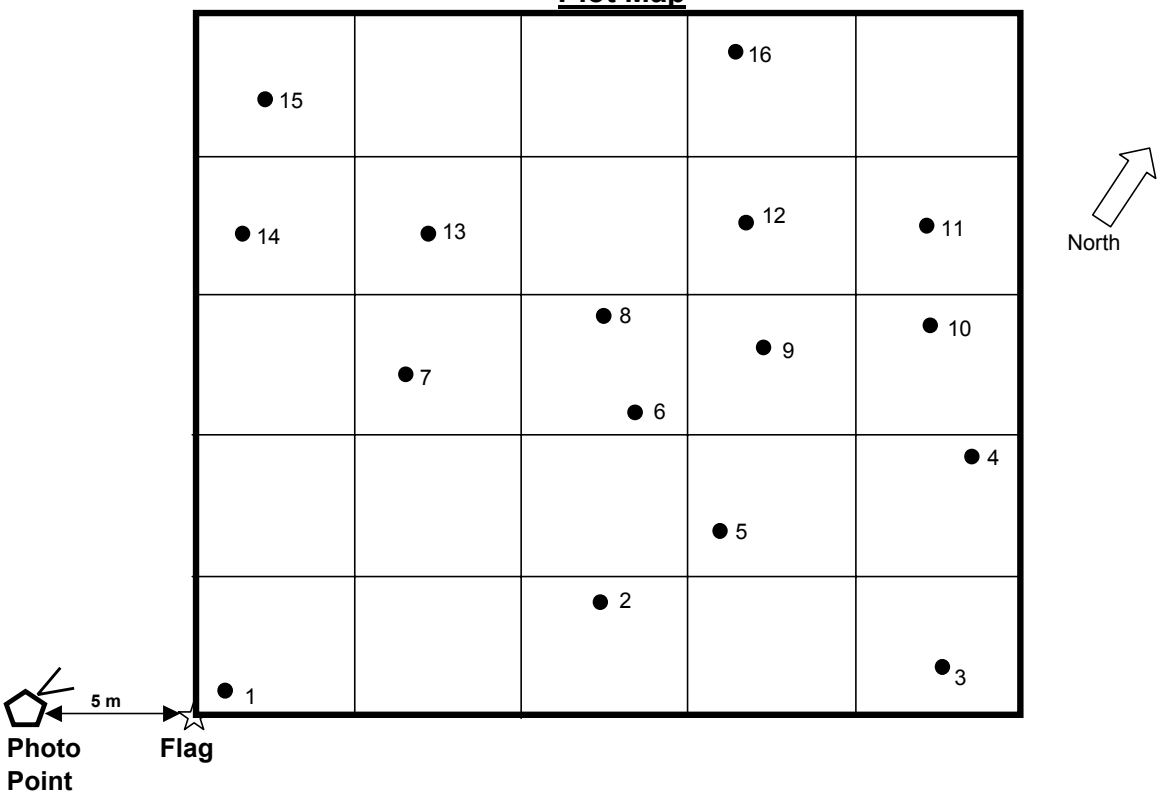
Previous

Current

Vegetation Monitoring Worksheet

Site: Daniels II **Plot:** 6 **Date:** 10/19/2006

Plot Map



ID	Species	Height (m)	Vigor	Comment
1	Bald cypress (*Taxodium distichum*)	0.88	4	
2	Cherrybark oak (*Quercus pagoda*)	0.21	4	
3	Unknown species	0.61	1	
4	Overcup oak (*Quercus lyrata*)	0.79	4	
5	Overcup oak (*Quercus lyrata*)	0.34	3	Resprout from base
6	Green ash (*Fraxinus pennsylvanica*)	0.70	2	
7	Swamp chestnut oak (*Quercus michauxii*)	0.09	2	Resprout from base
8	Green ash (*Fraxinus pennsylvanica*)	0.73	2	
9	Overcup oak (*Quercus lyrata*)	0.43	1	
10	Green ash (*Fraxinus pennsylvanica*)	1.10	4	
11	Green ash (*Fraxinus pennsylvanica*)	0.79	3	
12	Cherrybark oak (*Quercus pagoda*)	0.34	3	Resprout from base
13	Unknown species	0.37	3	
14	Swamp chestnut oak (*Quercus michauxii*)	0.30	3	
15	Swamp chestnut oak (*Quercus michauxii*)	0.24	3	
16	Overcup oak (*Quercus lyrata*)	0.27	2	Resprout from base

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

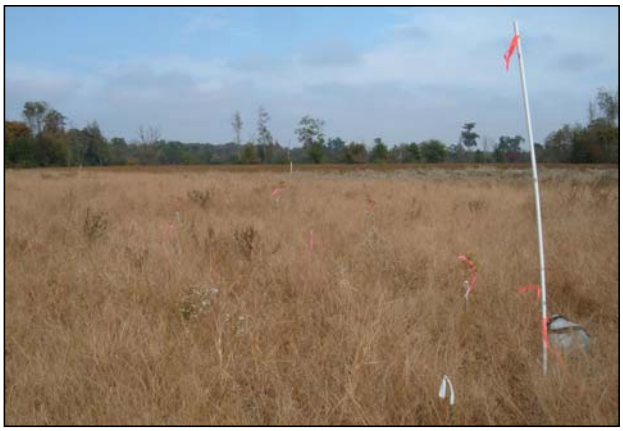
Species	Percent of Total
Green ash (*Fraxinus pennsylvanica*)	25.0%
Overcup oak (*Quercus lyrata*)	25.0%
Swamp chestnut oak (*Quercus michauxii*)	18.8%
Cherrybark oak (*Quercus pagoda*)	12.5%
Bald cypress (*Taxodium distichum*)	6.3%
Unknown species	12.5%

Density:

Total Number of Trees **16** / **0.025 acres** = **640** **trees / acre**

Survivability:

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



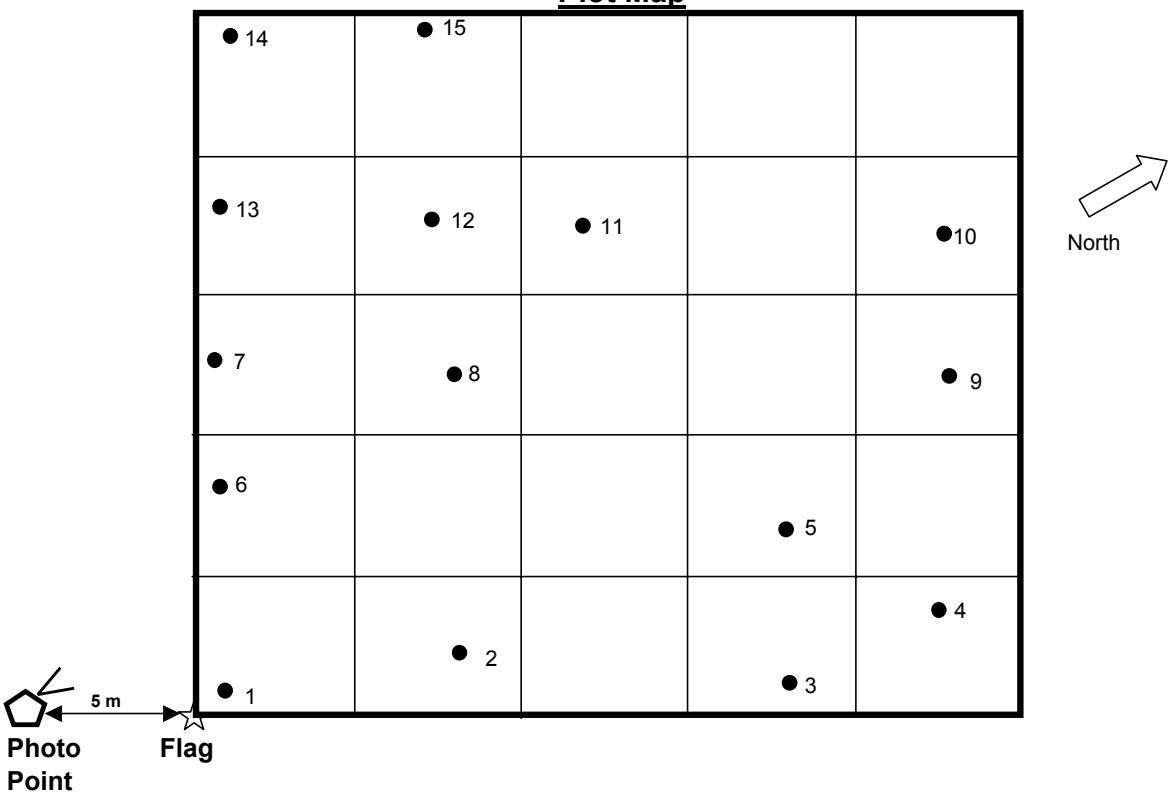
Previous

Current

Vegetation Monitoring Worksheet

Site: Daniels II **Plot:** 7 **Date:** 10/19/2006

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	0.58	1	
4	Swamp chestnut oak (*Quercus michauxii*)	0.37	3	
5	Unknown species	0.46	1	
6	Overcup oak (*Quercus lyrata*)	0.18	2	Resprout from base
7	Overcup oak (*Quercus lyrata*)	0.43	2	
8	Swamp chestnut oak (*Quercus michauxii*)	0.49	2	
9	Swamp chestnut oak (*Quercus michauxii*)	0.24	3	Resprout from base
10	Swamp chestnut oak (*Quercus michauxii*)	0.43	3	
11	Unknown species	0.55	1	
12	Unknown species	0.55	1	
13	Unknown species	0.58	1	
14	Overcup oak (*Quercus lyrata*)	0.70	2	
15	Swamp chestnut oak (*Quercus michauxii*)	0.61	4	

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

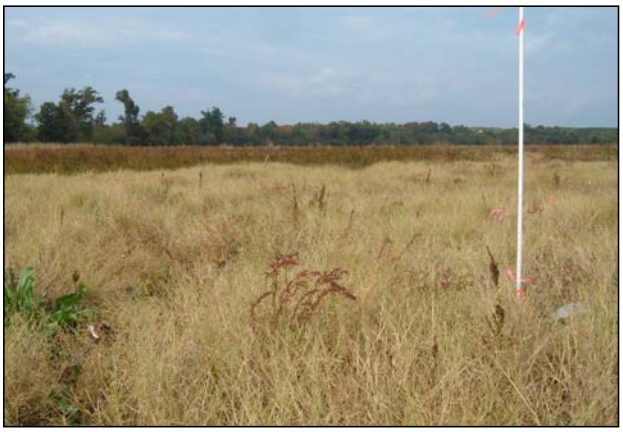
Species	Percent of Total
Overcup oak (*Quercus lyrata*)	20.0%
Swamp chestnut oak (*Quercus michauxii*)	40.0%
Unknown species	40.0%

Density:

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

Survivability:

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

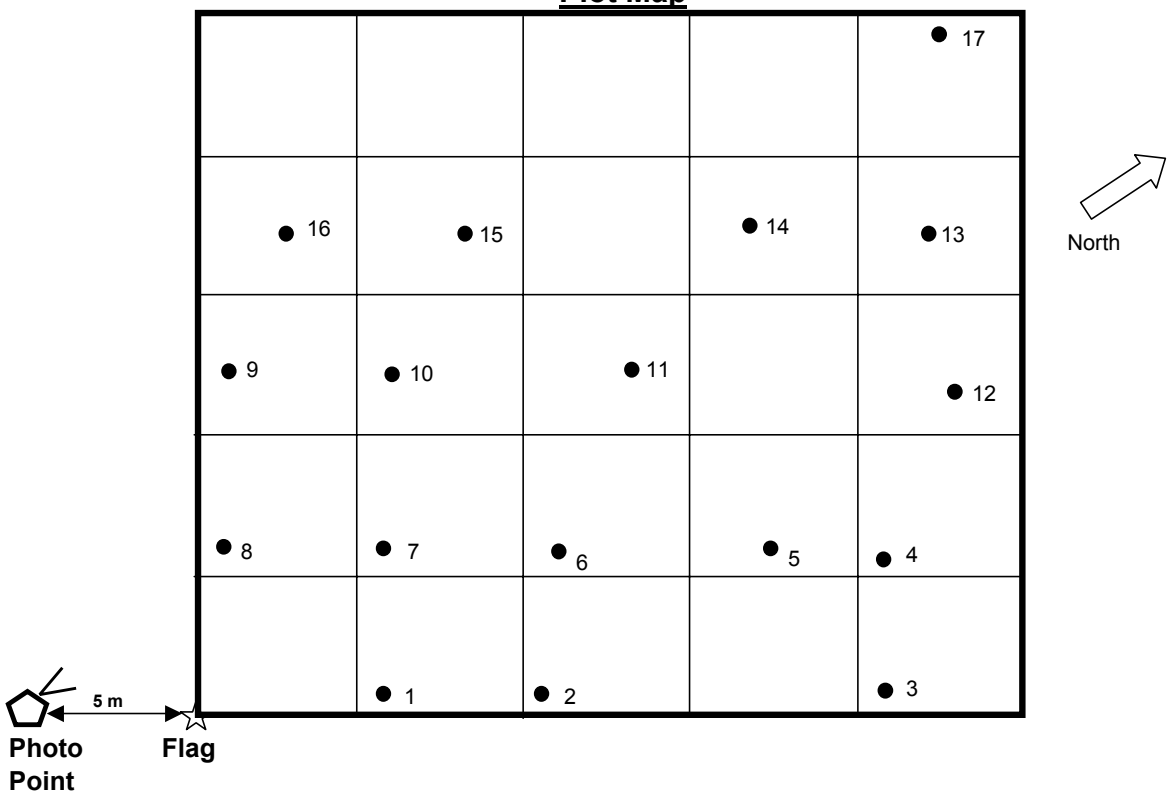


Previous **Current**

Vegetation Monitoring Worksheet

Site: Daniels II **Plot:** 8 **Date:** 10/19/2006

Plot Map



ID	Species	Height (m)	Vigor	Comment
1	Swamp chestnut oak (*Quercus michauxii*)	0.67	4	
2	Unknown species	0.61	1	
3	Green ash (*Fraxinus pennsylvanica*)	0.58	3	
4	Green ash (*Fraxinus pennsylvanica*)	0.58	3	
5	Swamp chestnut oak (*Quercus michauxii*)	0.70	3	
6	Green ash (*Fraxinus pennsylvanica*)	0.76	3	
7	Unknown species	0.73	1	
8	Unknown species	0.43	1	
9	Cherrybark oak (*Quercus pagoda*)	0.30	3	Resprout from base
10	Cherrybark oak (*Quercus pagoda*)	0.27	2	Resprout from base
11	Swamp chestnut oak (*Quercus michauxii*)	0.18	2	Resprout from base
12	Unknown species	0.70	1	
13	Unknown species	0.61	1	
14	Swamp chestnut oak (*Quercus michauxii*)	0.40	2	
15	Swamp chestnut oak (*Quercus michauxii*)	0.21	2	Resprout from base
16	Unknown species	0.67	1	
17	Overcup oak (*Quercus lyrata*)	0.24	2	Resprout from base

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

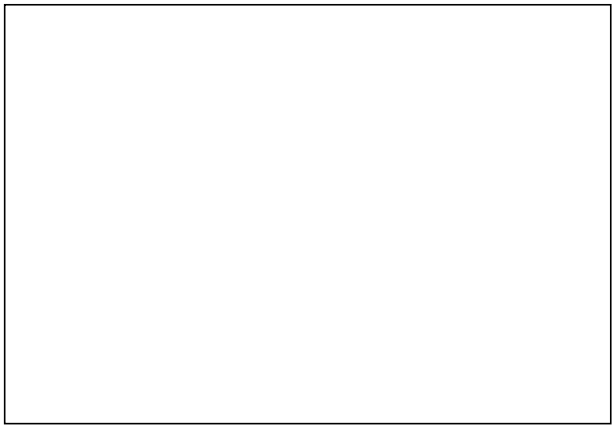
Species	Percent of Total
Green ash (*Fraxinus pennsylvanica*)	17.6%
Overcup oak (*Quercus lyrata*)	5.9%
Swamp chestnut oak (*Quercus michauxii*)	29.4%
Cherrybark oak (*Quercus pagoda*)	11.8%
Unknown species	35.3%

Density:

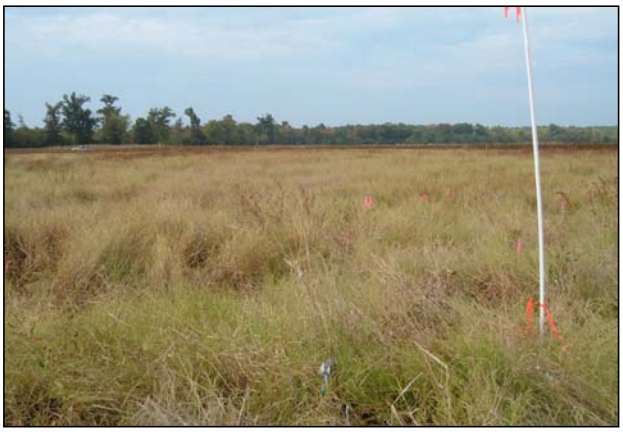
Total Number of Trees **17** / **0.025 acres** = **680** **trees / acre**

Survivability:

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



Previous

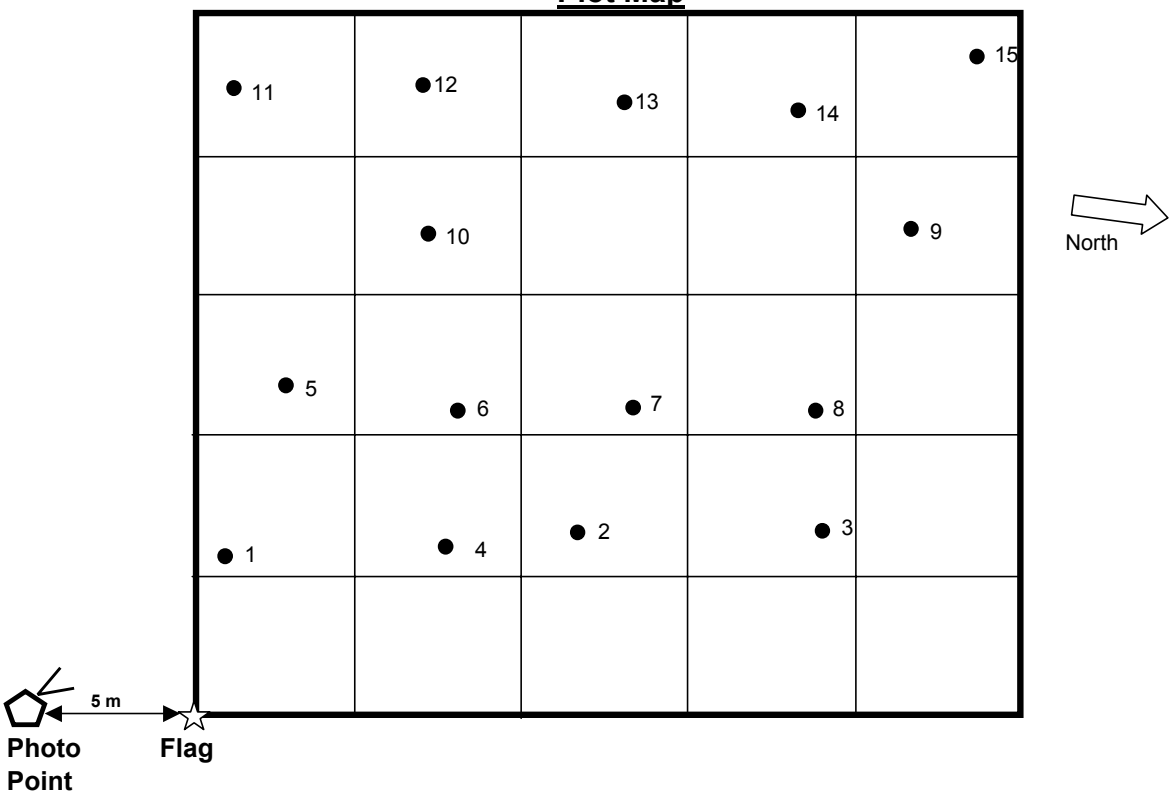


Current

Vegetation Monitoring Worksheet

Site: Daniels II **Plot:** 9 **Date:** 10/24/2006

Plot Map



ID	Species	Height (m)	Vigor	Comment
1	Green ash (*Fraxinus pennsylvanica*)	0.67	3	
2	Unknown species	0.49	1	
3	Swamp chestnut oak (*Quercus michauxii*)	0.18	2	Resprout from base
4	Bald cypress (*Taxodium distichum*)	0.61	3	
5	Green ash (*Fraxinus pennsylvanica*)	1.04	3	
6	Bald cypress (*Taxodium distichum*)	0.40	3	Resprout from base
7	Green ash (*Fraxinus pennsylvanica*)	0.76	3	
8	Green ash (*Fraxinus pennsylvanica*)	1.01	3	
9	Bald cypress (*Taxodium distichum*)	1.01	4	
10	Green ash (*Fraxinus pennsylvanica*)	0.67	3	
11	Green ash (*Fraxinus pennsylvanica*)	0.85	4	
12	Cherrybark oak (*Quercus pagoda*)	0.91	4	
13	Cherrybark oak (*Quercus pagoda*)	1.01	4	
14	Bald cypress (*Taxodium distichum*)	0.94	4	
15	Green ash (*Fraxinus pennsylvanica*)	1.40	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%
Cherrybark oak (*Quercus pagoda*)	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**

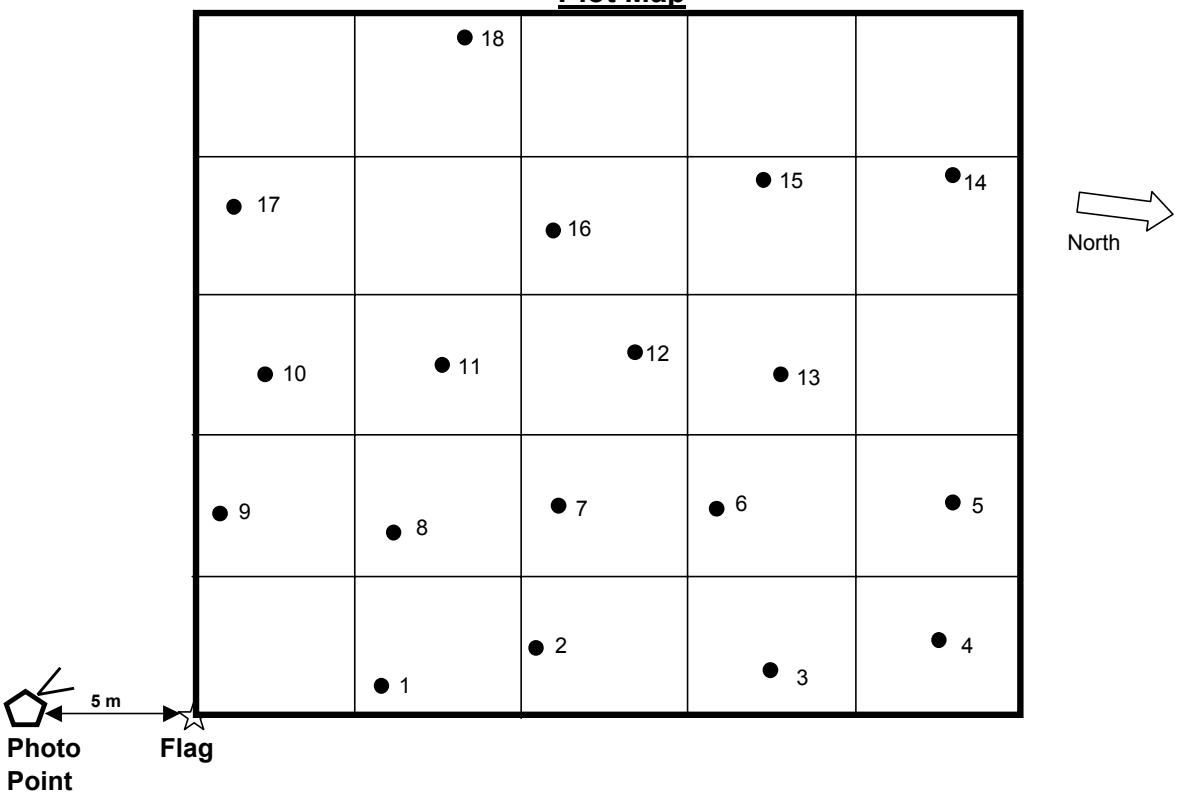
Previous

Current

Vegetation Monitoring Worksheet

Site: Daniels II **Plot:** 10 **Date:** 10/24/2006

Plot Map



ID	Species	Height (m)	Vigor	Comment
1	Overcup oak (*Quercus lyrata*)	0.30	3	
2	Laurel oak (*Quercus laurifolia*)	0.40	2	
3	Unknown species	0.52	1	
4	Unknown species	0.85	1	
5	Overcup oak (*Quercus lyrata*)	0.21	2	Resprout from base
6	Overcup oak (*Quercus lyrata*)	0.55	3	
7	Unknown species	0.61	1	
8	Overcup oak (*Quercus lyrata*)	0.55	3	
9	Swamp chestnut oak (*Quercus michauxii*)	0.52	4	
10	Overcup oak (*Quercus lyrata*)	0.52	3	
11	Overcup oak (*Quercus lyrata*)	0.49	3	
12	Swamp chestnut oak (*Quercus michauxii*)	0.40	3	
13	Unknown species	0.30	1	
14	Overcup oak (*Quercus lyrata*)	0.15	2	Resprout from base
15	Green ash (*Fraxinus pennsylvanica*)	0.98	3	
16	Cherrybark oak (*Quercus pagoda*)	0.37	3	
17	Green ash (*Fraxinus pennsylvanica*)	0.82	3	
18	Swamp chestnut oak (*Quercus michauxii*)	0.27	3	

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

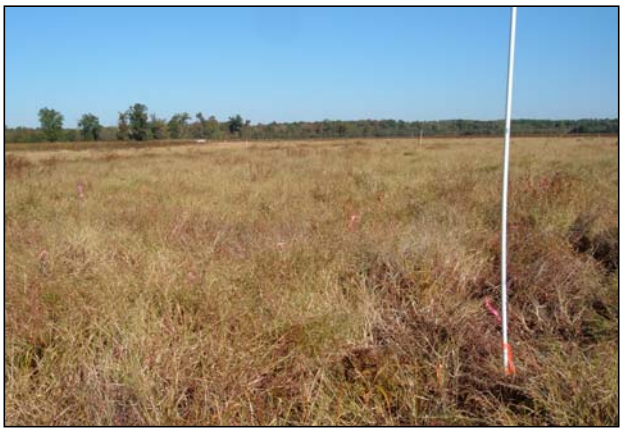
Species	Percent of Total
Green ash (*Fraxinus pennsylvanica*)	11.1%
Laurel oak (*Quercus laurifolia*)	5.6%
Overcup oak (*Quercus lyrata*)	38.9%
Swamp chestnut oak (*Quercus michauxii*)	16.7%
Cherrybark oak (*Quercus pagoda*)	5.6%
Unknown species	22.2%

Density:

Total Number of Trees **18** / **0.025 acres** = **720** **trees / acre**

Survivability:

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



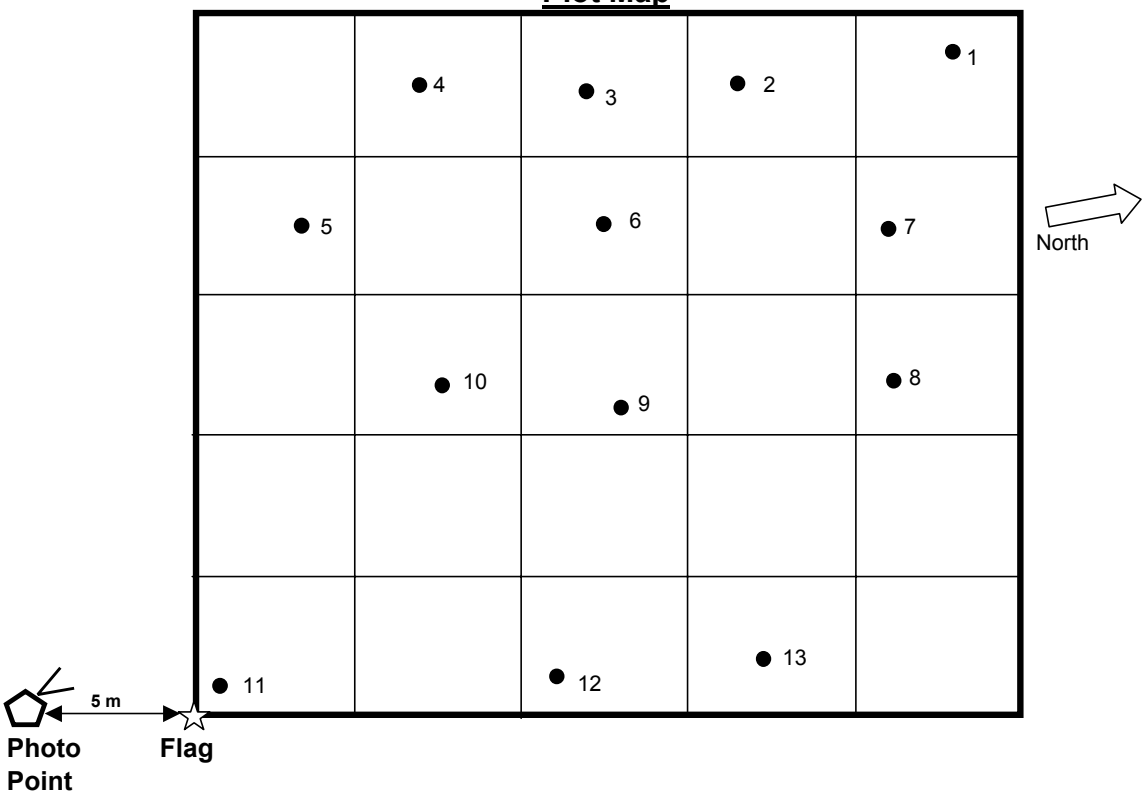
Previous

Current

Vegetation Monitoring Worksheet

Site: Daniels II **Plot:** 11 **Date:** 10/24/2006

Plot Map



ID	Species	Height (m)	Vigor	Comment
1	Overcup oak (*Quercus lyrata*)	0.34	3	
2	Unknown species	0.40	1	
3	Green ash (*Fraxinus pennsylvanica*)	0.52	2	
4	Overcup oak (*Quercus lyrata*)	0.58	4	
5	Green ash (*Fraxinus pennsylvanica*)	0.76	4	
6	Unknown species	0.43	1	
7	Overcup oak (*Quercus lyrata*)	0.91	4	
8	Green ash (*Fraxinus pennsylvanica*)	1.07	3	
9	Unknown species	0.30	1	
10	Overcup oak (*Quercus lyrata*)	0.24	3	Resprout from base
11	Green ash (*Fraxinus pennsylvanica*)	0.76	3	
12	Green ash (*Fraxinus pennsylvanica*)	0.70	3	
13	Bald cypress (*Taxodium distichum*)	0.52	4	

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

Species	Percent of Total
Green ash (*Fraxinus pennsylvanica*)	38.5%
Overcup oak (*Quercus lyrata*)	30.8%
Bald cypress (*Taxodium distichum*)	7.7%
Unknown species	23.1%

Density:

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

Survivability:

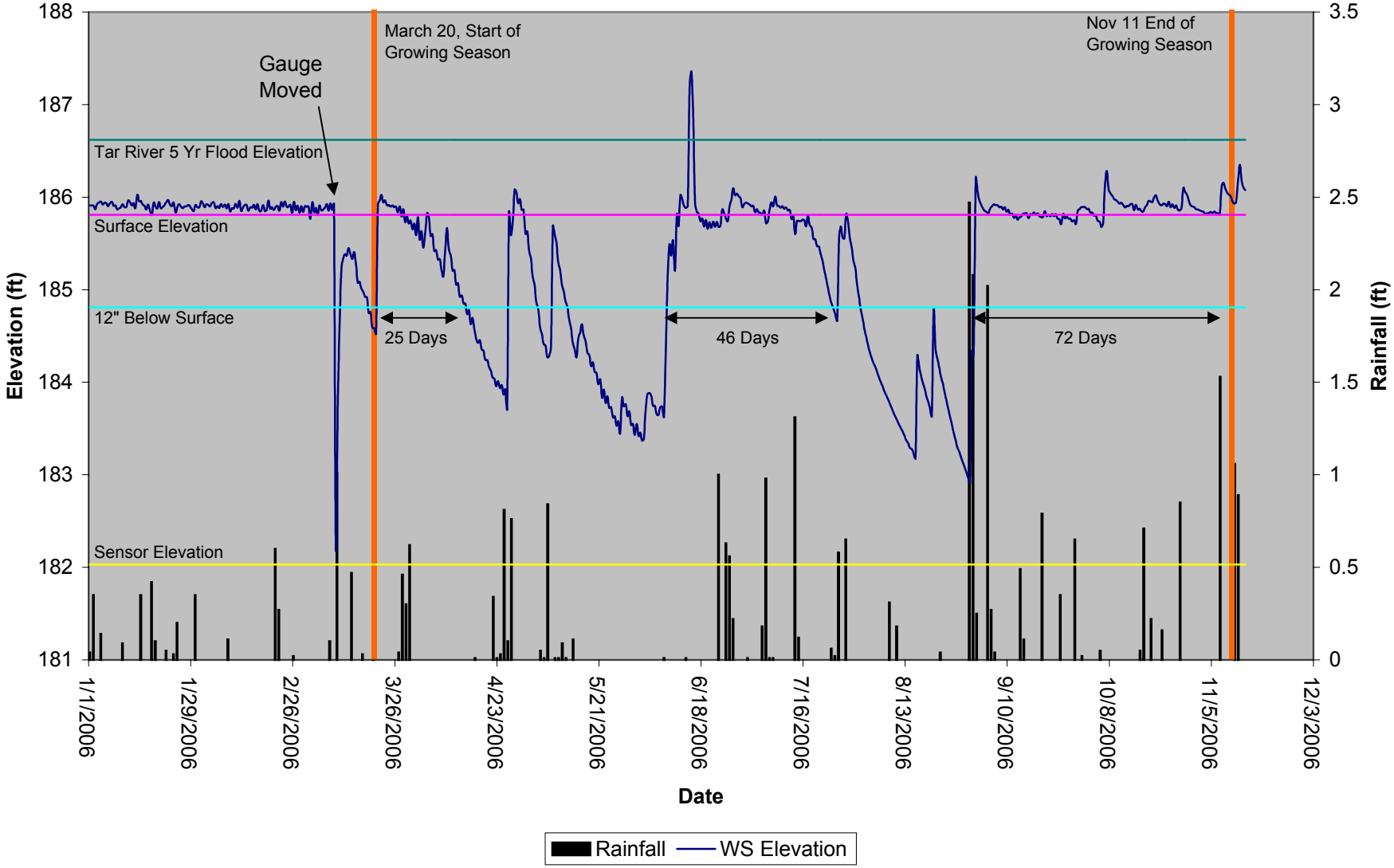
Total Number of Trees **13** / **13 trees** x **100** = **100** **% survivability**

Previous

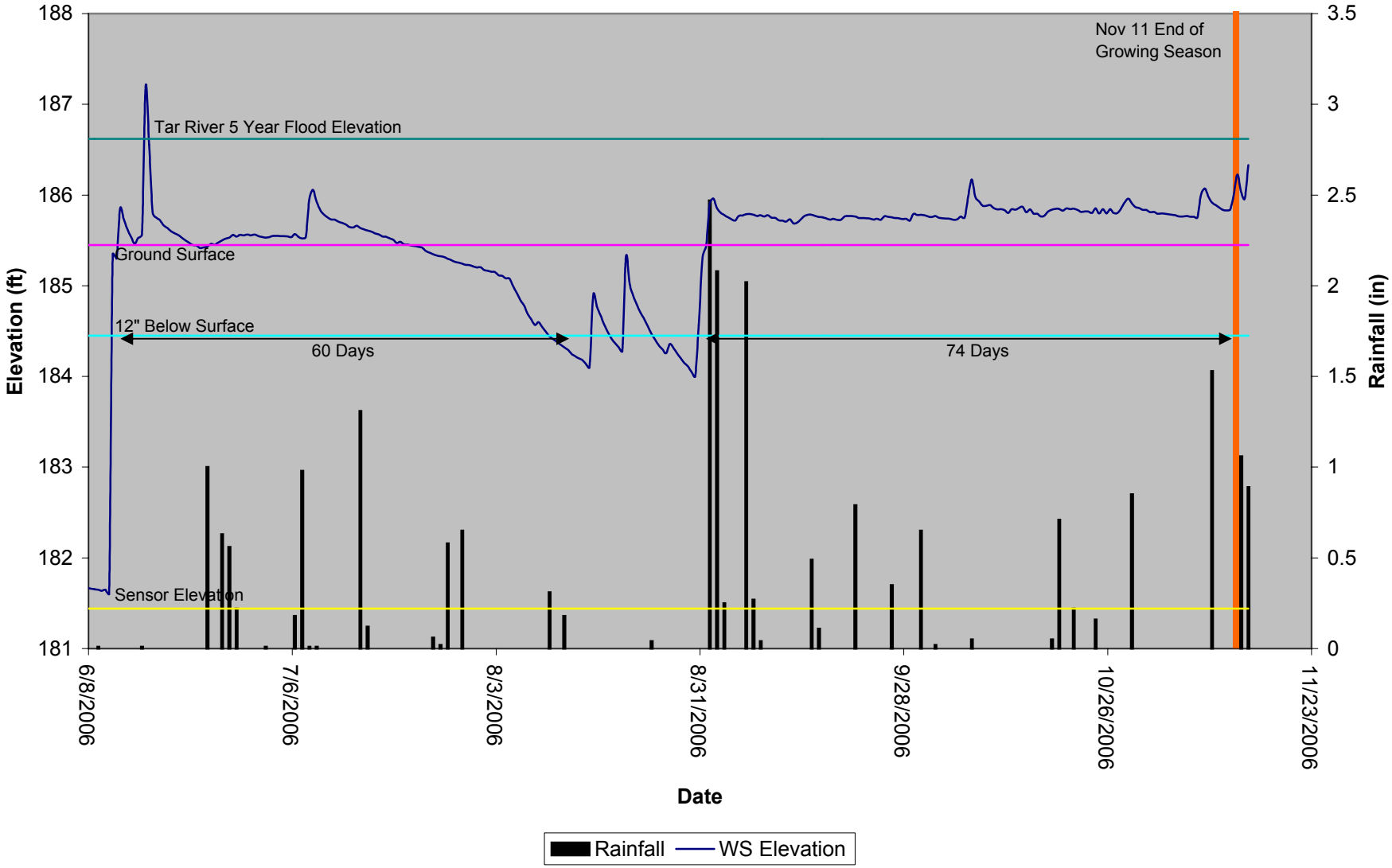
Current

Appendix B
Hydrologic Monitoring and Hydroperiod

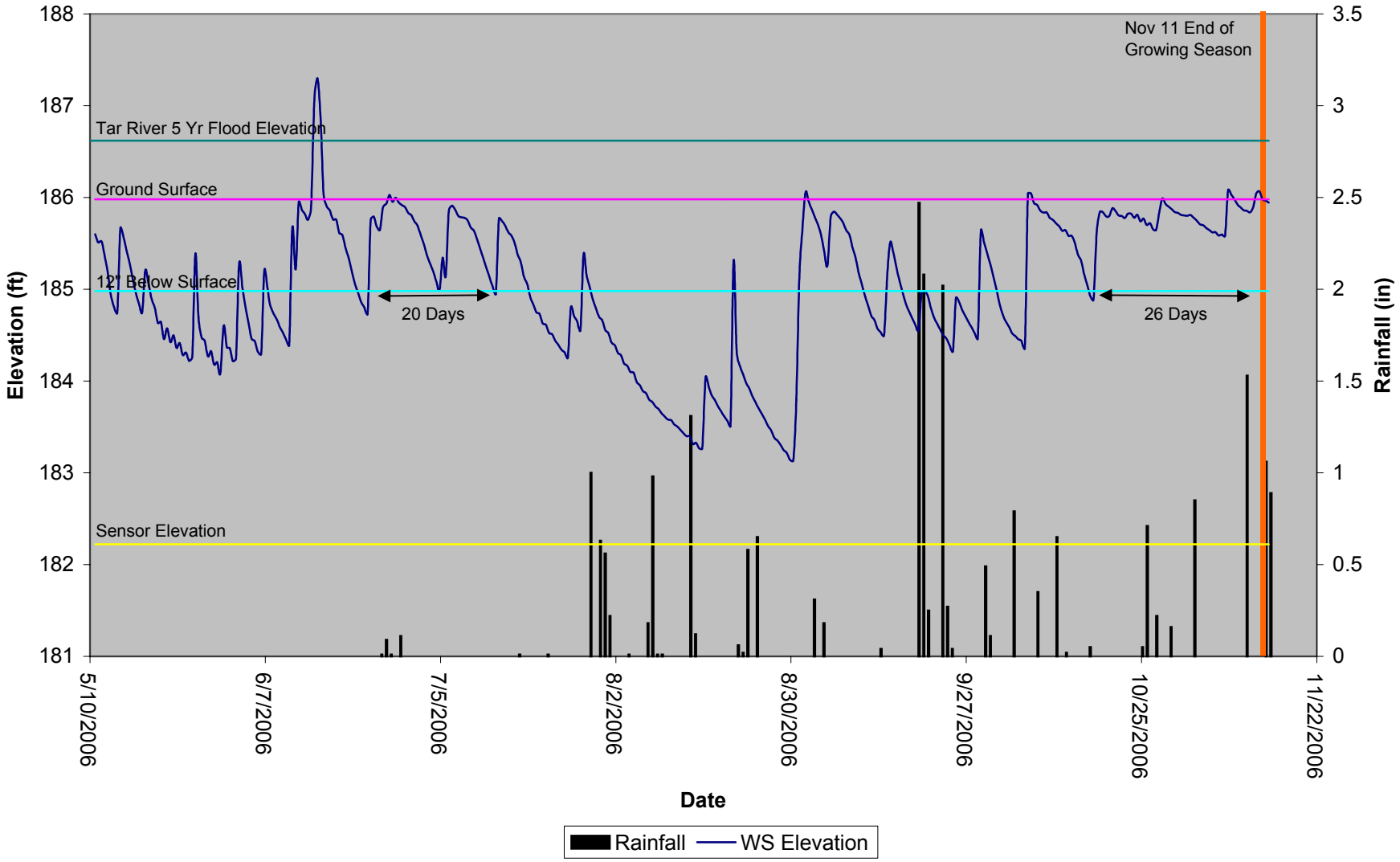
Daniels II Reference Gauge Hydrograph



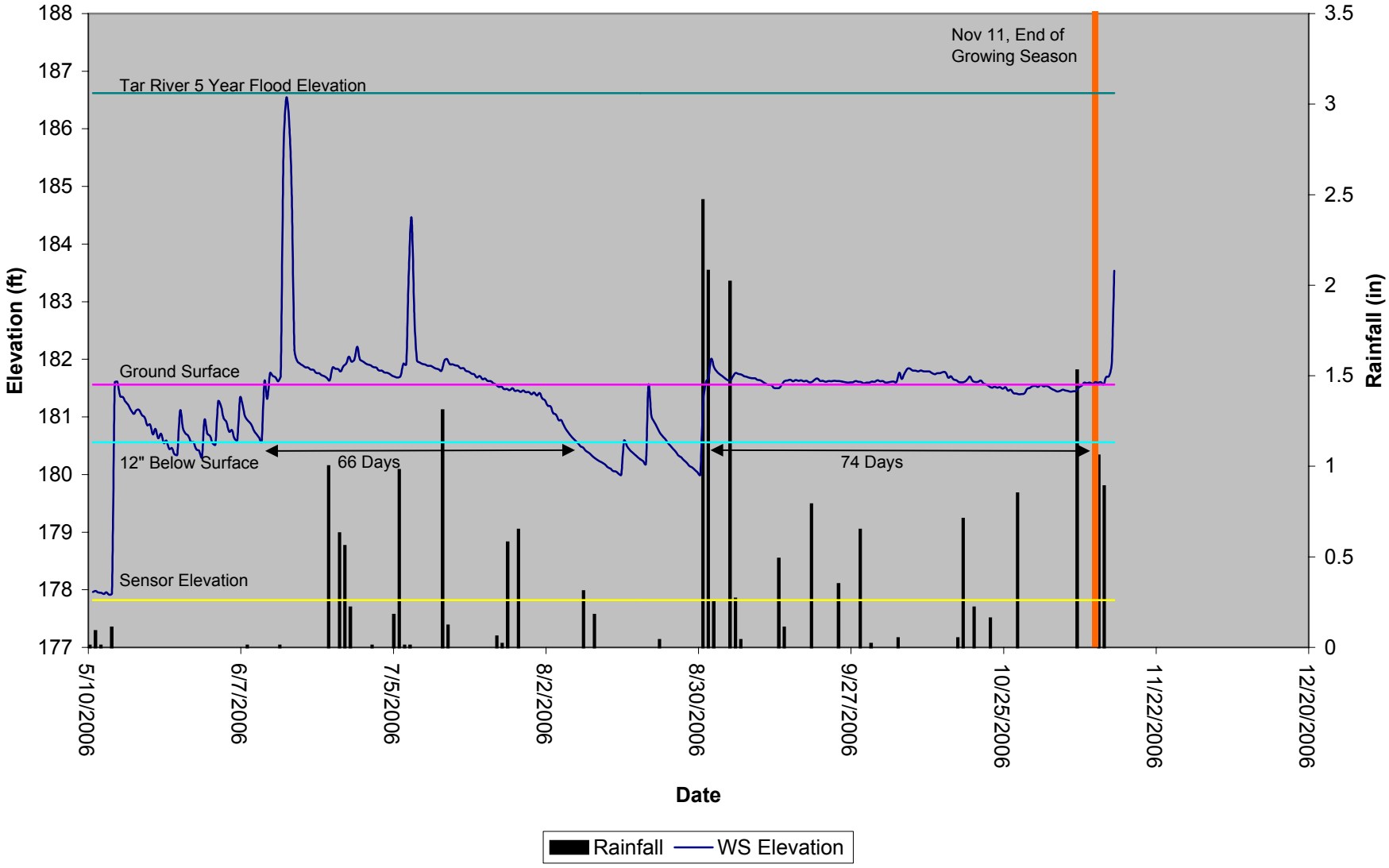
Daniels II Gauge 1 Hydrograph



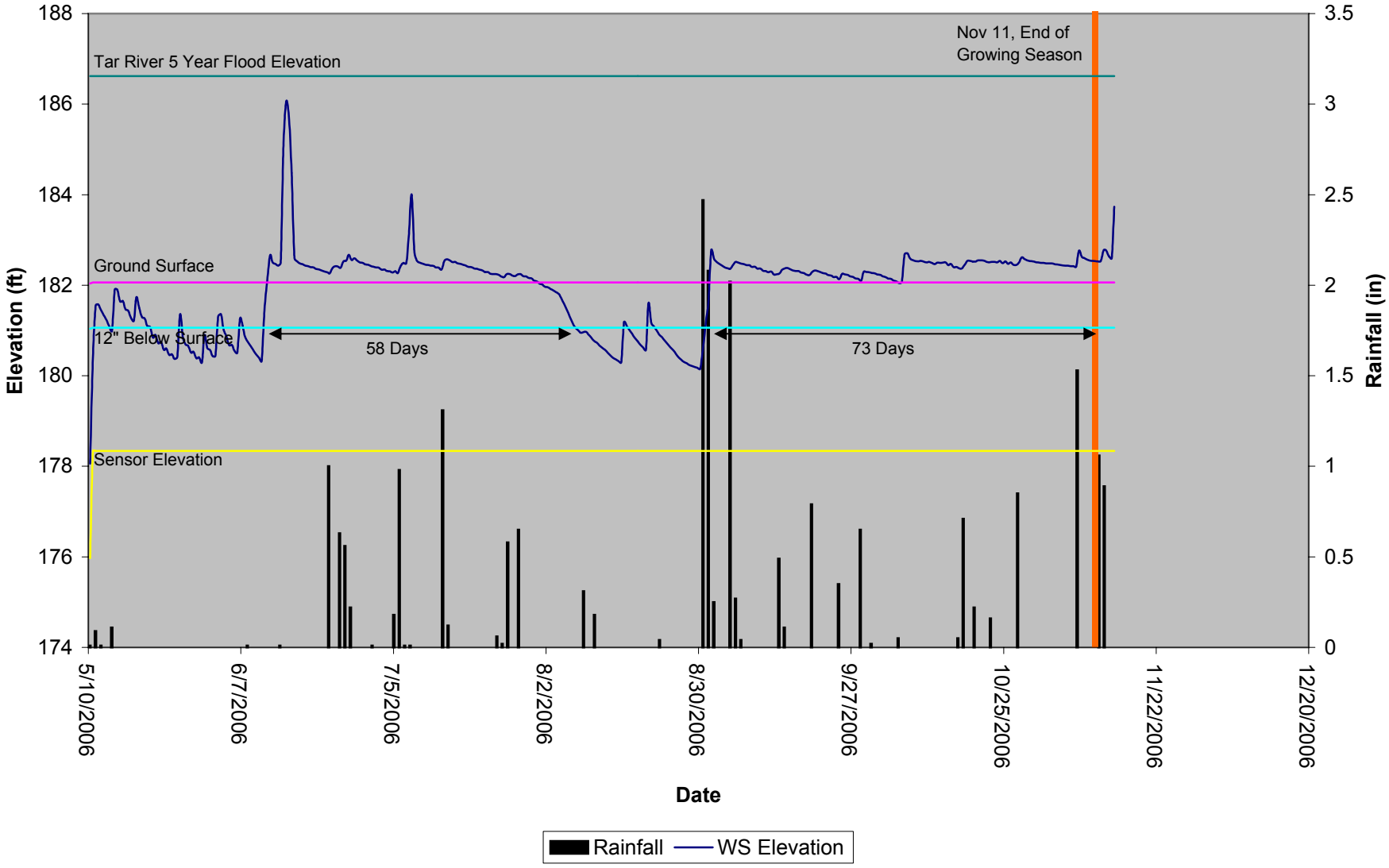
Daniels II Gauge 2 Hydrograph



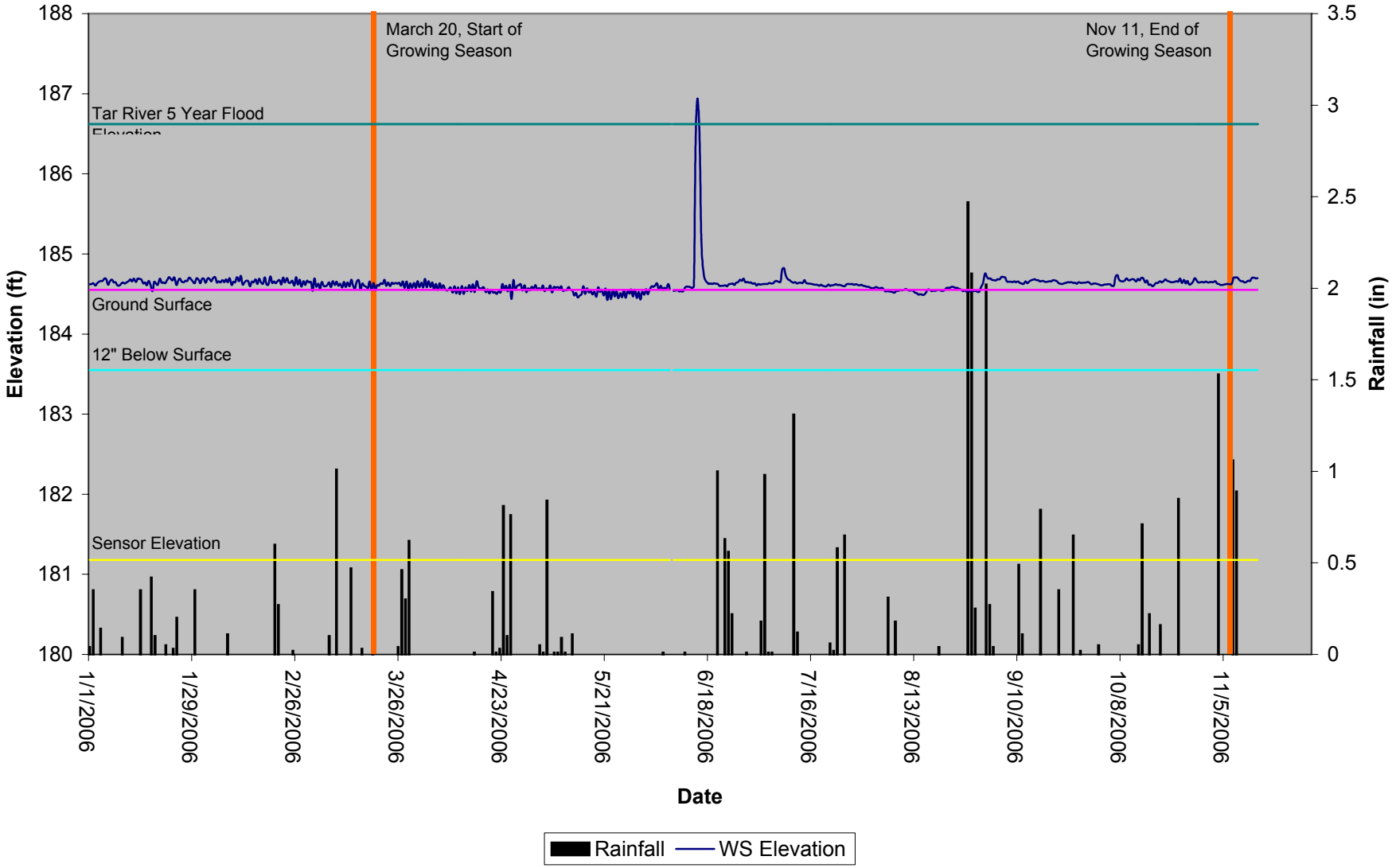
Daniels II Gauge 3 Hydrograph



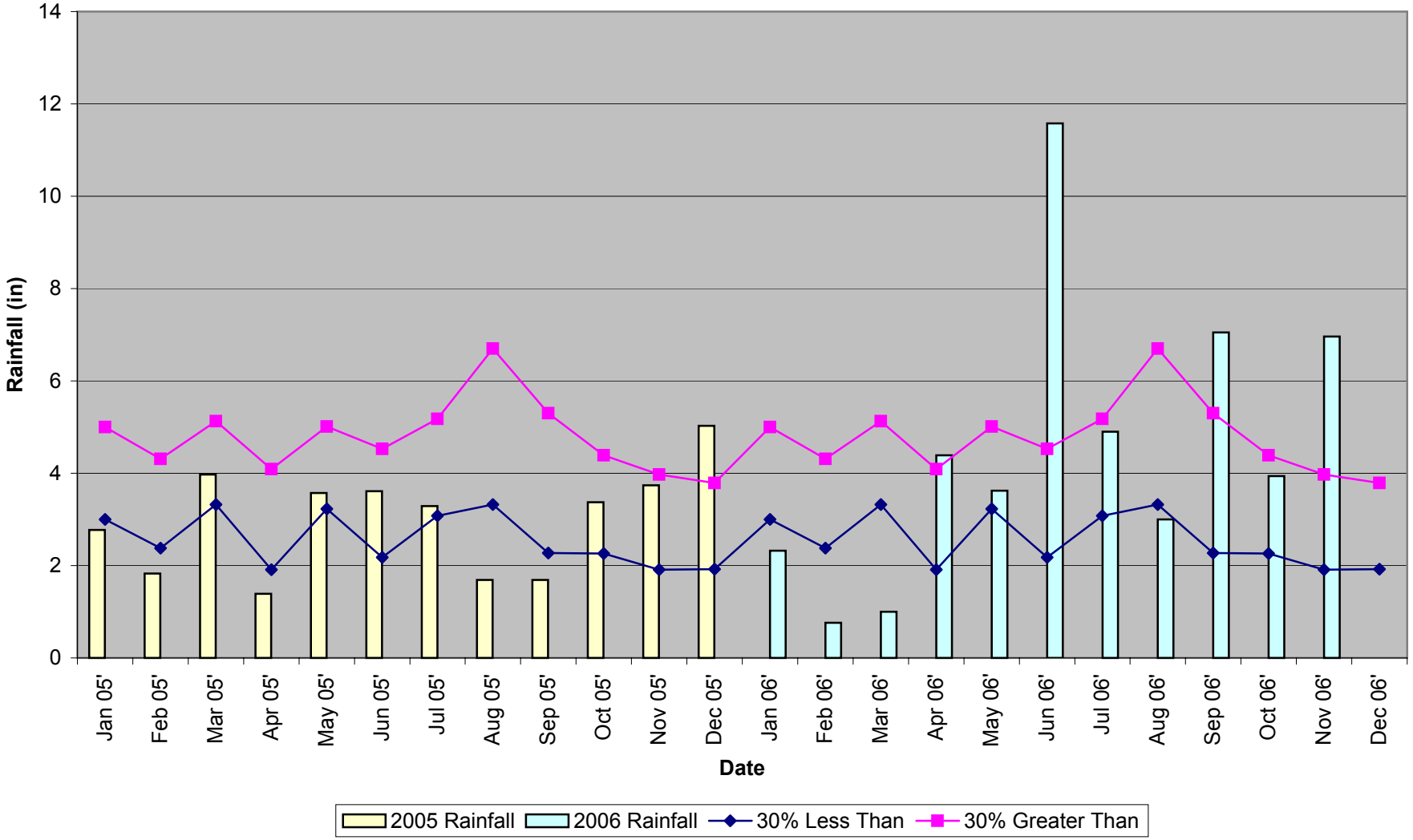
Daniels II Gauge 4 Hydrograph



Daniels II Preservation Gauge Hydrograph



Daniels Property 30-70 Percentile Graph 2005-2006
Louisburg, NC Monthly Rainfall



Appendix C
Permanent Photo Documentation Points

Photo Point 1: View looking west, enhancement wetland is on the left. 12/6/06 – MY01

Photo Point 2: View looking south toward enhancement wetland. 12/6/06 – MY01

Photo Point 3A: View looking east, toward vegetation plot # 5. 12/6/06 – MY01

Photo Point 3B: View looking south, toward preservation wetland. 12/6/06 – MY01

Photo Point 4A: View looking east, enhancement wetland is on the right. 12/6/06 – MY01

Photo Point 4B: View looking west, enhancement wetland is on the left. 12/6/06 – MY01

Photo Point 5: View looking south. 12/6/06 – MY01

Photo Point 6A: View looking northwest, toward vegetation plot #6. 12/6/06 – MY01

Photo Point 6B: View looking south. 12/6/06 – MY01

Photo Point 7: View looking north. 12/6/06 – MY01